Aug. 6, 1935. J. H. MILLIGAN 2,010,461

LOCKING MECHANISM

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Fig. 1.

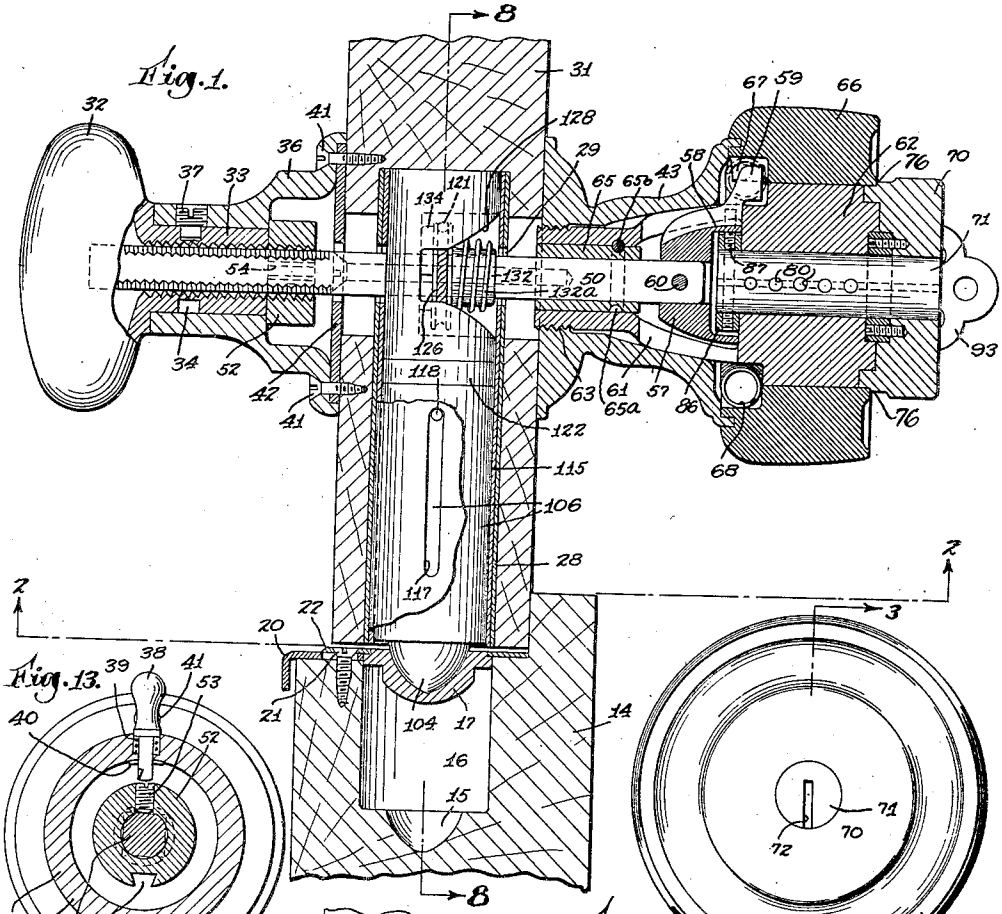
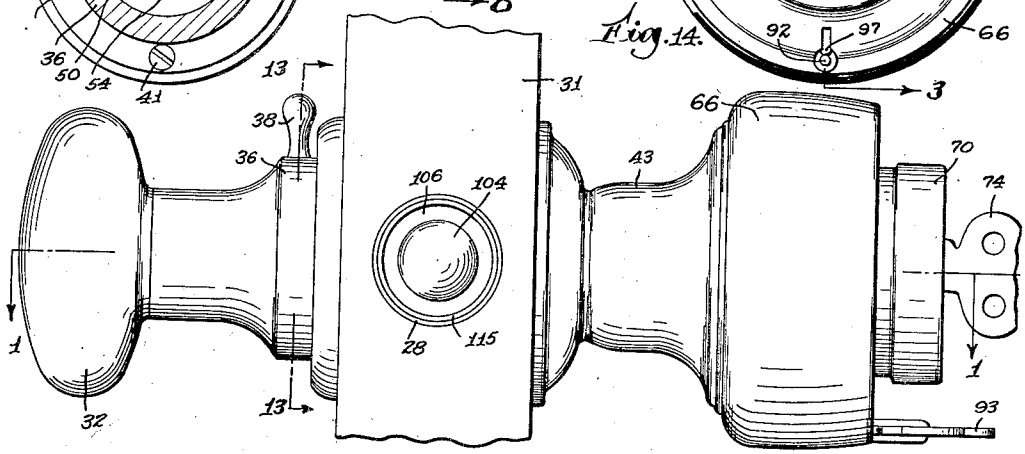


Fig. 13.

