March 13, 1951 C. A. HILLGREN 2,544,959

DOOR LOCK

Filed Aug. 1, 1945 2 Sheets-Sheet 1

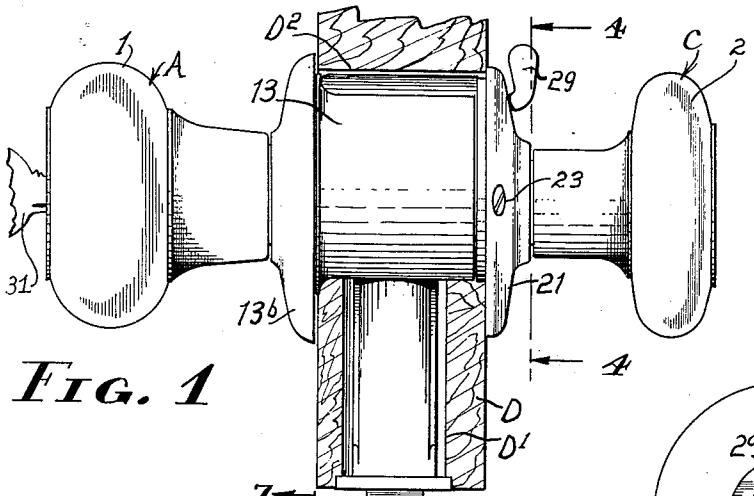


FIG. 1.

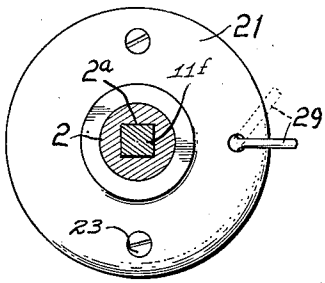


FIG. 4.

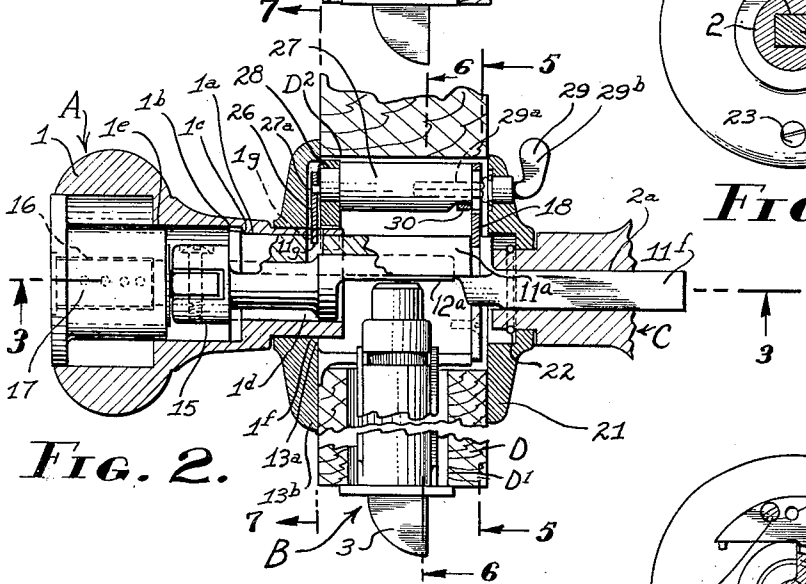


FIG. 2.

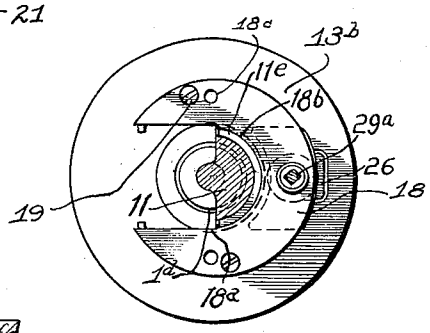


FIG. 5.

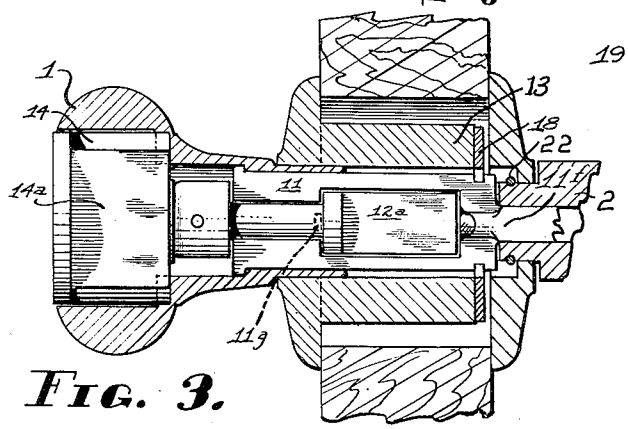


FIG. 3.

