May 17, 1955 R. W. AHLQUIST 2,708,357

DOOR LOCK

Filed Nov. 29, 1952

2 Sheets-Sheet 1

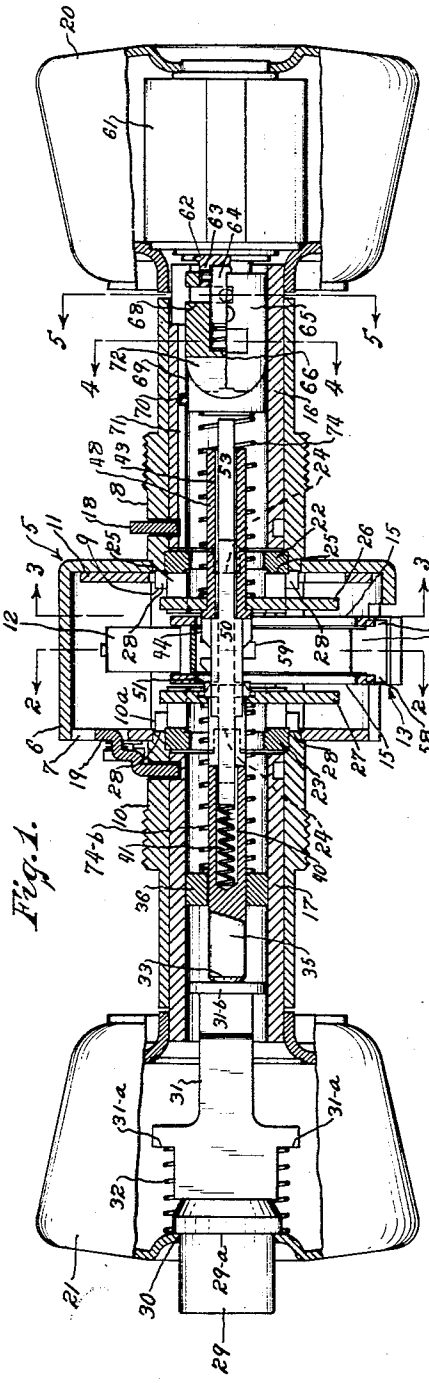


Fig. 1.

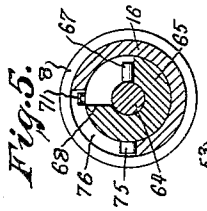


Fig. 5.

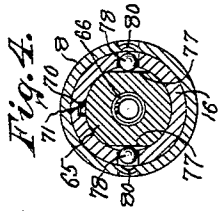


Fig. 4.

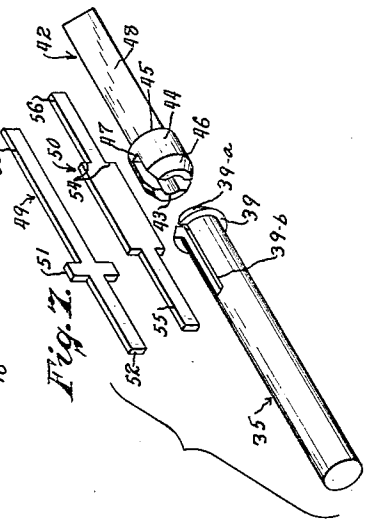


Fig. 7.

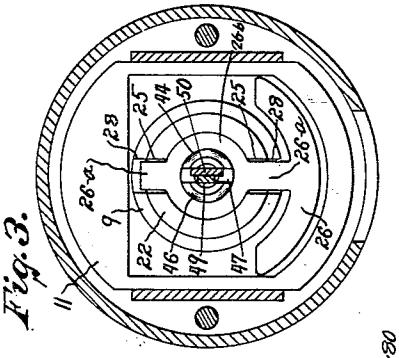


Fig. 3.

