March 10, 1953 N. A. WELCH 2,630,697

DOOR LOCK

Filed Feb. 23, 1951

Fig. 1.

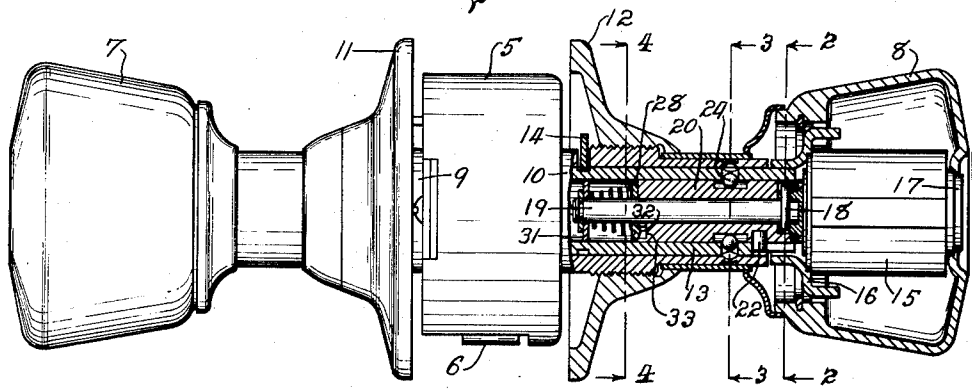


Fig. 2.

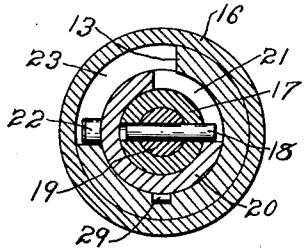


Fig. 3

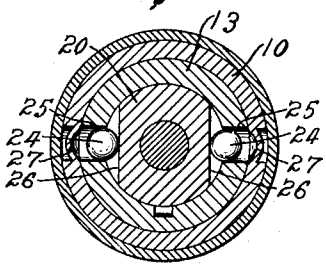


Fig. 4.

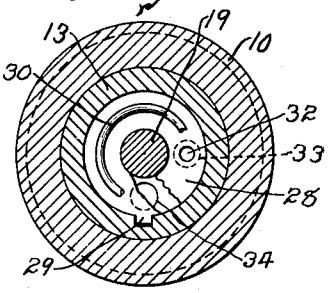


Fig. 5.

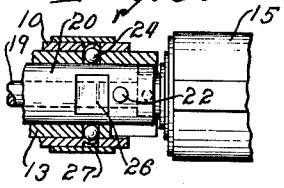


Fig. 6

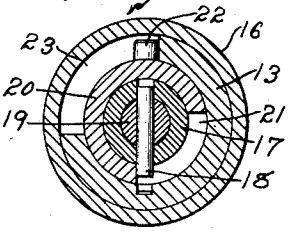


Fig. 7.

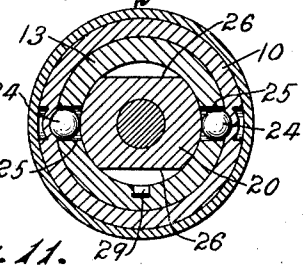


Fig. 8.

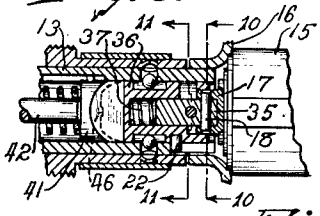


Fig. 10.

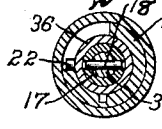


Fig. 11.

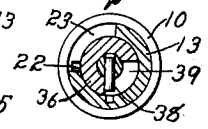
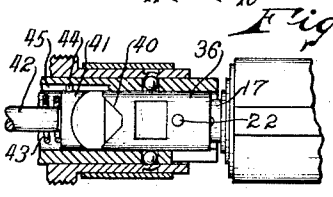


Fig. 9.



