Aug. 27, 1957 M. E. WILLIAMS ET AL 2,804,327

DEADLOCKING MECHANISM

Filed March 25, 1955 3 Sheets-Sheet 1

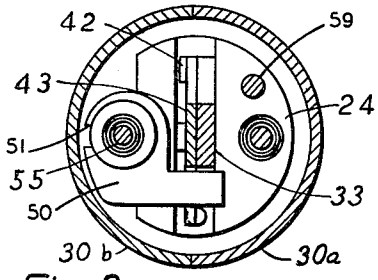

Fig. 3.

Fig. 1.

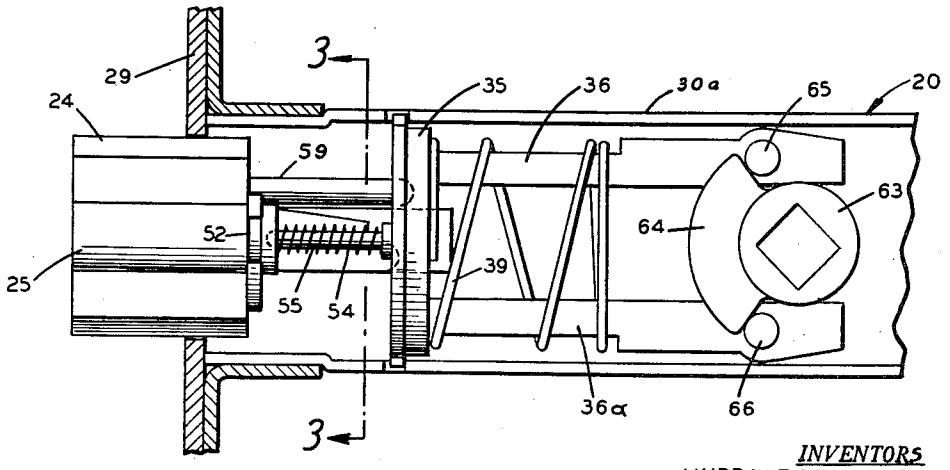

Fig. 2.

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Aug. 27, 1957 M. E. WILLIAMS ET AL 2,804,327

DEADLOCKING MECHANISM

Filed March 25, 1955 3 Sheets-Sheet 2

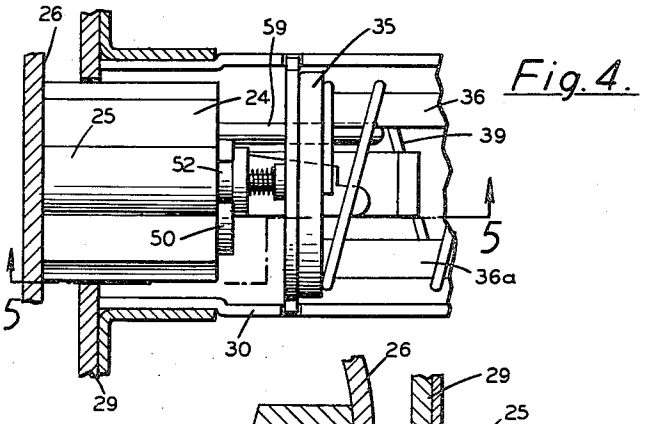

Fig. 4.

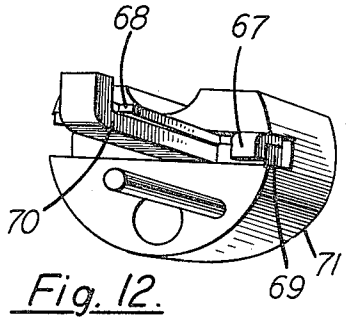

Fig. 12.

