June 23, 1953 H. QUIGLEY 2,642,735

KEY-IN-KNOB LOCK

Filed Sept. 2, 1948 3 Sheets-Sheet 1

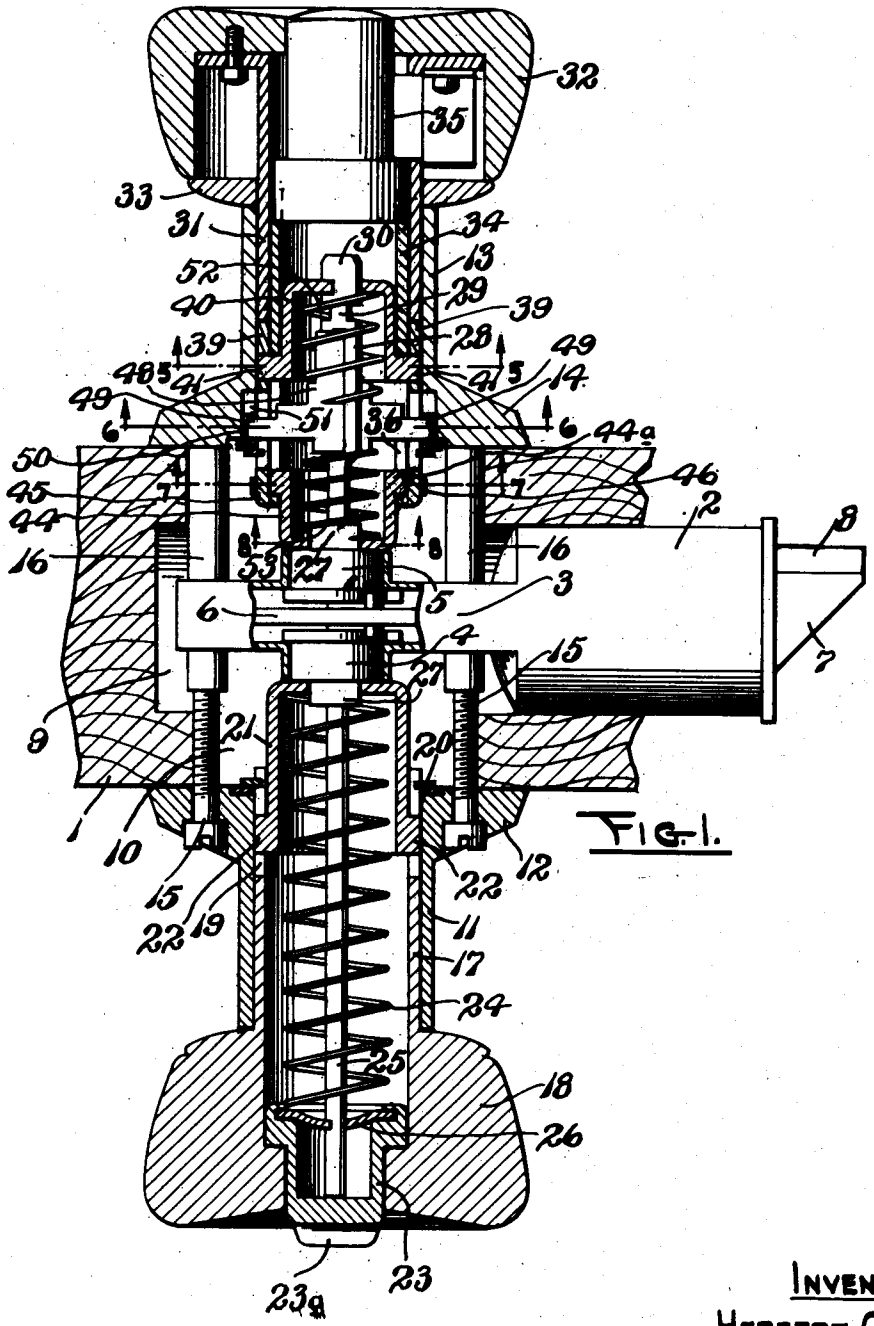


FIG. 1.

