Aug. 27, 1957 E. L. SCHLAGE ET AL 2,804,334

INTERLOCKING MECHANISM FOR TUBULAR DOOR LOCKS

Filed Aug. 19, 1954 3 Sheets-Sheet 1

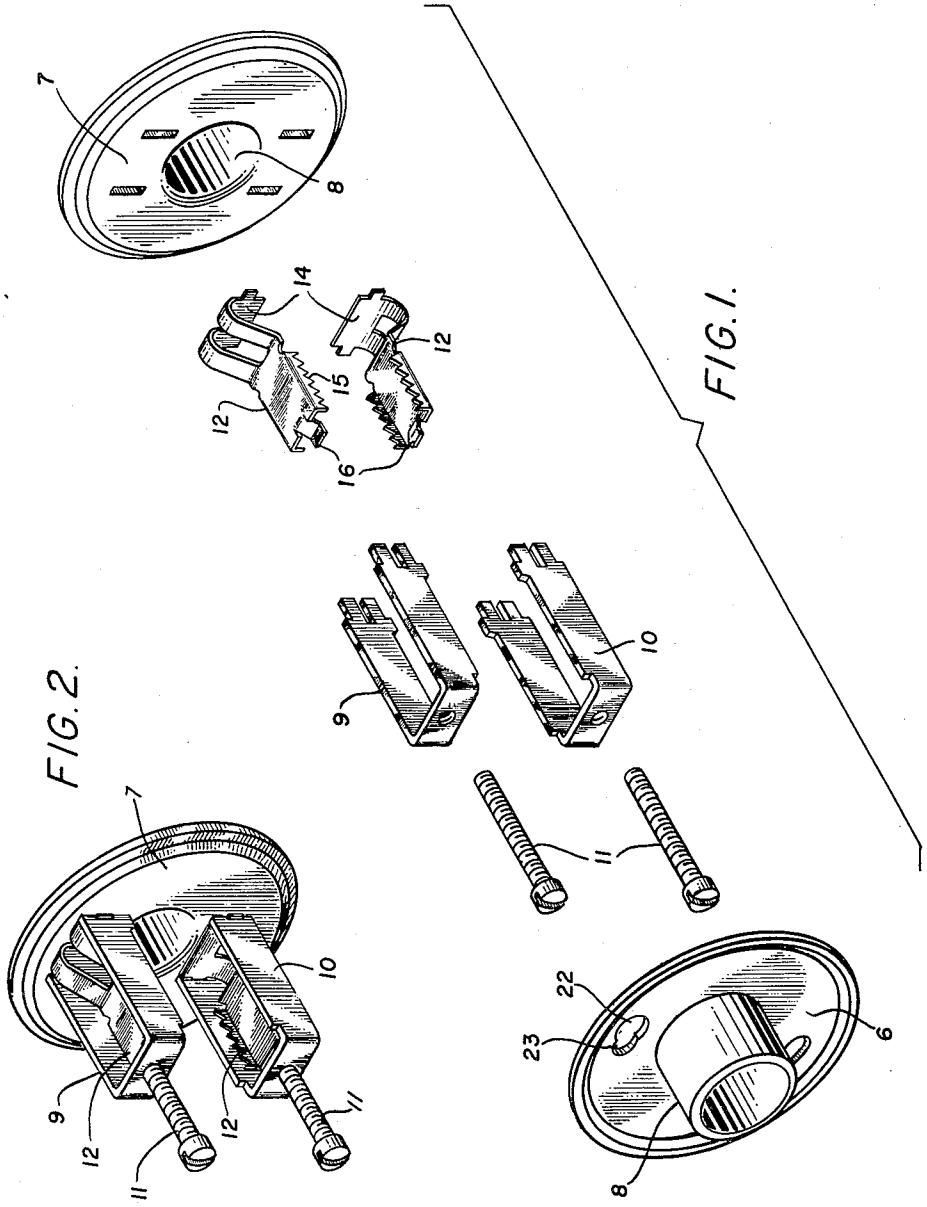


FIG. 1.

FIG. 2.

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FIG. 3.