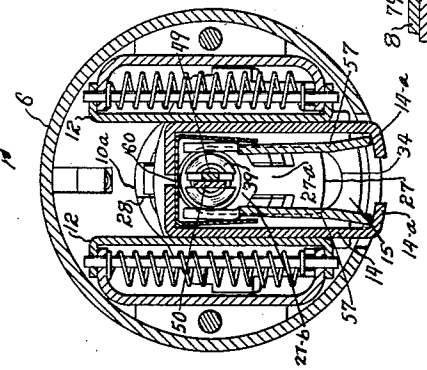


Fig. 2.

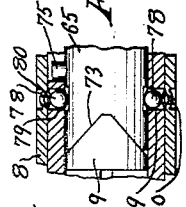


Fig. 6.

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DOOR LOCK

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2 Sheets-Sheet 2

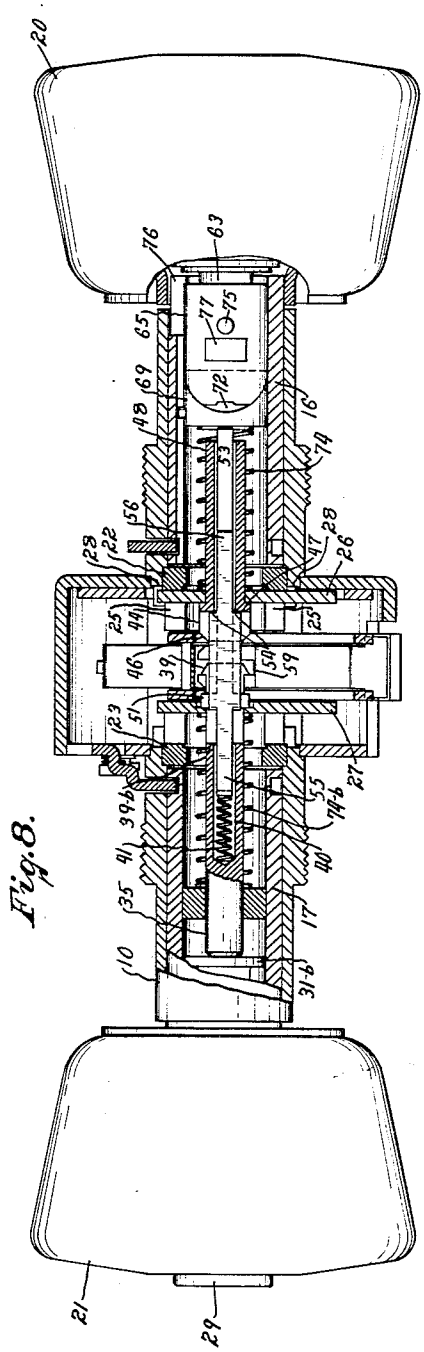


Fig. 8.

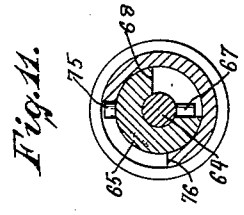


Fig. 11.

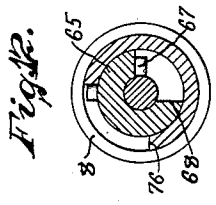


Fig. 12.

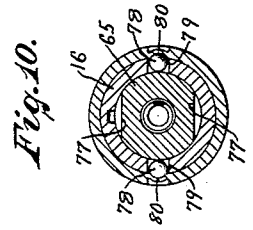


Fig. 10.

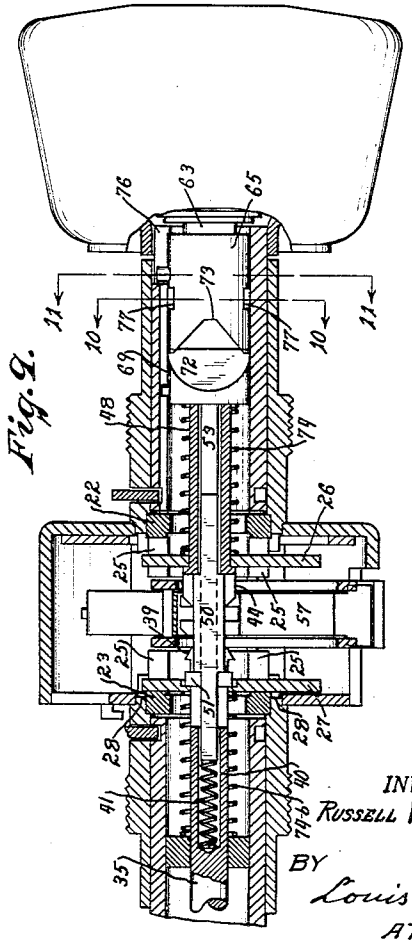


Fig. 9.