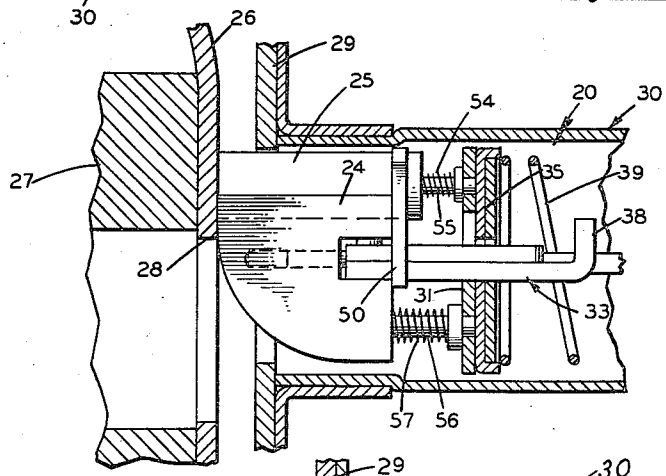

Fig. 5.

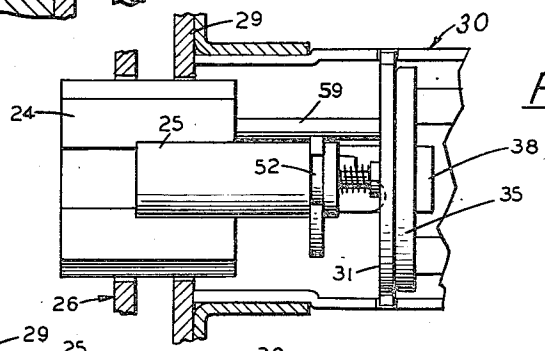

Fig. 6.

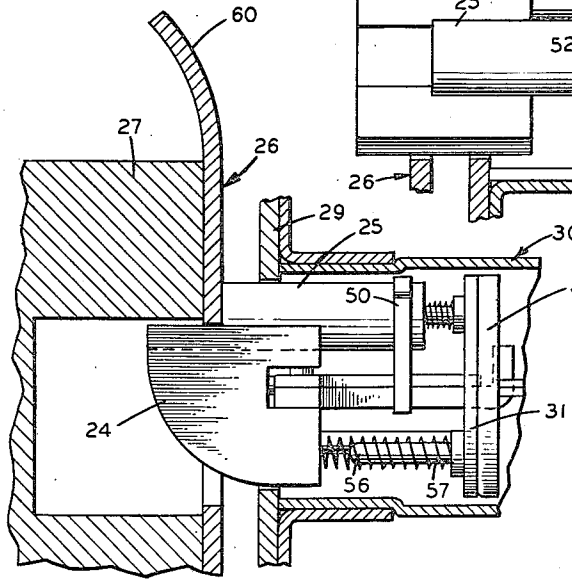

Fig. 7.

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DEADLOCKING MECHANISM

Filed March 25, 1955 3 Sheets-Sheet 3

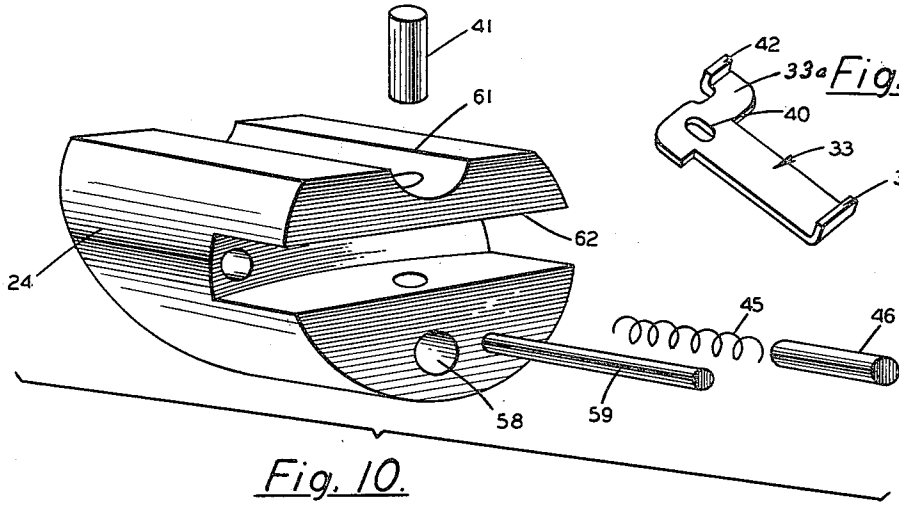

Fig. 10.