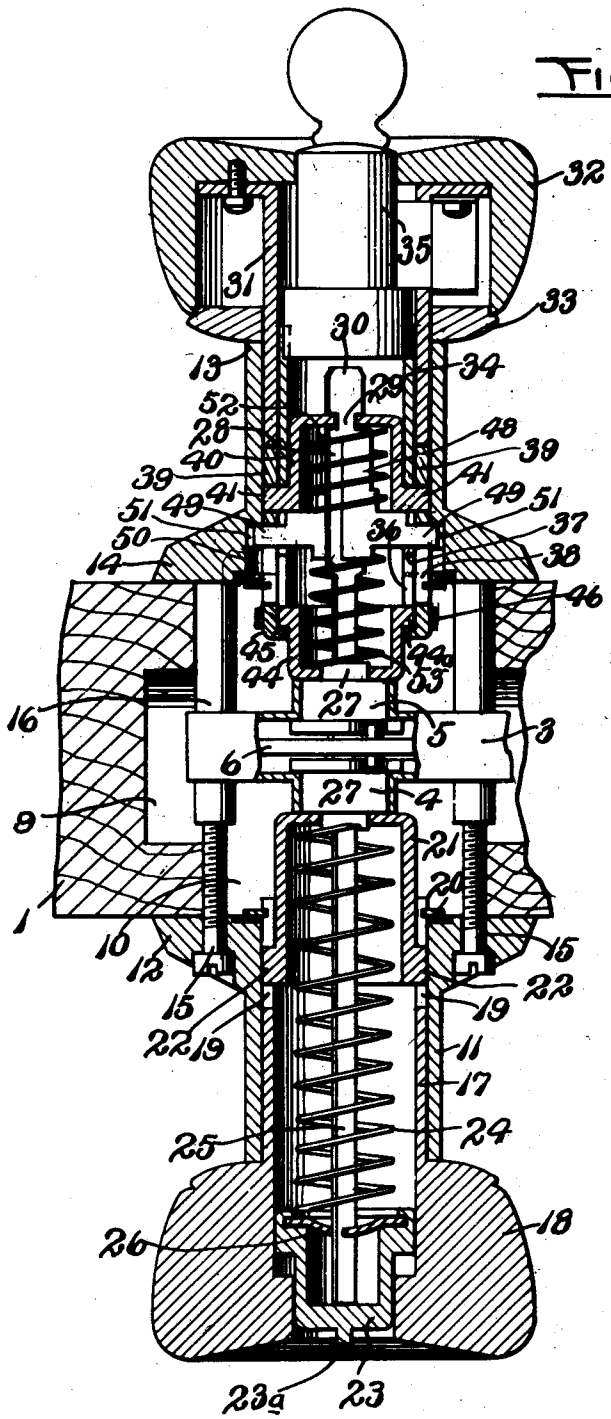
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FIG. 2.



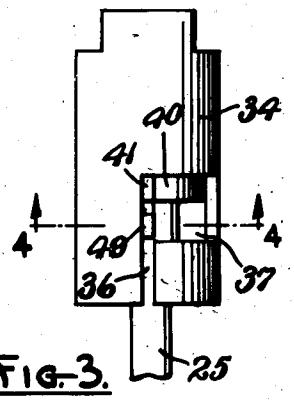


FIG. 3.

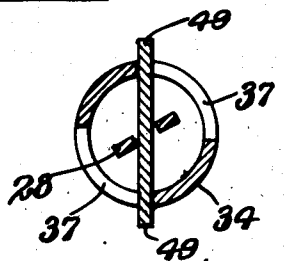


FIG. 4.

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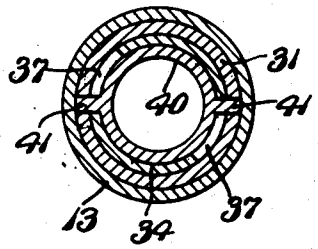


FIG. 5.

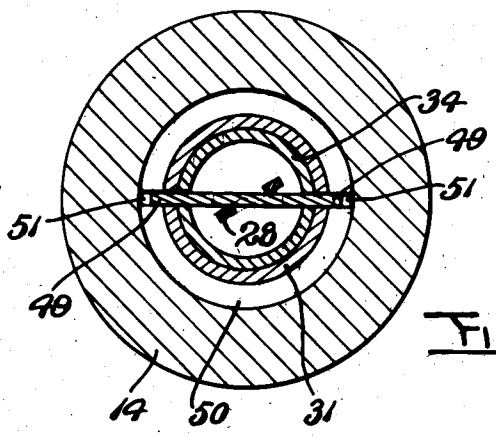


FIG. 6.

