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DOOR LOCK

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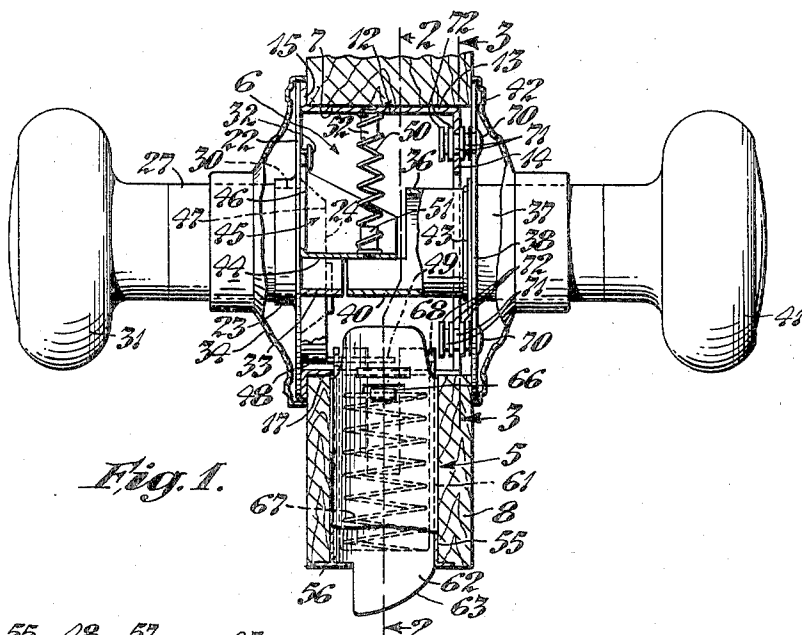


Fig. 1.

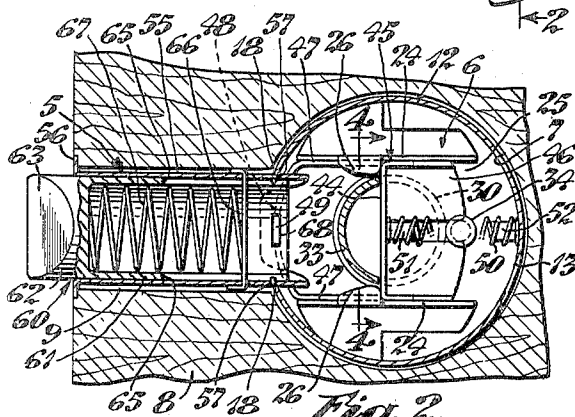


Fig. 2.

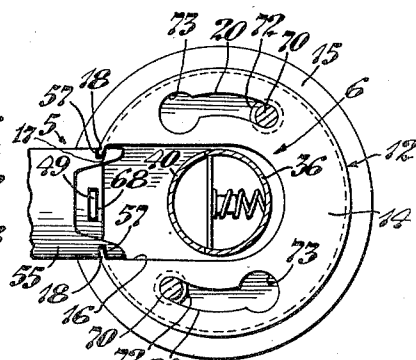


Fig. 3.

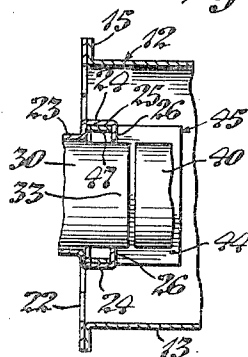


Fig. 4.

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UNITED STATES PATENT OFFICE

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DOOR LOCK

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9 Claims. (Cl. 292—169)

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My invention relates to door locks, and particularly to a door latching device of improved construction.

One object of my invention is to provide a door lock which is adjustable in width to adapt it to be applied to use with doors of various widths without altering the structure of the lock or door.

Another object is to provide a door lock which is adapted to be applied to a door without the use of screws or other extraneous fastening devices which are apt to become loosened.

Another object is to provide a door lock having an improved means for mounting the latch-bolt unit to adapt the unit for operation with either left-hand or right-hand doors, such a mounting means being self-adjusting to compensate for inaccuracies occurring in the right-angularly disposed holes in the door for accommodating the body of the lock and the latch-bolt unit.

Another object is to provide a door lock having an improved means for mounting the slidable bolt-retracting member to effect free movement thereof while guarding against displacement thereof.

Another object is to provide a door lock having an efficient means for operatively connecting the latch-bolt unit and bolt-retracting means for unitary movement.

Another object is to provide a door lock device which is comparatively simple in construction and highly efficient in operation.

Further objects of the invention are set forth in the following specification which describes a preferred embodiment of the door lock, by way of example, as illustrated by the accompanying drawing. In the drawing:

Fig. 1 is a horizontal sectional view through a door showing my improved door lock applied to use therewith;

Fig. 2 is a cross-sectional view through the door lock, taken on line 2—2 of Fig. 1;

Fig. 3 is a cross-sectional view, taken on line 3—3 of Fig. 1; and,

Fig. 4 is a vertical sectional view, taken on line 4—4 of Fig. 2.

