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LOCKABLE LATCH STRUCTURE FOR VERTICALLY SLIDABLE DOORS

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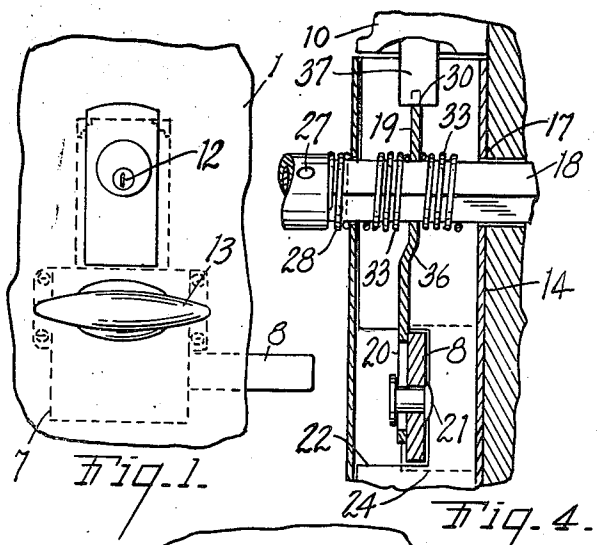


Fig. 1.

Fig. 4.

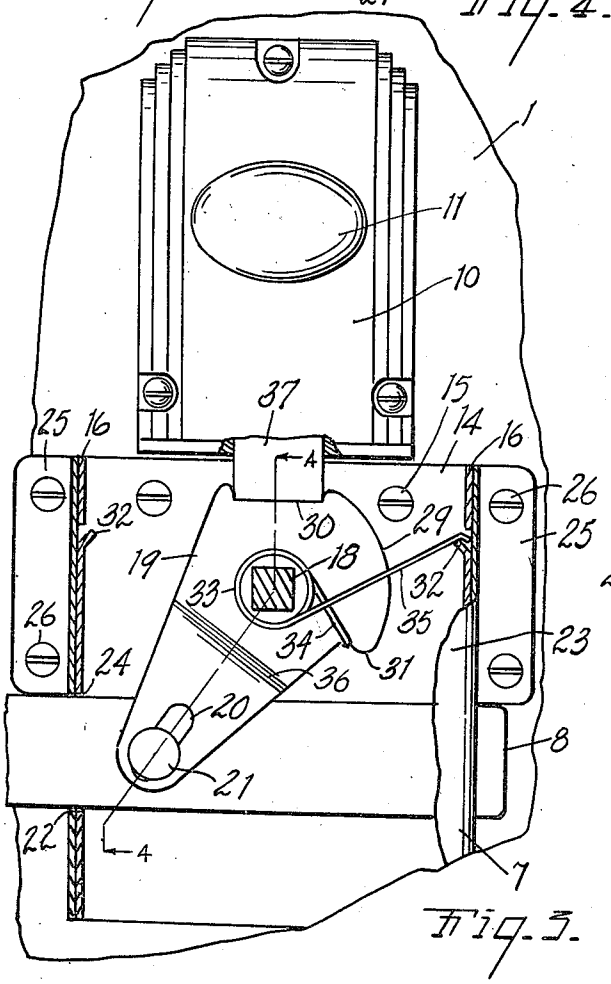


Fig. 3.

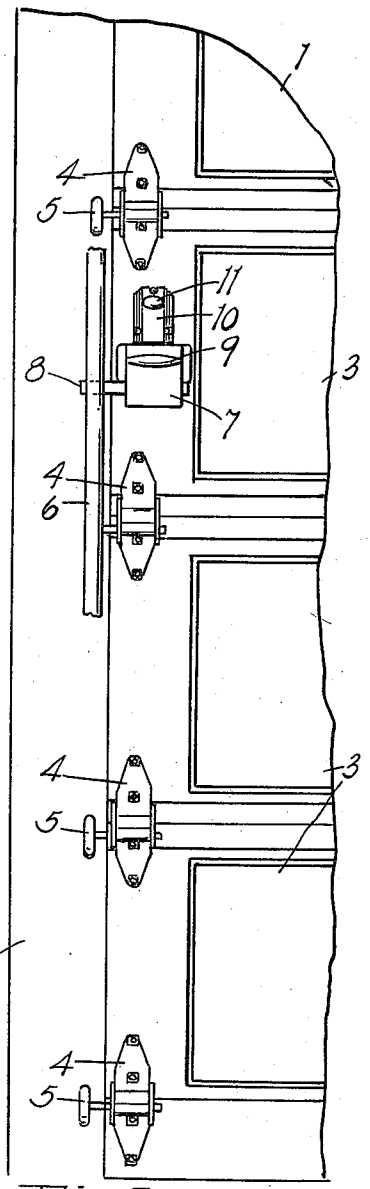


Fig. 2.

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LOCKABLE LATCH STRUCTURE FOR VERTICALLY SLIDABLE DOORS

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This invention relates to improvements in lockable latch structure for vertically slidable doors.

The principal objects of this invention are:

First, to provide a simple and inexpensive yet effective latch and lock structure for doors of the vertically slidably opening type.