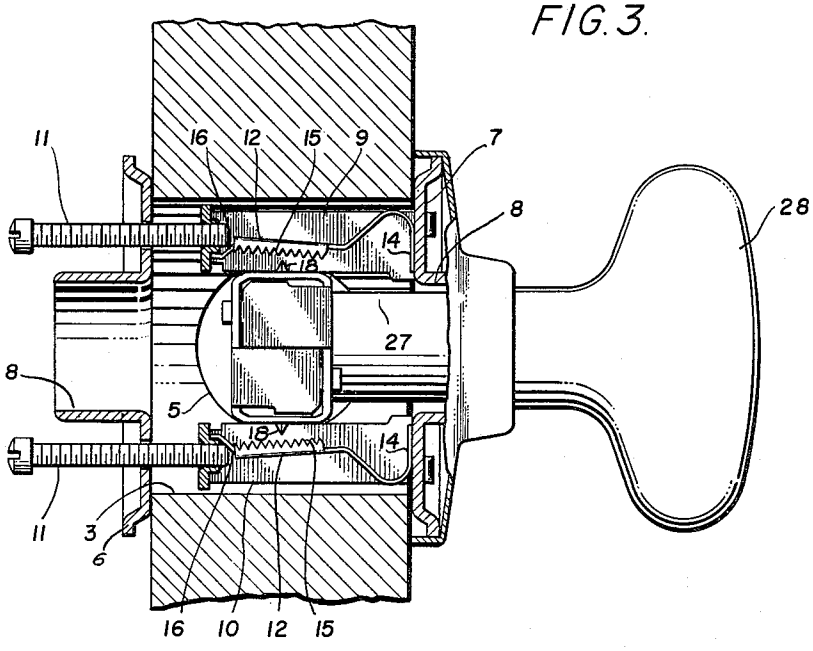
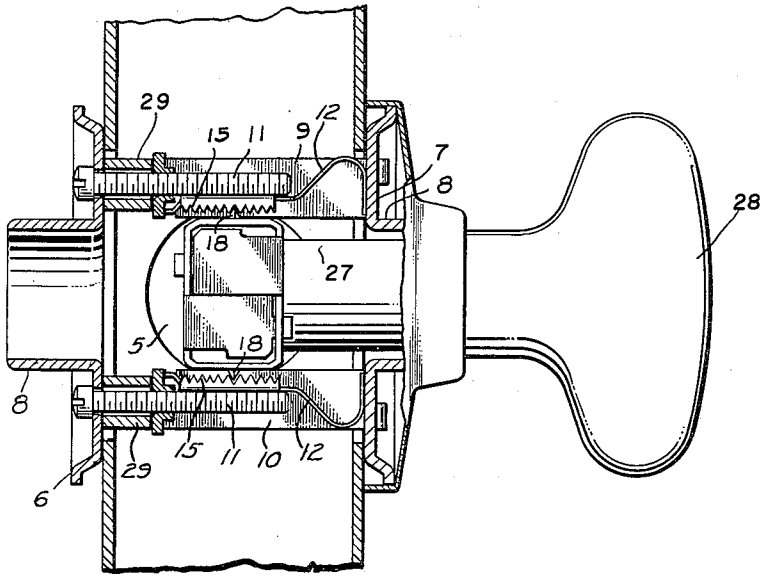


FIG. 4.



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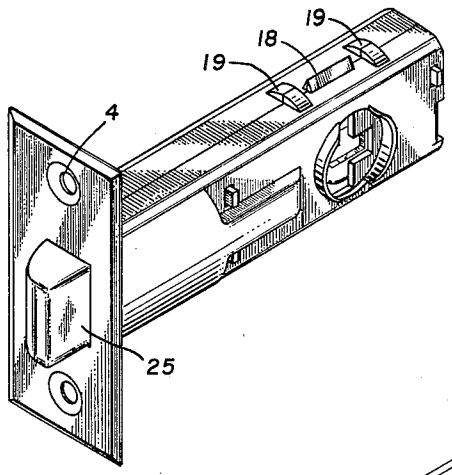


FIG. 5.

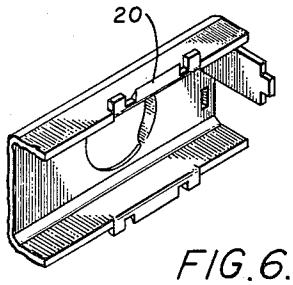


FIG. 6.