Fig. 14.

Fig. 2.



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LOCKING MECHANISM

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Fig. 3.

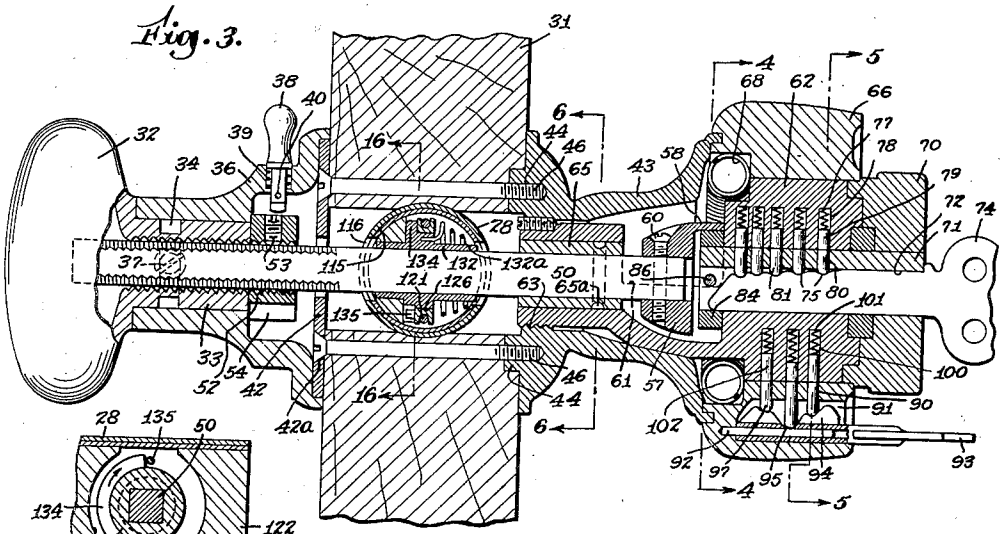


Fig. 4.

Fig. 16.

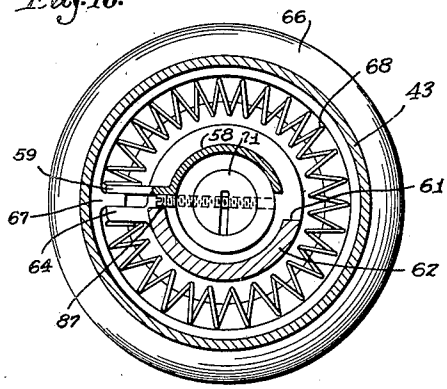


Fig. 5.

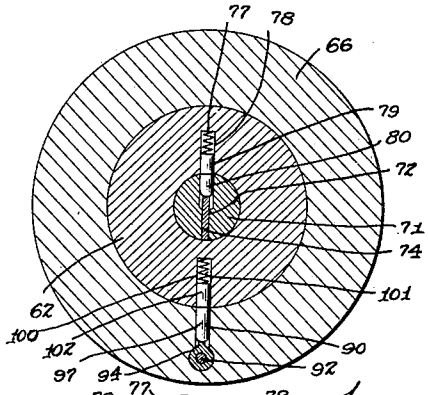


Fig. 6.

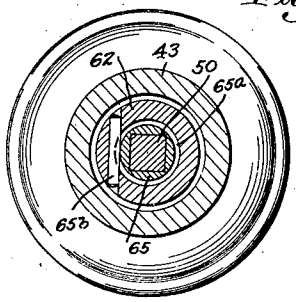
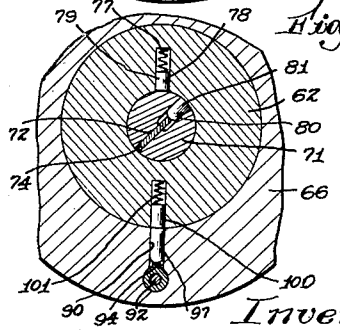


Fig. 7.



