July 8, 1952 F. BELAUSTEGUIGOITIA 2,602,318

LOCK MECHANISM

Filed July 13, 1949 4 Sheets-Sheet 1

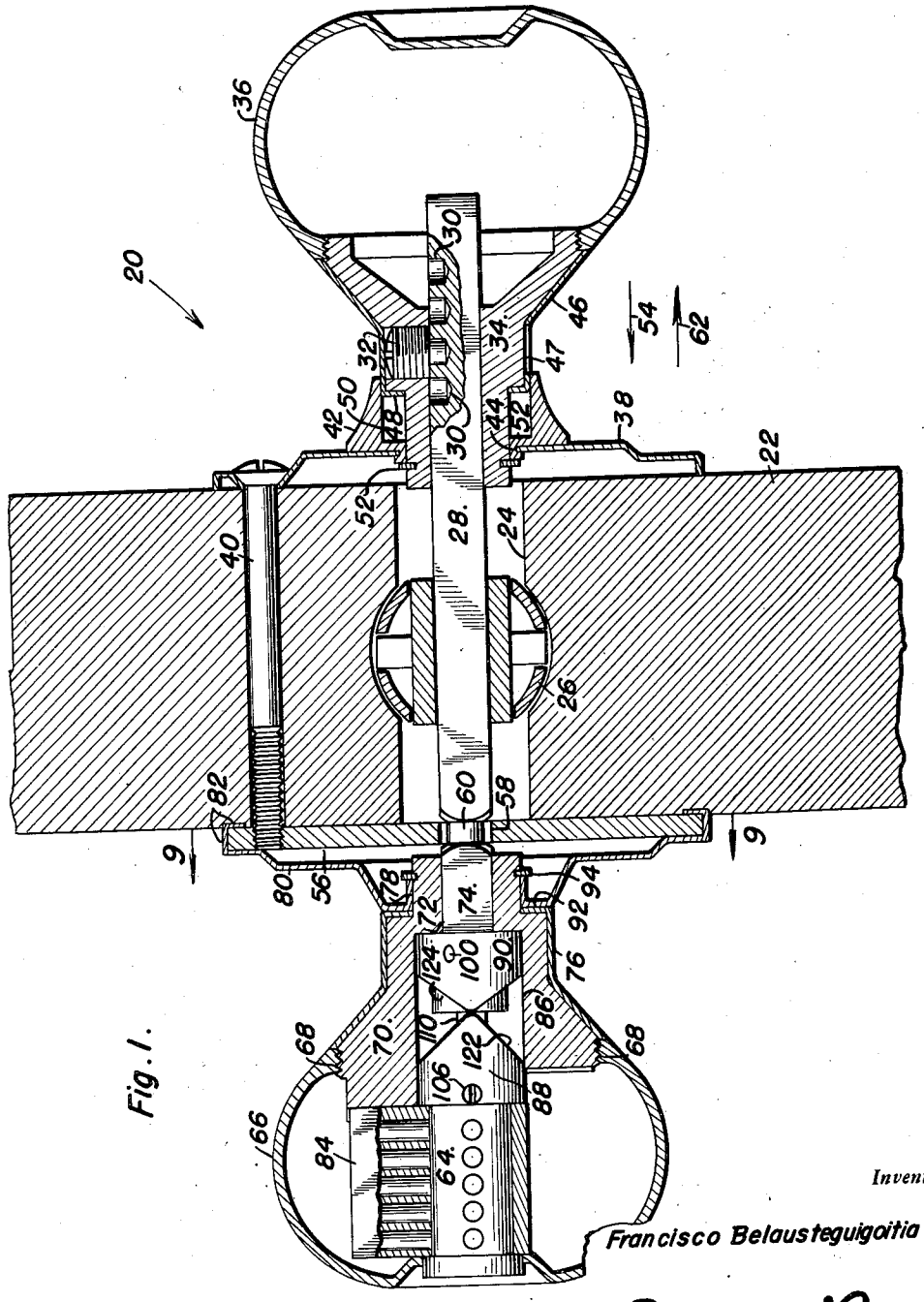


Fig. 1.