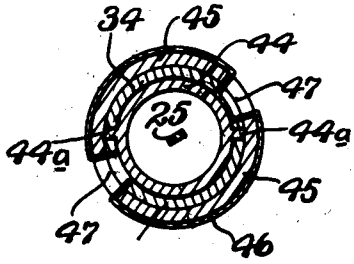


FIG. 7.

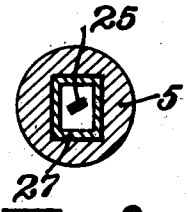


FIG. 8.

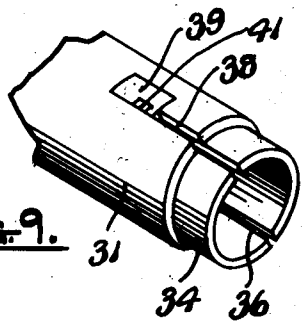


FIG. 9.

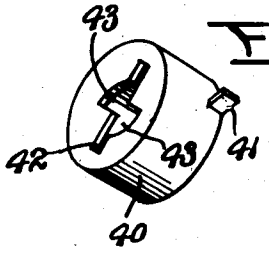


FIG. 10

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Patented June 23, 1953

2,642,735

UNITED STATES PATENT OFFICE

2,642,735

KEY-IN-KNOB LOCK

Herbert Quigley, Hastings, Mich., assignor to National Brass Company, Grand Rapids, Mich., a corporation of Michigan

Application September 2, 1948, Serial No. 47,438

10 Claims. (Cl. 70—146)

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This invention relates to a door lock operated by knobs on either side of the door, the outside knob having means associated therewith to selectively prevent or interpose a barrier against its rotative movement, and containing a key-actuated device that by-passes the barrier and by means of which the lock bolt may be retracted at the times as such bolt may not be retracted by operation of the outside knob. The structure embodying the invention also includes an inside knob which may be turned to operate the lock at all times, said inside knob further containing manually operable linkage with the outside knob barrier means, by means of which the barrier means may be moved selectively to either its operative or inoperative positions.

In an application filed of even date herewith, Ser. No. 47,437, a novel structure of lock bolt and operating means therefor for doors is shown and described, in which the bolt is retracted by independent operation of either of two roll-backs associated therewith, and with which structure the present invention for actuating the roll-backs may be used. The present invention is not necessarily limited in use to the one specific type of lock there described. The essential structure of the lock with which the present invention is to be used, is that it has a bolt which is retracted by roll-backs, one at either side of a bolt retractor, each roll-back being capable of independent operation in either direction.

With the present invention, when the barrier associated with the outside knob is in the position in which the knob is free to turn, the lock bolt may be retracted from either side of the door by independent rotation of either the outside or inside knob, but when the manually operable means which is associated with the inside knob and is operable from the inner side of the door is actuated to move the barrier means associated with the outside knob into position to hold the outside knob from turning, the lock bolt can be retracted only by turning the inside knob, or by the mentioned key-actuated device which is mounted and contained in the outside knob.

It is an object and purpose of the present invention to provide a novel, practical and secure door lock structure as described, which may be installed upon a door with a minimum of time and effort and which requires only a minimum of work in providing the openings in which the lock parts and the operating means therefor are received. The invention is also applicable to all doors of the normal standard widths of between 1⅜" and 1¾" in thickness.

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An understanding of the invention may be had from the following description, taken in connection with the accompanying drawings of which,

Fig. 1 is a horizontal section through the key-in-the-knob locking spindle embodying the present invention, with the parts thereof in unlocked position;

Fig. 2 is a like section showing the position of the parts when the door is locked against bolt retraction from its outer side;

Fig. 3 is an elevation of the operating member for the outside roll-back, the turning of which by a key unlocks the bolt;

Fig. 4 is a transverse section substantially on the plane of line 4—4 of Fig. 3;

Figs. 5, 6, 7 and 8 are transverse sections respectively on the planes of lines 5—5, 6—6, 7—7 and 8—8 of Fig. 1.

Fig. 9 is a fragmentary perspective view of the inner portions of the outer knob shell, and the operating member telescopically located therein;

Fig. 10 is a perspective view of a detail of structure housed within said operating member, and interposed between it and the immediate locking element of the structure which in one position permits retraction of the bolt from both the inner and outer sides of the door, and in another position prohibits retraction of the bolt from the outer side of the door in the absence of the key.

