

Nov. 19, 1957

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2,813,740

LATCH STRUCTURE FOR DOOR LOCKS

Filed May 20, 1955

2 Sheets-Sheet 1

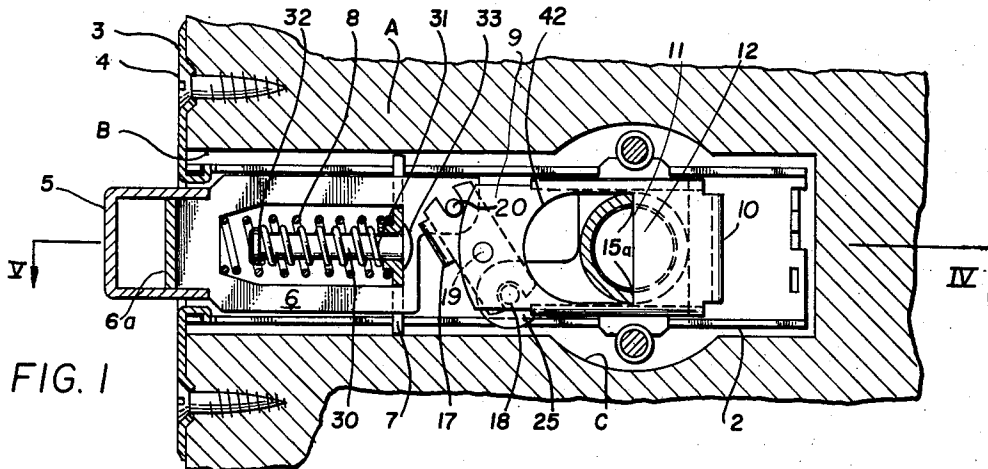


FIG. 1

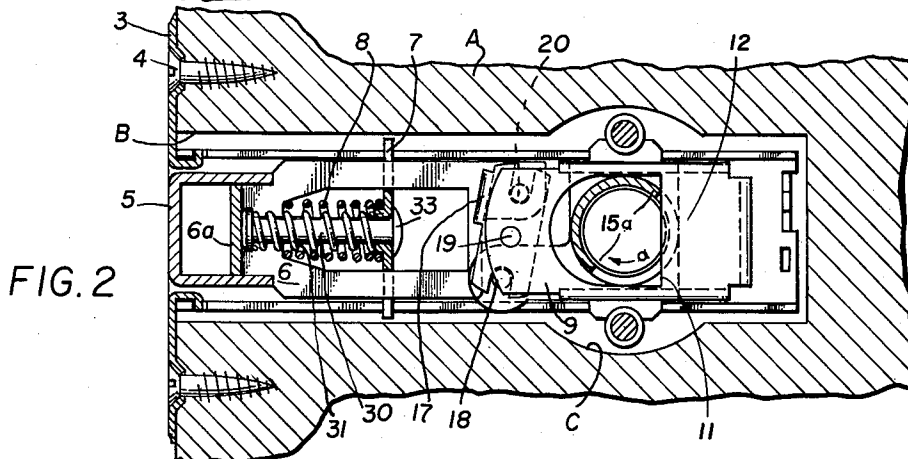


FIG. 2

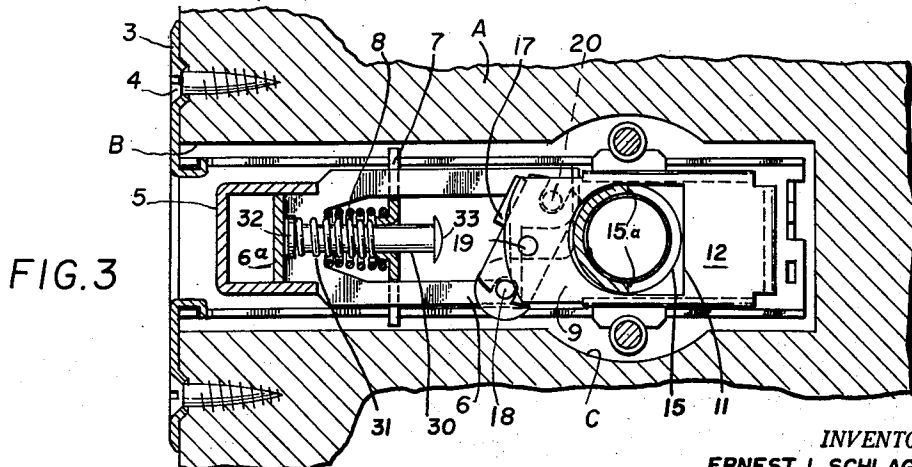


FIG. 3

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2 Sheets-Sheet 2

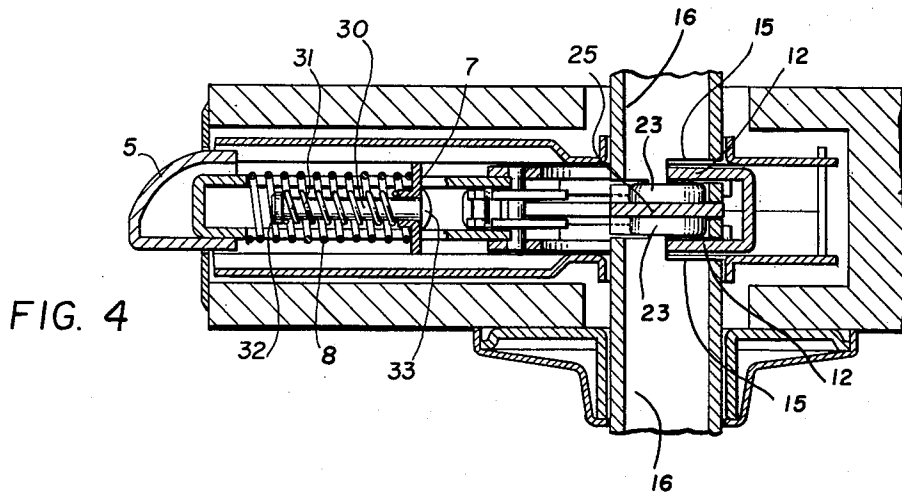


FIG. 5

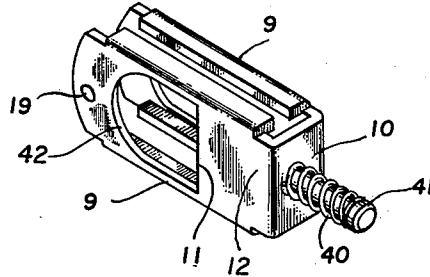
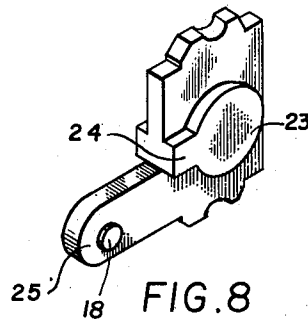


FIG. 6

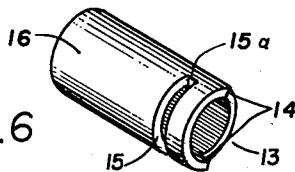
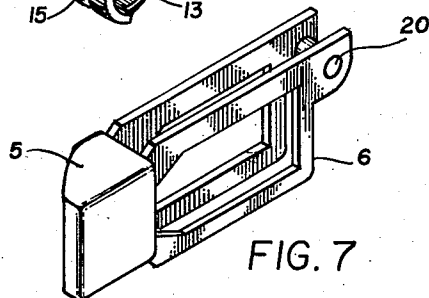


FIG. 7



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LATCH STRUCTURE FOR DOOR LOCKS

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2 Claims. (Cl. 292—169)

This invention relates to door locks and especially that type in which assembly or removal of the lock from a door is controlled by overdepression or retraction of the latch bolt.

In Patent No. 2,207,877, a door lock is disclosed in which assembly or removal of the lock from a door is controlled by overdepression of the latch bolt. The lock briefly stated comprises a housing having a retractor with a connected latch bolt slidably mounted therein, and a pair of spindles whereby the retractor and latch bolt are actuated, also the lock contains a dogging mechanism which normally secures the spindles against removal, but which releases the spindles when overdepression of the latch bolt takes place. The mechanism employed is simple and efficient, but there is one objection, and that is that a special tool is required to release the depressible latch before overdepression of the latch bolt can take place.

The object of the present invention is to provide a door lock in which assembly or removal of the lock from the door is controlled by overdepression of the latch bolt. The lock mechanism generally stated comprises a housing, a retractor and a connected latch bolt slidably mounted therein, a single or divided spindle whereby the retractor and latch bolt is retracted, a main spring whereby the retractor and latch bolt is normally maintained in projected position, a dogging mechanism engaging and securing the spindle or spindles against removal, and a secondary spring resisting but permitting overdepression of the latch bolt when a predetermined manual pressure is applied to the end of the latch bolt. By the use of a secondary spring it becomes possible to do away with the depressible latch and the special tool required in the structure of Patent No. 2,207,877, also it simplifies construction and by preloading the secondary spring accidental or mischievous overdepression of the latch bolt is prevented, as preloading of the spring requires the application of considerable pressure to the end of the latch bolt before overdepression can take place.