Inventor

Francisco Belausteguigoitia

By *Clarence A. O'Brien and Harvey B. Jacobson*

Attorneys

July 8, 1952 F. BELAUSTEGUIGOITIA 2,602,318

LOCK MECHANISM

Filed July 13, 1949 4 Sheets-Sheet 2

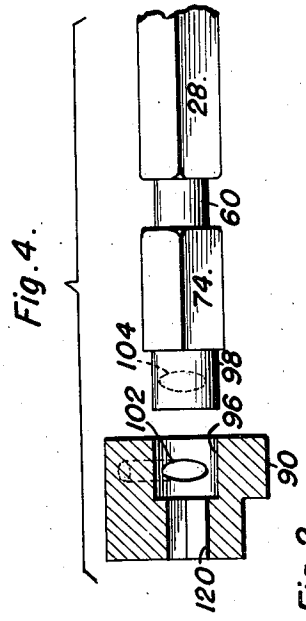


Fig. 4.

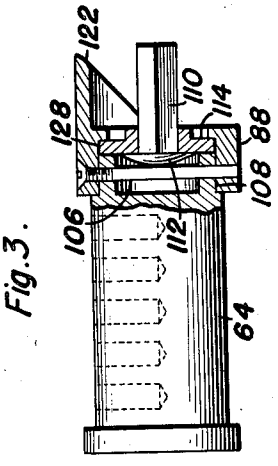


Fig. 3.

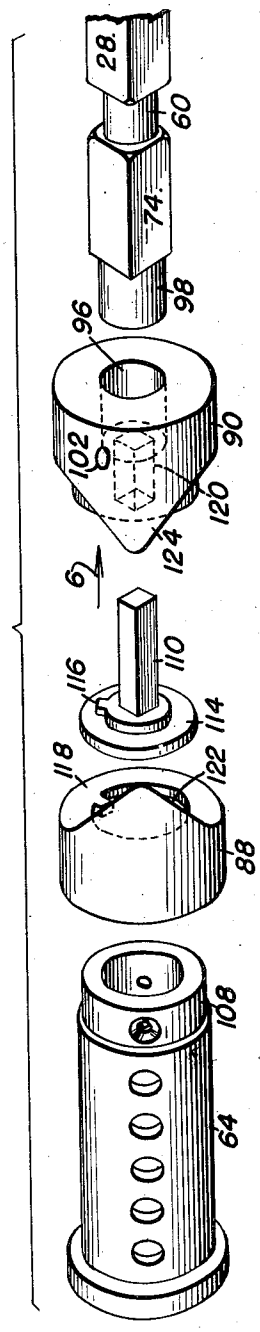


Fig. 2.

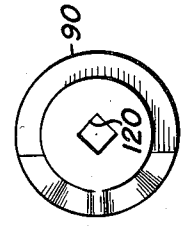


Fig. 6.

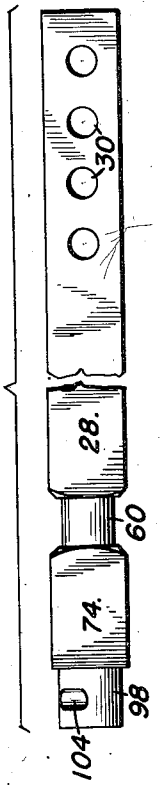


Fig. 5.

Inventor

Francisco Belausteguigoitia

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

July 8, 1952 F. BELAUSTEGUIGOITIA 2,602,318

LOCK MECHANISM

Filed July 13, 1949 4 Sheets-Sheet 3

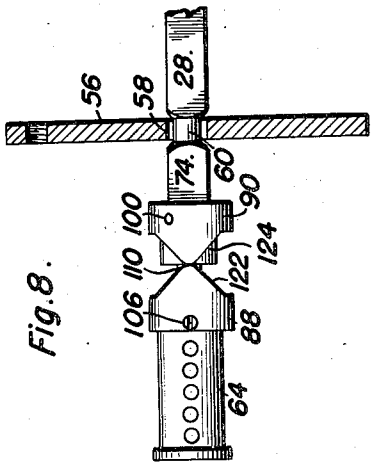


Fig. 8.