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2,708,357

DOOR LOCK

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Application November 29, 1952, Serial No. 323,243

14 Claims. (Cl. 70—216)

This invention relates to a door lock and more particularly to a door lock of the cylindrical type.

Such locks usually include an operating unit having a cylindrical case that is positioned in a hole in the face of the door stile and contains a retractor mechanism operable by rollback members on an inner and an outer knob spindle extending from the inner and the outer sides of the case respectively. The retractor mechanism is operatively connected to a separate latch bolt unit which is positioned in a separate hole in the edge of the door stile and at right angles to the axis of the operating unit.

An object of this invention is to provide such a cylindrical lock which is especially adapted for use in hotels and the like as a communicating suite lock and particularly as a lock for the doors of a bathroom which is located between and accessible from adjoining rooms.

Another object of the present invention is to provide such a cylindrical lock having improved means for selectively rendering either the outer operating knob inoperative, while the inner knob remains operative, or both the inner and the outer knobs inoperative.

A further object of this invention is to provide, in the same lock, emergency means for releasing the outer knob when it has been locked from the inner side of the door.

A still further object of this invention is to provide such a cylindrical lock having a key-controlled mechanism in the outer knob which may be selectively used either as an emergency release means or as a locking means for both the inner and the outer knobs.

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

Fig. 1 is a plan view of my improved cylindrical lock, partly in central horizontal section, illustrating the construction thereof and showing its mechanism in normal undogged position.

Fig. 2 is a sectional end view thereof on line 2—2 of Fig. 1.

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

Fig. 4 is a sectional end view on line 4—4 of Fig. 1, showing the key-controlled locking means in normal unlocked position.

Fig. 5 is a similar view on line 5—5 of Fig. 1.

Fig. 6 is a fragmentary side view, partly in central vertical section, showing the key-controlled locking mechanism in normal position.

Fig. 7 is an exploded isometric view showing the parts of the spindle unit used in my improved mechanism.

Fig. 8 is a view similar to Fig. 1, but showing the position of the mechanism when only the outer knob is dogged against operation.

Fig. 9 is a similar view showing the position of the mechanism when the inner knob is dogged and the outer knob is locked against operation.

Fig. 10 is a sectional end view on line 10—10 of Fig. 9.

Fig. 11 is a similar view on line 11—11 of Fig. 9.

Fig. 12 is a view similar to Fig. 11, but showing the key-controlled member in a different position.

As shown in the drawings, the numeral 5 generally indicates the case of a cylindrical lock which includes a cup-shaped member 6 and a cover 7. A tubular outer sleeve 8 extends from the bottom wall of said cup-shaped member and has a portion 9 which projects through the said wall and into the interior of the case. The cover 7 carries a similar inner sleeve 10 having a portion 10–*a* projecting through the cover 7 and into the case.

The case 5 contains a U-shaped sub-frame 11 which carries guide members 12—12 that slidably support a retractor 13. Said retractor preferably includes a U-shaped member 14 having side plates 15—15 secured to the opposite sides thereof and straddling the said guide members to slidably retain the retractor thereon, as more fully described in the co-pending application of Ernest L. Teich et al., Serial No. 211,940, filed February 20, 1951.

The sleeves 8 and 10 rotatably support outer and inner tubular knob shanks 16 and 17, respectively, which are retained within the said sleeves by retaining members 18 and 19, as fully described in the co-pending application of Ernest L. Teich et al., Serial No. 211,939, filed February 20, 1951. The shanks 16 and 17, respectively, have secured thereto outer and inner operating knobs 20 and 21 in the manner fully described in the co-pending application of Nicholas A. Welch et al., Serial No. 208,743, filed January 31, 1951, now Patent No. 2,675,692 issued April 20, 1954.