INVENTOR.
CARL A. HILLGREN
BY
William J. Hall
ATTORNEY

March 13, 1951 C. A. HILLGREN 2,544,959

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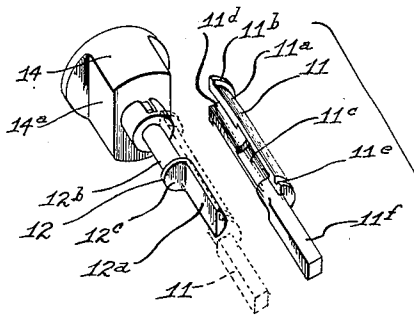
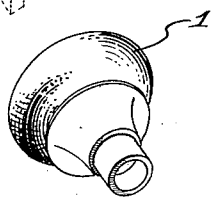


FIG. 9.



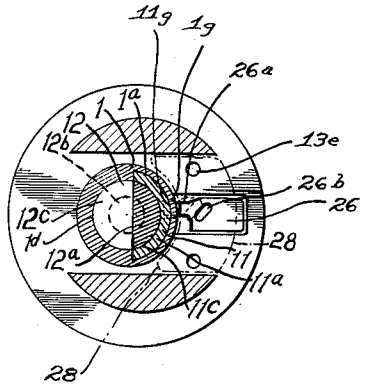
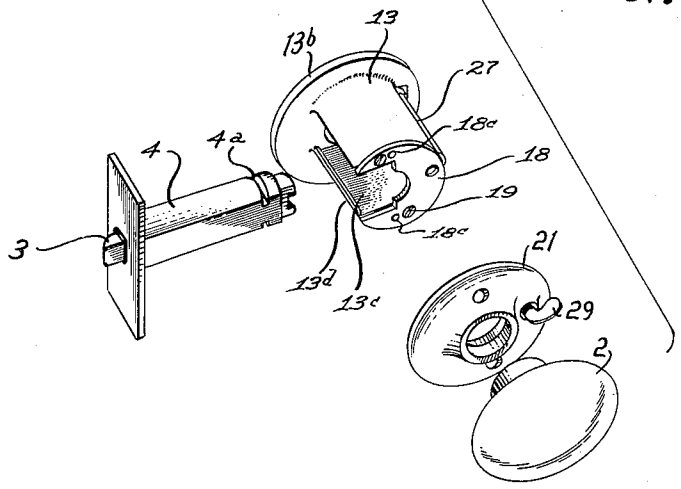


FIG. 7.



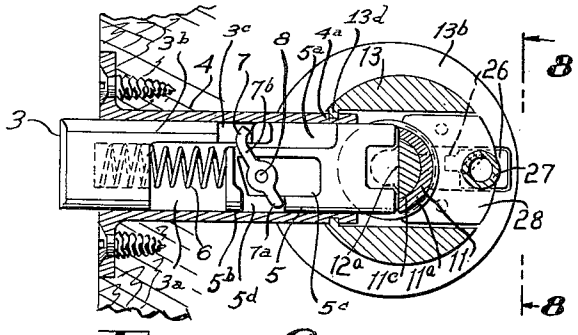


FIG. 6.

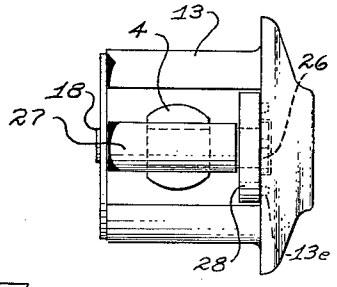


FIG. 8.

INVENTOR.
CARL A. HILLGREN
BY William B. Hall
ATTORNEY

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DOOR LOCK

Carl A. Hillgren, Los Angeles, Calif.

Application August 1, 1945, Serial No. 608,160

4 Claims. (Cl. 70—216)

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My invention relates to locks, and particularly to operating spindle mechanism for such locks.

One of the principal objects of this invention is to provide a lock which consists essentially of three main units which are adapted separately to be installed in a door or other closure, and in which the several units are interlocked and readily secured together by a minimum of securing means at one or the inner side of the door, and in which the several units may be installed in the door or closure with a minimum of fitting, so that the installation may be readily made with few tools or by unskilled persons, and whereby the lock may be secured in place by only a few screws.

