Sept. 23, 1947. E. N. HOWELL 2,427,909

LOCKING DEVICE

Filed Sept. 13, 1944

Fig. 1

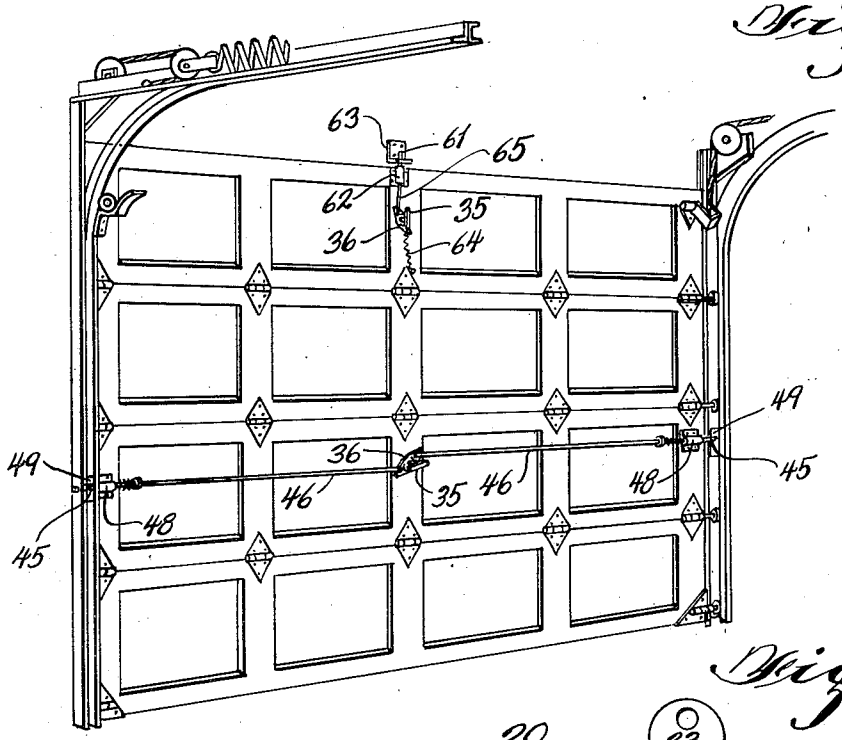


Fig. 2

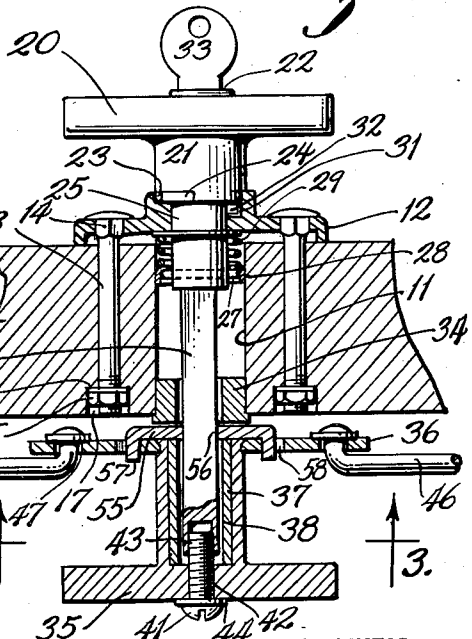


Fig. 3

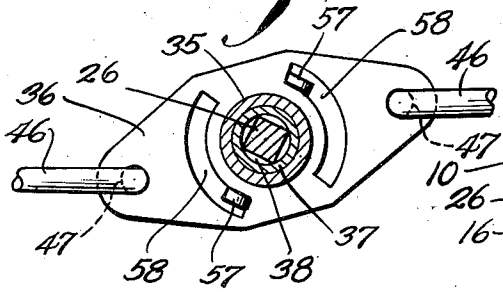
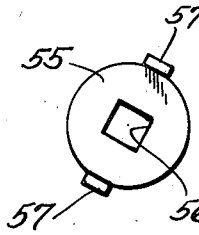


Fig. 4



INVENTOR.

Edward N. Howell

BY

L. F. Hammand

Atty.

Patented Sept. 23, 1947 2,427,909

UNITED STATES PATENT OFFICE

2,427,909

LOCKING DEVICE

Edward N. Howell, Arlington, Va.

Application September 13, 1944, Serial No. 553,880

6 Claims. (Cl. 70—216)

1

The present invention relates to locking devices, and more particularly to a locking device especially adapted for use in connection with sectional overhead doors of the general type disclosed in United States Patent No. 2,276,976.

In doors of this general design, it is customary to provide a pair of spring latches or a pair of dead bolts positioned on the opposite vertical edges of the door and controlled by a common handle located in the center of the door. Usually, the individual latches or deadbolts are actuated from the central handle by control rods or chains. In some cases a lock is positioned adjacent to the central handle so that the bolt of the lock will prevent movement of the handle and will thus secure the latches against release.