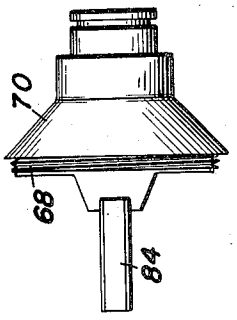


Fig. 10.

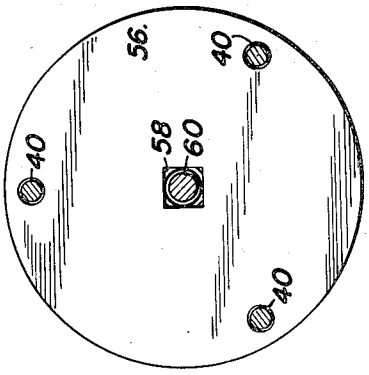


Fig. 9.

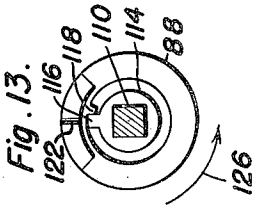


Fig. 13.

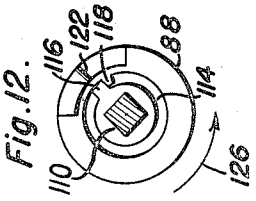


Fig. 12.

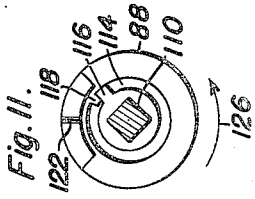


Fig. 11.

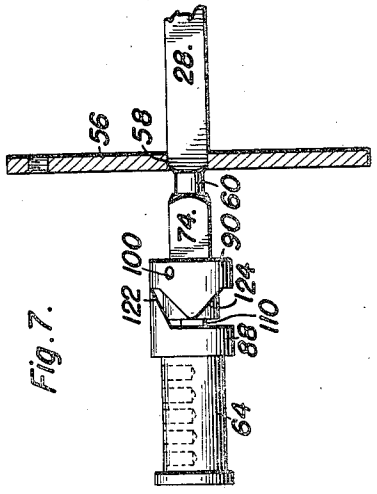


Fig. 7.

Inventor

Francisco Belausteguigoitia

By Clarence A. O'Brien and Harvey B. Jackson

Attorneys

July 8, 1952 F. BELAUSTEGUIGOITIA 2,602,318

LOCK MECHANISM

Filed July 13, 1949 4 Sheets-Sheet 4

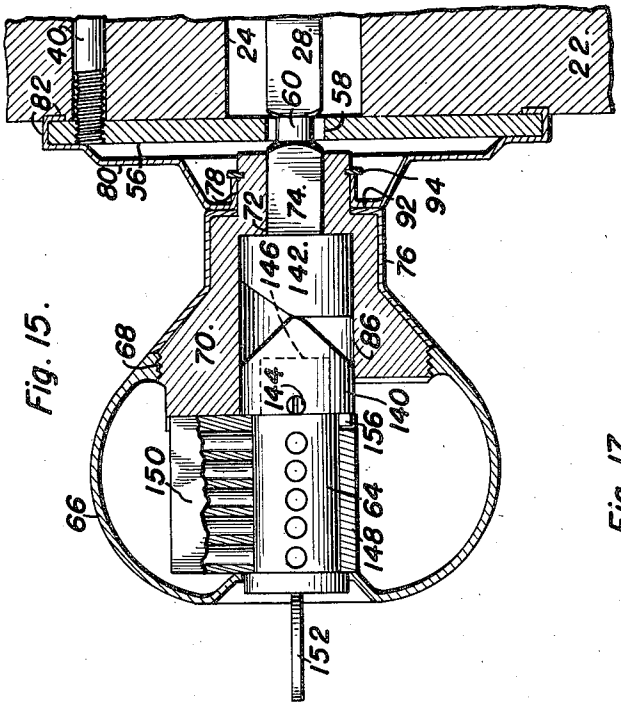


Fig. 15.