Like reference characters refer to like parts in the different figures of the drawings, and the transverse sections are taken looking in the directions indicated by the arrows associated with the section lines.

The door 1, fragmentarily shown in horizontal section, has a housing 2 for a bolt mounted therein, the housing being reduced from a cylindrical to rectangular cross-section at its inner portion 3, with two roll-backs 4 and 5 mounted to turn about a horizontal axis in opposite sides thereof operatively associated with a retractor 6 connected to a bolt 7 which projects at the outer end of the housing 2. An auxiliary member 8 is likewise shown projecting from the housing alongside of the bolt 7 in conformity with the disclosure in the previously mentioned application filed with this application. It is to be understood, however, that the invention herein is not limited to any particular latch bolt and auxiliary member associated therewith, but is operable for the withdrawing of any suitable latch bolt by turning either of the roll-backs 4 or 5.

For installation of the lock-bolt housing within which the bolt is mounted, cylindrical opening 9

is bored horizontally from the free edge of the door, having a diameter such that the cylindrical portion of the housing is insertable therein. Also relatively large transverse openings 10 are bored or otherwise cut from both the inner and outer sides of the door to said opening 9 connecting therewith, and at positions such that the inner rectangular portion 3 of the housing is between the openings 10.

At the inner side of the door, a knob shell 11 of cylindrical form is located, having a relatively heavy rosette 12 integral therewith. At the outer side of the door, a similar knob shell 13 and rosette 14 are provided. The two rosettes cover the outer ends of the openings 10, and are connected together by long screws 15 passing through one of the rosettes as 12, and threading into long sleeves 16 connected with the opposite rosette 14. Said sleeves pass through the inner portion 3 of the bolt housing, and the sleeves and screws are located in the transverse openings 10. The two knob housings are therefor fixedly secured to the door at opposite sides of it.

At the inner side of the door, a knob is provided including a cylindrical shank 17 which telescopes into the knob shell 11, and a knob 18 at its outer end which at its inner side comes against the outer end of the shell 11. The shank 17 at the inner portion thereof, is longitudinally slotted at opposite sides at 19 for a portion of its length. Shank 17 extends a distance beyond the rosette 12, and is secured in place by a retaining split ring 20 of flat metal as shown. The knob and its shank 17 may be turned in either direction about the longitudinal axis of the shank.

A member 21 of cup-form has oppositely extending wings 22 at its outer open end. The wings are received in the slots 19, and the member 21 telescopes into the inner end of the shank 17, being spring actuated at its closed end to project beyond said shank 17 to reach and connect to the outer roll-back 4, to conform to different door thicknesses. In the outer portion of the knob 18, a cup-like member 23 having a rib 23a at its outer closed end is located, and is acted upon by coiled compression spring 24, which at its inner end, bears against the cup-member 21, and at its outer end against the member 23. The member 23 may be pushed inwardly from its outer position as shown in Fig. 1, to that shown in Fig. 2, but normally will be moved to outer position (Fig. 1) by the spring 24, and such spring moves the member 21 to and holds it in connection with the outer roll-back 4. An elongated, flat metal bar 25 of relatively thin metal lies lengthwise of and within the spring 24, and engages with member 23 by sliding connection through a disk 26 across the open inner end of said member. The bar 25 extends through the roll-backs 4 and 5, each of which at its outer side has a squared projection 27. The projection 27 on the inner roll-back 4 is received in a square opening in the bottom of the cup-member 21. A distance beyond the projection 27 of the outer roll-back 5, bar 25 is widened as at 28, and has an elongated slot lengthwise through it. Bar 25 narrows to provide a short neck 29 beyond the widened section 28 and beyond the neck 29 is again widened in a relatively short terminal section 30.

A knob shank 31 is inserted into the knob shell 13, and at its outer end is permanently connected with a knob 32, said knob being deeply recessed at its inner side. The open end of the recess is covered by disk 33 secured to the knob, and bears against the outer end of the shell 13. An operating member in the form of a tubular sleeve 34 is located within the shank 31, and at its outer end has connected therewith a key-receiving barrel 35 of a lock which extends through the knob 32, adapting it to receive a key, as shown in Fig. 2 which when inserted therein, frees the barrel 35 from the knob 32 and the attached operating member 34 for rotative movement.

