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DOOR LATCH AND LOCK

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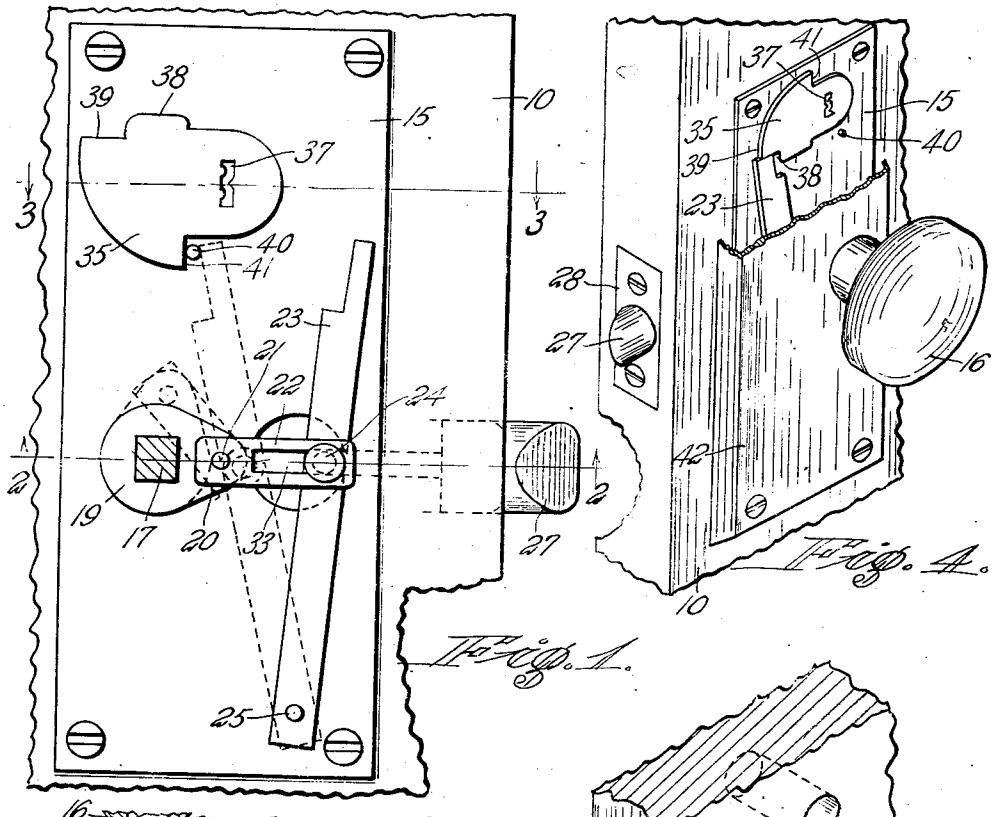


Fig. 1.

Fig. 4.

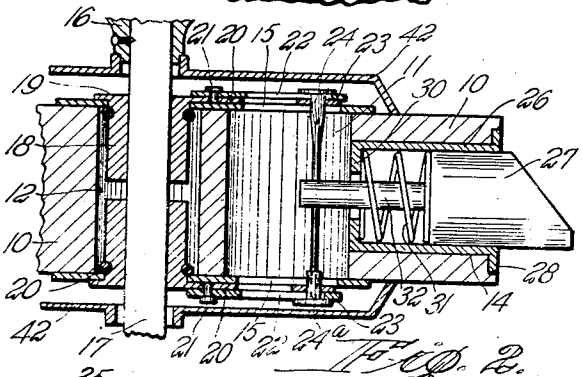


Fig. 2.

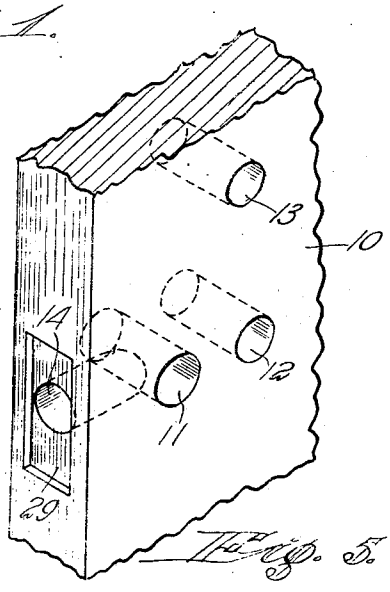


Fig. 5.