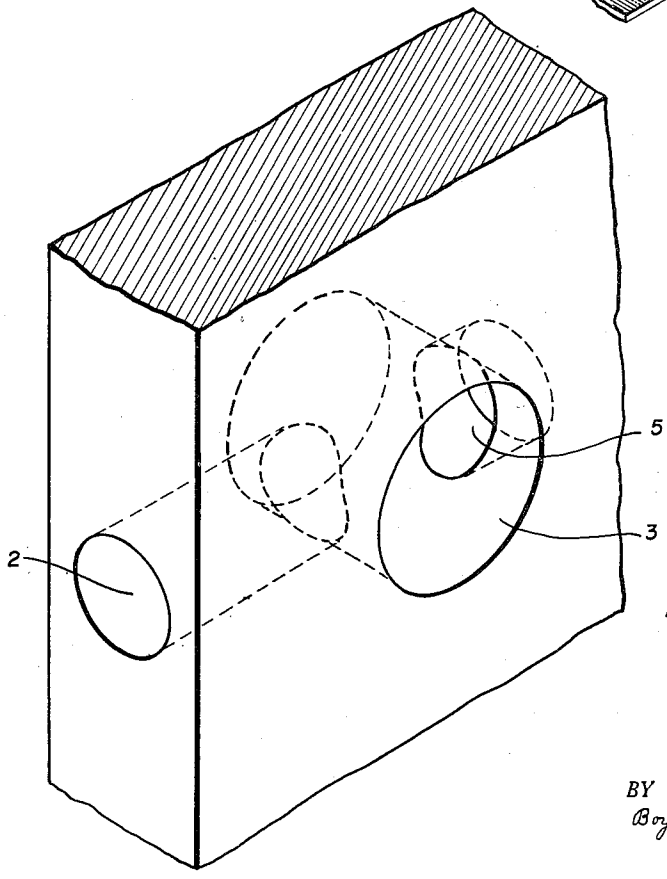


FIG. 7.

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INTERLOCKING MECHANISM FOR TUBULAR DOOR LOCKS

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Application August 19, 1954, Serial No. 450,882

8 Claims. (Cl. 292—337)

Tubular type door locks of the character disclosed in this invention consists of two units, to-wit a latch bolt unit and a latch bolt actuating unit, and the present invention relates to means for properly positioning and aligning the units when installed in a door and for positively interlocking and rigidly securing the units with relation to each other and the door in which they are installed.

A door in which a tubular lock of the character described, is to be installed must be provided with two holes or openings which are formed by means of a drill or bit, one hole being drilled into the edge of the door and the other at right angles thereto or through the faces of the door, and in a position where it intersects the first named hole. The latch bolt unit is inserted in the first named hole, and the latch bolt actuating unit is inserted in the hole drilled through the faces. For a certain size lock the first named hole may require a seven-eighths inch drill, while the other hole may require a one and a half inch drill. Carpenters usually do the drilling and installing of the locks. The seven-eighths inch drill the carpenter uses may be dull, broken or lost, and he may therefore use a fifteen-sixteenths inch drill or bit thereby forming a hole slightly oversize with the result that the inner end of the latch bolt unit has considerable play, both in a vertical and in a lateral direction, even though the second or larger hole may be properly drilled. A lock installed under such conditions may develop a twist or bind which interferes with smooth operation, and it is certain to have end-wise spindle play and in general will feel and seem poorly fitted when in use; again a lock of this character may be purchased and used to replace another lock of a similar type and the holes previously drilled in the door may be too large, and when the lock in installed play and poor fit will be the result.

The object of this invention is to provide a lock which may be properly fitted, aligned and installed under the adverse conditions just mentioned, and in particular it is an object of this invention to provide a lock in which the latch bolt unit and the latch bolt actuating unit may be properly positioned and aligned and positively interlocked and rigidly secured with relation to each other and the door in which they are installed.

The invention is shown by way of illustration in the accompanying drawings in which:

Fig. 1 is an exploded perspective view of the unassembled parts of the interlocking mechanism of this invention.

Fig. 2 is a perspective view showing the clamping posts, screws and jaws permanently attached to the outer clamping plate.

Fig. 3 is a vertical central section through the hole 3 of the door showing the two units inserted and in position to be interlocked.

Fig. 4 is a view similar to Fig. 3 showing the inner clamping plate applied and the two units in interlocked position.