Second, to provide a latch structure which is easily assembled and installed on a door.

Third, to provide a lockable latch structure which is spring biased to unlocked position so as to automatically unlatch the door when the lock mechanism is unlocked.

Fourth, to provide a door latch structure adapted to cooperate with a standard key operated lock and bolt so that the latch structure may be locked by the lock bolt.

Fifth, to provide a latch structure for a vertically slidable door which may be employed as a simple non-lockable latch and later converted to a lockable latch by the addition of a key operated lock bolt.

Other objects and advantages relating to details and economies of my invention will be apparent from a consideration of the following description and claims. The drawings, of which there is one sheet, illustrate a preferred form of my latch and lock structure.

Fig. 1 is a fragmentary front or outside elevational view of a door with my latch and lock structure in place thereon.

Fig. 2 is a fragmentary inside elevational view of the latch and lock structure installed on a door.

Fig. 3 is an enlarged fragmentary inside elevational view of the latch and lock with the cover for the latch partially broken away in vertical section.

Fig. 4 is a fragmentary cross sectional view through the latch structure taken along the plane of the line 4—4 of Fig. 3.

In the drawings I have illustrated a door 1 of the vertically slidable type mounted within a door opening formed in part by the side frame member 2. Doors of this type are commonly made up of several horizontally elongated sections 3 joined together by hinge structures 4. The hinge structures are provided with guide rollers 5, which are arranged to travel in a guide rail 6 mounted on the side frame 2 along the inner side of the door opening.

My latch structure includes a housing 7 mounted along one edge of the inner surface of the door and provided with a latch bolt 8 adapted to be extended into locking engagement with a keeper surface desirably formed in the side of

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the guide rail 6. An inner handle 9 is provided for operating the latch structure, and a key operated lock 10 is positioned above the housing 7 to cooperate with the latch structure, as will be described in detail presently. A manually operable knob 11 is provided on the lock for operation from the inner side of the door, as is common in locks of this type. The lock is provided with a lock cylinder and key hole 12 opening to the outer surface of the door, and an outer latch handle 13 is provided for operating the latch from the outside of the door.

As is most clearly illustrated in Figs. 3 and 4, the latch structure consists of an inwardly opening channel shaped base member 14 having its web portion secured to the inner surface of the door as by the screws 15 with its channel flanges 16 disposed vertically of the door. The web of the base 14 defines an opening 17 for the door handle shaft 18, which extends through the door and latch housing as illustrated. At least the middle portion of the handle shaft 18 within the latch housing and preferably the entire shaft is of non-circular cross section.

A latch operating arm 19 has a non-circular hole formed in one end thereof and is non-rotatably received over the handle shaft 18 within the housing 7. The arm 19 has a slot 20 formed therein and extending radially from the handle, and the slot slidably receives a pin 21 secured to the latch bolt 8 so that rotation or oscillation of the handle shaft and latch arm will reciprocate the latch bolt between door latching and unlatching positions.

The latch bolt 8 is guidingly supported in inwardly opening notches 22 formed in the side flanges 16 of the base. The latch bolt is retained in the notches by the cover 23 of the housing 7. The cover is also of channel shaped cross section and fits telescopically over the base member 14. The side flanges of the cover are notched from their forward or outer edges as at 24 to cooperate with the notches 22 in the base in forming guide openings for the latch bolt 8. Laterally outwardly turned ears 25 on the cover permit its easy attachment to the door by the screws 26.

The outer door handle 13 and the inner door handle 9 are non-rotatably secured to the handle shaft 18 in any of several convenient methods. In the example illustrated, I provide an inner handle 9 which is axially removable from the handle shaft and secured thereto as by the pin 27 (see Fig. 4). A coil spring 28 is compressed between the cover 23 and the shank of the handle

13 to bias the handles and shaft inwardly of the door and prevent rattling.

The latch structure thus far described is obviously operative to latch the door and can be operated from either the inside or outside of the door. In order that the latch structure can be immediately or later converted to a spring biased lockable latch, the upper end of the latch operating arm 19 is provided with an arcuate bolt blocking edge 29 with a bolt receiving notch 30 formed therein. The notch 30 is angularly arranged on the arm 19 so as to face outwardly and upwardly of the housing when the latch bolt 8 is in latched position as shown in Fig. 3. The bolt blocking edge 29 terminates in a spring anchor hook or notch 31. The side flanges 16 of the base are provided with inwardly struck anchor ears 32 on each side of the shaft 18.

In converting the latch to a spring biased latch, the cover 23, latch bolt 8 and latch operating arm 19 are removed inwardly of the handle shaft 18, and a double coil spring 33 is placed sidewise over the latch operating arm 19 with half of the coils of the spring on each side of the arm, as is best illustrated in Fig. 4. The adjacent turns of the two sections of the spring 33 are connected by a U-shaped integral extension 34 of the spring wire which engages the anchor notch 31 of the latch operating arm, as shown in Fig. 3. The outer ends of the spring 33 are extended in fixed anchors 35, and the ends of these anchors 35 are engaged with one of the locking ears 32 in the base member as the spring and latch operating arm are reassembled axially over the handle shaft 18. It will be noted that the lower end of the latch operating arm 19 is axially offset as at 36 so that the latch bolt, operating arm and spring can be assembled in either right or left hand position relative to the base member for operation along the right or left hand sides of a door. After the latch bolt and spring are assembled on the base with the bolt in unlatched position and the spring 33 in substantially unstressed condition, the inner cover 23 and handle 27 are installed as previously described.