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DOOR LOCK

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Application February 23, 1951, Serial No. 212,402

9 Claims. (Cl. 70—216)

1

This invention relates to a door lock and more particularly to locks having operating members, such as a knob, which is adapted to be locked against movement so as to prevent operation of the lock mechanism.

An object of this invention is to provide novel and highly efficient means for locking the operating member of a door lock against rotation to thereby prevent unauthorized operation of the lock.

A further object of this invention is to provide a novel locking mechanism which is particularly adapted for door locks of the cylindrical type and which is economical to produce.

Further objects and advantages of this invention will be more clearly understood from the following description and the accompanying drawings in which:

Fig. 1 is a plan view of a door lock of the cylindrical type with a portion thereof being shown in central horizontal section and showing the locking mechanism in unlocked position.

Fig. 2 is an enlarged sectional end view on line 2—2 of Fig. 1 and with the knob omitted.

Fig. 3 is a sectional view on line 3—3 of Fig. 1.

Fig. 4 is a similar view on line 4—4 of Fig. 1 and with the rose omitted.

Fig. 5 is a sectional plan view of a portion of the locking mechanism showing the same in locked position.

Fig. 6 is a view similar to Fig. 2 but showing the mechanism in locked position.

Fig. 7 is a view similar to Fig. 3 but showing the mechanism in locked position.

Fig. 8 is a sectional plan view of a portion of the mechanism illustrating a modified form of the invention.

Fig. 9 is a similar view but showing the mechanism in locked position and the cam member in elevation.

Fig. 10 is a sectional end view on line 10—10 of Fig. 8.

Fig. 11 is a similar view on line 11—11 of Fig. 8.

As illustrated in the drawings, a door lock embodying the present invention may comprise a case 5 which is preferably of the cylindrical type and contains a latch operating mechanism, such as shown in the co-pending application of Ernest L. Teich et al., Serial No. 211,939, filed February 20, 1951, which includes a retractor 6 that is operatively connected to a suitable latch member, not shown, and operated by the rotation of either the inner knob 7 or the outer knob 8 to retract the latch from its latching position when it is desired to open the door.

2

Each of said inner and outer knobs are rotatably mounted in tubular sleeves 9 and 10, respectively, which project from opposite sides of the case 5 and have threaded thereto suitable roses 11 and 12 that fit against the outer surfaces of the door and secure the lock thereto in operative position.

As shown in Fig. 1, the outer knob 8 has projecting therefrom a tubular spindle 13 which extends into the sleeve 10 and is preferably rotatably secured therein by a suitable securing member 14; the said knob 8 being preferably hollow and having a cylinder lock 15 of conventional form which is mounted therein and secured in position by means of a flange 16 that is rigidly connected to the spindle 13 in the manner clearly described in the co-pending application of Nicholas A. Welch, et al., Serial No. 208,743; the said lock 15 having a key plug 17 which projects through an opening in the front wall of the knob 8 and is thereby rendered accessible to receive a key for the operation thereof.

The said plug 17 projects inwardly from the lock 15 and has secured thereto, by means of a pin 18, a shaft 19 which extends into the spindle 13 and has rotatably mounted thereon a cam member 20 which has a sectoral notch 21 that receives the projecting end of the pin 18 and thereby provides a lost motion connection for operatively connecting the said cam member with the inner end of the key plug 17. The pin 18 is in the position illustrated in Fig. 2 when the locking mechanism is unlocked.

The said cam member has a stop pin 22 projecting radially therefrom into a sectoral notch 23 in the spindle 13 to thereby permit rotation of the cam member 20 independently of the spindle within a predetermined limit which, in the present case, is for the distance of 90 degrees. In addition, the pin 22 permits rotation of the spindle 13 by the key plug to cause retraction of the retractor 6.