Another important object of this invention is to provide a spindle means whereby the locking latch may be operated from both sides of the door or other closure, and whereby the operating means at both sides may be locked, and further whereby said latch may be operated from one side by a key.

An important feature of my lock is the provision of a latch operating means in the form of interpositioned semi-circular portions of operating spindles for engaging the rear portion of the latch so that the operation of either spindle will retract the latch.

A further important object of this invention is to provide novelly arranged spindles on the same axis, and in which one or a secondary spindle has a latch operating portion located within a corresponding portion of the main spindle and rotatable with respect to the latter, and whereby the secondary spindle is held in position against longitudinal or axial movement by the axial securing of the main spindle against such longitudinal movement.

A still further important object of this invention is to provide a lock having novel and simple means in association with the inner knob of a door for locking the inner and outer knobs or operating members of the lock against rotation or other operation, and a simple and novel means in connection therewith for separately operating the lock from the outside of the door.

Another important object of this invention is to provide a novel and simple cage which may be inserted from one side of the door, and which may be held in position by a knob or other operating means at the opposite side of the door, and in which such cage is utilized for securing the spindle or spindles in position, and also whereby the locking latch or bolt is secured in position when the cage is inserted into the door.

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With these and other objects in view, as will appear hereinafter, I have devised a lock having certain novel features of construction, combination, and arrangement of parts and portions, as will be hereafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings, and to the characters of reference thereon, which form a part of this application, in which:

Fig. 1 is a top view of my lock installed in a door, the door being shown in section through the median portion of the lock;

Fig. 2 is a fragmentary longitudinal sectional view thereof, the sectional portion being taken through the horizontal plane passing through the median portion of the lock, portions of the lock and door being shown fragmentarily to facilitate the illustration;

Fig. 3 is a fragmentary sectional view thereof, taken through 3—3 of Fig. 2;

Fig. 4 is a sectional view thereof, taken through 4—4 of Fig. 1;

Fig. 5 is a sectional view thereof, taken through 5—5 of Fig. 2;

Fig. 6 is a sectional view thereof taken through 6—6 of Fig. 2;

Fig. 7 is a sectional view thereof, taken through 7—7 of Fig. 2;

Fig. 8 is a fragmentary side view thereof, taken at 8—8 of Fig. 6; and

Fig. 9 is a perspective exploded view showing the relative relation of the principal elements of my lock.

My lock, for the purpose and convenience of installing the same in a door, designated D, is made in self-contained units A, B, and C. The unit A, which consists of a number of elements, as will be hereafter described, is mounted at the outside of the door, while the unit C is mounted on the inside of the door, and the unit B in the edge of the door. The unit B, which is the latch portion of the lock, is inserted into a drilled hole D^1 in the edge of the door, while the unit A is inserted through a transversely drilled hole D^2 located inwardly from the edge and intersecting the hole D^1. The portion of the unit A which is positioned within the drilled hole D^2 locks the latch unit B at the inner portion thereof. The unit C is secured to the inner end of the unit A as will be hereafter described in detail, thus securing all elements of the lock in position.

The unit A contains the outer knob 1 or other operating member at the outside of the door, while the knob 2, or second operating member, is part of the unit C. Both knobs or operating

members are arranged separately to operate the latch bolt 3 of the latch unit B.

The latch bolt 3 is enclosed in a cylindrical housing 4 which is of substantially circular cross-section, except for slightly flattened opposite sides, as shown best in Fig. 9, so that it may be easily inserted into the drilled hole D^1. The latch bolt 3 is reciprocally mounted in the outer portion of the housing, while at the inner portion thereof is reciprocally mounted the latch-bolt actuating member 5. The bolt has a cut-out portion 3^a at one side of its inner end, providing at the other side a leg 3^b which extends backwardly into a cut-out portion 5^a at one side of the actuating member. Thus the two members overlap each other. Within the cut-out portion 3^a is located a compression spring 6 which normally operates the bolt and actuating member, forcing the bolt outwardly to its normal latching position. The forward extension 5^b, opposite the cut-out portion 5^a, of the actuating member has a longitudinal slot 5^c in which is located the hub of a rocker 7 which is pivoted on a pin 8 supported in the opposite flat walls of the housing. This rocker has opposed arms 7^a and 7^b, the former extending into a transverse notch 5^d in the portion forming the outer side of the longitudinal slot 5^c, and the latter extending into a transverse notch 3^c in the backwardly projecting leg 3^b of the bolt. As the actuating member 5 is forced outwardly, by rotating either of the knobs 1 and 2, as will be hereafter described, the shoulder forming the inner end of the notch 5^d engages the short arm of the rocker and forces the longer arm 7^b against a corresponding shoulder forming the inner end of the notch 3^c, withdrawing or retracting the bolt.