The operating member 34 (Fig. 3), at its inner end portion, is longitudinally slotted at opposite sides at 36 from its inner end, and is also provided with oppositely disposed relatively large, rectangular openings 37 connecting with the slots (Figs. 3 and 4). The knob shank 31 likewise is provided with two oppositely disposed slots 38 extending from its inner end for a distance and joining with rectangular openings in each of which a filling plate 39 is inserted, which is held between the knob shell 13, and the operating member 34.

A cup-member 40 is located within the operating member 34 and from the walls thereof, two diametrically opposed fingers 41 extend outwardly passing through the slots 36, and into recesses made to receive them in the plates 39. Such plates 39 are used for conveniences in assembly of the parts. The outer closed end of the cup member 40 has a diametrically located slot 42 widened and curved substantially at 43 centrally of the outer end of the cup, as shown in Fig. 10.

An additional cup member 44 having an open outer side has the bottom or closed end portion thereof provided with a squared opening into which the projection 27 of the outer roll-back 5 enters. Lugs or fingers 44a diametrically opposed to each other project radially from the open side portion of the member 44 into the slots 36 of the operating member, so that when the barrel 35 is turned and the operating member 34 turns with it about their longitudinal axis, cup member 44 is likewise turned and rotates the outer roll-back 5, thereby retracting the bolt 7. A ring 45 surrounds the lower end of the operating member 34, and is provided with an annular lip at its inner side as shown. It is surrounded by a thin metal band 46 formed from a length of material bent substantially into a circular band parted at one side, having end portions received in recesses at 47 in the ring 45, and the operating member 34, said band 46 also midway between its ends having an inwardly pressed section received in similar recesses 47 at the opposite sides of the parts 45 and 34 as shown in Fig. 7.

A locking barrier 48 is inserted through the slot in the widened portion 28 of bar 25 and at its inner end has two oppositely extending arms 49 which, in one position of the locking barrier (Fig. 1), at their ends are located in an annular groove 50 made around the opening in the rosette 14 through which the shank 31 passes. When in such position the outer knob 32, and its connected shank 31, together with the cup-member 44, may be turned back and forth about their axis as the ends of the arms 49 have freedom of movement in the annular groove 50. Two diametrically opposed recesses 51 are also provided in the outer rosette 14 outwardly of the annular groove 50 into and joining therewith, which when the barrier member is moved outwardly to the position shown in Fig. 2, the ends of the arms 49 are received, thereby locking the knob and attached parts movable therewith against movement because the arms 49 are held from movement by the fixed rosette 14 of the outer knob shell.

With the parts in the position shown in Fig. 1,

either knob may be independently turned. Upon turning the inner knob 18 in either direction, the inner roll-back 4 is rotated and the bolt 7 retracted. Upon turning the outer knob 32 connected with shank, said shank 31, together with the operating member 34, cup-member 40 and locking barrier 48, is freely turned to thereby turn the member 44 connected with the outer roll-back 5 so that bolt 7 may be retracted. Springs 52 and 53 bear oppositely against the locking barrier 48 while the spring 52 of greater strength than spring 53, when free to do so, moves the parts to the position shown in Fig. 1, in which position the bolt may be retracted by a manual operation of either knob 18 or 32 in either direction of turning movement.

To lock the outer knob 32 against operation, the member 23 is pushed against to compress the springs 24 and 52, whereupon bar 25 is moved lengthwise. The outer widened head 30 on the bar 25 which extends through the slot 42 is thereupon moved from the position in Fig. 1 to that in Fig. 2 bringing the narrowed neck at 29 into a position with reference to the slot 42 and enlargements 43 thereof, that such bar 25 may be turned about its longitudinal axis to move the terminal head or section 30 into a position out of alinement with the slot 42 and thus hold bar 25 against return to its normal position under the force of the spring 52. Such turning of the bar 25 is accomplished by manual engagement of the projecting rib 23*a* on the member 23. The longitudinal movement of the bar 25 carries the ends of the arms 49 into the recesses 51 of the rosette 14. Thus, the outer knob 32 is locked against rotative movement. Of course, by engaging the rib 23*a* and turning member 23 and the connecting bar 25 back to aline the section 30 with the slot 42, the outer knob will be unlocked. Such locking of the outer knob against operation does not affect the inner knob 18 and the bolt 7 at all times may be retracted from the inner side of the door by turning knob 18.