Referring to the drawing in detail, my improved door lock or door latching device is of the same general type as commonly employed on inside doors of buildings, although its use is not limited to such installations. The door lock comprises a latch-bolt unit 5 and a latch-bolt actuating unit 6, the latch-bolt actuating unit being disposed in a hole 7 extending transversely of the door 8 and the latch-bolt unit being inserted through a smaller hole 9 disposed at right angles

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to the hole 7 and drilled inwardly from the vertical edge of the door.

The latch-bolt actuating unit 6 comprises a cylindrical sheet metal housing 12 having a circular wall 13, a plate portion 14 at one end, and a peripheral flange 15 at its other end. The plate portion 14 has a radially extending slot 16 and the circular wall 13 has a longitudinal slot 17 of narrower width than the slot 16, thus providing a pair of longitudinal guides or keys 18 which are employed for a purpose to be later explained. The plate portion 14 is also provided with a pair of diametrically opposite bayonet slots 20, which are used for securing the actuating unit 6 on the door in the manner to be explained hereinafter.

Secured to the flange 15 of the housing 12 is a removable sheet metal cover member 22 having a central hub 23. As shown in Figs. 2 and 4, the metal of the member 22 is slit on opposite sides of its horizontal center line and the material defined by the slits is folded laterally to provide a pair of vertically spaced flanges 24 which define a horizontal guideway 25 therebetween. Retaining ears 26 are folded vertically from the flanges 24 in overlying parallel relation to the plane of the member 22. Secured to the hub 23 is a sleeve 27 which forms substantially a continuation of the hub. Adapted to rotate in the hub 23, 27 is a tubular actuating spindle 30, which may be held axially in place in any suitable manner and which carries a door knob 31 at its outer end. The inner end of the tubular spindle 30, that is, the end extending into the housing 12, is cut away transversely to provide an arcuate retractor-actuating portion 33. The cover member 22 also has a lug 32 which aids in guiding the latch retractor member to be later described. Also mounted on the hub 27 is a circular escutcheon plate 34.

The latch-bolt actuating means 6 also includes a second spindle 36, which is rotatable in the hub portion 37 of a circular plate 38 disposed against the other side of the door 8. The spindle 36 has an inner narrowed retractor-actuating portion 40 and at its outer end carries a door knob 41. An escutcheon plate 42 is mounted on the hub 37 of the plate 38. The spindle 36 preferably is held axially in place by means of a spring-ring 43.

The narrowed portions 33 and 40 of the respective spindles 30 and 36 normally are disposed with the ends of their arcuate portions engaged against the side of a vertical portion 44 of a latch-bolt retractor member 45. The member 45 also has a transverse vertical base portion 46, 55 which rests against the inner surface of the

plate 22 and is adapted to slide laterally there-against. The member 45, which is constructed from sheet metal, has a pair of opposite laterally projecting arms or runners 47 which are connected by an arcuate portion 48. The connecting portion 48 is provided with a finger 49 extending parallel to the axis of the spindles 30 and 36. The member 45 thus is adapted to slide laterally in the guideway 25, and is held from displacement by the retaining ears 26 which overlie the runners 47, see Figs. 2 and 4. The latch-bolt retractor member 45 normally is held in the position shown in Fig. 2 under the influence of a coil spring 50 disposed between the vertical portion 44 and the wall 13 of the housing 12, the ends of the spring embracing lugs 51 and 52 on these parts. When either of the spindles 30 or 36 are rotated through substantially 180°, in either direction from the position shown in Fig. 2, the ends of their arcuate portions 33 or 40 act to slide the retractor member 45 toward the right, as viewed in this figure, to retract the latch-bolt in the manner explained hereinafter.

The latch-bolt unit 5 consists of a tubular bearing 55 of thin metal adapted to be slid inwardly into the transverse hole 9 of the door 8 and having a circular flange 56 at its outer end positioned against the edge of the door. The bearing 55 has a pair of diametrically opposite slots 57 (Fig. 3) adapted to receive the guide keys 13 of the housing 12. The latch-bolt 60 consists of a tubular sleeve 61 having an outer closed end or head 62, which is bevelled off on one side, as shown at 63 in Fig. 1, to adapt it to ride along the keeper of the lock (not shown) and to snap into the keeper opening, as is usual in locks or latching devices of this general type. The sleeve portion 61 is provided with a pair of longitudinally extending slots 65 through which extends a spring retainer element 66. Disposed within the sleeve portion 61 is a coil spring 67 having its opposite ends engaging against the inner end of the head 62 and the retainer element 66, respectively. The sleeve portion 61 also has a pair of opposite transverse slots or openings 68 adjacent its inner end, and it will be apparent that when the latch-bolt unit 5 is installed in the door 8 and the finger 49 disposed in either of the slots 68, the latch-bolt 60 may be withdrawn from its keeper by rotating either of the spindles 30 or 36.