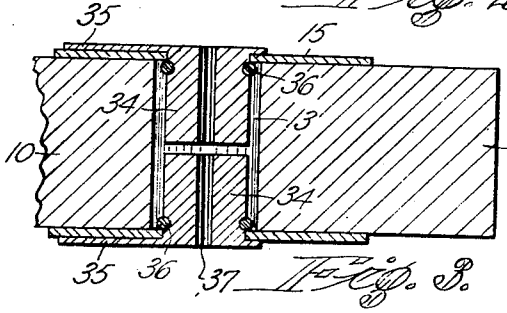


Fig. 3.

Inventor

ALFRED REGINALD JONES

By

Attorney

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DOOR LATCH AND LOCK

Alfred Reginald Jones, Burlington, Ontario, Canada

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5 Claims. (Cl. 70—153)

This invention relates to improvements in door latches and locks and consists essentially of a round combined spring latch and bolt slidingly operable within the door, novel means mounted on the opposite faces of the door for retracting the latch bolt against the urge of the spring in response to manipulation of the door knob and means for locking the latch bolt against retraction by the use of the door knob.

Door latch and lock mechanism is commonly encased as a unit, with door knobs and spindle separable from the unit, the latter being either applied to one face of the door, or mortised into the door from the edge, and commonly includes a protractable and retractable bevelled spring latch bolt retractingly responsive to manipulation of the door knob and also a protractable and retractable locking bolt operating subject to the turn of a key. The unit when placed on the face of the door is unsightly but very easily applied by drilling a round hole for the spindle. To obviate the unsightliness of this external type of unit it has become conventional practice to mortise the unit into the door, but mortising the unit consumes a great amount of time and painstaking labor. To overcome the skilled labor involved in mortising a unit various attempts have been made to provide satisfactory locks embodying cylinders in which the latching and locking mechanism is contained, the cylinders being applied by drilling round holes into the door from the edge. These types of locks however failed owing to the impracticability of compacting complicated mechanism within a necessarily small and round compass, and have been too expensive to produce on a commercial scale. Moreover, the use of these latter types of lock required the drilling of two holes in from the edge of the door, one for the latching bolt and one for the locking bolt since it has been found impracticable to produce a combined latching and locking bolt of this character. Furthermore, the drilling of two holes required factory precision in order to get them exactly parallel both with the faces of the door and to each other.

The principal object of the invention, therefore, is to provide a combined door latch and lock, the mechanism of which will be concealed but nevertheless applied mainly to the faces of the door in order to obviate the customary mortising.

A second important object is to provide a combined door latch and lock, the mechanism of which is concealed but nevertheless applicable to the door by merely drilling a plurality of round holes having a high degree of tolerance in the precision of position and parallelism.

A third important object is to provide a device of the kind described wherein the knob actuated retraction mechanism and the key actuated locking mechanism lie mainly in a compact flat position between the faces of the door and a conventional form of shallowly recessed escutcheons.

A fourth important object is to provide a device of the class described which will be simple, durable, efficient, easy to apply, and inexpensive to produce and to purchase.

With the above and other objects in view as will be hereinafter apparent, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawing and specifically claimed.

In the accompanying drawing like characters of reference indicate like parts in the several views, and:

Figure 1 is a face view of a portion of a door showing in connection therewith a door latch and lock as constructed in accordance with the present invention but with the escutcheon and door knob removed.

Figure 2 is a bottom sectional elevation taken on the line 2—2 of Figure 1.

Figure 3 is a top sectional elevation taken of the line 3—3 of Figure 1.

Figure 4 is a reduced perspective view including the escutcheon which is partially broken to show the locking tumbler in certain arm locking position.

Figure 5 is similarly a perspective view of the region of the door before application of the lock showing the round holes which are drilled for such application.

In the drawing a portion of a door is indicated by the numeral 10. In preparation of the door for the reception or application of the improved latching and locking device, round holes 11, 12 and 13 are drilled through the door from one face to the other, and a round hole 14 is drilled in horizontally from the edge of the door and into communication with the hole 11. These holes are preferably drilled with the use of a templet for proper arrangement.

In its present embodiment the invention consists of a flat face plate 15 screwed or otherwise suitably secured to one face of the door over the holes 11, 12 and 13, and a like plate is similarly secured in the same position to the opposite face of the door. In these plates there are holes cen-

trally aligned with the holes 11, 12 and 13 in the door but smaller in diameter to allow for tolerance of any inaccuracy occurring in properly spacing and directing the door holes.