The spindle mechanism for operating the latch, that is, for retracting the bolt, consists of a main spindle 11 and a secondary or key operated spindle 12, the former being non-rotatably connected to both the outer and inner knobs. Both of these spindles extend axially into a cylindrical cage 13, the spindle 11 extending through the cage, while the spindle 12 is short of the inner end of the cage. The outer end of the spindle 11 is axially held or axially located within the hub or shank of the outer knob 1 by means of the secondary spindle 12 which is connected to the inner end of a cylinder 14 against longitudinal movement. The cylinder 14 is located coaxially within the outer knob and is non-rotatable and axially fixed with respect thereto. But the spindle 12 is rotatable with respect to the cylinder and the outer knob, as will be hereinafter described. The cylinder 14 is prevented from relative rotation with respect to the knob 1 by means of a key portion consisting of flattened opposite sides 14^a of the cylinder which fit into the correspondingly shaped recess 1^e within the knob, as shown in Figs. 2 and 3.

The outer end portion of the spindle 11 is of semi-circular cross-section, as indicated by 11^a, and this portion fits into a correspondingly shaped bore or recess 1^a at the inner end of the hub or shank of the outer knob 1. The outer end of the semi-circular portion 11^a of the spindle has a semi-circular enlargement or shoulder 11^b which fits into a correspondingly enlarged recess 1^b in the hub of the knob 1, and is retained by a shoulder 1^c. At the flat side of the semi-circular portion 11^a of the spindle 11 are axially arranged semi-circular recesses 11^c and 11^d in which are located, respectively, a latch operating portion 12^a of semi-circular cross-section, and a round shank 12^b, the latter being of smaller diameter than the semi-circular latch operating portion 12^a. At the inner end of the latter portion is a head 12^c of the same diameter as the portion 12^a, to facilitate axial location of the spindle 12 both within the semi-circular recess 11^c of the spindle 11 and within a semi-circular bore 1^d at the inner end of the hub of the knob 1, the bore 1^d being located diametrically opposite the semi-circular bore 1^a. The outer end of the spindle 12 is connected, preferably pivotally and by means of a screw 15, to the inner end of a cylindrical plug 16, which is the key receiving member, and is rotatably mounted within and coaxially with respect to the cylinder 14. Within this plug 16 and the cylinder 14 are located the usual tumbler pins 17 for locking the plug in non-rotatable relation with respect to the cylinder and also for releasing the same by a key to permit rotation of the plug.

Intermediate the ends of the spindle 11, and specifically at the inner end of the semi-circular portion 11^a, is provided a semi-circular groove 11^e into which fits a plate 18. This plate is of U-shape, corresponding to the cross-section of the cage 13. It has an opening 18^a through which the spindle 11 extends. This opening has a semi-circular inner end 18^b which fits into the semi-circular groove 11^e for retaining the spindle 11 in position. This plate 18 is secured to the end of the cage 13 by screws 19.

In mounting the spindles within the outer knob 1 and in the cage 13, the portions 12^a and 12^b of the key operated spindle 12 are inserted into the recesses 11^c and 11^d, respectively, of the outer spindle, as indicated by dotted lines of the main spindle 11 in Fig. 9, and this unit, together with the cylinder 14 is inserted axially into the knob 1 from the outer end, the semi-circular portion 11^a fitting into the correspondingly shaped bore 1^a in the knob 1. The spindles, assembled in the knob 1, are inserted axially within the outer end of the cage 13 but at 180° from their normal position. When the spindles are inserted to their full extent, the spindles are rotated by means of the knob 1, permitting the inner end 18^b of the plate 18 to enter the groove 11^e, thus locking the several members against axial movement with respect to each other. When thus inserted, the inner end portion 1^f of the hub of the knob extends into and is rotatable within a circular recess 13^a in an escutcheon plate 13^b which forms a flange at the outer end of the cage.

The escutcheon plate 13^b is adapted to be placed against the outside of the door to cover the drill hole D^2 into which the cage 13 extends.