With the outer knob 32 locked from the turning movement, any retraction of the bolt 7 from the outer side of the door is by inserting a key into the barrel 35 which is thereby released to turn with the connecting operating member 34 about their common longitudinal axis with the parts in the locking position as shown in Fig. 2. This results in turning the member 44 connected with the outer roll-back 5. The opposite openings 37 into the operating member 34 permits the turning thereof while the barrier arms 49 are securely held in the recesses 51.

The outer roll-back 5 is turned by the operating member 34 either by the knob 32 or the lock barrel 35 by means of a key inserted therein. When the barrier member 48 is in its outer position, as in Fig. 2, and held against rotative movement, the operating member 34 connected with cup member 44 may be rotated by reason of freedom of movement from arms 49 in the openings 37 (Figs. 3 and 4). When the barrier 48 is at its inner position, as in Fig. 1, the outwardly projecting arms 49 thereof are free to move in the groove 50 of the rosette 14, but have entered the slots 36 in the operating member 34. Thus on turning the knob 32 and its shank 31, and with the arms 49 in the slots 36 of the shank, turning said shank turns the operating member 34 and it, through its connection through the roll-back 5, retracts the bolt. Accordingly the bolt may be retracted by turning knob 32 when the barrel 49 is in the position shown in Fig. 1 through the described connection of the knob shank and the operating member 34.

When the barrier member is in the position shown in Fig. 2, and is held against turning movement, it also holds the shank 31 of the outer knob 32 against movement. The outer roll-back 5 must be turned by a direct turning of operating member 34 by key actuation of the barrel 35, it being released from the knob 32 by the insertion of the key.

The inner knob structure is connected by its cup member 21 with the inner roll-back 4 at all times and may be freely turned under all conditions to retract the bolt. The spring 24 insures that the cup member 21 shall be pressed into position to engage with the roll-back 4 under varying thicknesses of the door 1, and the spring 53 serves the same purpose of insuring connection of the member 44 with the outer roll-back 5. The spring 52 will move the barrier member 48 and bar 25 to unlocked position, as in Fig. 1, when the head 30 is alined with slot 42 in the member 40. The member 40 is secured and held against movement when the outer knob 32 is locked as in Fig. 2.

The locking of the outer knob against rotation is done by pressing inwardly upon the member 23, and turning it by means of the rib 23*a* to move bar 25 from the position in Fig. 1 to that in Fig. 2, and such bar 25 and the barrier member 48 carried therewith are returned to the initial position of Fig. 1 by a reverse turning of the member 23 to aline the head 30 with slot 42. When the member 23 has been pushed against the spring 24, as in Fig. 2, and turned to turn the head 30 into its retained position, a release of the pressure on the member 23 results in its being moved outwardly by spring 24, the bar 25 being slidable through disk 26.

Each of the knob structures, one at the inner and the other at the outer sides of the door is a complete assembly. The outer knob structure will have the bar 25 assembled with it. It is placed at the outer side of the door and bar 25 inserted through the roll-backs and lengthwise of the member 21 and inner knob shank 17 and through the slot to receive it in the disk 26. The screws 15 are thereupon connected with sleeve 16 and the installation on the door is complete.

The cup members 21 and 44 moved by springs 24 and 53 connect with the projections 27 on the roll-backs and with the doors of the lesser thicknesses, such cup members will traverse the slots 19 and 36 in shank 17 and in the operating member 34, the springs being compressed, until finally located by the rosettes 12 and 14 coming against the opposite inner and outer sides of the door. The labor required in installation is merely that of boring the cylindrical opening 9 and the transverse openings 10, placing the parts of the structure at opposite sides of the door, and tightening the screws 15; and for different thicknesses of doors, cutting a pre-selected length from the end of the bar 25, which may carry indicated lines of cutting for different door thicknesses.

With the structure as described, it is evident that the desired purposes and functions of the invention are fully attained. The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. Operating means for a latch bolt having a

retractor connected therewith and including two independently operable roll-backs, one at each side of the retractor for retracting the bolt on turning either roll-back in either direction, a knob adapted to be mounted on the outer side of a door between the sides of which the bolt and the retractor are adapted to be installed, means for rotatably mounting said knob, a second knob adapted to be rotatably mounted at the inner side of the door, means for connecting said second knob with the roll-back at the inner side of the latch bolt, a tubular operating member rotatably mounted within the first knob, means for connecting it with the other roll-back, movable means adapted to be moved between two positions longitudinally of said operating member adapted in one position to connect said first knob and operating member, and in the other position to permit relative rotation of them, and to lock the knob against turning in said other position, means for manually moving said last mentioned means located within the inner knob and extending therefrom into the operating member within the outer knob, and manually operable means in said outer knob and connected with the operating member for operating the operating member when it is released from said outer knob, and said outer knob is held against movement.