The general object of this invention is to provide an improved locking device particularly suited to the control of one or more latch bars whereby a large sectional door may be secured. More specifically, the prime object of the present invention resides in the provision of a lock or simplified structure, well adapted to economical mass production methods of manufacture, and of concentric design; so that the entire lock structure may be mounted in a single cylindrical opening through the door. In addition to the above, the present invention contemplates the provision of a lock having a selective control so that the door may be locked from the exterior side of the door and yet the bolts may be released from the inside.

A further object of the invention resides in the provision of a locking structure as above, having its several parts so designed and inter-related that the locking unit may be easily assembled or disassembled, and will be equally adapted to the use on a door having two oppositely disposed latches, or having a single vertical latch at the center of the door.

The foregoing objects of the invention are accomplished in the preferred embodiment illustrated in the drawings by the provision of a novel central locking unit including an interior and exterior handle in coaxial relationship with each other; together with a cylinder lock to cause the latches to be locked from the exterior of the door, but under control of the interior handle. The relationship of the interior and exterior handles is concentric, with their axes in line with each other, so that the entire locking structure may be installed on the door in a single opening of relatively small diameter, so that the installation of the lock may be expeditiously done with ordinary carpenter's tools, and will not require

2

cutting odd shaped openings or drilling multiple bores to house the lock.

Referring now to the drawings of the present specification,

Figure 1 is a perspective view of a sectional folding door showing two alternative methods of installing the lock.

Figure 2 is a detail cross sectional view of the preferred embodiment of the present invention.

Figure 3 is a sectional view taken substantially on the plane of the line 3—3 in Figure 2 and illustrating the latch control lever associated with the interior lock handle.

Figure 4 is a detail plan view of an operating plate forming a part of the lock structure.

The type of structure illustrated in the drawings has been chosen as best illustrative of the principles of this invention. The lock is installed on the door portion 10 within a single bore 11 extending completely through the door. This bore is cylindrical and is sufficiently small so that it may be drilled by the use of an ordinary carpenter's brace. Further, since it is of cylindrical form, it will not require any routing or chiseling of the door. The exterior surface of the door is finished by an escutcheon plate 12 which may be secured to the door in any desired manner. In case of a metal or metal covered door this plate 12 may be formed integrally with the door or welded to its surface, but in the structure illustrated, and intended for use on a door of wooden construction, the plate 12 is secured to the door by a pair of carriage bolts 13 locked against rotation in the escutcheon 12 by squared shank portions 14. The opposite ends of the carriage bolts 13 are secured by the nuts 15 bearing against the washers 16 in the countersunk openings 17.

The exterior handle 20 of the door includes a shank portion 21 in which a rotatable cylinder lock 22 of any conventional type is positioned. The shank 21 extends through the plate 12 but the shank and the escutcheon plate are interlocked by the lug 23 and groove 24 so that the rotary motion of the handle 20 with respect to the escutcheon plate is limited.

The interior end of the shank of the handle 20 includes a portion 25 of reduced diameter in which one end of a square actuating shaft 26 is secured by means of a cross-pin 27. The cross-pin 27 is maintained in position by a flanged washer 28. Frictional engagement between the escutcheon plate 12 and the handle 20 is established by a relatively light coil spring 29 interposed between the flanged washer 28 and the

inner surface of the escutcheon 12. The inner surface of the escutcheon 12 also includes a keeper notch 31 in alignment with the transverse bolt 32 of the cylinder lock 22, so that if the bolt 32 is extended into the keeper 31 it will be impossible to rotate the handle 20. However, when the key 33 of the cylinder lock 22 is turned, the bolt 32 will be withdrawn into the lock cylinder so that the handle 20 may rotate with respect to the escutcheon plate 12. The actuating shaft 26 extends through the bore 11 of the door and is rotatable in a bushing 34 pressed into the bore 11 adjacent the interior surface of the door. The square actuator shaft 26 is thus mounted for rotation between the handle 20 on the exterior side of the door and the bushing 34 on the interior side.

The shaft 26 serves to support and provide a rotatable mount for an interior door handle 35, which is formed integrally with or permanently affixed to a double-ended operating lever 36. For this purpose, the handle 35 and operating lever 36 are provided with a cylindrical interior sleeve 37 having a bore 38 of such size as to rotate freely over the square shaft 26 and the handle 35 is secured to the shaft 26 by a screw 41 threaded through the threaded portion 42 of the handle and into a tapped opening 43 in the square actuator shaft 26. The screw 41 is locked in position on the handle by a lock washer 44.