Fig. 11.

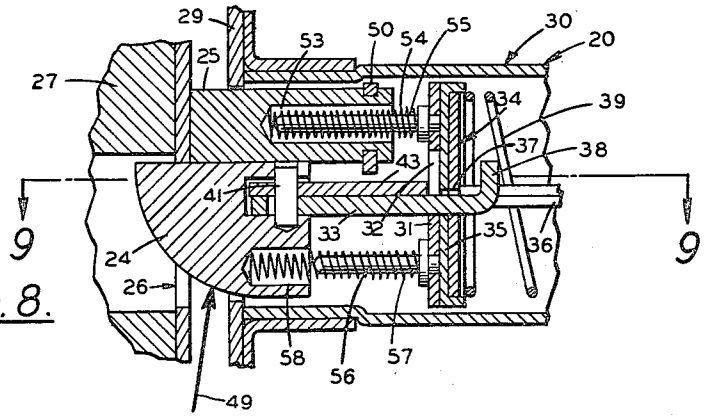

Fig. 8.

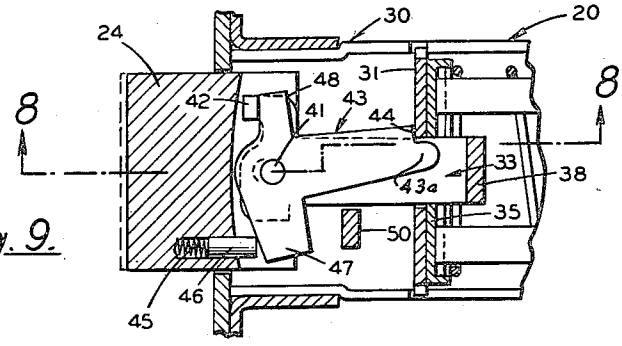

Fig. 9.

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2,804,327

DEADLOCKING MECHANISM

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Application March 25, 1955, Serial No. 496,693

3 Claims. (Cl. 292—169)

This invention relates to deadlocking mechanism for door latches. The general function of a deadlocking mechanism is to prevent the withdrawal of the latch bolt from locking position as a result of forces applied by a knife blade or some similar instrument applied between the door and the jamb. Stated thus broadly, the function of deadlocking is not a new concept. Typical patents illustrating this type of device include Numbers 2,424,782; 2,444,819; 2,549,983; 2,558,509; and 2,661,972. The present invention relates to a sub-group of deadlocking mechanisms which are based upon a dogging member carried by the assembly which moves with the bolt. The action of an auxiliary bolt, or detector, which is slideably mounted with respect to the principal locking bolt, serves to actuate the dogging member and position it in response to the engagement of the auxiliary bolt with the outer surface of the keeper with which the latch mechanism cooperates. While a deadlocking mechanism serves to prevent the "knifing" of a bolt (retraction of the bolt with an instrument inserted between the door and the jamb), it must not interfere with the normal operation of the knob-controlled rollback mechanism. A degree of lost motion is provided in the connection between the retracting link and the bolt in the type of device with which this invention is associated, this motion being utilized to provide for the withdrawal of the dogging member from obstructing position. Particularly, this invention relates to the formation of a dogging member and the retracting link in a fashion which gives simplicity of design and comparative freedom from the effects of the accumulation of tolerances. Additionally, a novel arrangement is provided for establishing the operating relationship between the auxiliary bolt and the dogging member, which results in simplicity of assembly and a general ruggedness and reliability. The several features of this invention will be discussed in detail through an analysis of the particular embodiments illustrated in the accompanying drawings. In the drawings:

Figure 1 presents a view, partially in section, taken on a horizontal plane, and illustrating the cooperating relationship of the latch mechanism and the keeper as the door is swung into closed position with respect to the jamb.

Figure 2 is a section, taken on an enlarged scale, on the plane 2—2 of Figure 1.