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

Fig. 1 is a vertical longitudinal section of a door lock mounted in a door and showing the latch bolt in normal projected position;

Fig. 2 is a similar view showing a latch bolt in normal retracted position;

Fig. 3 is a similar view showing a latch bolt in overdepressed position;

Fig. 4 is a horizontal longitudinal section taken on line IV—IV of Fig. 1, but showing certain elements in elevation;

Fig. 5 is a perspective view of one form of retractor;

Fig. 6 is a perspective view of the inner end of one of the spindles;

Fig. 7 is a perspective view of the latch bolt guiding member; and,

Fig. 8 is a perspective view of the plate which supports the inner ends of the spindles.

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Referring to the drawings in detail and particularly Figs. 1 to 4, A indicates a portion of a door in which is drilled or bored two holes, one through the edge of the door as indicated at B and the other transversely of the door as indicated at C. The lock housing indicated at 2 is inserted through the hole B and its inward movement is limited by a face plate 3 which is secured in place by screws 4. In the outer end of the housing and normally projecting through the face plate is a latch bolt 5 which is secured to a slidably mounted latch bolt guiding member 6. This guide is U-shaped, see Fig. 7, and straddles a stationary plate 7 disposed crosswise of the housing and fixed thereto, this plate together with the housing forming a support and guide for the latch bolt guiding member. A main spring 8 is interposed between the plate 7 and the outer end 6a of the guide member, this spring serving to normally maintain the latch bolt in projected position.

Adjacent the inner end of the housing is slidably mounted a retractor (Fig. 5). The retractor is also U-shaped and consists of two spaced apart side sections 9—9 and a connecting end section 10. The side sections each have an opening formed therein, the forward portion of each opening being rounded as at 42 and the rear portion of each opening presenting a straight vertical face 11, which is acted upon by the rollback members of the spindles as will hereinafter be described. The portions of the side sections of the retractor behind the vertical faces 11 will hereinafter be referred to as detents 12 as they interlock with the respective spindles to secure them against removal at all times except when the latch bolt is overdepressed for the purpose of releasing the spindles during assembly or removal of the lock from the door.

The lock structure here described shows two spindles, but a single spindle, or a telescoping type of divided spindle such as shown in Patent No. 2,207,877 may be employed. The spindles here illustrated are of the tubular type, see Fig. 6, and are indicated by the numeral 16. The inner end of each spindle is cut away as indicated at 13 to form a pair of shoulders 14—14, and outwardly, but adjacent the rollback members are formed slots 15 which are provided for reception of the interlock detents 12 previously referred to and to form rollback members 15a. The outer ends of the spindles are provided with knobs (not shown) which may be secured thereon in any suitable manner.

With the spindles in place (Fig. 4) the detents 12 enter the slots 15 of the respective spindles and interlock with the spindles and secure them against endwise removal. If a spindle is rotated in the direction of arrow a (Fig. 2) one rollback member 15a will engage the vertical face 11 of the retractor and force it rearwardly to a position where the latch bolt assumes normal retracted position (Fig. 2). On the other hand, if manual pressure is applied to the end of the latch bolt and it is overdepressed as shown in Fig. 3, the retractor will be forced further toward the rear of the housing or to a position where the detents 12 are fully retracted with relation to the slots 15, and when that position is assumed as shown in Fig. 3, both spindles are free and may be removed by pulling them outwardly from the housing. Similarly, if the spindles are to be inserted during assembly or installation of the lock, the latch bolt will have to be overdepressed in order that the spindles may be inserted. The openings formed on each side of the retractor are slightly larger than the spindles so that the inner ends of the spindles may freely pass through when inserted. If the latch bolt is now released the detents will enter the slots 15, thus interlocking with the spindles and securing them against removal.

Normal retraction of the latch bolt is imparted thereto by the spindles and the retractor actuated by the spindles,

while projection of the latch bolt is actuated by the constant pressure exerted by the main spring 8. The guide member which carries the latch bolt is in some instances directly connected to the retractor, so as to move in unison with the same. In the structure here shown, a motion multiplying lever 17 is interposed. This lever is pivoted at its lower end as indicated at 18 to an arm forming an extension of an anchor plate 25 (Fig. 8). The center of the lever is pivoted as at 19 to the forward end of the retractor, while the upper end of the lever is pivoted as at 20 to the rear end of the latch bolt guide, thus, if the motion imparted to the retractor by the rollback members of the spindles is one quarter of an inch the motion of the latch bolt and its guide member will be one half inch, as the lower pivot 18 of the lever is stationary, and the leverage is two to one.