The sleeves 8 and 10 have enlarged bores at their inner ends in which are rotatably mounted annular connectors 22 and 23, respectively, that are connected to their respective knob shanks 16 and 17 by tongue and slot connections, as at 24—24. The walls of the said connectors contain diametrically opposed notches 25—25 which receive the straight bar portions 26–*a* and 27–*a*, respectively, of the rollback members 26 and 27 that operate the retractor 13, as fully described in the said co-pending application of Ernest L. Teich et al., Serial No. 211,940. Each of said rollbacks 26 and 27 has a circular boss, 26–*b* and 27–*b*, respectively, intermediate the straight bar portion which is disposed in the bore of its respective connector and slidably supports the rollback therein. The portion 9 of the sleeve 8 is also provided with diametrically opposed notches 28—28 forming abutments between which the straight portion 26–*a* of the rollback 26 is received for the purpose to be hereinafter more fully described.

It will be understood that rotation of either of the knobs 20 or 21 will cause rotation of its respective rollback member which will, in turn, cause the retractor to move inwardly in the case 5 and withdraw the latch bolt.

In order to dog the outer knob against rotation, it is necessary to move the rollback 26 in the notches 25—25 and relatively to the connector 22 until the straight portion 26–*a* of the said rollback is located within the respective notches 28—28 in the portion 9 of the sleeve 8. When the said rollback is in this position, rotation of the outer knob is prevented by the engagement of the said portion 26–*a* of the rollback with the sides of the notches 28—28 so that the retractor 13 cannot be retracted by means of the outer knob.

The mechanism which I employ to move the said rollback 26 into dogging position, as above described, is similar to the mechanism fully described in the co-pending application of Frank J. McConneil, Serial No. 221,646, filed April 18, 1951. This mechanism includes a pushbutton 29 that is slidably mounted in an opening 30 in the front wall of the inner knob 21 and has secured thereto an extension member 31 which has abutment surfaces 31–*a* thereon to receive one end of a

compression spring 32 that has its outer end in engagement with the said front wall of the knob 21 and urges the pushbutton inwardly with respect to the knob. The said pushbutton 29 is provided with an annular shoulder 29–*a* which engages the marginal edge portion of the opening 30 to limit the outward movement of the pushbutton with respect to the said knob.

The extension member 31 has a substantially circular foot portion 31–*b* which is bent at right angles thereto and is slidable within the shank 17. The said foot portion provides an abutment for the end 33 of a spindle unit that extends co-axially in the door lock within the knob shanks and through a clearance slot 34 in each of the side plates 15—15 of the retractor.

In order to attain the objects of the present invention, the end of the inner sleeve 10, which projects through the cover 7 into the case 5, is also provided with opposed notches 28—28 to receive the straight portion 27–*a* of the rollback 27 and thereby dog the inner knob 21 against rotation and the construction of said spindle unit differs substantially from the construction shown in the said co-pending application of Frank J. McConnell, Serial No. 221,646.

The said spindle unit, as clearly illustrated in the accompanying drawings, preferably includes an inner spindle section 35 which is rotatably and slidably supported within a suitable bearing member 36 in the inner knob shank and slidably projects through an opening in the circular boss 27–*b* of the rollback member 27. The end of the said inner section 35 extends into the case 5 and is provided with an annular flange 39 that has a tapered annular surface 39–*a* for the purpose to be hereinafter described. The said spindle section has a slot 39–*b* extending across the end thereof and a bore 40 in which there is contained a spring member 41. The spindle unit also includes an outer spindle section 42 having an axial bore 43 and a head portion 44 that has a shoulder 45 at one end, a tapered annular surface 46 at its other end and a cross-slot 47 which extends across the said head. The said spindle section 42 also has a squared shank portion 48 which extends through a square hole in the circular boss 26–*b* of the rollback 26 and is thereby prevented from rotating relatively to said rollback.