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LOCKING MECHANISM

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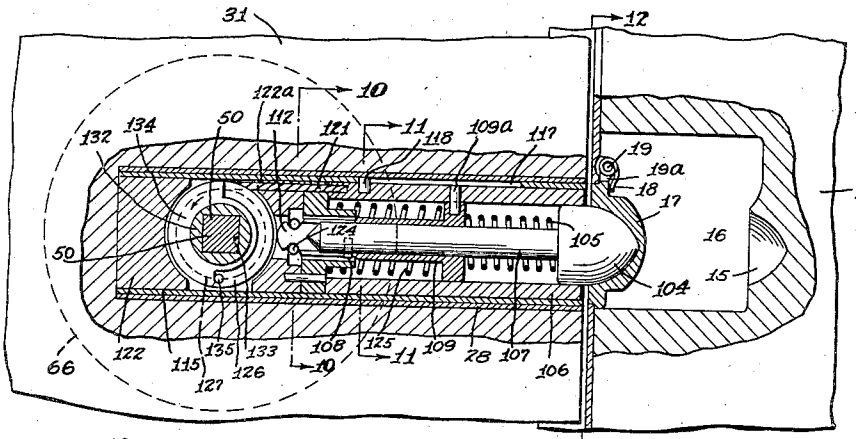


Fig. 8.

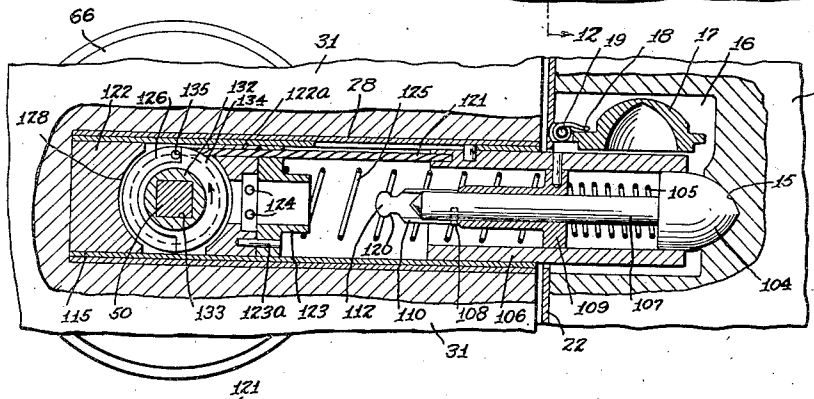


Fig. 9.

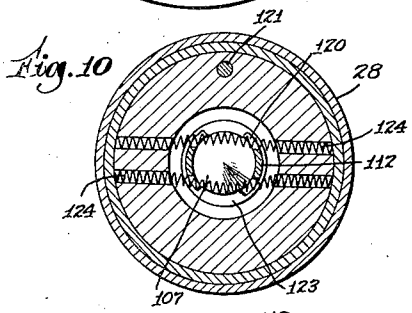


Fig. 10

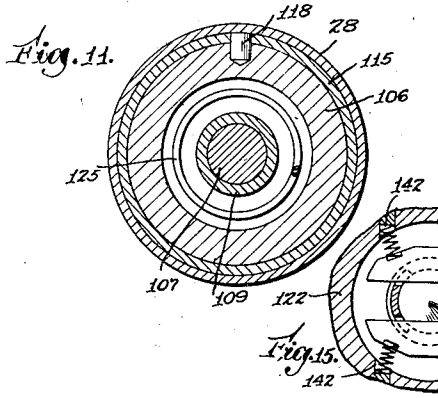


Fig. 11.

Fig. 15.

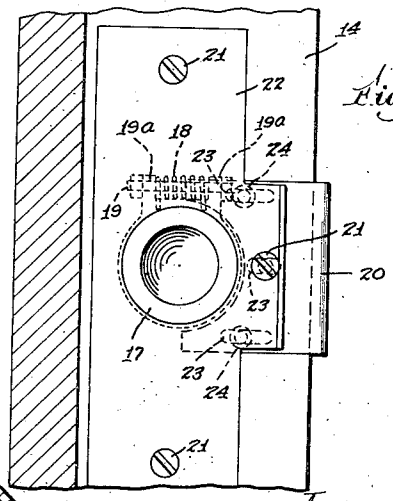


Fig. 12.

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Patented Aug. 6, 1935 2,010,461

UNITED STATES PATENT OFFICE

2,010,461

LOCKING MECHANISM

Joseph H. Milligan, Holliston, Mass., assignor of fifty-one one-hundredths to Edwin M. Warwick, Boston, Mass.

Application July 1, 1933, Serial No. 678,675

14 Claims. (Cl. 70—91)

This invention relates to locking mechanism and particularly to locking mechanism for the doors of offices, homes and the like.