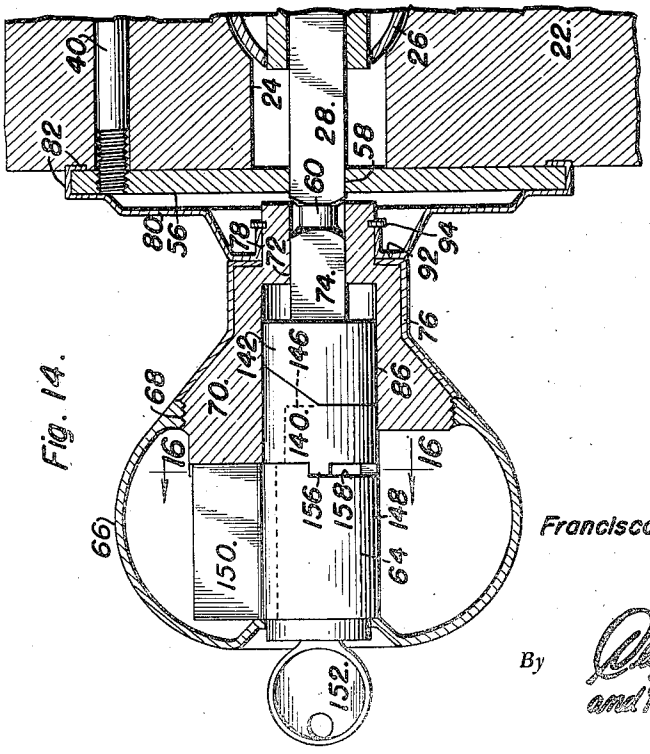


Fig. 14.

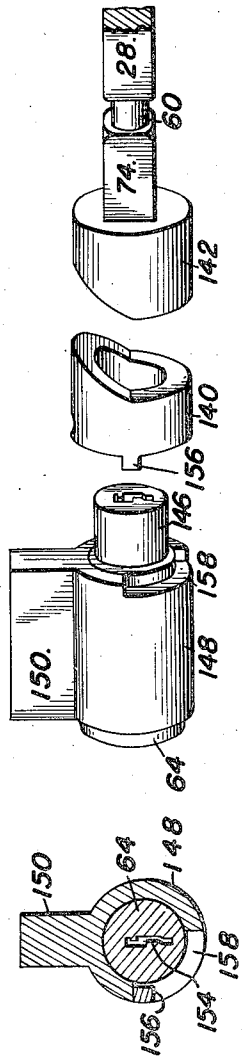


Fig. 17.

Fig. 16.

Inventor

Francisco Belausteguigoitia

By Clarence A. O'Brien and Harvey B. Jacobson

Attorneys

Patented July 8, 1952 2,602,318

UNITED STATES PATENT OFFICE

2,602,318

LOCK MECHANISM

Francisco Belausteguigoitia, Mexico City, Mexico

Application July 13, 1949, Serial No. 104,504
In Mexico August 21, 1948

3 Claims. (Cl. 70—223)

1

This invention relates to new and useful improvements and structural refinements in lock mechanisms, more specifically, door lock mechanisms, and the principal object of the invention is to facilitate locking of the door by a simple push on the inside door knob, whereby the lock mechanism cannot be actuated until the inside knob is pulled to its initial position, or until an appropriate key is inserted in the outside door knob and turned.

This object is achieved by the provision of what may be called a stationary tumbler plate formed with a polygonal opening to receive a slidable latch actuating shaft which carries the inner and outer knob, the shaft having a polygonal cross-sectional configuration which is complementary to the opening in the tumbler plate and prevents the shaft from rotating until such time as the shaft is slid to a position wherein a cross-sectionally reduced portion of the shaft is disposed in the tumbler plate opening and rotation of the shaft is facilitated.