Between the spindle sections 35 and 42 is contained a pair of push members 49 and 50 which are preferably flat and disposed in side-by-side relation. The member 49 has an enlarged portion 51 which slidably fits within the slot 39–*b* of the inner spindle section and engages the rollback 27. The said member 49 also includes stem portions 52 and 53 which extend, respectively, into the bore 40 of the spindle section 35 and through the bore 43 in the spindle section 42.

The member 50 has an enlarged portion forming shoulders 54—54 which project into the slot 47 of the outer spindle section and engage the bottom of said slot. The said member 50 also includes a stem portion 55, which extends into the bore 40 and engages the spring member 41, and a stem portion 56 that extends into the bore 43 of the outer spindle section 42.

The head 44 of the outer spindle section is normally located between a pair of retaining fingers 57—57 which are pivotally supported upon the inwardly extending portions 14–*a*—14–*a* of the U-shaped member 14 and are retained in position by means of laterally extending ears 58—58 that extend into notches in the side plates 15—15. Each of the said retaining fingers is provided with a notch 59 in its free end and the said fingers are urged towards each other, about their pivots and into engagement with the periphery of the head 44, by means of a U-shaped spring member 60 which is contained within the member 14 and between the side plates 15—15.

My improved lock also includes a key-operated locking mechanism such as is fully described in the co-pending application of Nicholas A. Welch, Serial No. 212,402, filed February 23, 1951, now Patent No. 2,630,697 issued March 10, 1953. This mechanism includes a conventional cylinder lock having a casing 61, which is contained within the outer knob 20, and a key-plug 62 that is rotatable by means of a key. The said key-plug has an end portion 63 which projects inwardly therefrom and carries a stud 64 that is rigidly secured to said end portion. A cam member 65 is rotatable within the end portion of the outer knob shank 16 and over the said stud 64 and a spring member 66 is contained between the stud and cam member.

A slidable cam plug 69 is contained within the said end portion of the outer shank 16 and is secured against rotation therein by means of a pin 70 which projects from said cam plug into a longitudinal slot 71 in the inner surface of the shank. The said slidable cam plug has a pointed cam portion 72 which extends into a V-shaped cam portion 73 in the cam member 65 and a spring 74 is provided between the rollback 26 and the cam plug 69 to urge said plug into engagement with the cam member 65 and the rollback into engagement with the shoulder 45 on the outer spindle section 42.

The cam member 65 has a pin 75 which projects radially therefrom into a segmental notch 76 in the end of the shank 16 and the said cam member also has, preferably at opposite sides thereof, flat cam surfaces 77—77, each of which is adapted to move a locking ball 78 within a radial hole 79, that extends through the wall of the outer shank 16, and into a recess 80 in the inner surface of the outer sleeve 8 for the purpose to be hereinafter more fully described.

My improved door lock is adapted for use in hotels and the like and is particularly intended for the doors of a bathroom that is located between two adjoining suites or rooms. Assuming, therefore, that the said lock is installed for use as a bathroom lock between a bathroom and an adjoining hotel room, the inner knob 21 is located on the bathroom side of the door and the operation of said lock is as follows:

When the dogging mechanism and the rollbacks 26 and 27 are in their normal position, as illustrated in Fig. 1, operation of either the outer knob 20 or inner knob 21 will cause retraction of the retractor and withdrawal of the latch bolt connected thereto, as well understood by those skilled in the art, and the retracting movement of the retractor will merely cause the retaining fingers 57—57 to slide over the peripheral surface of the head 44 without interfering with the said movement.

When it is desired to dog the outer knob 20 against operation, so as to prevent operation of the retractor from the outside of the door, the pushbutton 29 is depressed and this will cause movement of the spindle section 35, the spring 41, the push member 50 and the spindle section 42 as a unit against the pressure of the spring 74. Relative movement between the said spindle sections is prevented since the spring 41 is stiffer than the spring 74.