Figure 3 is a section taken on the plane 3—3 of Figure 2.

Figure 4 presents a fragmentary view taken on a vertical plane, and showing the condition of the mechanism prior to the instant in which the bolt drops into locking engagement with the keeper.

Figure 5 is a section taken on the plane 5—5 of Figure 4.

Figure 6 is a fragmentary section taken on a vertical plane showing the condition of the mechanism after the bolt has dropped into locking engagement with the keeper, and illustrating the depressed condition of the auxiliary bolt.

Figure 7 is a view taken on a horizontal plane of the mechanism in the condition illustrated in Figure 6, and also including the associated structure of the keeper and the door jamb.

Figure 8 illustrates the condition of the components of the mechanism when outside forces are brought to bear on the bolt in an attempt to urge it back from locking position without operation of the knobs.

Figure 9 presents a section taken on the plane 9—9 of Figure 8.

Figure 10 presents an exploded view, on an enlarged scale, of the bolt, together with the parts directly associated therewith.

Figure 11 presents a perspective view of the retracting link.

Figure 12 illustrates a modified form of the invention.

Referring to Figure 1, a latch mechanism generally indicated at 20 is shown mounted in an appropriate bore in the edge of the door 21. The knobs 22 and 23 control the conventional rollback mechanism within the latch structure to induce normal retracting movement of the bolt to permit the door to be opened. A principal bolt 24 is slideably mounted in the structure of the latch 20, and normally projects outwardly from the edge of the door as shown in Figure 1. In addition to the principal bolt 24, which is responsible for holding the door in closed position, the auxiliary bolt, or detector, 25 is provided which is slideably mounted with respect to the principal bolt 24, and which activates and controls the deadlocking mechanism. When in closed position, the principal bolt 24 falls into engagement with the keeper 26 secured to the door jamb structure 27, and engages the opening 28.

Figures 2, 4, 5, 6, and 7 are of principal value in illustrating the various conditions under which the deadlocking mechanism must function, and it will be desirable to proceed with a discussion of the structure of the mechanism as a preliminary to a consideration of its performance under these conditions. For this purpose, reference is particularly made to Figures 3 and 8 through 11, inclusive. Referring to Figures 8 and 9, the bolt 24 is slideably mounted within an aperture in the front plate 29, which is fixed with respect to the latch housing 30. For the purposes of this invention, the front plate 29, its supporting structure 29*a*, and the case sections 30*a* and 30*b* surrounding the latch mechanism will all be given the common designation of "housing." A transverse abutment plate 31 is fixed with respect to the housing, and is provided with a central opening 32 through which the retracting link 33 operates. This member is illustrated in detail in the perspective view shown in Figure 11. The roll back assembly includes the crosshead generally indicated at 34, formed by the laminated transverse panel 35 and the retracting arms 36. A central opening 37 in the panel 35 slideably receives the inner end of the link 33, and a formed portion 38 on the retracting link permits the retractor to apply sufficient force to the link to withdraw the bolt from extended position. A spring 39 urges the retractor to the forward position, where it remains until the knobs are actuated.

The outer end of the retracting link 33 is provided with an elongated hole 40 which receives the pin 41 establishing a pivotal lost motion connection between the retracting link 33 and the principal bolt 24. The lateral extension 33*a* on the outer end of the retracting link terminates in the formed abutment portion 42, which is disposed in a plane substantially perpendicular to the direction of retracting movement of the bolt.

The dogging member 43 is also pivotally mounted on the bolt 24 on the pin 41. This member rests against the retracting link 33, and has at its inner end a notched section providing a surface 44 which is presented to the

transverse abutment plate **31** when the dogging member is rotated to active position illustrated in Figure 9. The forces responsible for displacing the dogging member into this position are provided by the spring **45** operating via the plunger **46** against the lateral extension **47** on the dogging member. Another lateral extension **48** on the opposite side of the pin **41** is disposed inwardly opposite the abutment **42** on the retracting link **33**.