The cage has an opening 13^c at its cylindrically outer side, and at the opposite sides or edges of the opening are provided ledges 13^d which are adapted to fit into transverse grooves or notches 4^a at the upper and lower sides of the inner end portion of the housing 4 of the latch unit, as shown best in Figs. 6 and 9. In order to install the lock, the latch unit B is first inserted, then the unit A is installed by inserting the inner end of the cage 13 into the hole D^2 and forcing the ledges 13^d into transverse grooves or notches 4^a of the housing 4, thus securing the latch unit in position.

The inner knob 2 which forms part of the knob unit C is rotatably mounted at the inner end of its hub portion in an inside escutcheon plate 21, the hub of the knob being shown as rotatably retained therein by a ring 22. The plate 21 is retained in position and with respect to the remain-

ing portions of the lock by screws 23 which are screwed from the outer side of the plate 21 into the open end of the cage 13 through holes 18c in the plate 18. These screws 23 draw both of the escutcheon plates together against the opposite side of the door, through the cage 13 which anchors the inner end of the semi-circular portion of the spindle 11 to the plate 18 carried by the cage.

The inner end of the spindle 11 has a reduced axial extension 11f which is shown as of square cross-section. This portion 11f extends into an axial opening 2a, of square cross-section, in the knob 2. The end of the square portion 11f, extending beyond the hub of the knob 2, is secured to the end of the semi-circular portion 11a but beyond the recess 11c.

The latch bolt 3 may be retracted freely by rotating either knob in either direction. Both of the knobs may be locked against rotation for preventing retraction of the latch bolt 3 by a small latch 26 which is reciprocally mounted in a radial direction at the inner side of the outer escutcheon plate 13b supported by the cage 13. The inner end of this latch 26, designated 26a in Fig. 7, is adapted to enter aligned recesses 1g, near the inner end of the hub of the outer knob 1, and a recess 11g in the semi-circular section 11a of the spindle 11. The latch 26 is moved or operated by a rock shaft 27 rotatably mounted on an axis parallel to the axis of the spindles and located in a longitudinal recess in the back wall of the cage 13. This shaft is reduced at its opposite ends and extends into openings in a retainer 28 and in the plate 18, in which the shaft is rotatably supported. The retainer is located at the inner side of the escutcheon plate 13b by dowels on the retainer which extend into spaced holes 13e, as shown in Fig. 7. At the inner end of the rock shaft 27 is a crank pin 27a which extends into an angular slot 26b in the latch 26, as shown in Fig. 7. In the outer end of the rock shaft 27 extends axially an operating safety key 29, this key having a polygonal portion 29a at its inner end which extends loosely into the rock shaft. This key is provided at its outer end with a handle portion 29b for rotating the key. This key is rotatably mounted intermediate its ends in the escutcheon plate 21 so that it is carried by and removed with the escutcheon plate. By shifting of the handle portion 29b from the dotted to the solid line position as shown in Fig. 4, the latch 26 is forced inwardly. At the outer end of the cage 13 and inwardly from the plate 18 is a leaf spring 30 which holds the rock shaft 27 in either of its rocked positions for resiliently holding the same in a locking or unlocked position.

When desiring to lock knobs against rotation, the handle portion 29b of the key 29 is shifted from the dotted to the solid line position, as stated above. In order to retract the latch bolt 3 from the outside of the door, a key 31 is inserted in the plug 16 in order to rotate the plug, and thereby to rotate the secondary or key operated spindle 12. Thus the actuating member 5 of the latch unit B is forced outwardly, and the latch bolt 3 retracted.

Though I have shown and described a particular construction, combination, and arrangement of parts and portions, I do not wish to be limited to the same, but desire to include in the scope of my invention the construction, combination, and arrangement, substantially as set forth in the appended claims.

I claim:

1. In a lock structure, an outer knob, an inner knob, a spindle provided intermediate its ends with a portion of semi-circular cross-section non-rotatably connected at one end coaxially to the inner knob, and provided at the end adjacent the inner knob with an arcuate groove about the axis of the spindle, a retaining plate secured relative to and between two knobs and provided with a semi-circular opening adapted to receive the spindle at the arcuate groove thereof for axially locating the spindle, there being provided in the plane face of the semi-circular cross-section of said spindle concentric semi-circular recesses positioned end to end, one at the outer end of the spindle and the other inwardly thereof, the latter being of greater diameter, and a key-operated spindle located coaxially within the outer knob and coaxially with and rotatable relative to the first spindle, the key-operated spindle having a latch operating portion located within the larger recess of the first spindle, and also having a connecting shank connecting the latch operating portion with the outer knob, the shank being located within the smaller recess, the latch operating portion of the key-operated spindle being also of semi-circular cross-section with the face thereof located normally substantially within the plane of the corresponding face of the first spindle.

