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2,769,652

## DEADLOCKING MECHANISM FOR AUXILIARY DOOR LOCKS

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Application March 28, 1955, Serial No. 497,258

2 Claims. (Cl. 292—169)

In its preferred form, this invention relates to the construction of auxiliary door locks. This general category of mechanisms includes devices which are ordinarily installed on a door in addition to a knob-operated latch. Since it is very frequently desirable to withdraw the auxiliary latch from operating position, it becomes necessary to provide mechanism for maintaining the retracted position against accidental displacement, whether or not a biasing spring is used to urge the bolt outwardly.

In the preferred form of the invention, a deadlocking member is pivotally mounted on the bolt stem at an intermediate point on the member. The forward portion of this member is preferably formed in the shape of a hook for engaging a beam secured with respect to the lock housing. The rearward extremity of the locking member is positioned by the radius arm which controls the reciprocating movement of the bolt. In the preferred form of the invention, the positioning of a locking member becomes the joint responsibility of the manually-controlled radius arm and a biasing spring operative to urge the locking member continually in position to engage the fixed abutment beam.

The several features of the invention will be discussed in detail through an analysis of the particular embodiments illustrated in the accompanying drawing. In the drawing,

Figure 1 presents a sectional view in elevation of a mechanism embodying this invention.

Figure 2 is a fragmentary section similar to that of Figure 1, but showing the device in an intermediate position during the operation of the manually-controlled radius arm.

Figure 3 illustrates a succeeding intermediate position.

Figure 4 is a section taken on the plane 4—4 of Figure 1.

Referring to the drawing, a housing may be considered as formed by the opposite housing sections 10 and 11, and the front plate 12. A sleeve 13 embraces the forward portions of the housing sections 10 and 11, and is fixed with respect to the front plate through the engagement of the extruded portions 14 and 15 with the flanges 16 and 17. The bolt 18 is essentially a bar of metal (ordinarily brass) having a uniform cross section along its length, since the illustrated lock is not of the type in which the bolt is forced inwardly as it engages the keeper. The positioning of the bolt in the illustrated mechanism is determined entirely by the action of the manually-controlled radius arm 19.

The bolt 18 is provided with a stem 20 which is firmly secured to the bolt 18, and fixed with respect thereto either with transverse pins as indicated at 21 and 22, or by deformed portions of the metal of the bolt 18 which are forced to enter into suitable openings or recesses in the portion of the stem 20 which is received within the bolt 18.

Adjacent the inner end of the stem 20, a slot 23 is provided which cooperates with the pin 24 on the radius arm unit 19. Rotation of the radius arm in a counter-

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clockwise direction as viewed in Figures 1, 2, and 3, brings the pin 24 into contact with the rearward wall of the slot 23, and pulls the bolt stem 20 and the bolt 18 inwardly. The holes 25 and 26 in the housing portion 10 (and similar holes (not shown) in the housing section 11) are provided to accommodate fastening screws or shafts which secure the lock with respect to the door, and form no part of this invention.

A deadlocking lever 27 is pivotally mounted on the bolt stem 20 on the pin 28. The forward portion of the lever 27 is formed as a hook 29 for engagement with the beam 30, which is fixed with respect to the housing sections 10 and 11 through engagement of the projections 31 and 32 with appropriate openings in the housing sections. The spring 33, positioned by the stud 34, acts between the notch 35 and the forward portion 29 of the locking member 27 to urge it in the direction to engage the beam 30. The sliding movement of the bolt stem 20, in spite of the presence of the beam 38, is provided for through the slot 36 in the stem, the beam 30 being placed in engagement with the slot 36 during the process of assembly. The engagement of the beam 30 with the ends of the slot 36 provides a limit stop to the sliding movement of the bolt.