An important feature of the invention therefore resides in the above outlined arrangement of the tumbler plate and shaft which permits the mechanism to be locked and unlocked by simply sliding the latch actuating shaft.

Another feature of the invention involves the provision of a lock cylinder in the outside door knob together with means for operatively connecting this cylinder to the latch actuating shaft in such manner that rotation of the lock cylinder first slides the shaft to its unlocked position and thereupon rotates the shaft so as to actuate the associated latch.

Some of the advantages of the invention reside in its simplicity of construction, in its dependable operation, in its adaptability for use in association with doors of different sizes and thicknesses, and in its adaptability to economical manufacture.

With the above more important objects and features in view, and such other objects and features as may become apparent as this specification proceeds, the invention consists essentially of the arrangement and construction of parts as illustrated in the accompanying drawings, in which:

Figure 1 is a cross-sectional view of the invention in situ on a door, the invention being shown in its unlocked position;

Figure 2 is a group perspective view of the lock cylinder, two cam members, a cam member connecting pin and a portion of the latch actuating shaft used in the invention;

2

Figure 3 is a side elevational view, partially broken away, of the lock cylinder, together with one of the cam members and the cam member connecting pin, the cam member and pin being illustrated in section;

Figure 4 is a group illustration showing the second cam member in section and illustrating a portion of the latch actuating shaft in elevation;

Figure 5 is an elevational view of the latch actuating shaft per se;

Figure 6 is an end view of the cam member shown in Figure 2, this view being taken in a direction of the arrow 6 in that figure;

Figure 7 is a fragmentary elevational detail of the lock cylinder, cam members, shaft and tumbler plate in locked position;

Figure 8 is an elevational view, similar to that shown in Figure 7, but illustrating the elements in their unlocked position;

Figure 9 is a cross-sectional view, taken substantially in the plane of the line 9—9 in Figure 1 but with the escutcheon plate removed;

Figure 10 is an elevational view showing the hub of the outside knob together with the key cylinder tumbler box;

Figures 11, 12 and 13 are schematic illustrations showing the progressive coaction between the cam member connecting pin and one of the cam members;

Figure 14 is a fragmentary sectional view, similar to that in Figure 1 but showing a modified embodiment of the invention in its locked position;

Figure 15 is a fragmentary sectional view, similar to that in Figure 14 and showing the modified embodiment in the unlocking stage;

Figure 16 is a cross-sectional detail, taken substantially in the plane of the line 16—16 in Figure 14, and

Figure 17 is a group perspective view of the lock cylinder, cam members and shaft used in the modified embodiment.

Like characters of reference are employed to designate like parts in the specification and throughout the several views.

Referring now to the accompanying drawings in detail, the invention consists of a lock mechanism designated generally by the reference character 20, the same being associated with a door 22 provided for that purpose with a transverse bore 24 and equipped with a latch 26 of any conventional type. This latch includes the usual projectible and retractible tongue which is actuated by a rotatable shaft or spindle 28 extending centrally through the bore 24 and being

formed in one end portion thereof with a row of apertures 30 to selectively receive a set screw 32 provided in the hub 34 of an inside door knob 36, whereby the hub is adjustably secured to the 28 as will be clearly apparent.