2. In a lock structure, an outer knob, an inner knob, a spindle provided intermediate its ends with a portion of semi-circular cross-section non-rotatably connected at one end coaxially to the inner knob, and provided at the end adjacent the inner knob with an arcuate groove about the axis of the spindle, a retaining plate secured relative to and between two knobs and provided with a semi-circular opening adapted to receive the spindle at the arcuate groove thereof for axially locating the spindle, there being provided in the plane face of the semi-circular cross-section of said spindle concentric semi-circular recesses positioned end to end, one at the outer end of the spindle and the other inwardly thereof, the latter being of greater diameter, a key-operated spindle located coaxially within the outer knob and coaxially with and rotatable relative to the first spindle, the key-operated spindle having a latch operating portion located within the larger recess of the first spindle, and also having a connecting shank connecting the latch operating portion with the outer knob, the shank being located within the smaller recess, the latch operating portion of the key-operated spindle being also of semi-circular cross-section with the face thereof located normally substantially within the plane of the corresponding face of the first spindle, a latch rock shaft rotatably mounted at one end in the plate on an axis parallel to the axes of the spindles, a latch connected to the other end of the rock shaft for locking the first spindle and the outer knob against rotation, and a latch lever at one side of the inner knob detachably and non-rotatably connected to the inner end of the rock shaft.

3. In a lock structure, a cage adapted to be fitted in a door, an outer knob rotatably mounted thereon and extending from the outer side thereof, a retaining plate secured to the inner side of the cage, an escutcheon plate secured to the inner side of the cage beyond the retaining plate,

an inner knob rotatably mounted on the escutcheon plate and extending therefrom, a spindle rotatably mounted within the cage and non-rotatably connected with both knobs, said spindle being provided within the cage with a portion of semi-circular cross-section and at the portion adjacent the inner knob with an arcuate groove about the axis of the spindle, said retaining plate having a semi-circular opening for receiving the spindle at the arcuate groove thereof for axially locating the spindle, there being provided in the plane face of the semi-circular cross-section of said spindle concentric semi-circular recesses positioned end to end, one at the outer end of the spindle and the other inwardly thereof, the latter being of greater diameter, and a key-operated spindle located coaxially within the outer knob and coaxially with and rotatable relative to the first spindle, the key-operated spindle having a latch operating portion located within the larger recess of the first spindle, and also having a connecting shank connecting the latch operating portion with the outer knob, the shank being located within the smaller recess, the latch operating portion of the key-operated spindle being also of semi-circular cross-section with the face thereof located normally substantially within the plane of the corresponding face of the first spindle.

4. In a lock structure, a cage adapted to be fitted in a door, an outer knob rotatably mounted thereon and extending from the outer side thereof, a retaining plate secured to the inner side of the cage, an escutcheon plate secured to the inner side of the cage beyond the retaining plate, an inner knob rotatably mounted on the escutcheon plate and extending therefrom, a spindle rotatably mounted within the cage and non-rotatably connected with both knobs, said spindle being provided within the cage with a portion of semi-circular cross-section and at the portion adjacent the inner knob with an arcuate groove about the axis of the spindle, said retaining plate having a semi-circular opening for receiving the spindle at the arcuate groove thereof for axially locating the spindle, there

being provided in the plane face of the semi-circular cross-section of said spindle concentric semi-circular recesses positioned end to end, one at the outer end of the spindle and the other inwardly thereof, the latter being of greater diameter, a key-operated spindle located coaxially within the outer knob and coaxially with and rotatable relative to the first spindle, the key-operated spindle having a latch operating portion located within the larger recess of the first spindle, and also having a connecting shank connecting the latch operating portion with the outer knob, the shank being located within the smaller recess, the latch operating portion of the key-operated spindle being also of semi-circular cross-section with the face thereof located normally substantially within the plane of the corresponding face of the first spindle, a latch rock shaft having one end rotatably mounted on one end of the cage and the other end rotatably mounted in the retaining plate, the axis of the rock shaft being parallel to the axes of the spindles, a latch connected to the first end of the rock shaft for locking the first spindle and the outer knob against rotation, and a latch lever at one side of the inner knob non-rotatably connected to the other end of the rock shaft.

CARL A. HILLGREN.

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