From the foregoing it will be seen that the screw 41 acts as a pivot between the square actuator 26 and the interior handle 35 so that although the screw maintains the two parts in coaxial relationship, the handle is free to rotate with respect to the actuator shaft. Since the handle 35 is rigidly secured to the control lever 36, these two members will turn together and will serve to control the two latch bolts 45 of the door. The bolts 45 are actuated by a pair of rigid control rods 46 extending to the bolts from the openings 47 in the lever 36.

The latches 45 are slidably mounted in brackets 48 and are positioned so that they engage the keepers 49 on the door frame when the door is moved to closed position. It is contemplated that the latch bolts 45 will be provided with coil springs 51 so that the latch bolts will be spring urged into the keepers, although an alternative construction may be used in which these springs are omitted. In either case the movement of the latch bolts 45 is controlled by the rotation of the lever 36, so that when the lever is rotated in a counterclockwise direction (as viewed in Figure 3) the control rods 46 will draw the bolts inwardly against the action of the springs.

As before stated, the interior handle 35 and the lever 36 are freely rotatable on the square actuator shaft 26. In order to establish a mechanical connection so that the rotation of the exterior handle 20 and the shaft 26 will actuate the latch bolts 45, an operating plate 55 is interposed between the lever 36 and the actuator 26. This plate 55 is provided with a central square opening 56 fitted over the actuator 26, and has on its outer edges a pair of lugs 57, each of which engages an elongated arcuate slot 58 in the lever 36. The lugs 57 and slots 58 provide a lost-motion connection between the indexing plate 55 and the control lever 36. In addition, the plate 55 serves as an indexing member, and performs the function of positioning the lever 36 in different attitudes; that is, when the lock is being used for the control of two latchbolts positioned horizontally on the opposite edges of the door the plate 55 may be positioned as indicated in Figure 3 to locate the control lever 36 so that the latchbolts are each urged inwardly in response to a counterclockwise rotation of the interior handle 37. It is also contemplated, however, that the locking device illustrated may be used for the control of a single bolt, as illustrated by the vertical bolt 61 slidably mounted in a bracket 62 to be urged upwardly into its engagement with the keeper 63 by means of a spring 64 (see Figure 1). When used in this manner, the plate 55 may be rotated 90° counterclockwise with respect to the actuator 26 so that the lever 36 lies in a position 90° removed from that shown in Figure 3. At this time, the lever 36 will serve to control the bolt 61 by drawing it downwardly by the control rod 65. Thus it is unnecessary to alter the positioning of the outer escutcheon of the lock in order to control either vertical or horizontal latchbolts associated with the door.

It is believed that the general mode of operation of the device will be readily apparent from the foregoing structural description. However, it may be pointed out that when the cylinder lock 22 is unlocked the transverse bolt 32 will be withdrawn from the keeper notch 31, so that when the handle 20 is manually rotated the movement will be transmitted through the actuator 26 to the plate 55. To open the door, the handle 20 will be rotated in a clockwise direction (as viewed from the outside of the door) which will rotate the disc 55 in a counterclockwise direction (Figure 3). As the plate 55 is moved, the lugs 57 will engage the ends of the slots 58 and move the double ended control lever 36 in a counterclockwise direction until the rods 46 withdraw the bolts 45 from their keepers and permit the door to be opened.

When the cylinder lock 22 is locked, the transverse bolt 32 will be seated in the keeper notch 31 and it will not be possible to rotate the exterior handle 20. Under these circumstances, the springs associated with the latch bolts will maintain the latchbolts in engagement with the keepers and the door will be secure.

However, if it is desired to open the door from the interior side, the handle 35 may be rotated to swing the double-ended control lever 36 in counterclockwise direction and withdraw the latchbolts from their keepers. This operation takes place without moving the indexing plate 55, due to the lost-motion connection provided by the lugs 57 and slots 58 in the lever 36.

Thus by the use of the invention here disclosed, a structure is provided that may be conveniently installed in a single, small, cylindrical opening through a door, and will accomplish selective control to a pair of spring latches, so that the door may be locked from the exterior side but may be readily opened from the interior. Further, this is accomplished without the necessity of resorting to structures requiring elaborate alteration or cutting of the door to provide satisfactory mounting.

In addition, the particular combination and relationship of parts disclosed provides a symmetrical unit of neat and pleasing appearance, including a unique arrangement for maintaining the several parts in assembled relationship. That is, the parts of the device comprise a fixed subassembly of the exterior parts, together with an interior sub-assembly secured in operating relationship by one screw only. Thus the fixed exterior sub-assembly, consisting of the escutcheon plate 12, handle 20, lock 22, actuator 26, pin 27,

washer 28 and friction spring 29 may be permanently assembled at the factory and need never be disassembled, since the sub-assembly may be mounted on the door merely by inserting the bolts 13 and tightening the nuts 15.