The rearward extension 37 of the deadlocking member 27 is formed to extend across and beside the slot 23, and cooperate with the pin 24 of the manually-operated radius arm 19. Rotation of the radius arm through torque supplied to the coupling slot 38 induces rotation in a counterclockwise direction, accompanied by a movement of the pin 24 from the position shown in Figure 1 to that shown in Figure 3. The rotary movement of the pin about the axis of the radius arm 19 generates a considerable amount of lateral movement of the pin with respect to the axis of retraction of the bolt 18. Such lateral movement creates a downward force applied against the rearward extremity 37 of the deadlocking member, and thereby rotates it in a clockwise direction about its pivot pin 28. Such rotation elevates the hook portion 29 of a locking member and removes it from engagement with the beam 30. The slot 23 and the rearward portion 37 are formed and positioned in such a manner that the hook portion 29 is removed from engagement from the beam 30 prior to the moment when the pin 24 would otherwise act against the rearward surface of the slot 23 to position the retractor to create tension in the deadlocking member. This condition, corresponding to the beginning of retraction of the bolt, is illustrated in Figure 2.

During the reciprocating movement of the bolt, the lower portion of the retractor (as shown in the drawing) 20 slides on the inside of the housing. To remove a tendency to rattle, a leaf spring 29 is mounted in the housing, and is disposed to bear on the upper surface 40 of the retractor 20, urging the retractor into firm engagement with the opposite side of the housing. In addition to this function, the leaf spring 39 provides a feeling of positive positioning of the bolt either in the fully retracted or the fully extended condition through the arrangement of the discontinuities 41 and 42 in the bearing surface 40. In the fully projected position of the bolt, the surface 41 of the retractor is positioned as shown in Figures 1 and 2 in engagement with the spring 39. The engagement of the spring with this surface creates a definite "feel" of the mechanism which makes it obvious to the user that the bolt is in its fully projected condition. At the inner extremity of the stroke of the bolt, the spring 38 will engage the surface 42, and create the same sense of "feel" to inform the user that the bolt is fully withdrawn.

The particular embodiments of the present invention which have been illustrated and discussed 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 lock, comprising: an axially-split housing having opposite sections and a front aperture; a bolt slideably received in said aperture; a retractor member connected adjacent its forward end to said bolt, and having a slot at the rearward end formed by opposite walls spaced from each other in the direction of sliding movement of said bolt, and also having a central slot providing axially opposite surfaces spaced apart by an amount substantially corresponding to the distance of movement of said bolt from projected to retracted positions; a radius arm rotatably mounted in said housing on an axis transverse to the path of sliding movement of said bolt, said radius arm having a member slideably engaging said rearward slot; a deadlocking lever pivotally mounted at the central portion thereof on said retractor member, said lever having a rearward portion extending beside and across said slot, and a locking portion provided with a hook extending forwardly, whereby transverse movement of said radius arm member along said slot causes said radius arm member to position said lever about its pivot mounting; transverse beam means received within said central slot on said retractor member, and having the opposite ends of said beam means received respectively in the opposite sections of said housing, and thereby normally fixed with respect to said housing, said beam means being disposed for engagement with said locking portion with said bolt in fully projected position, said retractor member rearward slot and rearward portion of the lever being formed to cause disengagement of said locking portion from said beam, on rotation of said radius arm, prior to retraction of said bolt beyond the position of said bolt corresponding to engagement of said locking portion with said beam means; and biasing means urging said locking portion toward said beam means.

2. A lock, comprising: a housing; a front aperture; a bolt slideably received in said aperture; a retractor member connected adjacent its forward end to said bolt, and having a slot at the rearward end formed by opposite walls spaced from each other in the direction of sliding movement of said bolt, and also having a central slot having axially opposite surfaces spaced apart by an amount at least equal to the distance of sliding movement of said bolt; a radius arm rotatably mounted in said housing on an axis transverse to the path of sliding movement of said bolt, said radius arm having a member slideably engaging said slot; a deadlocking lever pivotally mounted at the central portion thereof on said retractor member, said lever having a rearward portion extending beside and across said slot, and a locking portion provided with a hook extending forwardly, whereby transverse movement of said radius arm member along said slot causes said radius arm member to position said lever about its pivot mounting; transverse beam means received within said central slot and fixed with respect to said housing, and disposed for engagement with said locking portion with said bolt in fully projected position, said retractor member slot and rearward portion of the lever being formed to cause disengagement of said locking portion from said beam, on rotation of said radius arm, prior to retraction of said bolt beyond the position of said bolt corresponding to engagement of said locking portion with said beam means; and biasing means urging said locking portion toward said beam means.

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