2. In a structure as described, operating means for a retractable latch bolt including, two independently turnable centrally apertured roll-backs associated with a latch bolt for retracting it on turning either roll-back in either direction, outer and inner knob shells, each having a cylindrical opening therethrough, adapted to be fixedly secured to outer and inner sides of a door between which a bolt is adapted to be installed, knobs having each a centrally apertured projecting shank extending into its associated knob shell, connections between said shanks of the knobs and their respective adjacent roll-backs for independently turning said adjacent roll-backs, a bar located within the outer knob shell and extending across the shank of said outer knob, said shank having opposed slots through which said bar passes, and said outer knob shell having an annular groove within it into which the ends of said bar extend when said bar is in one position, and recesses in conjunction with said groove outwardly thereof into which the ends of said bar extend in another position, thereby locking the outer knob against rotation, an elongated bar extending longitudinally and axially through said inner knob and through said roll-backs into the outer knob shank, said first bar extending transversely through a slot provided in said longitudinal bar, manually operable means mounted in the inner knob for moving said longitudinal bar lengthwise to move said first bar from its knob released to its locked position with respect to its outer knob shell, and means for releasably securing said longitudinal bar and said first bar in said last mentioned position.

3. A construction as defined in claim 2, wherein said connection between said shank of said outer knob and said outer roll-back is adapted to permit limited rotary displacement between said shank and said outer roll-back, an operating member of hollow cylindrical form mounted within said outer knob shank, said operating member having opposed openings elongated in the direction of rotation of said operating member through which the ends of said first bar pass permitting rotative operation of said operating member, and key-operated means mounted within said outer knob and secured to said operating member, said key operated means accessible from the outer side thereof for turning said operating member, and connections between said operating member and the outer roll-back to turn said roll-back with said operating member.

4. Operating means for a latch bolt having a retractor and inner and outer independently movable, centrally apertured, roll-backs for retracting the same comprising, inner and outer centrally apertured knobs, each knob having a cylindrical shank, inner and outer shells in which the shanks of said knobs are rotatably mounted, means for connecting the inner knob to the inner roll-back, a hollow cylindrical operating member rotatably mounted in the outer knob, and connected to the outer roll-back, a notch at the inner side of the outer shell, a longitudinal slot in the shank of the outer knob, a corresponding longitudinal slot merging into an arcuate slot in the wall of the operating member, a locking bar extending through the slots in the knob shank and the operating member, a push rod operable at the inner knob and connected to said locking bar whereby said locking bar may be moved to a first position in which it is located in the notch in the outer shell, the longitudinal slot in the shank of the outer knob and the arcuate slot in the operating member, in which position the outer knob shank is locked against rotation and the operating member is free to oscillate, and to a second position in which said locking bar is removed from said notch and is in both of said longitudinal slots in which position the outer knob is free to rotate and the operating member is connected for rotation with the knob shank, and key operated means in the outer knob connected with said operating member and adapted to lock or unlock the operating member to the knob.

5. The elements of claim 4 in which said push rod is connected with said locking bar for oscillation axially of the knob shank and releasable means operable at said inner knob for retaining the push rod and locking bar in said first position.

6. Operating means for a latch bolt having a retractor connecting thereto, and including a roll-back at a side of the retractor and associated therewith for retracting the bolt on turning the roll-back in either direction, and a knob shell adapted to be secured to a side of a door between the sides of which the bolt and retractor are adapted to be installed, said shell including a cylindrically outwardly extending portion, a knob having a cylindrical shank extending through said shell, said shank having a longitudinal slot at its inner end, a cup member telescopically movable into the inner end portion of said shank and having a projection entering said slot, said cup member having a closed inner end with a polygonal shaped opening therein into which opening a complementary shaped outer portion of said roll-back extends forming a connection therewith, and yielding spring means acting on said cup member to move it in a direction adapting it to maintain engagement with the roll-back.