The plate 25 is fixedly secured in the housing midway between the side walls of the housing, and in alignment with the axis of the spindles. This plate serves a number of important functions. First of all, it is straddled by the retractor and in conjunction with the housing forms a guide therefor. Secondly, it carries the extension arm upon which the motion multiplying lever is pivoted as at 18. Third, it will be noted by referring to Figs. 4, 3, that a boss 23 is formed on each side thereof. These bosses receive and form bearings for the inner ends of the spindles, and finally, the anchor plate carries a stop lug 24 (Fig. 8) which limits rotational movement of the spindles. The stop lug 24 is important as overrotation of the spindles could otherwise take place with the result that they would free themselves of the detents and could then be removed. In use, overrotation is prevented by engagement of shoulders 14 with lug 24. The detailed construction of the lock housing, the plate 25, the retractor, the motion multiplying lever and the latch bolt guide, etc., are fully illustrated and described in my copending application entitled "Bearing and Spindle Structure for Door Locks," filed May 18, 1954, Serial No. 430,697, and for that reason are only briefly described and referred to in this application.

The important feature of this invention is the provision of means for resisting overdepression of the latch bolt, said means however, permitting overdepression when a predetermined manually exerted pressure is applied to the end of the latch bolt. The means employed is best shown in Figs. 1 to 3. Referring to Fig. 1, it will be noted that the cross plate 7 supports a pin 30 having a head at each end as indicated at 32 and 33. A spring 31 which may be termed a secondary spring surrounds the pin and is interposed between the plate 7 and the head 32 of the pin. During normal operation of the latch bolt, the secondary spring is inactive, but if manual pressure is applied to the end of the latch bolt and it is overdepressed as shown in Fig. 3, the end 6a of the latch bolt guide engages the head 32 of the pin 30 and as the pin is freely slidable in the plate 7, spring 31 becomes compressed. This spring may be preloaded to such an extent that while manual depression of the latch bolt from the position shown in Fig. 1 to the position shown in Fig. 2 may be accomplished with comparatively little resistance, the pressure is instantly and very considerably increased the moment overdepression commences, as spring 31 may be preloaded to any pressure increase required. For instance, children will often amuse themselves by turning the knobs of the door and pushing on the end of the latch bolt, but their strength will usually not be sufficient to overdepress the latch bolt as in Fig. 3, due to the greater pressure

required to compress the preloaded spring 31, on the other hand, if the secondary spring were not provided, a child might readily overdepress and at the same time holding on to a knob might accidentally pull it and the spindle out of the lock, hence a preloaded secondary spring will prevent playing or mischievous children from removing the knobs and spindles. A mature person or a mechanic will have no trouble as they have the strength to compress spring 31, and furthermore, will not require a special tool during assembling or removal.

While the secondary spring is shown as supported and carried by the cross plate 7, it might just as well be carried by the rear end plate 10 of the retractor, as shown at 40 in Fig. 5. In that position it would be inactive during normal projection and retraction of the latch bolt. If overdepression takes place as in Fig. 3 the head end 41 of the pin would engage the inner end of the housing and the preloaded spring would be compressed and resist overdepression in the same manner as shown in Fig. 3.

I claim:

1. In a door lock structure having a housing and a latch bolt reciprocable therein from a projected position projecting outwardly from such door to a depressed position withdrawn into said door and adapted to be further depressed to an overdepressed position, a latch bolt spring urging said latch bolt to said projected position at all times and an auxiliary spring positioned outwardly of said spindle applying a substantially greater force to said latch bolt than said latch bolt spring and adapted to be compressed upon movement of said latch bolt from said depressed to said overdepressed position for resisting such movement; a retractor mechanism and a spindle operatively connected to said mechanism, interengaging elements on said spindle and mechanism for holding them in operating relationship, and said elements being disengageable when said latch bolt is in said overdepressed position.

2. In a door lock structure having a housing and a latch bolt reciprocable therein from a projected position projecting outwardly from such door to a depressed position withdrawn into said door and adapted to be further depressed to an overdepressed position, a latch bolt spring urging said latch bolt to said projected position at all times and an auxiliary spring positioned outwardly of said spindle applying a substantially greater force to said latch bolt than said latch bolt spring and adapted to be compressed upon movement of said latch bolt from said depressed to said overdepressed position for resisting such movement; a retractor mechanism and a spindle operatively connected to said mechanism, interengaging elements on said spindle and mechanism for holding them in operating relationship, and said elements being disengageable when said latch bolt is in said overdepressed position, an axially extending pin mounted for reciprocation and acting as a retainer for said auxiliary spring, said latch bolt spring being mounted concentric with said auxiliary bolt spring.

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