A common door knob will be seen in Figure 4 indicated by the numeral 16. The door knob spindle 17, to which both knobs are removably fastened in the conventional or any suitable manner pass through conforming cores in bushings 18 which turn subject to the spindle 17 on manipulation of the knob 16. These bushings are journalled in the holes in the plates 15 which open to the hole 12 in the door and are provided with outside retention flanges 19, and inside the plates are conventionally provided with wire retention clips 20 disposed in conforming annular grooves. Formed with each flange 19 is a crank 20 carrying a crank pin 21. Pivoted to each crank pin 21 is a slotted drag-link 22 having slotted connection also with a reciprocal levelling arm 23 by means of a pin 24 which extends through the door hole 11 and through the corresponding holes in the plates 15. The arms 23 which are pivoted to the plates at 25 at a different level than the links extend upwardly and terminate well beyond the pin 24 when a certain locking device is to be used with the latch. Otherwise the arms may terminate lower at the pin.

In the hole 14 is arranged a sleeve 26 in which slides a round and bevelled latch bolt 27. The sleeve is provided with a face plate 28 which is preferably countersunk into the recess 29 in the edge of the door, and is held in position by screwing the face plate to the door. The sleeve 26 has a rear internal flange 30 and a helical spring 31 within the sleeve bears against the internal flange 30 and the bolt 27 urging the bolt to its projected position as shown in all the views. Concentrically extending from the base on the bolt 27 into the door hole 11 is a draw-bar 32 and through this draw-bar the pin 24 passes.

As previously set forth, the bolt 27 is retained in normal projected position by means of the spring 31, that is to say, in latched position. In that position, the bolt is engaged with the complemental keeper in the door jamb, which may be of any conventional or common type and hence is not shown. To withdraw the bolt from the keeper the door knob is turned in the common manner, thus turning the spindle 17 and with the spindle the crank 20. The movement of the cranks 20 transmitted to the bolt 27 through the slotted drag-links 22, draw bar 32 and pin 24, retracts the bolt against the compression of the spring 31. On releasing the door knob, the bolt 27 will obviously return to its protracted position under the urge of the spring 31, when at the same time the mechanism will revert to its normal position by reverse action common to spring latches. The levelling arm 23 keeps the draw-bar 32 in level position during the reciprocal movement of the bolt 27 thus keeping the latter from binding in the sleeve 26 which might otherwise occur by the lift of the crank. In closing the door it will be well understood that the bolt 27 will snap into position in the keeper without the use of the knob as is common in spring protracted bevelled bolts. In thus closing the door without the use of the knob the retraction of the bolt 27 will cause the pin to move back in the slots 33 in the drag-links 22. Thus the bolt on impinging the keeper will retract against the compression of the spring 31 and protract into the keeper without disturbing the door knob, the bushings 18, the cranks 20 or the links 22.

Journalled in holes in the plate 15 in registry with the hole 13 are opposed bushings 34 and formed with these bushings are flat tumblers 35. These bushings may be held in place similarly to the bushings 18 by wire clips 36. Through the bushings and through the tumblers 35 is a key hole 37. By the manipulation of a key it can be seen that these tumblers can be thrown from one side to the other, that is to say, into locked position and into unlocked position. In unlocked position one tumbler is shown in Figure 1 and in locked position the opposite tumbler is shown in Figure 4. Each tumbler has an offset obstructor 38 and when the tumbler is turned to locked position the obstructor 38 falls in the path taken by the arm 23 when the spindle 17 ordinarily operates to retract the bolt 27. Thus the retraction of the bolt 27 is prevented. In turning the tumbler 38 to this locked position it will be seen that a projection 39 engages the top of the arms 23 therefore acting as a stop for the tumbler in its arm locking position, whereupon the operator is aware that the tumbler is fully turned. Similarly a stop 40 limits the movement of the tumbler in its unlocked position by contact with the projection 41 thereon.

After the lock has been installed on the door and before the knobs are mounted, shallowly recessed escutcheons 42 are fitted to the door and enclose and exclude from sight all external mechanism. After the escutcheons have been fitted the knobs 16 may be mounted and set in the usual manner.