The outer limit to the projected position of the bolt **24** may be established either by an appropriate stop associated with the housing (an arrangement not shown in the drawings), or by the engagement of the portion **38** of the retracting link with the back of the plate **35** of the retractor. Figures 8 and 9 correspond to the condition in which an outside force applied in the position of the arrow **49** in Figure 10 has caused the bolt to be moved inwardly a slight amount, but sufficient to disengage the portion **38** from the back of the plate **35**. No tension is present pulling the retractor link inwardly. Under these conditions, the spring **45** is capable of rotating the dogging member **43** into the position illustrated in Figure 9; and in so doing, moving the retractor link toward the bolt by the engagement of the extension **48** with the abutment **42**, such movement being limited by the configuration of the elongated hole **40**.

As soon as the retractor **34** moves inwardly, tension is applied to the link **33**. Such action induces the movement of the link to the opposite limit of its freedom of movement established by the elongated hole **40**, carrying with it the abutment **42**. This movement of the abutment **42** transfers motion to the lateral extension **48** of the dogging member **43**, and thereby induces a rotation of that member around the pin **41** to bring the surface **44** in a clockwise direction a sufficient amount so that that surface is no longer presented to the transverse abutment plate **31**. Under this condition, both the retracting link **33** and the dogging member **43** pass through the central aperture **32** of the transverse abutment plate **31**. The length of the dogging member **43** is sufficient so that it is never fully withdrawn from the central opening **32**, and the rounded end **43***a* therefore remains in engagement with the opening in the condition shown in Figure 9 to act as a guide. In Figure 9, the dotted lines indicate the approximate fully projected position of the bolt, from which the bolt has been moved inwardly by forces applied as indicated at **49** in Figure 10.

In order for the dogging member **43** to assume the position illustrated in Figure 9, the lateral extension **47** must be free from the plate **50** which is connected to the auxiliary bolt **25**. The formation of the plate **50** is best illustrated in Figure 3. A notched portion **51** of the plate **50** is received within a groove **52** in the auxiliary bolt **25**, which also has a bore **53** accommodating a spring **54** and a guide post **55** (refer to Figure 8). The post **55** is fixed with respect to the transverse abutment plate **31**, resulting in the application of an independent outward biasing force continually urging the auxiliary bolt **25** to its projected position. The bolt remains in such projected position until depressed by the presence of the keeper **26** (or until the retracting mechanism withdraws the entire assembly associated with the bolt). When the presence of the keeper **26** maintains the auxiliary bolt **25** in an inward position, as illustrated in Figure 8, the spring **45** is free to move the dogging member **43** into the engaging position illustrated in Figure 9. Under conditions in which the auxiliary bolt is not thus depressed by the presence of a keeper, its movement to its full projected position under the action of the spring **54** brings the plate **50** outwardly into engagement with the lateral extension **47** of the dogging member, and maintains the dogging member in the position in which the surface **44** is not presented to the transverse abutment plate **31**. The plate **50** is angularly positioned about the axis of the auxiliary bolt **25** by the confinement of the plate **50** between the housing **30** and the link **33**, as best shown in Figure 3.

In addition to the guide post **55**, the transverse abutment plate is also provided with the guide post **56**, which establishes the position of the spring **57** extending into the bore **58** of the bolt **24**. The action of the spring **57** generates a tendency to maintain the bolt outwardly with respect to the housing structure. A guide rod **59** is mounted fixedly with respect to the bolt **24**, and is slideably received within appropriate openings in the transverse abutment plate **31** and the laminated panel **34** of the retractor. The presence of the guide rod **59** tends to stabilize the retracting movement of the bolt as the bolt rides over the entering portion **60** of the keeper **26**.

Referring to Figure 10, the enlarged exploded view illustrates the formation of the bolt which accommodates the structure thus far described. A semi-cylindrical recess **61** is formed in the flat side of the bolt for receiving the auxiliary bolt **25**, and a slot **62** is machined in the rearward face for receiving the retracting link **33** and the dogging member **43** in superimposed relationship, as best shown in Figure 8.