Such movement of the spindle section 42 will move the rollback 26 in the notches 25—25 in the connector 22 and into the dogging notches 28—28, as clearly illustrated in Fig. 8, and thereby, through the connector 22 and the shank 16, dog the outer knob against rotation. Movement of the spindle section 42 into dogging position will remove the head 44 from between the retaining fingers 57—57 and the said fingers will then move towards each other under the pressure of the spring member 60. Further movement of the spindle section 35 will bring the tapered flange 39 thereof into contact with said retaining fingers and force them apart. The said flange will then move past the edges of the notches 59 therein whereupon the said edges will be brought into contact with the end of the flange 39 to retain the spindle section 35 against the pressure of the spring 74 and thereby retain the rollback member 26 in dogging position, as clearly illustrated in Fig. 8.

When my improved lock is in the said dogging position, the door is locked from the outside, but may still be readily opened from the inside by simply rotating the inner knob **21**. This will cause the inner rollback **27** to retract the retractor and thereby carry the retaining fingers **57—57** against the periphery of the flange **39** and cause the said fingers to spread apart and move out of engagement with the said flange whereupon the rollback **26**, the spindle section **42**, the push member **50** and the spindle section **35** will be moved back to normal undogged position, as shown in Fig. 1, by the pressure of the spring **74**.

When the lock mechanism is in the dogged position shown in Fig. 8 and an emergency should occur, such as would render the occupant of the bathroom incapable of rotating the inner knob **21** to open the door from the inside, the said lock mechanism may be undogged by an authorized person possessing the required key for operating the cylinder lock and an undogging operation for such an emergency may be performed by simply inserting the key into the key-plug and rotating it in a clockwise direction for one-quarter turn. This will cause rotation of the stud **64** which will rotate the cam member **65** from its normal position, shown in Fig. 5, to the position shown in Fig. 11 and such rotation of said cam member will force the cam plug **69** inwardly. This inward movement of the cam plug **69** will move the spindle section **42** and the push member **50** against the pressure of the spring **41** and the head **44** of the said spindle section will enter between the retaining fingers and spread them apart to release the inner section **35** and thereby permit the spring **74** to force the rollback **26** out of engagement with the notches **28—28** and return the pushbutton **29** to its normal position against the pressure of the spring **32**. At this time, the mechanism will be in the position shown in Fig. 9 and is returned to its normal position by rotating the key for 180 degrees in a counterclockwise direction which will return the cam member **65** and the cam plug **69** to normal position as shown in Figs. 1 and 5. The key is then rotated for 90 degrees in a clockwise direction thereby returning the pin **67** to the position illustrated in Fig. 5 wherein the key may be withdrawn from the key plug. The outer knob is now operable so that it may be rotated to cause operation of the rollback **26** and retraction of the retractor for withdrawing the latch bolt connected thereto and permitting opening of the door.

It will be noted from Fig. 9 that during the operation of the emergency release mechanism, above described, the inner rollback **27** is moved into the notches **28—28** of the sleeve **10**. The construction of the lock which causes this action constitutes a novel feature of my invention which will now be described.

When the hotel room is to be rented without the use of the bathroom or an adjoining room, the door may be locked from both sides by inserting the key into the key plug **62** and rotating the stud **64** in a clockwise direction from the position shown in Fig. 5 to that shown in Fig. 11. This will rotate the cam member **65**, as above described, and move the cam plug **69** rearwardly into engagement with the adjacent end of the pusher member **49** which extends through the spindle section **42**. Further movement of said plug will cause continued movement of said pusher member and the portion **51** thereof will move the rollback **27** into the dogging notches **28—28** in the sleeve **10** against the spring **74**–*b* in the inner shank **17** and into position to dog the inner knob against rotation. Rotation of the cam member **65** will move the balls **78** into their respective recesses **80** to thereby lock the outer shank to the sleeve **8** and prevent operation of the outer knob. The key may then be rotated in a counterclockwise direction for the quarter turn of lost motion which is provided between the drive pin **67** and the cam member **65** to thereby return the key plug to its normal position and permit removal of the key therefrom while still leaving the cam member **65** and the inner rollback in their dogging positions, as shown in Figs. 9, 10 and 12, wherein operation of both the inner and the outer knobs is prevented.