Fig. 5 is a perspective view of the latch bolt unit.

Fig. 6 is a perspective view of a portion of the latch bolt unit housing, and showing a modified structure, and

Fig. 7 is a perspective view of that portion of the door which is drilled to receive the lock.

Referring to the drawings in detail and especially to Fig. 7, where a portion of a wooden door is shown, it will be noted that two holes have been drilled in the door, one into the edge as indicated at 2, and the other at right angles thereto or transversely through the door as indicated at 3. The door lock to be fitted or mounted in the door consists of two units, one known as the latch bolt unit is shown in perspective in Fig. 5. This unit is inserted in the opening 2 and is secured in place by screws extending through a face plate 4 secured at the outer end of the unit. The hole 2 extends beyond the hole 3 as indicated at 5, hence, if the hole 2 has been drilled to proper size, there will be little if any play at the inner end of the latch bolt unit, as it is supported substantially throughout its entire length, but if the hole has been drilled oversize or if the lock replaces another lock where the hole 2 is oversize, there will be a considerable amount of both vertical and lateral play.

The second unit is known as a latch bolt actuating unit. This unit in the main consists of two clamping plates indicated at 6 and at 7 in Fig. 1; the plate 6 will be known as the inner clamping plate and the plate 7 as the outer. Both plates are provided with a hub 8 and these serve as bearings for a spindle hereinafter to be described. The outer clamping plate 7 carries a pair of post members generally indicated at 9 and 10, see Fig. 2. These posts are substantially U-shaped and are formed by punch and die operations from sheet metal, and they may be riveted, spot-welded or otherwise rigidly and permanently secured to the plate 7. The outer ends of the posts are punched and threaded to receive a pair of clamping screws 11. Also carried by the outer clamping plate 7 is a pair of clamping jaws 12, see Figs. 1 and 2. These jaws are made of spring steel and have a base portion 14 which fits between the inner ends of the U-shaped posts and become secured to the plate 7 when the posts are riveted or otherwise secured thereto. The free ends of the clamping jaws are serrated as indicated at 15, and between these serrated portions is formed a cam-like member 16.

In actual practice after the latch bolt unit has been inserted the next operation is to insert the outer clamping plate or in other words the unit shown in Fig. 2. This is inserted in the hole 3 and when inserted the posts 9 and 10 will straddle the inner end of the latch bolt unit and as such form a support therefor, and when the clamping plate is properly centered with relation to the hole 3, the latch bolt unit will assume its correct horizontal position, thus, if the hole 2 is oversize, the longitudinal central axis of the latch bolt unit will coincide with the longitudinal central axis of the hole, as the inner end of the latch bolt unit will be supported solely by the posts 9 and 10 and does not depend on the wall of the hole for support. The posts 9, 10 not only support the inner end of the latch bolt unit, but they also interlock therewith to secure the latch bolt unit against endwise removal from the hole 2. This is accomplished as follows.

By referring to Fig. 5 it will be noted that ribs 18 project from the upper and lower faces of the latch bolt housing, also that there is a lug 19 at each end of the rib and that the lugs are spaced from the ribs to receive the legs of the U-shaped posts 9 and 10 between them, thus, as the legs of the posts engage the ribs 18 and the lugs 19 and lie in the spaces between them, a positive interlock is formed between the posts and the latch bolt unit, preventing endwise removal thereof. The ribs 18 may be formed by projecting portions of a plate secured between the housing sections of the latch bolt unit, or

they may be formed as a part of one or both housing sections as shown at **20** in Fig. 6. Be that as it may, whether the ribs are formed on the housing section or on a plate clamped between them they should be V-shaped as shown in Fig. 5 to fit the serrations **15** formed on the clamping jaws.

After insertion of the unit shown in Fig. 2 and after it has been centered with relation to the hole **3** to insure horizontal positioning of the latch bolt unit, it is necessary for the carpenter or other mechanic installing the unit to grasp the inner end of the latch bolt unit and adjust it laterally so that the inner end of the unit will assume a position central to the hole **5** or in other words, a position midway between the opposite faces of the door; this being possible as the spring action of the clamping jaws holds the serrated jaws spread apart and out of engagement with the V-shaped ribs **18** as shown in Fig. 3.