Referring to Figure 2, the normal condition of the latch mechanism is illustrated, which corresponds to that when the door is open. The rollback member **63** is then relatively inactive, with its cam portion **64** disposed between the studs **65** and **66** on the retracting arms **36** and **36***a*. Operation of the handle in either direction will bring the cam portion **64** into engagement with one of the pins **65** or **66**, and will create movement to the right of the retractor. Such movement, as outlined previously, will result in engagement of the laminated plate **35** with the portion **38** of the retracting link, and will thereby urge the bolt inwardly. Figures 4 and 5 illustrate the relationship of the components when the bolt and the auxiliary bolt are depressed on engagement with the portion **60** of the keeper (without rotation of the handles). Figures 6 and 7 show the main bolt **24** in locking position, and the auxiliary bolt depressed by the keeper **26**. In Figures 6 and 7, the outward position of the bolt (under the urging of the spring **56**) is limited by the engagement of the end **38** of the link **33** with the inside surface of the panel **35**. The dogging member **43** does not become active until the bolt is moved inwardly a slight amount by outside forces to remove the tension from the link **33**.

Referring to Figure 12, a modified form of the invention is illustrated in which the formed portion **67** on the dogging member **68** serves the same function as the abutment **42** on the link **33** previously described. In the arrangement shown in Figure 12, the lateral extension **69** of the link **70** is left flat, and is disposed outwardly opposite the formed portion **67** so that rearward movement of the link **70** with respect to the bolt **71** will rotate the dogging member to inactive position.

The particular embodiments of the present invention which have been illustrated and described herein are for illustrative purposes only and are not to be considered as a limitation upon the scope of the appended claims. In these claims, it is our intent to claim the entire invention disclosed herein, except as we are limited by the prior art.

We claim:

1. A deadlocking mechanism for a latch, said latch having a housing, a principal bolt slideably mounted in said housing, and retracting means for said principal bolt, said mechanism comprising: an auxiliary bolt slideably mounted with respect to said principal bolt for movement along a substantially fixed axis parallel to the movement of said principal bolt, said auxiliary bolt normally projecting from the end of said housing with said bolt; a transverse abutment plate fixed with respect to said housing, said abutment plate having an aperture therein; a retracting link traversing said aperture and operatively connected adjacent its inner end to said retracting means, said retracting link having adjacent its outer end a lost-motion connection with said principal bolt with limited

freedom of movement parallel to the direction of movement of said bolts, and also having a lateral extension adjacent said outer end and an abutment on said extension, said abutment presenting an abutting surface having at least a portion thereof disposed in a plane substantially perpendicular to the direction of movement of said bolts; a dogging member having a pivot connection to said bolt and disposed adjacent said retracting link, said dogging member having a portion extending inwardly along said link, and having a transverse surface outwardly disposed from said traverse abutment plate when said principal bolt is in projected position, said surface being presented to said plate adjacent said aperture on rotation of said dogging member about the pivotal connection thereof with respect to said link, said dogging member also having a lateral extension laterally opposite said pivot connection and disposed inwardly opposite said abutment on said lateral extension of said link whereby inward movement of said link with respect to said principal bolt within the freedom of movement provided by said lost-motion connection will rotate said dogging member about the pivotal connection thereof and thereby move said transverse surface into position for free passage through said aperture, said dogging member having a second lateral extension on the opposite side of said pivotal mounting from said first-mentioned lateral extension; actuating means connected to said auxiliary bolt, and having a portion thereof disposed transversely with respect to the axis of said bolt inwardly opposite said second lateral extension on said dogging member and between said link and said housing whereby said link and said housing stabilize said actuating means portion against rotation about the axis of said auxiliary bolt; dogging member biasing means urging said dogging member about the pivotal mounting thereof in a direction to present said transverse surface to said transverse abutment plate; auxiliary bolt biasing means urging said auxiliary bolt outwardly to limit position against the opposition of said second lateral extension on said dogging member against said actuating means, and thereby tending to move said transverse surface into position for free passage through said aperture; and principal bolt biasing means urging said principal bolt outwardly.