When the mechanism is in the locking position and it is desired to unlock it so as to return it to its normal position, as shown in Fig. 1, the key is inserted into the plug **62** and rotated counterclockwise for a quarter turn and then clockwise for a quarter turn to permit removal of the key. This will return the lock mechanism from the positions shown in Figs. 9, 10 and 12 to those shown in Figs. 1, 4 and 5 wherein it is rendered operable by means of either knob.

It will be understood that when my improved lock mechanism is in the different position, above described, it will operate as follows:

1. When the mechanism is in its normal position, as shown in Fig. 1, it may be operated by both the inner and the outer knobs.

2. When the push button **29** is forced inwardly, so that the mechanism is in the position shown in Fig. 8, the outer knob is dogged against operation, the lock may be operated only by the inner knob and such operation will cause undogging of the outer knob.

3. When the mechanism is in the position shown in Fig. 8, and an emergency occurs so that it becomes necessary to open the lock by an emergency operation, the key-operated mechanism may be used to undog the rollback **26** and permit operation of the lock by the outer knob.

4. When it is desired to prevent operation of the lock by both knobs, the key is inserted and the key plug is rotated in a clockwise direction for a quarter turn, and then rotated in a counterclockwise direction to permit removal of said key from the lock.

I claim:

1. In a door lock including a case, a retractor slidably mounted within said case, an inner and an outer rollback for operating said retractor, an operating member on said case for each of said rollbacks, abutments on said case adapted to engage said inner and outer rollbacks, means operable through the inner operating member for moving the outer rollback into engagement with its respective abutments to prevent operation thereof by its operating member and retaining means in said case for retaining said outer rollback in engagement with said abutments; key-controlled means operable through the outer operating member for causing engagement of the inner rollback with its respective abutments and operation of the retaining means to cause disengagement of the outer rollback from its respective abutments.

2. In a door lock including a case, a retractor slidably mounted within said case, an inner and an outer rollback for operating said retractor, an operating member on said case for each of said rollbacks, abutments on said case adapted to engage said inner and outer rollbacks and means operable through the inner operating member for moving the outer rollback into engagement with its respective abutments to prevent operation thereof by its operating member; key-controlled means operable through the outer operating member for locking the outer operating member and causing engagement of the inner rollback with its respective abutments for dogging the inner operating member.

3. In a door lock including a case, a retractor slidably mounted within said case, an inner and an outer rollback for operating said retractor, an operating member on said case for each of said rollbacks, abutments on said case adapted to engage said inner and outer rollbacks, means operable through the inner operating member for moving the outer rollback into engagement with its respective abutments to prevent operation thereof and retaining means in said case for retaining said outer rollback in engagement with said abutments; key-controlled means operable through the outer operating member for moving the outer rollback out of dogging position and the inner

rollback into engagement with its respective abutments to dog the inner operating member.

4. In a door lock including a case, a retractor slidably mounted in said case, an inner and an outer rollback, an inner and an outer operating member on said case for rotating said rollbacks to cause withdrawal of the retractor, abutments on said case adapted to engage the said outer rollback to prevent rotation of the outer operating member, a longitudinally movable member manually operable through the inner operating member for moving said outer rollback into engagement with said abutments and retaining means carried by said retractor for engaging said longitudinally movable member to retain the outer rollback in engagement with said abutments; key-controlled means operable through the outer operating member independently of the said longitudinally movable member for causing release of the said longitudinally movable member by the retaining means to permit disengagement of the outer rollback from the abutments and to dog the said inner rollback.

5. In a door lock including a casing, a retractor, an inner and an outer rotatable operating member, an inner rollback operatively connected to the inner operating member, an outer rollback operatively connected to the outer operating member, abutments on said casing engageable by said outer rollback to dog the outer operating member against rotation, a longitudinally movable spindle unit including inner and outer movable sections, means operable through the inner operating member for moving said spindle unit to cause dogging engagement of said outer rollback with said abutments, means for retaining the spindle unit and rollback in dogging position; the outer spindle section being longitudinally movable through the outer operating member independently of the inner spindle section, means on said outer spindle section for causing the release of said retaining means to cause movement of the spindle unit and outer rollback out of dogging position, and key-controlled means in the outer operating member for moving said outer spindle section and locking said outer operating member.