After lateral adjustment has been made the inner clamping plate **6** is slipped over the heads of the screws **11** as the plate has enlarged openings **22** formed therein which are extended in the form of arcuate slots **23**, thus by aligning the enlarged portions **22** of the holes of the plate with the heads of the screws the plate may be slipped over them, and then by slightly rotating the plate the screws will enter the slotted sections **23**, so that when the screws finally assume clamping position there will be metal on opposite sides of the heads for the screws to engage. When the inner clamping plate has been slipped over the screws and brought into contact with the inner face of the door, the first thing that happens when the screws are being screwed into place is, that the inner ends of the screws will engage the cam members **16** formed on the clamping jaws thus forcing the jaws toward each other and into clamping engagement with the ribs **18**, finally assuming the position shown in Fig. 4, thus, when the screws are finally screwed up tight, the clamping plates will firmly clamp the opposite faces of the door, and the inner end of the latch bolt housing will be firmly gripped by the clamping jaws and rigidly secured in adjusted position, and this is accomplished whether the hole **2** is oversize or not, as once the unit shown in Fig. 2 is inserted and the posts carried thereby straddle the inner end of the latch bolt housing the posts become the sole support and not only that, but it also permits vertical and lateral adjustment of the inner end of the latch bolt housing before it is finally secured in place by the application of the inner clamping plate and the screws **11**. Whether the hole **3** is oversize or not, makes little if any difference, however, it must obviously be large enough in diameter to permit the posts **9** and **10** to enter when the unit shown in Fig. 2 is to be inserted. The screws **11** have a tendency in most installations to work loose, in this structure when the screws are finally tightened they are held in place by friction or in other words, by the outward pressure of the clamping jaws against the screws, and as this pressure may be considerable due to the fact that the spring arms may be preloaded, any chance of the screws working loose is rather remote.

It should be understood that the latch bolt unit contains a latch bolt such as indicated at **25**, and any suitable form of connected retracting mechanism, similarly that either one or two spindles may be employed which will be supported by the hubs **8** of the respective clamping plates, and that the spindles will be provided with a roll back mechanism which will actuate the retractor and the latch bolt. A spindle **27** and a knob **28** are shown in Figs. 3 and 4, and they may be inserted with a unit **6** or at any time thereafter, but as the retracting mechanism, the spindles and the latch bolt actuated thereby form no part of the present invention, further description and illustration is thought unnecessary, however, if the holes **2** and **5** are oversize and the inner end of the latch bolt housing is not rigidly secured between the clamping plates there will be considerable end play in the spindles and knobs, furthermore, if the inner end of the latch bolt housing is not properly aligned or positioned when the clamping plates are pulled together by the clamping screws, a bind or twist may develop which will definitely interfere with smooth and proper action, giving anyone operating the lock a feeling that the lock is improperly applied or that the lock is defective or poorly constructed. By constructing a tubular lock as here illustrated and installing it as described, all the above objections and defects are overcome, and a smoothly operating and dependable lock results.

The lock structure shown is not only applicable to doors made of wood, but it is also applicable to hollow metal doors, the only change necessary being that the posts are made sufficiently long to function as spacers between the metal panels forming the door, so that they will not spring inwardly sufficiently to be noticeable when the clamping screws are tightened. Tubular spacers may be interposed between the posts and the inner clamping plate as indicated at **29**, see Fig. 4, to serve the same purpose'

We claim:

1. In a lock of the character described, a latch bolt unit and a latch bolt actuating unit, said latter unit including an inner and an outer clamping plate engageable with the inner and outer faces of a door in which the units are mounted, a pair of posts secured to the outer clamping plate, a pair of clamping screws extending through the inner clamping plate and having threaded engagement with the posts to pull the clamping plates into clamping engagement with the respective faces of the door, a pair of clamping jaws on opposite sides of said latch bolt unit secured to the outer clamping plate, and means on said jaws actuated by the screws for forcing the clamping jaws toward each other into gripping engagement with said opposite sides of the latch bolt unit, and to rigidly secure said unit between the posts.