In order to provide for locking the outer knob 8 against rotation and thereby prevent the operation of the lock, there is included in the said mechanism a pair of locking balls 24 which are movable in radial openings 25 in the spindle 13 by means of cam surfaces 26 on the cam member 20 so that when the cam member is rotated by the key operation of the key plug 17, the said locking balls will be projected into locking notches 27 in the sleeve 10 and thereby prevent rotation of the spindle 13 and consequently prevent operation of the retractor 6 by the outer knob 8.

In the construction shown in Fig. 1, the mecha-

nism preferably includes a retaining washer 28 which is slidably secured to the spindle 13 by a tongue and groove connection 29 and is urged against the end of the cam member 20 by means of a spring 30 that is anchored against a washer 31 secured to the end of the said shaft. The retaining washer 28 is provided with a projection 32 which extends into spaced recesses 33 and 34 in the end of the cam member to thereby yieldingly retain the said member in predetermined positions relatively to the spindle 13.

The operation of the above improved locking mechanism is as follows:

When the said mechanism is in the unlocked condition shown in Fig. 1, the cam surfaces 26 are in register with the balls 24 and will permit said balls to move inwardly in the radial openings 25 of the spindle 13 so that the said spindle may be rotated within the sleeve 10 when it is desired to operate the retractor 6 by means of the outer knob 8.

When it is desired to lock the said mechanism, so as to prevent operation of the retractor 6 by the outer knob 8, the key plug is rotated by a suitable key in a clockwise direction, as viewed in Fig. 2, and this will in turn rotate the pin 18 and, since it is in engagement with the end of the notch 21, it will also rotate the cam member 20 for a quarter turn until the stop pin 22 engages the end of the sectoral notch 23, as shown in Fig. 6, and the cam member is in the locking position illustrated in Fig. 7 wherein the locking balls 24 are projected, by the outer surfaces of said cam member, through the radial openings 25 and the locking notches 27 in the sleeve 10. In this position the said balls will prevent rotation of the spindle relatively to the said sleeve and thereby prevent operation of the retractor 6 by the knob 8. The key plug is then rotated 90 degrees in the opposite direction until the pin 18 resumes its normal position thereby permitting the key to be withdrawn from the plug. When it is desired to unlock the said mechanism, the key plug 17 is rotated 90 degrees from its normal position in a counter clockwise direction thereby rotating the cam member to its normal position as illustrated in Fig. 3. Return of the key plug to the position illustrated in Fig. 2 will permit withdrawal of the key.

As the cam member 20 is rotated, the action of the edge of the recess 33 against the projection 32 will force the retaining washer 28 inwardly against the tension of the spring 30 until the said cam member is rotated for 90 degrees and the recess 34 is aligned with the projection 32. The said projection 32 will then enter the recess 34 and retain the cam member in the locked position.

From the above description it will be understood that the lost motion connection between the pin 18 and the ends of the sectoral notch 21 will permit the plug to be counter rotated while the cam member is retained in its locked or unlocked position and thereby permit the alignment of the lock tumblers within the plug 15 with the conventional recess in the cylinder of the lock to thereby permit withdrawal of the key.

The modified form of the invention, illustrated in Figs. 8 to 11, is particularly intended for use in connection with a door lock of the type such as fully shown and described in a co-pending application of Frank J. McConnell, Serial No. 221,646, filed April 18, 1951. In the mechanism of this modified form, a short shaft 35 is secured to the inner end of the key plug 17, by means of the pin 18, and the cam member 36 has an axial recess therein into which the said short shaft extends. A spring 37 is interposed between the end of the said shaft and the bottom of the recess to normally urge the cam member inwardly within the knob spindle 13.

The said cam member is secured to the short shaft by means of the pin 38 which extends into a notch 39 in the cam member and provides a lost motion connection, between said cam member and the short shaft, allowing a 90 degree rotation of the short shaft by the key plug independently of the cam member.

The rotation of the said cam member relatively to the knob spindle is also controlled by means of the stop pin 22 in the same manner as in Fig. 1.