An escutcheon plate 38 is secured to the inner surface of the door 22 by a set of transversely extending screws 40 and is provided with a central opening whereby a socket 42 may be secured thereto as at 44. The hub 34 is partially covered by a rotatable shield 46 which obscures the set screw 32 from view, this shield constituting a continuation of the knob 36 as is best shown in Figure 1. However, an aperture 47 is provided in the shield 46 so that access to the screw 32 may be had, but this aperture normally is not in register with the screw, so that the shield prevents the possibility of the screw becoming accidentally displaced from the hub 34. A cylindrical portion of the shield 46 is formed with an inturned flange 48 which abuts an annular step provided on the hub 34, and the hub together with the cylindrical portion of the shield are slidable in a bore or recess 50 with which the socket 42 is provided. The extent of sliding movement of the hub 34 in the outward direction is limited by a keeper ring 52 with which the hub is equipped and which is engageable with the inner portion of the socket 42 which is secured to the escutcheon plate 38, as shown in Figure 1. On the other hand, inward sliding of the hub 34 in the bore 50 is restricted by the flange 48 of the shield 46 coming in contact with the end surface 52 of the recess 50 of the socket 42, as will be clearly apparent. It is to be noted that the bore 24 of the door 22 is sufficiently large to freely receive the cylindrical inner end portion of the hub 34 and the keeper ring 52 when the knob 36 is pushed in the direction of the arrow 54.

The aforementioned screws 40 also secure in position a tumbler plate 56 disposed at the outer surface of the door 22, this tumbler plate being formed with a polygonal opening 58 which is adapted to slidably receive the shaft 28, the latter being of a polygonal cross-sectional configuration so that when it is disposed in the opening 58, rotation of the shaft 28 is not possible. (See Figure 7.) However, the shaft 28 is formed intermediate the ends thereof with a diametrically reduced portion 60, preferably circular in cross-section, and when this diametrically reduced portion of the shaft is disposed in the opening 58 of the tumbler plate 56, the shaft 28 is free to rotate, as will be clearly apparent. (See Figures 1 and 8.)

It will be apparent from the foregoing that when the mechanism shown in Figure 1 is actuated by forcing the inside knob 36 in the direction of the arrow 54 so that the polygonal cross section of the shaft 28 engages the opening 58 (see Figure 7) the shaft 28 cannot be rotated and actuation of the latch 26 will be impossible until the knob 36 is pulled outwardly in the direction of the arrow 62. In this manner, after the lock mechanism is locked from the inside of the door, opening or unlocking thereof will be possible only from the inside, unless an appropriate key is inserted in a conventional lock cylinder unit 64 provided in an outside door knob 66.

This knob is mounted upon a screw-threaded portion 68 of a hub 70 which, in turn, is formed with a polygonal bore 72 to receive a portion 74 of the aforementioned shaft 28, the hub 70 being covered by a suitable shield 76 which constitutes

a continuation of the knob 66, substantially as shown. It is to be noted that the hub 70 is rotatable but not slidable in a tubular bearing portion 78 of an escutcheon plate 80, the marginal edges of which are angulated around and under the tumbler plate 56 as shown at 82, whereby the escutcheon plate 80 is firmly secured in position by the aforementioned bolts 40.

The hub 70 carries a lock cylinder tumbler box 84 which cooperates with the lock cylinder or barrel unit 64 in the conventional manner, and it is to be noted that the hub 70 is formed with a cylindrical bore or recess 86 to receive a pair of coacting cam members 88, 90.

The hub 70 is also provided with an annular step or shoulder which is covered by an inturned flange 92 formed integrally with the shield 76, the flange 92 abutting the escutcheon plate 80 and a suitable keeper ring 94 being provided on the hub 70 inside the escutcheon plate 80, whereby longitudinal sliding or shifting movement of the hub 70 and outside knob 66 is prevented.

Since the diametrically reduced portion 60 of the shaft 28 must be disposed in a predetermined position relative to the tumbler plate 56 and since the hub 70 and outside knob 66 are not slidable, the aforementioned apertures 30 provided in the shaft 28 coact with the set screw 32 of the hub 34 of the inside knob 36 in permitting the mechanism to be adjusted for doors of different thicknesses, which adjustment is facilitated by simply varying the position of the hub 34 on the shaft 28, as will be clearly understood.