The lock here shown is fitted for a door opening toward the operator from the left. For a door operating toward the operator from the right the unit on one face of the door is simply reversed with that on the other.

The pin 24 is preferably provided with a permanent head on one end and a removable head 24*a* on the opposite end for easy assembly. The removable head may be constructed by providing it with a socket which is slidingly separable from the shank portion of the pin. The removable head is kept from accidently coming off the shank of the pin by the closely lying escutcheon.

Moreover, in the event of an attempt on the lock by an unauthorized person in removing one escutcheon and face plate 15 and then trying to extract the pin 24, only the detachable head 24*a* would respond. The pin itself is prevented from being pushed out the opposite side by the presence of the inaccessible opposite escutcheon and consequently the bolt invulnerable to independent manipulation.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, therefore, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

I claim:

1. In combination with a door, a spring protractable latch bolt holed into the door from the edge thereof and having a rearwardly extending draw-bar, a bolt retraction pin extending from one face of the door into a transverse hole in the door and connected to the draw-bar, a door knob spindle extending through a second transverse hole in the door and associated with a crank lying adjacent to a face of the door, a drag-link con-

necting the crank and the pin, and a levelling arm for the bolt, said arm being fulcrumed at another level than the bolt and pivotally associated with said link.

2. A latch bolt retraction unit consisting of a plate applicable to the face of a door and having round openings registerable with round transverse holes in a door to which the plate is applicable, a door knob spindle bushing revolvable in one of the plate openings and having a non-round core for the reception of a door knob spindle, a crank on said bushing, a slotted drag-link pivotally connected to the crank, and means associated with the slotted portion of the drag-link and arranged to extend through one of the openings and into one of the holes of a door from outside the face of the door there to connect with means associated with a latch bolt, and a leveller arm pivotally connected to one portion of the plate and pivotally associated with the slotted portion of the drag-link.

3. In a latch bolt retraction unit comprising a first assembly consisting of a plate applicable to one face of a door and having round openings registerable with round transverse holes in a door to which the plate is applicable, a door knob spindle bushing revolvable in one of the plate openings and having a non-round core for the reception of a door knob spindle, a crank on said bushing, a slotted drag-link pivotally connected to the crank, and a leveller arm pivotally connected to one portion of the plate and pivotally associated with the slotted portion of the drag-link, a similar second assembly applicable to the opposite face of a door, a pin loosely connected with the slotted portions of the drag-links and arranged to extend from one drag-link to the other through one of the openings in the door and to intermediately connect with means associated with a latch bolt.

4. In combination with a door, a spring protractable latch bolt holed into the door from the edge thereof and having a rearwardly extending draw-bar, a bolt retraction pin extending from a face of the door into a transverse hole in the door and connected to the draw-bar, a door knob spindle extending through a second transverse hole in the door and associated with a crank lying adjacent to the face of the door, a slotted drag-link connecting the crank and the pin, a levelling arm for the bolt, said arm being fulcrumed at another level than the bolt and pivotally associated with the slotted portion of said link and adapted to lie in a normal position while the bolt is normally protracted and to move to a second position with the link when the bolt is retracted in response to manipulation of the door knob and to also move to its second position independently of the link and along the slot therein when the bolt retracts automatically on impingement with a keeper, and a tumbler arranged to lie in one position out of the path of the arm and to be thrown to a second position into the path of said arm to intercept movement of the arm and consequently the bolt from normal position.

5. In combination with a door, a spring protractable latch bolt holed into the door from the edge thereof and having a rearwardly extending draw-bar, a bolt retraction pin extending from a face of the door into a transverse hole in the door and connected to the draw-bar, a door knob spindle extending through a second transverse hole in the door and associated with a crank lying adjacent to the face of the door, a slotted drag-link connecting the crank and the pin, a levelling arm for the bolt, said arm being fulcrumed at another level than the bolt and pivotally associated with the slotted portion of said link and adapted to lie in a normal position while the bolt is normally protracted and to move to a second position with the link when the bolt is retracted in response to manipulation of the door knob and to also move to its second position independently of the link and along the slot therein when the bolt retracts automatically on impingement with a keeper, a tumbler arranged to lie in one position out of the path of the arm and to be thrown to a second position into the path of said arm to intercept movement of the arm and consequently the bolt from normal position, and said tumbler and said arm lying on a common vertical plane.

ALFRED REGINALD JONES.