The lock housing 10 can then be easily mounted on the inner surface of the door immediately above the housing 7 and with the lock bolt 37 directed downwardly toward the latch structure. Note that in the unlatched position of the operating arm 19, the lock bolt 37 will engage and be held in retracted position by the blocking edge 29 on the end of the latch operating arm. As the latch bolt and operating arm are rotated to door latching position by either of the door handles, the locking notch 30 will come into registry with the lock bolt 37, and the bolt will extend into locking engagement therewith. Preferably the lock 10 is of the self-closing spring pressed type which automatically engages the bolt with the latch arm. Concurrently the spring 33 will have been tensioned so that later retraction of the lock bolt, either by use of a key from the outside of the door or by operation of the knob 11, will result in the latch operating arm and latch bolt being automatically retracted.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Lockable latch structure comprising, a base of channel shaped cross section adapted to be secured to the inner face of a door and along one side thereof with the flanges of the channel extending vertically, said flanges each having an upwardly facing anchor surface formed thereon toward the upper end thereof, a rotatable door handle shaft of non-circular cross section extending through said base, a latch bar transversely slidably mounted in the flanges of said base and below said shaft and adapted to project laterally from said door into engagement with a keeper, the flanges of said base having notches formed therein receiving said bar, a latch operating arm having a non-circular hole therein non-rotatably receiving said shaft, a radially extending slot in said arm, the end of said arm having the slot therein being offset from the plane of the remainder of the arm, a pin slidable in said slot and secured to said latch bar, a double coil spring sleeved around said shaft with part of the coils of the spring on each side of said arm, the mid portion of said spring being extended in a U-shaped arm and engaged with a notch in the periphery of said arm, the end portions of said spring being radially extended and lockingly engaged with one of said anchor surfaces whereby rotation of said shaft and movement of said arm and latch bar to door latching position will tension said spring, a cover for said base adapted to be secured to said door exteriorly of the sides of said base and coacting with said base to retain said latch bar in operative position, an inner door handle removably secured to said shaft inwardly of said cover, and a coil spring positioned around said shaft and compressed between said cover and said inner handle to bias said shaft inwardly of said door, the periphery of said arm having an arcuate bolt blocking edge with a lock bolt receiving notch therein registering with the open end of said base in the door latching position of said arm and latch bar.

2. Lockable latch structure comprising, a base of channel shaped cross section adapted to be secured to the inner face of a door and along one side thereof with the flanges of the channel extending vertically, said flanges each having an upwardly facing anchor surface formed thereon toward the upper end thereof, a rotatable door handle shaft of non-circular cross section extending through said base, a latch bar transversely slidably mounted in the flanges of said base and below said shaft and adapted to project laterally from said door into engagement with a keeper, the flanges of said base having notches formed therein receiving said bar, a latch operating arm having a non-circular hole therein non-rotatably receiving said shaft, a radially extending slot in said arm, the end of said arm having the slot therein being offset from the plane of the remainder of the arm, a pin slidable in said slot and secured to said latch bar, a coil spring sleeved around said shaft, a portion of said spring being engaged with a notch in the periphery of said arm, the end portion of said spring being radially extended and lockingly engaged with one of said anchor surfaces whereby rotation of said shaft and movement of said arm and latch bar to door latching position will tension said spring, a cover for said base and coacting with said base to retain said latch bar in operative position, and a door handle removably secured to said shaft, the periphery of said arm having an arcuate bolt blocking edge with a lock bolt receiving notch therein registering with the open end of said base in the door latching position of said arm and latch bar.

3. Lockable latch structure comprising, a base of channel shaped cross section adapted to be secured to the inner face of a door and along one side thereof with the flanges of the channel ex-

tending vertically, a rotatable door handle shaft extending through said base, said base having an anchor surface disposed in radial relationship with said shaft, a latch bar transversely slidably mounted in the flanges of said base and below said shaft and adapted to project laterally from said door into engagement with a keeper, the flanges of said base having notches formed therein receiving said bar, a latch operating arm having a non-circular hole therein non-rotatably receiving said shaft, means drivingly connecting said latch bar to said arm for reciprocation thereby, a coil spring sleeved around said shaft, one end of said spring being engaged with a portion of said arm disposed radially of said shaft, the other end of said spring being extended and lockingly engaged with said anchor surface on said base whereby rotation of said shaft and movement of said arm and latch bar to door latching position will tension said spring, a cover adapted to be removably secured over said base and having a hole passing said shaft and coacting with

said base to retain said latch bar in operative position, and a door handle removably secured to said shaft, the periphery of said arm having an arcuate bolt blocking surface with a lock bolt receiving notch therein registering with the open end of said base in the door latching position of said arm and latch bar.

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