One object of my invention is to provide improved locking mechanism which will upon closing of a door automatically lock it with a bolt lock. Another object is to provide means to hold the automatic locking mechanism in suspension which can be operated from the inside of a room upon turning of the inside door knob. Another object is to provide two different door knob locks on the outside of the door operable independently of each other, making one lock adaptable to be operated by a master key and non-pickable, while the other takes an individual key. Another object is to provide locking means to control the knobs, which may be moved to unlocking position by the insertion of the key, whereupon the mere rotation of the knobs actuates the door lock. Still another object is to provide mechanism to accomplish the above enumerated purposes which operates with certainty, is relatively simple, and is so easy to assemble that unskilled labor may readily be taught to assemble the parts.

The foregoing and other objects which will appear as the nature of the invention is better understood, may be accomplished by a construction, combination and operative arrangement of parts such as is disclosed by the drawings. The nature of the invention is such as to render it susceptible to various changes and modifications, and, therefore, I am not to be limited to the construction disclosed by the drawings; but am entitled to all such changes therefrom as fall within the scope of my claims.

In the drawings:

Figure 1 is a section taken on the line 1—1 of Figure 2, showing my locking mechanism in open position.

Figure 2 is a side elevation showing the door knobs affixed to a door with the two keys in position.

Figure 3 is a section on the line 3—3 of Figure 14 showing both keys in position which will permit turning of the outer and inner knobs on the outside of the door.

Figure 4 is a section on the line 4—4 of Figure 3 looking at the inside of the outer door knob.

Figure 5 is a section on the line 5—5 of Figure 3 showing lock pins for the outer and inner knobs.

Figure 6 is a section on the line 6—6 of Figure 3.

Figure 7 is a section similar to Figure 5 showing the position of a lock pin for the inner knob after being moved away from locking position by rotation of the inner knob.

Figure 8 is a section on the line 8—8 of Figure 1 showing the locking mechanism in an unlocked position.

Figure 9 is a view similar to Figure 8 showing my mechanism in locked position.

Figure 10 is an enlarged section on the line 10—10 of Figure 8, showing the springs to hold the locking bolt in open position.

Figure 11 is an enlarged section on the line 11—11 of Figure 8.

Figure 12 is a side elevation looking at the face of the striker in the edge of the door jamb.

Figure 13 is a section taken on the line 13—13 of Figure 2 illustrating the thumb pin mechanism for keeping the mechanism in unlocked position by holding the spindle against rotation.

Figure 14 is an end elevation of the outer and inner knobs on the outside of the door.

Figure 15 is a modification of the spring apparatus shown in Figure 10.

Figure 16 is a section on the line 16—16 of Figure 3.

As illustrated the door jamb 14 has a hole 15 therein to receive a latch, and a larger hole 16 to receive a bolt, said latch and bolt being referred to later. Within said jamb 14 is a movable latch cover 17 to which is fastened a wire spring 18 which in turn is wound around a pin 19 which is set in lugs 19a. Fastened to said door jamb 14 is a striker 20 which is held by screws 21, one of said screws passing through a striker adjusting member 22 having slots 23 therein into which slots pins 24 extend, which pins are permanently fixed in said striker 20. Extending into a door 31 is a tubular rod or cover 28 having holes 29 through the sides thereof through which a spindle passes, later described.

Connected to said door 31 is an inside door knob 32 having an extension 33 in which a groove 34 is cut and which extends all the way around said extension 33. A rose 36 covers said extension 33 and a screw 37 passes through said rose 36 into the groove 34 in said extension 33, thereby holding said rose 36 to said knob 32; but in such a way that said knob may be rotated independently of said rose. A thumb pin 38 extends through said rose 36, leaving a projecting outside portion that can readily be pushed downwardly by the thumb of a person after turning the inside door knob 32 to prevent the bolt from locking. A small spring 39 surrounds said thumb pin 38, being inside the thumb pin hole in the rose 36. Said thumb pin is held against removal by a wire 40 passing through a hole in one end of said pin 38. Screws 41 pass through said

rose 36 and a circular flange 42 to hold said rose to the door 31. Said circular flange 42 is in contact with said door 31 and has countersunk holes 42a.

The outside door knob has a rose 43 having two bosses 44 in which are screw threaded holes to receive screws 46 the head of which screws 46 fit into the countersunk holes 42a, passing through the door 31 into said bosses 44 to thereby hold the outside door knob firmly to the door.