2. In a lock of the character described, a latch bolt unit and a latch bolt actuating unit, said latter unit including an inner and an outer clamping plate engageable with the inner and outer faces of a door in which the units are mounted, a pair of spaced apart posts secured to the outer clamping plate, each post comprising two legs connected at their outer ends, said posts engaging opposite sides of the latch bolt unit and forming a support for the inner end thereof, a pair of clamping screws extending through the inner clamping plate and having threaded engagement with the outer ends of the posts and adapted to be screwed inwardly between the legs of the posts when the clamping plates are to be clamped against the opposite faces of the door, and clamping jaws disposed between the legs of the posts and actuated by the clamping screws for urging said jaws toward each other for clamping the latch bolt unit between the legs of the posts.

3. In a lock of the character described, a latch bolt unit and a latch bolt actuating unit, said latter unit including an inner and an outer clamping plate engageable with the inner and outer faces of a door in which the units are mounted, a pair of spaced apart posts secured to the outer clamping plate, each post comprising two legs connected at their outer ends, said posts engaging opposite sides of the latch bolt unit and forming a support for the inner end thereof, a pair of clamping screws extending through the inner clamping plate and having threaded engagement with the outer ends of the posts and adapted to be screwed inwardly between the legs of the posts when the clamping plates are to be clamped against the opposite faces of the door, a pair of resilient arms secured to the outer clamping plate, said arms being disposed between the legs of the posts and the outer ends of the arms being free, clamping jaws on the free end of each resilient arm, and a cam member on the free end of each resilient arm said cam members being engaged by

the clamping screws when screwed inwardly between the legs of the posts and forcing the clamping jaws into engagement with the latch bolt unit to secure it between the posts.

4. In a door lock of the character described, a clamping plate, a pair of spaced apart posts secured to the plate, each post comprising a pair of legs connected at their outer ends, a clamping screw for each post and having threaded engagement therewith, a pair of resilient arms secured to the clamping plate, said arms being disposed between the legs of the posts and the outer ends of the arms being free, and a cam-like member on the free end of each arm, said cam-like member being engaged by the clamping screws when they are being screwed into place, and said cam-like members forcing the arms toward each other.

5. In a door lock of the character described, a clamping plate, a pair of spaced apart posts secured to the plate, each post comprising a pair of legs connected at their outer ends, a clamping screw for each post and having threaded engagement therewith, a pair of resilient arms secured to the clamping plate, said arms being disposed between the legs of the posts and the outer ends of the arms being free, and a cam-like member on the free end of each arm, said cam-like members being engaged by the clamping screws when they are being screwed into place, and said cam-like members forcing the arms toward each other, and gripping jaws formed on the adjacent faces of the resilient arms.

6. In a lock of the character described, a latch bolt unit and a latch bolt actuating unit, said latter unit including an inner and a outer clamping plate engageable with the inner and outer faces of a door in which the units are mounted, a pair of posts secured to the outer clamping plate, said posts engaging opposite sides of the latch bolt unit and forming a support therefor, means on the latch bolt unit forming a guide and an interlock between the posts and the latch bolt unit, and preventing endwise removal of the latch bolt unit from between the posts, a pair of clamping screws extending through the

inner clamping plate and having threaded engagement with the posts, and clamping jaw carried by the outer clamping plate and urged toward each other by the clamping screws for securing the latch bolt unit against lateral movement between the posts.

7. In a lock of the character described, a latch bolt unit and a latch bolt actuating unit, said latter unit including an inner and an outer clamping plate engageable with the inner and outer faces of a door in which the units are mounted, a pair of posts secured to the outer clamping plate, said posts engaging opposite sides of the latch bolt unit and forming a support therefor, a projecting rib on each side of the latch bolt unit, a lug at each end of each rib and spaced from said ribs, said ribs and lugs forming guides for the posts and interlocking with the posts to prevent endwise removal of the latch bolt unit from between the posts, a pair of clamping screws extending through the inner clamping plate and having threaded engagement with the posts, a pair of resilient clamping jaws secured to the outer clamping plate, and means on said jaws cooperating with the clamping screws to force the clamping jaws into clamping engagement with the ribs on the latch bolt unit.

8. In a door lock which includes a latch bolt unit and a latch bolt actuating unit, clamping members carried by said actuating unit and engageable with the top and bottom sides of said latch bolt unit for clamping said latch bolt unit therebetween, means urging said clamping members toward each other into clamping engagement with said latch bolt unit upon installing said units, and projections on said top and bottom sides of said latch bolt unit engageable with said clamping members for limiting axial and transverse shifting of said latch bolt unit when engaged by said members.

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