The shaft 28 is slidable but non-rotatable in the latch mechanism 26, while the aforementioned cam member 90 is provided with a circular bore 96 to receive a cylindrical end portion 98 of the shaft 28, on which it is rigidly secured by means of a pin 100 which extends through a transverse bore 102 provided in the cam member 90 and engages a groove 104 formed in the shaft portion 98. (See Figures 2 and 4.) When the member 90 is installed on the shaft end portion 98, the bore 102 is drilled so as to result in the formation of the groove 104, whereupon the pin 100 is pressed in the bore 102 to firmly secure the member 90 on the shaft portion 98.

The aforementioned cam member 88 is secured by means of a transversely extending pin or screw 106 to a tubular extension or adapter 108 provided on the lock cylinder 64, and a pin 110 operatively connects the two cam members 88, 90 as will be presently described. The pin 110 is equipped with a rounded head 112 disposed in the aforementioned adapter 108 of the lock cylinder 64 (see Figure 3) and a stepped flange 114 is mounted on the pin 110 immediately adjacent the head 112. The flange 114 is formed integrally with an outwardly projecting radial lug 116 which is engageable with an inwardly projecting radial lug 118 provided in the cam member 88, and it is to be noted that the pin 110 is polygonal in cross section and is slidably receivable in a polygonal portion 120 of the bore 96 of the cam member 90.

Finally, it is to be noted that the cam members 88, 90 are formed with coacting, substantially triangular lobes 122, 124, respectively, so that when one of the cam members remains stationary while the second member is rotated, the lobes 122, 124 slide the cam members apart.

It should be understood that when the key is removed from the lock cylinder 64 the lobes 122,

124 of the two cam members are so disposed that the cam member 90 together with the shaft 28 and the inside knob 36 may be slid in the direction of the arrow 54, in which position the rotation of the shaft and actuation of the latch 26 is prevented by the tumbler plate 56. The mechanism under such circumstances is in its locked position and may be unlocked by either pulling the knob 36 in the direction of the arrow 62 or inserting an appropriate key in the lock cylinder 64. In the latter instance rotation of the key in the direction of the arrows 126 in Figures 11, 12 and 13 will rotate the lock cylinder 64 and the cam member 88 so that the lobe 122 of the latter will engage the lobe 124 of the cam member 90 and will slide the cam member 90, without rotating, in the direction of the arrow 62, thus placing the diametrically reduced portion 60 of the shaft 28 in the opening 58 of the tumbler plate 56 and facilitating subsequent actuation of the latch 26.

It should be understood that the flange 114 of the pin 110 is rotatably disposed in the cam member 88 as indicated at 128 in Figure 3, this being so arranged that rotation of the lock cylinder 64 and of the cam member 88 may be effected during an initial period without rotating the pin 110. In other words, the lock cylinder 64 and the cam member 88 may be rotated from the position shown in Figure 11 to the position shown in Figure 12 through a distance of almost 360 degrees, until the lug 118 of the cam member engages the lug 116 of the flange 114. As has been already explained, during this initial rotation of the lock cylinder 64 the cam members 88, 90 shift the shaft 28 to its unlocked position, that is, from the locked position shown in Figure 7 to the unlocked position shown in Figure 8, whereupon further rotation of the lock cylinder 64 in the direction of the arrow 126 will be transmitted through the medium of the lugs 118, 116 to produce rotation of the polygonal pin 110, and consequently, of the cam member 90 together with the shaft 28, thus actuating the latch 26.

Needless to say, after the door has been unlocked and opened, the key may be withdrawn from the lock cylinder 64 and the mechanism will remain in its unlocked position until it is again locked by sliding the shaft 28 in the direction of the arrow 54.

If desired, the portion 74 of the shaft 28 and the bore 72 of the hub 70 may be circular in cross section so that the hub together with the knob 66 are freely rotatable on the shaft, the unlocking action being effected solely by inserting a key into the lock cylinder 64 and rotating the latter, as will be clearly apparent.

Referring now to the modified embodiment of the invention illustrated in the accompanying Figures 14–17, inclusively, this embodiment is similar to that already described, but is much simpler in construction, thus affording convenience and economy in manufacture.