In the said modified form, the cam member has, at the inner end thereof, a cam notch 40 providing opposed cam surfaces between which is received a thrust cam member 41 having a pointed outer end providing opposed cam surfaces which fit within the notch 40 and cooperate with the cam surfaces thereof. This cam member 41 engages a plunger 42 which operates the door lock mechanism of the said co-pending McConnell application.

The thrust cam member 41 is urged against the end of the cam member 36 by means of a spring 43 and is slidably secured to the spindle 13 by means of a stud 44 which projects into a groove 45 on the inner wall of said spindle.

When it is desired to lock the said modified form of lock mechanism, the short shaft 35 is rotated by the key operation of the key plug 17. This will rotate the cam member 36, to the position illustrated in Fig. 9, and thereby move the balls 24 outwardly into the locking notches 27 and lock the knob spindle against rotation as above described. During the said rotation of the cam member 36, the thrust cam member 41 will be forced inwardly and thereby move the plunger 42 to operate the lock mechanism as described in the said McConnell co-pending application. This modified mechanism will therefore permit the use of the above described knob spindle locking means in connection with a door lock so that, if the outer knob should be locked from the inside, such as may be done with the lock of the co-pending McConnell application, it may be unlocked from the outside, by an authorized person, by simply rotating the cam member 36 with the proper key and forcing the thrust cam member 41 inwardly to thereby move the plunger 42 and unlock the knob spindle from the inside. The cam member 36 may then be turned in the opposite direction, to withdraw the balls 24 from their locking position, and the outer knob may then be rotated to operate the door lock and thereby retract the latch member and permit opening of the door.

When the door lock is in unlocked condition and the plunger 42 is retracted, rotation of the cam member 36 to move the balls 24 into their locking position will merely force the thrust cam member 41 inwardly against the tension of the spring 43 without operating the said plunger.

It will be noted from Fig. 11 that, when the key plug is rotated, the pin 38 will rotate the cam member 36 for a distance of 90 degrees until the stop pin 22 engages the end of the notch 23. With the pin 22 in that position, the pointed end of the member 41 will fit into the notches

46 at the ends of the cam member 36, as shown in Fig. 9, and thereby retain the said member in its locked position while, due to the allowed movement of the pin 38 within the notch 39, the key plug may be returned to its normal position to thereby return the key tumblers to their aligned position and permit withdrawal of the key from the lock.

I claim:

1. A door lock comprising the combination of a case having a lock mechanism therein, a sleeve secured to the case and extending outwardly therefrom, a knob having a tubular spindle extending through the sleeve and rotatable therein for operating the lock mechanism in the case, the said spindle having an opening extending through the wall thereof and the sleeve having a recess in the inner surface of its wall alignable with said opening, locking means including a ball movable through said opening and extendable from the spindle into the said recess in the sleeve wall for locking the spindle against rotation and preventing operation of the lock mechanism, a cam member rotatable within the spindle and having a cam surface for moving said ball into locking position, means contained within the knob for operating said cam member, and yieldable means secured to the spindle and engageable with an abutment on the cam member for retaining said cam member in locked and unlocked position to prevent unintentional rotation thereof.

2. A lock comprising a case having a lock mechanism contained therein, a sleeve secured to and extending outwardly from said case, a knob having a tubular spindle extending therefrom through the sleeve and rotatable in said sleeve for operating the lock mechanism, the said spindle having an opening extending through the wall thereof, the said sleeve having a recess in the inner surface thereof in alignment with the said opening in the wall of the spindle, a ball movable in said opening and extendable from said spindle into the recess in the sleeve for locking the spindle against rotation to thereby prevent operation of the lock mechanism, a rotatable cam member contained within the spindle and having a cam surface thereon for moving the ball outwardly into the said recess, key operated means contained within the knob including a key plug loosely connected to the cam member, a shaft extending from the key plug through said cam member, and means including a spring member anchored on said shaft and yieldingly retaining said cam member in position relatively to the spindle.