7. In operating means for a latch bolt having a retractor connected therewith and including two independently operable roll-backs, one at each side of the retractor for retracting the bolt on turning either roll-back in either direction, an outer knob and a shank rotatable with said

outer knob for mounting said outer knob on the outer side of a door between the sides of which the bolt and the retractor are adapted to be installed, an inner knob adapted to be rotatably mounted at the inner side of the door, an escutcheon plate mounted to the outer side of said door and surrounding said shank, means for connecting said inner knob with the inner of said roll-backs, the improvement which comprises: a tubular operating member rotatably mounted within the outer knob; means connecting said operating member and the outer of said roll-backs; a recess in said escutcheon plate; a barrier member within and longitudinally movable of said operating member; said shank having a longitudinally extending slot; said operating member having a longitudinally extending slot and an opening in the wall thereof communicating with the slot and elongated in the direction of rotation of said operating member; an arm on said barrier member extending through said slots for engaging said operating member and said shank when said barrier member is in its inward position and extending through said opening and into the slot in said shank and said recess when said barrier member is in its outward position, to prevent the outer knob from rotating and permit relative movement between said shank and operating member; means for moving said barrier member longitudinally of said operating member.

8. In operating means for a latch bolt having a retractor connected therewith and including two independently operable roll-backs, one at each side of the retractor for retracting the bolt on turning either roll-back in either direction, an outer knob and a shank rotatable with said outer knob for mounting said outer knob on the outer side of a door between the sides of which the bolt and the retractor are adapted to be installed, an inner knob adapted to be rotatably mounted at the inner side of the door, an escutcheon plate mounted to the outer side of said door and surrounding said shank, means for connecting said inner knob with the inner of said roll-backs; the improvement which comprises: a tubular operating member rotatably mounted within the outer knob; means connecting said operating member and the outer of said roll-backs; a circular channel at the inner end of said escutcheon plate; a recess outwardly of and communicating with said circular channel; a barrier member within and longitudinally movable of said operating member; said shank having a longitudinally extending slot, said operating member having a longitudinally extending slot and an opening in the wall thereof communicating with the slot and elongated in the direction of rotatioan of said operating member; an arm on said barrier member extending through said slot for engaging said operating member and said shank and seated within said channel when said barrier member is in its inward position and extending through said opening and into the slot in said shank and said recess when said barrier member is in its outward position to prevent the outer knob from rotating and permit relative movement between said shank and said operating member; means for moving said barrier member longitudinally of said operating member.

9. In operating means for a key-in-knob latch having a pair of independently operable roll-backs and an inner knob and an outer knob each mounted for independent rotation and each connected to the roll-back adjacent thereto, a hollow, cylindrical shank attached to said outer knob, an escutcheon plate surrounding said shank, the improvement which comprises: said shank having an axially extending slot therein; a tubular member rotatably mounted within said shank and connected to the adjacent of said roll-backs; a recess in said escutcheon plate; the walls of said tubular member defining a slot longitudinally of said tubular member and an opening communicating with the end of said slot adjacent said outer knob and elongated in the direction of rotation of said tubular member; a barrier member within and longitudinally movable of said tubular member; an arm on said barrier member extending through said slots for engaging said tubular member and said shank when said barrier is in its inward position and extending through said opening and into the slot in said shank and said recess when said barrier member is in its outward position to prevent the outer knob from rotating and permit relative movement between said shank and tubular member; and means for moving said barrier member longitudinally of said tubular member.

10. In an operating means for a key-in-knob latch having a pair of independently operable roll-backs and an inner knob and an outer knob each mounted for independent rotation and each connected to the roll-back adjacent thereto, a hollow, cylindrical shank attached to said outer knob, an escutcheon plate surrounding said shank, the improvement which comprises: a tubular member rotatably mounted within said shank and connected to the adjacent of said roll-backs; a recess in said escutcheon plate; a barrier member within and longitudinally movable of said tubular member; said shank having a longitudinally extending slot, said tubular member having a longitudinally extending slot and an opening in the wall thereof communicating with the slot and elongated in the direction of rotation of said tubular member, an arm on said barrier member extending through said slots for engaging both said tubular member and said shank when said barrier is in its inward position and extending through said opening and into the slot in said shank and said recess when said barrier member is in its outward position to prevent the outer knob from rotating and permit relative movement between said shank and said tubular member; and means for moving said barrier member longitudinally of said tubular member.

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