In the modified embodiment the aforementioned pin 110 is eliminated and the coacting cam members 88, 90 are substituted by a pair of relatively simpler members 140, 142.

The outer end portion 74 of the latch actuating shaft 28 extends through the polygonal bore 72 of the hub 70 into the recess 86 of the hub, in which recess the cam member 142 is slidably positioned on the shaft portion 74. That is to say, the member 142 is slidable longitudinally in the recess 86, but is rigidly secured to the shaft 28.

The recess 86 also accommodates the cam member 140 which is secured by a transverse pin 144 to a boss 146 provided on the inner end of the conventional lock cylinder barrel 64. The latter, in turn, is rotatably positioned in a cylindrical jacket 148 carrying the tumbler box 150. This tumbler box is secured in any suitable manner to the hub 70, and it will be apparent from the foregoing that when a key 152 is inserted in the barrel 64, the latter may be rotated in the jacket 148, thus rotating the cam member 140 and causing the latter to slide the cam member 142 and the shaft 28 to the unlocked position of the latter, as shown in Figure 15. Thereupon, rotation of the knob 66 will rotate the shaft 28 by virtue of the polygonal bore 72 in the hub 70 through which the shaft portion 74 extends.

It is to be noted that the keeper pin or screw 144 extends transversely of the key receiving slot 154 in the barrel 64, thus preventing the possibility of a wire or a similar implement being inserted through the slot 154 into the recess 86 to effect unauthorized sliding of the shaft 28 to its unlocked position.

In order to limit the extent of rotation of the barrel 64 relative to the sleeve 148, a stop dog or protuberance 156 is provided on the cam member 140 and is movable in an arcuate cut away portion or notch 158 with which the sleeve 148 is equipped.

The dog 156 is engageable with the end walls of the notch 158 and thus not only effectively restricts the extent of rotation of the barrel 64, but provides assurance that the barrel and the key can be turned in only one direction during the unlocking operation.

It is believed that the advantages and use of the invention will be readily understood from the foregoing disclosure and, accordingly, further description thereof at this point is deemed unnecessary.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor changes in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

Having described the invention, what is claimed as new is:

1. In a lock mechanism, the combination of a latch actuating shaft slidable from a non-rotatable locked position to a rotatable unlocked position, said shaft having inner and outer ends, an inside knob secured to the inner end portion of said shaft for sliding and rotation therewith, a non-slidable outside knob positioned on the outer end portion of said shaft, a rotatable lock cylinder unit provided in said outside knob, a first cam member disposed in the outside knob and connected to said lock cylinder unit for rotation therewith, a second cam member secured to the outer end portion of said shaft in the outside knob and engageable with the first cam member whereby the second cam member and said shaft may be slid inwardly to its unlocked position when the lock cylinder unit is rotated, and means for transmitting rotation from the first cam member to the second cam member when said shaft is in its unlocked position, said means being inoperative when the shaft is slid outwardly.

2. The device as defined in claim 1 wherein said second cam member is provided with a polygonal bore, said means comprising a pin rotatably mounted in said first cam member and having a

polygonal shank slidable but non-rotatable in said bore, an outwardly projecting lug provided on said pin, and an inwardly projecting lug provided on the first cam member and adapted for driving engagement with the outwardly projecting lug when said shaft is in its unlocked position.

3. The device as defined in claim 1 together with an outside hub having said outside knob secured thereto and provided with a polygonal bore, at least a portion of said shaft being polygonal and slidably but non-rotatably disposed in said bore, whereby the knob may impart rotation to the shaft only when the latter is in its unlocked position.

FRANCISCO BELAUSTEGUIGOITIA.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
655,605	Churchill	Aug. 7, 1900
1,387,888	Holt	Aug. 16, 1921
1,686,406	Caplan	Oct. 2, 1928
1,940,018	Rymer	Dec. 19, 1933
2,484,961	Russell et al.	Oct. 18, 1949

FOREIGN PATENTS

Number	Country	Date
7,045	Great Britain	Apr. 5, 1893