A solid spindle 50 extends from the inside door knob 32 through the door 31 to the outside door knob, screwed onto which spindle is a collar 52 which abuts against the inside door knob rose 36, being held in fixed position by a set screw 53. In said collar 52 is a groove 54 into which the thumb pin 38 can be moved when the spindle 50 is turned to bring said groove 54 opposite said thumb pin 38. When in normal position said groove 54 is not alined with said thumb pin 38; but when it is desired to leave the door 31 unlocked and closed, as when a person is inside a room, turning of the inside knob 32 will bring them opposite each other, so that pressure on the thumb pin 38 causes it to enter said groove 54, to hold the locking mechanism in unlocked position. When the door knob and spindle have been turned to this position the turning has compressed a spring in the outer door knob later described, consequently when the thumb pin 38 enters the groove 54 the tension of said spring forces said pin 38 against a wall of the groove 54, to thereby hold it against further movement. To release it the knob is turned a trifle against the tension of the spring thereby moving the thumb pin away from the groove wall, with the result that the small spring 39 forces said thumb pin upwardly to normal position, and, therefore, out of said groove, whereupon the knob and spindle return to normal position, which is locking position.

On that end of said spindle 50 that is on the outside of the door 31 is a coupling member 57 having an arcuate shoulder portion 58 and an arm 59 which extends beyond said shoulder 58. Said coupling member 57 is held fast to said spindle 50 by a screw 60. Whenever any knob is rotated the spindle 50 is also rotated which rotates said coupling member 57 until said arm 59 strikes against the wall 61 of the hub portion 62. Said hub portion 62 extends from within the outside door knob to a point adjacent the door 31 where it is screw threaded as at 63 into the rose 43 of the outside door knob. Within said hub 62 and abutting against the door 31 is a sleeve 65 having a square hole to receive the spindle 50 so it will turn with said spindle, said sleeve having a groove 65a extending around it. A pin 65b extends through said hub 62 in an off center position, and enters said groove 65a to hold said sleeve 65 in place, yet permitting free rotation with the spindle 50. Said hub 62 has a stop pin 64 just beyond said wall 61, which is later referred to. The outside door knob consists of an outer portion 66 having a lug 67 fixed therein which contacts with the stop pin 64 when the door is locked. Movement of the outer knob 66 moves said lug 67 which in turn moves said arm 59 and spindle 50. Within said outer portion 66 of the outside door knob is a circular spiral spring 68, one end of which abuts against said arm 59 of the coupling member and the other end against said stop pin 64 on the hub portion 62 when in normal or locked position, said spring holding the knob in a position to normally keep the mechanism locked. When the lock, later described, is moved to open position this spring 68 is compressed, and will, upon release, resume normal position unless held against movement as by the thumb pin 38 contacting against the wall of the groove 54.

Extending into the knob outer portion 66 is an inner knob 70 having an extension plug 71 which is made integral with or permanently fixed to said inner knob 70. A key slot 72 extends through said inner knob 70 and said plug 71 and is adapted to receive a key 74 having teeth 75 of varying height. A small portion of said inner knob 70 overlaps said outer knob 66 as shown at 76 in Figure 1 of the drawings, keeping said outer knob in place, and yet permitting its rotation.

In said hub portion 62 are holes 78, in the closed end of which are springs 77, abutting against which are driver lock pins 79, when in open position, as shown in Figure 3 of the drawings. In said extension plug 71 are holes 80 having setting lock pins 81 of varying length therein, which pins 81 rest in the recesses between the teeth 75 of said key 74 when said key is in the slot 72. Insertion of said key 74 pushes the pins 81 which are in the extension plug 71 against said pins 79 in the hub portion 62 forcing said pins 79 upwardly against the springs 77 and out of said plug 71 so said plug can be rotated by turning said inner knob 70. The key remains stationary in said slot 72.

On the end of said plug 71 is a collar 84 having holes therein to receive a pin 86 which extends through said collar into said plug 71, a portion 87 of which projects beyond said collar and contacts with said arm 59, so that the turning of said inner knob 70 rotates said arm 59 to thereby actuate the locking mechanism.

In the outer knob 66 are locking holes 90, there being three shown in the drawings, below which is a key hole 91, inserted into which key hole is a key post 92 extending horizontally, over which a hollow or tubular key 93 fits having teeth 94 between which teeth is a recess 95 which is cut through the metal to meet the horizontal hole in the key which surrounds said key post 92 when the key is in place, which serves to prevent picking of the lock as movement of the center pin upwardly forces it into a hole 100 in the hub portion 62, which locks outer knob against any movement. Setting lock pins 97 of varying length as shown in Figure 3 of the drawings enter said locking holes 90, resting upon different portions of said key 93, the middle pin extending into said recess 95. In said hub portion 62 are the locking holes 100 having springs 101 in the closed end of said holes 100. Driver lock pins 102 movably fit in said holes 100, which the springs 101 tend to force outwardly, so that said lock pins 102 enter said locking holes 90 to thereby prevent rotation of the outer knob 66 unless the key 93 is inserted, which moves the pins upwardly so that the outer knob 66 can be rotated free of said hub portion 62, thereby permitting the mechanism to be unlocked.