The present invention provides an improved means for installing the latch-bolt actuating means 6 on doors of various thickness. To mount this means on the door 8, the housing 12 together with its enclosed parts is slid into the opening 7 in the door from one side thereof, and when slid completely into the door its flange 15 abuts the side of the door. The escutcheon plate 34 is then slid against the side of the door 8 to provide a neat joiner. After these parts have been disposed on the door, the assembly including the plate 38, spindle 36, knob 41, and escutcheon plate 42 is placed against the side of the door with the inner end 40 of the spindle 36 located in the operative position shown in the drawing. To retain the parts in place in the opening 7 of the door 8, I provide a pair of connecting pins or studs 70, which are suitably attached, as by riveting, to the inner surface of the plate 38. As shown in Fig. 1, the pins 70 are provided with a plurality of longitudinally-spaced circumferential slots 71, thus providing flanges or heads 72 between each two slots. The heads 72 are of a diameter to permit them to enter the enlarged

openings 73 at the ends of the bayonet slots 20 in the end wall 14 of the housing, and the slotted portions 71 of the pins are of a diameter to permit them to slide in the slots 20. It is thus apparent that by placing the plate 38 against the side of the door and entering the pins 70 in the enlarged portions 73 of the bayonet slots 20 and thereafter turning the plate in clockwise direction, as viewed in Fig. 3, the several parts are assembled together on the door. If preferred, the metal at the sides of the bayonet slots 20 may be bent to provide frictional resistance to turning of the pins 70 in the slots. It is to be noted that by providing a plurality of the slots 71 and heads 72 on the pins 70, the same latch-bolt actuating means 6 may be employed with doors of various thicknesses, the pins being of any suitable length and the appropriate number of slots 71 being provided for this purpose.

Prior to mounting the retracting unit 6 on the door, the latch-bolt unit 5 is slid into the hole 9 of the door 8, and as the housing 12 is slid into the hole 7 the guide keys 18 of the latter are caused to enter the slots 57 in the sides of the tubular bearing member 55 to retain the latch-bolt unit in the door. At the same time, the finger 49 enters one of the slots or openings 68 of the latch 60 to operatively connect the latch and the retractor member 45. It is to be noted that the latch-bolt unit 5 may be inserted in either of two positions so that the same unit can be employed with either left or right-hand doors.

With the locking device installed in the door 8 in the manner explained above, it is ready for operation. To operate the device either knob 31 or 41 may be turned to cause the inner arcuate ends 33 or 40 of the spindles 30 or 36 to urge the slidable retractor member 45 toward the right, as viewed in Fig. 2. Sliding movement of the retractor member 45 in this direction against the action of the spring 50 causes the finger 49 to draw the latch-bolt 60 inwardly in the bearing 55 against the influence of the spring 67 to withdraw the inclined end 62 of the bolt from the keeper of the lock. When the knob is released, the bolt 60 will be projected outwardly by the combined action of the springs 50 and 67. When the door is closed against its jamb, the bolt 60 will yield to permit its end 62 to ride across the keeper plate and then will be projected into the keeper opening in the usual manner.

It will be observed from the foregoing that my invention provides a particularly simple, yet highly efficient locking or latching device which may be employed on doors of wooden or metal construction. As one feature of improvement, the present invention provides a simple means for adapting the locking device to be installed on doors of various thicknesses without the use of screws or other separate fastening means, as used in prior locking devices of conventional types. The invention further provides a new and improved bolt-retracting member and means for slidably mounting this member within the housing of the lock and connecting it to the bolt. As a still further improvement, my invention provides an ingenious means for retaining the latch-bolt assembly within the door, and this means consists solely of the simple interengaging key-and-slot connection between the latch-bolt unit and the latch-bolt actuating unit. The locking device thus may be readily and quickly installed by a relatively inexperienced workman.

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While I have herein shown and described the improved door lock as embodied in a preferred form of construction, by way of example, it will be understood that various modifications may be made therein without departure from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door and including a slidable latch-bolt; spring means normally operative to project the outer end of said latch-bolt outwardly from the edge of said door; a latch-bolt actuating unit insertable in a transverse opening in said door and including a housing having an open end and a slot through which the inner end of said latch-bolt extends, said actuating unit also including a plate member adapted to enclose said open end of said housing and having a traverse guideway; a retractor member slidable in said guideway and operatively connected with the inner end of the latch-bolt, ears on said plate member overlying portions of said retractor member for retaining the same in said guideway; and means for moving said retractor in said guideway.

2. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door and including a slidable latch-bolt provided with an aperture adjacent its inner end; spring means normally operative to project the outer end of said latch-bolt outwardly from the edge of said door; a latch-bolt actuating unit insertable in a transverse opening in said door and including a housing having an open end and a slot through which the inner end of said latch-bolt extends, said actuating unit also including a plate member adapted to enclose said open end of said housing and having a transverse guideway; a retractor member slidable in said guideway and provided with a finger engageable in the aperture of said latch-bolt; ears on said plate member overlying portions of said retractor member for retaining the same in said guideway; and means for moving said retractor in said guideway.

3. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door and including a slidable latch-bolt; spring means normally operative to project the outer end of said latch-bolt outwardly from the edge of said door; a latch-bolt actuating unit insertable in a transverse opening in said door and including a housing having an open end and a slot through which the inner end of said latch-bolt extends, said actuating unit also including a plate member adapted to enclose said open end of said housing and having a transverse guideway; a retractor member having opposite runners slidable in said guideway and a connecting portion operatively connected with the inner end of the latch-bolt, said retractor member also having a plate portion extending between said runners; ears on said plate member overlying portion of said retractor member for retaining the same in said guideway; and means for moving said retractor in said guideway.

4. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door and including a slidable latch-bolt provided with an aperture adjacent its inner end; spring means normally operative to project the outer end of said latch-bolt outwardly from the edge of said door; a latch-bolt actuating unit insertable in a transverse opening in said

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door and including a housing having an open end and a slot through which the inner end of said latch-bolt extends, said actuating unit also including a plate member adapted to enclose said open end of said housing and having a transverse guideway; a retractor member having opposite runners slidable in said guideway and a connecting portion provided with a finger engageable in the aperture of said latch-bolt, said retractor member also having a plate portion extending between said runners; ears on said plate member overlying portions of said retractor member for retaining the same in said guideway; and means for moving said retractor in said guideway.

5. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door; and a latch-bolt actuating unit including a cylindrical housing adapted for insertion in a transverse opening in said door, said housing having a flange engageable against one side of said door, and also provided with an end wall disposed in said transverse opening, said end wall being provided with at least one arcuate bayonet slot, a plate engageable against the other side of said door, and at least one pin on said plate engageable in said bayonet slot to detachably connect said plate and said end wall to retain said housing in said transverse opening of said door, said pin having a plurality of longitudinally spaced beads, each adapted to engage the edges of said bayonet slot whereby to permit attachment of said actuating unit to doors of various thicknesses.

6. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door; and a latch-bolt actuating unit including a cylindrical housing adapted for insertion in a transverse opening in said door, said housing having a flange engageable against one side of said door, and also provided with an end wall disposed in said transverse opening, said end wall being provided with a pair of arcuate bayonet slots, and a pair of pins on said plate engageable in said bayonet slots to detachably connect said plate and said end wall to retain said housing in said transverse opening of said door, said pins having a plurality of longitudinally spaced beads, each adapted to engage the edges of said bayonet slots whereby to permit attachment of said actuating unit to doors of various thicknesses.

7. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door; a latch-bolt actuating unit insertable in a transverse opening in said door; means for interconnecting said units; said latch-bolt unit including a tubular bearing member, a latch-bolt slidable in said bearing member, and having a pair of longitudinal slots at its opposite sides and a latching portion at its outer end; a retainer element extending transversely across said bearing member and through said longitudinal slots; and a coil spring engageable between said retaining element and said latch-bolt, said spring being normally operative to project said latch-bolt outwardly; said latch-bolt actuating unit being operatively connected to said latch-bolt for moving the same against the action of said spring.

8. In a lock structure adapted for use on a door: a latch-bolt unit insertable in an opening in an edge of said door; a latch-bolt actuating unit insertable in a transverse opening in said

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door; means for interconnecting said units; said latch-bolt unit including a tubular bearing member, a hollow tubular latch-bolt slidable in said bearing member, and having a pair of longitudinal slots at its opposite sides and a latching portion at its outer end; a retainer element extending transversely across said bearing member and through said longitudinal slots; and a coil spring positioned within the tubular latch-bolt and engageable between said retainer element and the forward end portion of said latch-bolt, said spring being normally operative to project said latch-bolt outwardly; said latch-bolt actuating unit being operatively connected to said latch-bolt for moving the same against the action of said spring.

9. In a lock structure adapted for use on a door; a latch-bolt unit insertable in an opening in an edge of said door; a latch-bolt actuating unit insertable in a transverse opening in said door; means for interconnecting said units; said latch-bolt unit including a tubular bearing mem-

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ber and a latch-bolt axially reciprocable therein, the latch-bolt having an aperture adjacent its inner end and a latching portion at its outer end; said latch-bolt actuating unit including a housing; and a manually operable retractor member slidable transversely within said housing, said retractor member being provided with a finger extending transversely through the aperture of said latch-bolt for retracting the latter.

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