The interior sub-assembly is completed by slipping the bushing 34 over the actuator and into the bore 11, positioning the plate 55 and the lever and handle structure 35—36 on the end of the actuator, and inserting the screw 41. The lever 36 conceals the interior ends of the bolts 13, so that the handle presents a neat appearance, while the single screw 41 secures all of the parts in operating position.

While the foregoing disclosure describes the present preferred embodiment of the invention in accordance with the patent statutes, it is obvious that numerous changes and modifications may be made without departing from the scope of the invention as defined by the appended claims.

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

1. A locking device comprising an exterior sub-assembly including a rotatable handle and an actuator shaft adapted to extend through the thickness of a door and to project a substantial distance on the interior side; together with a bearing to support the actuator shaft at a point remote from the exterior handle, an interior handle supported by and rotatably mounted on the actuator shaft, a screw member in threaded relationship with both the handle and the actuating shaft to maintain the parts in assembled relationship, and means to lock the screw member in fixed position with respect to the handle.

2. A locking device comprising an exterior sub-assembly including a rotatable handle and an actuator shaft in axial alignment with the handle and adapted to extend through the thickness of a door; together with an operating member in non-rotatable relationship with respect to the actuator shaft; a lever supported by and rotatably mounted on the actuator shaft; at least one latch bolt controlled by said lever; a lost-motion connection interconnecting said lever and the aforementioned operating member; an interior handle to move said lever; and a screw member in threaded relationship with both the interior handle and the actuating shaft, said screw being adapted to maintain all of the aforementioned parts in assembled relationship.

3. A locking device comprising an exterior sub-assembly including a rotatable handle, a locking structure associated with said handle, a bolt to prevent rotary movement of said handle, and an actuator shaft in axial alignment with the handle and adapted to extend through the thickness of a door and to project a substantial distance on the interior side; all of the aforementioned parts being mechanically interlocked to maintain themselves in assembled relationship; together with a bearing to support the actuator shaft at a point remote from the exterior handle, an operating plate in non-rotatable relationship with respect to the actuator shaft, a handle supported by and rotatably mounted on the actuator shaft, a double-ended lever carried by the handle, a lost-motion connection interconnecting said double-ended lever and the aforementioned operating member, and a screw member in threaded relationship with both the handle and the actuating shaft, said screw being adapted to maintain all of the parts in assembled relationship.

4. In a locking device adapted for mounting in a single cylindrical bore through a door frame, the combination of an exterior sub-assembly consisting of an escutcheon plate adapted to lie against the face of the door frame and surround the bore, an exterior handle, an actuator rod, a cylinder lock coaxial with the handle and having a bolt portion to prevent rotary movement of the handle with respect to the escutcheon plate, and means to engage the walls of the bore to position the entire exterior sub-assembly in a position coaxial with the bore; said means including a flanged member rotatably mounted with respect to the exterior handle; together with an interior sub-assembly including a latch operating lever and a handle mounted on and supported entirely by the actuator rod; and means for positioning the interior sub-assembly in coaxial relation with the exterior sub-assembly; said means comprising a bearing adapted to be fitted within the walls of the interior end of the bore through the door frame, and between the door and the interior sub-assembly; the bearing having a center hole to surround and support the actuator rod.

5. In a locking device adapted for mounting in a single cylindrical bore through a door frame, the combination of an exterior sub-assembly consisting of an escutcheon plate adapted to lie against the face of the door frame and surround the bore, an exterior handle, an actuator rod, a cylinder lock coaxial with the handle and having a bolt portion to prevent rotary movement of the handle with respect to the escutcheon plate, and means to engage the walls of the bore to position the entire exterior sub-assembly in a position coaxial with the bore; said means including a flanged member rotatably mounted with respect to the exterior handle; together with an interior sub-assembly including a latch operating lever and a handle mounted on and supported entirely by the actuator rod; and means for positioning the interior sub-assembly in coaxial relation with the exterior sub-assembly.

6. In a locking device adapted for mounting in a single cylindrical bore through a door frame, the combination of an exterior sub-assembly consisting of an escutcheon plate adapted to lie against the face of the door frame and surround the bore, an exterior handle, an actuator rod, a cylinder lock coaxial with the handle and having a bolt portion to prevent rotary movement of the handle with respect to the escutcheon plate, and means to position the entire exterior sub-assembly in a position coaxial with the bore; together with an interior sub-assembly including a latch operating lever and a handle; and means for positioning the interior sub-assembly in coaxial relation with the exterior sub-assembly.

EDWARD N. HOWELL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
929,637	Thomas	July 27, 1909
1,654,489	Teich	Dec. 27, 1927
1,858,804	Carlson	May 17, 1932
1,883,119	Toncray	Oct. 18, 1932