A door latch 104 is forced outwardly by a spring 105 which is within a locking bolt 106. A rod 107 is connected to said latch 104 within said bolt 106, moving in and out of said bolt 106 with the latch 104, said rod having a stop pin 108. Around said rod 107 is a locking sleeve 109 fixed by a pin 109a to said bolt 106, in which sleeve said rod slides horizontally, said sleeve extending outside the bolt 106, the outer end being divided into

two parts 112, thereby providing a slot 110 between them in which said stop pin 108 moves. When said stop pin 108 reaches the end of said slot 110 it prevents further outward movement of said latch 104. Within the tubular rod or cover 28 which is in the door 31 is an assembly casing 115 which has holes 116 to aline with the holes 29, through which the spindle 50 passes, and there is also a slot 117. A pin 118 in said bolt 106 extends into said slot 117 thereby preventing rotation of said bolt and limiting its horizontal movement. In opening a door the initial movement forces the tapering portion of said door latch 104 against said latch cover 17, and being tapered said door latch is caused to slide into the locking bolt 106 against the spring 105, to thereby free the door.

Near the end of said parts 112 notches 120 are cut, into which springs 124, referred to later, slip when the bolt 106 is in open position. A flexible cord 121 is fastened to said bolt 106 and extends to a housing 122 which has a hole 122a at one end near its periphery to permit said cord 121 to slide therethrough. Said housing 122 has a collar 123 over which a coiled spring 125 fits, which spring extends therefrom into said bolt 106 surrounding said locking sleeve 109, which spring 125 extends to force said bolt 106 and said housing 122 apart, to thereby force said bolt into locking position.

Within said housing 122 just back of said collar 123 are two springs 124 which partly close the opening through said housing 122. The two parts 112 of the locking sleeve 109 force their way between said springs 125, spreading them apart, with the result that said springs pass into the notches 120, thereby holding the bolt 106 in open position.

One end of said cord 121 is fastened to a ring 126 having a channel 127 therein in which said cord 121 is wound. Said housing 122 has a cut-out portion 128 in which said ring 126 is inserted, there being a hole through said housing 122 through which said spindle 50 passes. A stop lug 130 extends from said housing 122 into said cut-out portion 128 to thereby limit the winding movement of said cord 121 around said ring 126.

Next to said ring 126 is a small hub 132 an end of which extends through said ring 126. Said hub 132 has a conical spring 132a attached to it, said spring also being fastened to the side of said housing 122. This spring keeps said ring 126 under tension supplementing the spring 68 in the outer door knob 66. Extending through said hub 132 is a square hole 133 through which the spindle 50 passes. Rotation of the spindle rotates said small hub 132 and the ring 126 so that when opening the locking mechanism said flexible cord 121 is wound around said ring 126 thereby withdrawing the bolt 106 from the door jamb. Said hub 132 has a skirt 134 extending about half way around it. A pin 135 projects from the said ring 126, and when it contacts with said lug 130 further rotation of the ring 126 is stopped. When the shoulder or end of said skirt 134 contacts with said pin 135 rotation of said hub 132 rotates said ring 126 to thereby wind the cord. When the knob is released the spindle 50 rotates said hub 132 back to normal position as said hub 132 is then free to rotate independently of said ring 126. When said cord is wound around said ring 126 the lock is open. Upon closing of the door the latch 104 contacts with the striker 20, pushing said latch inwardly which forces said rod 107 between said springs 124, thereby spreading them so they move out of said notches 120. The end of said rod moves beyond said notches 120 so that it keeps springs 124 spread until the notches 120 have passed by permitting the bolt 106 to enter the door jamb.

In the modification shown in Figure 15 of the drawings instead of using the springs 124 I substitute jaws 140 which are held in position by springs 141 fastened in recesses 142 in said housing 122. These jaws 140 are easily spread apart when the parts 112 of the locking sleeve 109 pass between them.