6. In a door lock including a case, a retractor mounted within said case, an inner and an outer rollback, an inner and an outer operating member on said case for operating said rollbacks to cause withdrawal of the retractor; abutments on said case adapted to engage the said inner and outer rollbacks, respectively, to prevent operation of the inner and outer operating members, a spindle unit including an inner section and an outer section; said outer section being adapted to move the outer rollback, pushbutton means operable through the inner operating member for moving the inner section of the spindle, key-controlled means operable through the outer operating member for moving the outer section of the spindle, a push member between said inner and outer sections for causing movement of the outer section upon operation of the pushbutton means to cause movement of the outer rollback into engagement with its respective abutments, and a separate push member extending through the outer section of the spindle and operable by the key-controlled means for moving the inner rollback into engagement with its respective abutments.

7. A door lock as set forth in claim 6 wherein the key-controlled means include locking means for locking the outer knob to prevent operation thereof.

8. A lock as set forth in claim 6 wherein the outer section of the spindle is movable by the key-controlled means to permit disengagement of the outer rollback from its respective abutments.

9. In a door lock including a case, a retractor, inner and outer rollbacks, inner and outer operating members for operating said rollbacks, respectively, abutments engageable with said rollbacks for preventing operation of the said inner and outer operating members, a spindle unit including an inner section and an outer section movable relatively to the inner section; said outer section being adapted to move the outer rollback, retaining means engageable with said inner section to retain the outer rollback in engagement with its abutments and releasable by the outer spindle section; a push member connecting the inner section with the outer section for operation of the outer section to cause movement of the outer rollback into engagement with its respective abutments, a separate push member extending through said outer section and adapted to move the inner rollback into engagement with its respective abutments, pushbutton means operable through the inner operating member for moving the inner section of the spindle, key-controlled means operable through the outer operating member for moving the separate push member and the outer section of the spindle to cause movement of the inner rollback into engagement with its respective abutments and of the outer section to release the retaining means and permit movement of the outer rollback out of engagement with its respective abutments, and spring means for urging said outer rollback out of engagement with said abutments; the said key-controlled means including locking means for locking the outer operating member to prevent operation thereof.

10. A door lock as set forth in claim 9 wherein a spring member is interposed between the inner section of the spindle and the push member connecting it to the outer section.

11. In a door lock including a case, a retractor, an inner and an outer rollback, and inner and outer operating members connected to said rollbacks; a spindle unit including an inner section, an outer section, a pair of push members between said inner and outer sections, one of said push members connecting the inner section to the outer section, the other push member being engageable with the inner rollback and extending through the outer section, push button means operable through the inner operating member for moving the spindle unit to cause movement of the outer rollback into engagement with its respective abutments and thereby dog the outer operating member, and key-controlled means operable through the outer operating member to move the said other push member and thereby cause movement of the inner rollback into engagement with its respective abutments for dogging the inner operating member.

12. A door lock as set forth in claim 11 wherein the key-controlled means includes locking means for locking the outer operating member.

13. A door lock including a case, a retractor, inner and outer rollbacks, inner and outer operating members respectively connected to said rollbacks, abutments on said case and retaining means for retaining the outer rollback in engagement with its respective abutments; a spindle unit including an inner spindle section, means for moving the inner section, an outer spindle section adapted to move the outer rollback, a push member between said inner and outer sections moving the outer section upon movement of the inner section to cause engagement of the outer rollback with its respective abutment, key-controlled means, and a separate push member operable by said key-controlled means for moving the inner rollback into engagement with its respective abutments.

14. A door lock as set forth in claim 13 wherein the outer spindle section is also movable by the key-controlled means to operate the retaining means and permit disengagement of the outer rollback from its respective abutments.

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