2. A deadlocking mechanism for a latch, said latch having a housing, a principal bolt slideably mounted in said housing, and retracting means for said principal bolt, said mechanism comprising: an auxiliary bolt slideably mounted with respect to said principal bolt for movement along a substantially fixed axis parallel to the movement of said principal bolt, said auxiliary bolt normally projecting from the end of said housing with said bolt; a transverse abutment plate fixed with respect to said housing, said abutment plate having an aperture therein; a retracting link traversing said aperture and operatively connected adjacent its inner end to said retracting means, said retracting link having adjacent its outer end a lost-motion connection with said principal bolt with limited freedom of movement parallel to the direction of movement of said bolts, and also having a lateral extension adjacent said outer end and an abutment on said extension, said abutment presenting an abutting surface having at least a portion thereof disposed in a plane substantially perpendicular to the direction of movement of said bolts; a dogging member having a pivot connection to said bolt and disposed adjacent said retracting link, said dogging member having a portion extending inwardly along said link and having a transverse surface outwardly disposed from said transverse abutment plate when said principal bolt is in projected position, said surface being presented to said plate adjacent said aperture on rotation of said dogging member with respect to said link, said dogging member also having a lateral extension laterally opposite said pivot connection and disposed inwardly opposite said abutment on said lateral extension of said link whereby inward movement of said link with respect to said principal bolt within the freedom of movement provided by said lost-motion connection will rotate said dogging member about the pivotal connection thereof and thereby move said transverse surface into position for free passage through said aperture, said dogging member having a second lateral extension on the opposite side of said pivotal mounting from said first-mentioned lateral extension; actuating means connected to said auxiliary bolt having a portion thereof disposed inwardly opposite said second lateral extension on said dogging member; dogging member biasing means urging said dogging member about the pivotal mounting thereof in a direction to present said transverse surface to said transverse abutment plate; auxiliary bolt biasing means urging said auxiliary bolt outwardly to limit position against the opposition of said second lateral extension on said dogging member against said actuating means, and thereby tending to move said transverse surface into position for free passage through said aperture; and principal bolt biasing means urging said principal bolt outwardly.

3. A deadlocking mechanism for a latch, said latch having a housing, a principal bolt slideably mounted in said housing, and retracting means for said principal bolt, said mechanism comprising: an auxiliary bolt slideably mounted with respect to said principal bolt for movement along a substantially fixed axis parallel to the movement of said principal bolt, said auxiliary bolt normally projecting from the end of said housing with said bolt; a transverse abutment plate fixed with respect to said housing, said abutment plate having an aperture therein; a retracting link traversing said aperture and operatively connected adjacent its inner end to said retracting means, said retracting link having adjacent its outer end a lost-motion connection with said principal bolt with limited freedom of movement parallel to the direction of movement of said bolts, and also having a lateral extension adjacent said outer end; a dogging member having a pivot connection to said bolt and disposed adjacent said retracting link, said dogging member having a portion extending inwardly along said link and having a transverse surface outwardly disposed from said transverse abutment plate when said principal bolt is in projected position, said surface being presented to said plate adjacent said aperture on rotation of said dogging member about the pivotal connection thereof with respect to said link; means on said lateral extension on said retracting link and on said dogging member providing interengaging transverse surfaces laterally opposite said pivot connection whereby inward movement of said link with respect to said principal bolt within the freedom of movement provided by said lost-motion connection will rotate said dogging member about the pivotal connection thereof and thereby move said transverse surface into position for free passage through said aperture, said dogging member having a lateral extension on the opposite side of said pivotal mounting from said interengaging surfaces; actuating means connected to said auxiliary bolt and having a portion thereof disposed inwardly opposite said lateral extension on said dogging member; dogging member biasing means urging said dogging member about the pivotal mounting thereof in a direction to present said transverse surface to said transverse abutment plate; auxiliary bolt biasing means urging said auxiliary bolt outwardly to limit position against the opposition of said lateral extension on said dogging member against said actuating means, and thereby tending to move said transverse surface into po-

sition for free passage through said aperture; and principal bolt biasing means urging said principal bolt outwardly.

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