The use of a flexible connecting means such as said cord 121 makes it possible to use an extraordinary long bolt, so that attempts to unlock a door by prying it away from the door jamb will be frustrated.

What I claim is:

1. Locking mechanism in combination with door knob means comprising an outer knob having an opening therein, an inner knob extending into and rotatable in said outer knob, said outer and inner knobs being adapted to rotate independently of each other, a spindle, locking instrumenatlities, part of which is adapted to enter a door jamb, connected to and operated by said spindle, said outer knob embodying means adapted upon rotation of said outer knob to rotate the spindle and thereby to actuate said locking instrumentalities, said inner knob embodying means adapted upon rotation of said inner knob also to rotate the spindle and thereby actuate said locking instrumentalities, said inner and outer knobs each having provision to receive unlocking means.

2. Locking mechanism in combination with door knob means comprising an outer knob having an opening therein, an inner knob extending into and rotatable in said outer knob, a spindle, locking instrumentalities, part of which is adapted to enter a door jamb, connected to said spindle, means so positioned that rotation of said inner knob will rotate said spindle and thereby actuate the locking instrumentalities, said outer knob embodying a member adapted upon rotation of said outer knob also to rotate the spindle and thereby actuate said locking instrumentalities to move them to locking position, said inner and outer knobs having provision to receive unlocking means.

3. Locking mechanism in combination with door knob means comprising a rotatable outer knob having an opening therein, an inner knob extending into and rotatable in and independently of said outer knob, a spindle, locking instrumentalities part of which is adapted to enter a door jamb connected to said spindle, a coupling member carried by the spindle means to establish an operable connection between said inner knob and said coupling member whereby rotation of said inner knob will rotate said spindle, said outer knob embodying a member adapted upon rotation of said outer knob to cooperate with said coupling member and thereby rotate the spindle, locking means connected to said outer knob to prevent its rotation, and separate locking means connected to said inner knob to prevent its rotation, both of said locking means being so positioned that unlocking of one does not affect the other, said inner and outer knobs each having provision to receive unlocking means.

4. Locking mechanism in combination with door knob means, comprising an outer knob having an opening therein, an inner knob extending

into and rotatable in said outer knob, locking instrumentalities extending into said opening part of which is adapted to enter a door jamb, said locking instrumentalities embodying a coupling member, a spindle extending into said locking instrumentalities, means fixedly holding said spindle to said coupling member, said inner knob embodying means adapted upon rotation of said inner knob to actuate said coupling member, said outer knob embodying means adapted upon rotation of said outer knob to actuate said coupling member, said outer and inner knobs embodying locking means operable independently of each other, said outer and inner knobs having provision to receive unlocking means.

5. Locking mechanism in combination with door knob means, comprising a door knob for the inside of the door to be locked, an outer knob for the outside of the door to be locked, said outer knob having an opening therein, an inner knob extending into and rotatable in said outer knob, locking instrumentalities part of which is adapted to enter a door jamb, a spindle connected to said locking instrumentalities, said inner knob having means adapted upon rotation of said inner knob to rotate said spindle, said outer knob having means adapted upon rotation of said outer knob also to rotate said spindle, said outer and inner knobs each having a separate provision to receive unlocking means, and locking means in said locking instrumentalities and said inner and outer knobs so positioned that the said locking means for either of said outer and inner knobs may be actuated independently of each other.

6. Locking mechanism in combination with door knob means, comprising a door knob for the inside of the door to be locked, an outer knob for the outside of the door to be locked, said outer knob having an opening therein, an inner knob extending into and rotatable in said outer knob, locking instrumentalities part of which is adapted to enter a door jamb, a spindle connected to said locking instrumentalities, said inner knob having means adapted upon rotation of said inner knob to actuate said locking instrumentalities, said outer knob having means adapted upon rotation of said outer knob to actuate said locking instrumentalities, spring means abutting between said outer knob and said locking instrumentalities so positioned as to normally hold said locking instrumentalities in locking position, said outer and inner knobs having provisions to receive unlocking means, and locking means in said locking instrumentalities and said inner and outer knobs so positioned that the said locking means for either of said outer and inner knobs may be actuated independently of each other.

7. Locking mechanism in combination with door knob means, comprising a door knob for the inside of the door to be locked, an outer knob for the outside of the door to be locked, said outer knob having an opening therein, an inner knob extending into and rotatable in said outer knob, locking instrumentalities part of which is adapted to enter a door jamb, said locking instrumentalities embodying a hub and a coupling member in said hub, means adapted to hold said hub in fixed position with relation to the door to be locked, a spindle extending into said hub, means to fixedly hold said coupling member to said spindle, said inner knob having means adapted upon rotation of said inner knob to actuate said coupling member, said outer knob having means adapted upon rotation of said outer knob to actuate said coupling member, said outer and inner knobs having provisions to receive unlocking means, and locking means in said hub and said inner and outer knobs so positioned that said locking means for either of said outer and inner knobs may be actuated independently of each other.