3. A lock comprising a case having a lock mechanism contained therein, a sleeve secured to and extending outwardly from said case, a knob having a tubular spindle extending through said sleeve and rotatable therein for operating the lock mechanism in the case, the said spindle having a radial opening extending through the wall thereof, the said sleeve having a recess in the inner wall thereof alignable with the opening in the spindle, a ball contained within said opening and extendable from the spindle into the said recess to lock the spindle against rotation and prevent operation of the lock mechanism, a rotatable cam member contained within the spindle and having a cam surface for moving the ball into locking position, key operated means including a key plug rotatable in the said knob, means providing a lost motion connection between said key plug and cam member and permitting limited rotation of the key plug independently of the cam member, means for limiting the rotation of the cam member relatively to the spindle, a retaining member slidably secured to the spindle, and spring means urging said retaining member for yieldingly retaining the cam member against rotation relatively to the spindle and in locked and unlocked positions.

4. A lock comprising a case having a lock mechanism contained therein, a sleeve secured to and extending outwardly from said case, a knob having a tubular spindle extending through said sleeve and rotatable therein for operating the lock mechanism, said spindle having openings extending through the wall thereof and the sleeve having recesses on the inner surface thereof alignable with said openings, balls movable within the openings and extendable from the spindle into the said recesses for locking the spindle against rotation and preventing operation of the lock mechanism, a cam member rotatable within the spindle for moving said balls into locking position, key operated means within the knob for rotating said cam member, a member slidable within said spindle upon the rotation of the said cam member, and a plunger extending into said spindle and movable by said slidable member for affecting the lock mechanism.

5. A lock as set forth in claim 4 wherein the rotatable cam member is provided with cam surfaces at the end thereof engageable with cam surfaces upon the slidable member for moving said slidable member upon the rotation of the rotatable cam member.

6. A lock comprising a case having a sleeve extending outwardly therefrom, a lock mechanism contained within said case, an outer knob, a tubular spindle extending from said outer knob through the sleeve and rotatable in said sleeve for operating the said lock mechanism, the said spindle having openings extending radially through the walls thereof and the said sleeve having recesses in the inner surfaces thereof alignable with the said openings, balls movable in the said openings and extendable from the spindle into the said recesses for locking the spindle against rotation relatively to the sleeve and preventing rotation of the locking mechanism, a rotatable cam member within the spindle having cam surfaces for moving the balls to locking position, a member slidable within the spindle and movable upon rotation of the cam member, the said slidable member being secured against rotation relatively to the spindle, a spring urging said slidable member into engagement with the cam member, a plunger extending into said spindle and movable by said slidable member for conditioning the lock mechanism, key operated means within the knob including a key plug, and means connecting said key plug with the cam member; the said connecting means including a projection on the key plug extending into the cam member, a spring between said projection and cam member normally urging the cam member into contact with the slidable member to thereby yieldingly retain the cam member against unintentional rotation relatively to the spindle, a pin and notch connection between said plug and cam member for connecting the plug to the cam member and permitting limited independent rotation of the plug, and means for limiting rotation of the cam member relatively to the spindle.

7. A lock as set forth in claim 1 wherein the

yieldable means include a member slidable within the spindle and secured against rotation relatively thereto, an abutment on said slidable member engageable with an abutment on the cam member, and spring means for urging said abutments into engagement.

8. A lock as set forth in claim 2 wherein the retaining means further include a retaining washer upon the shaft and slidably secured to the spindle against rotation relatively thereto, and wherein the spring member yieldingly urges the said retaining washer against the cam member, and interengageable abutments on said retaining washer and cam member.

9. A lock as set forth in claim 6 wherein the slidable member is yieldably engageable with

notches in the end of the cam member to retain said cam member against unintentional rotation relatively to the spindle.

NICHOLAS A. WELCH.

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

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