8. Locking mechanism comprising a spindle, means connected to and adapted upon actuation to actuate said spindle, locking means operably connected to said spindle, a bolt adapted to enter a door jamb, instrumentalities adapted to hold said bolt to said locking means when said bolt is moved to unlocked position, said locking means embodying a cord connected to said bolt, said locking means embodying a winding member on which said cord is adapted to be wound when said bolt is moved to unlocking position, and another member on which said winding member is mounted having a hole through which said spindle passes whereby rotation of said spindle rotates said other member, said winding member embodying means to operatively connect with said other member whereby actuation of said other member may actuate said winding member, and spring means connected to said other member adapted to normally hold said winding member in unwound position.

9. Locking mechanism comprising a locking bolt, a housing, locking instrumentalities in said housing, said instrumentalities embodying a cord connected to said bolt, means connected to and adapted to actuate said instrumentalities, said instrumentalities embodying spring holding means, and a winding member for said cord, a latch in said bolt, means in said bolt adapted to normally keep a portion of said latch outside of said bolt, means in said bolt adapted to connect with and be held by said spring holding means when said bolt moves to unlocked position, and means connected to said latch adapted upon actuation to release the connection between said spring holding means and said means in said bolt.

10. Locking mechanism comprising a locking member adapted to enter a door jamb, locking instrumentalities, means connected and adapted to actuate said locking instrumentalities, said locking instrumentalities embodying flexible means adapted to be wound thereon connected to said locking member, means connected to said locking member adapted upon actuation to be received and held by said locking instrumentalities when said locking member is moved to unlocking position and adapted to be released by said locking instrumentalities when said locking member is moved to locking position, and instrumentalities connected to said locking member adapted to release the said hold of said locking instrumentalities upon actuation of said locking member to locking position.

11. Locking mechanism comprising a spindle, a knob for the inside of the door to be locked, means to operably connect said knob to said spindle, a knob for the outside of the door to be locked, a coupling member connected to said spindle, means connected to said outside door knob adapted upon actuation of said knob to actuate said coupling member and thereby rotate said spindle, locking means operably connected to said spindle, a locking member adapted to enter a door jamb, flexible means extending from said locking member to said locking means and fastened to said locking member, said locking means comprising instrumentalities adapted upon actu-

ation to draw said flexible means towards said locking means whereby said locking member is withdrawn from said door jamb, attaching means connected to said locking member adapted to be held to said locking means when said locking member is drawn to unlocked position, a latch member in said locking member and extending beyond it, means connected to said latch member adapted upon actuation to enter said locking means and release said attaching means from said locking means.

12. A locking mechanism for a door comprising a door-knob for the inside of the door, a spindle secured to said door-knob and extending through the door, a locking bolt actuated by rotation of the spindle, a coupling member secured to the spindle, two concentric knobs on the outside of the door constituting an outer knob and an inner knob, each of said concentric knobs being rotatable independently of the other knob and each having a separate means for operatively-engaging and rotating said coupling member as the knob is rotated whereby the spindle may be actuated by either the inner knob or the outer knob independently of the other, means for releasing the locking mechanism by rotation of the spindle and a separate key-controlled locking means for each of the concentric knobs.

13. A locking mechanism for a door comprising a stationary hub member secured to the door and having an axial bore, a spindle extending into the hub, a locking bolt controlled by the spindle, an outer knob rotatable about the hub member, an inner knob rotatable in said axial bore independently of the outer knob, a coupling member fixed to the spindle, each knob having means for operatively-engaging and rotating the coupling member as the knob is rotated and a separate key-controlled locking means for each knob.

14. A locking mechanism for a door comprising a spindle extending through the door, means to rotate the spindle, a bolt adapted to enter a door-jamb, a hub secured to the spindle, a winding member mounted on the hub for limited rotation relative thereto, a cord connected at one end to the winding member and at the other end to the bolt whereby rotation of the spindle in one direction rotates the winding member to wind the cord thereon and thereby withdraw the bolt to its unlocked position, means to lock the bolt in its unlocked position and a spring acting on the spindle to return it and the hub to normal position when the spindle is released.

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