

Dec. 8, 1964

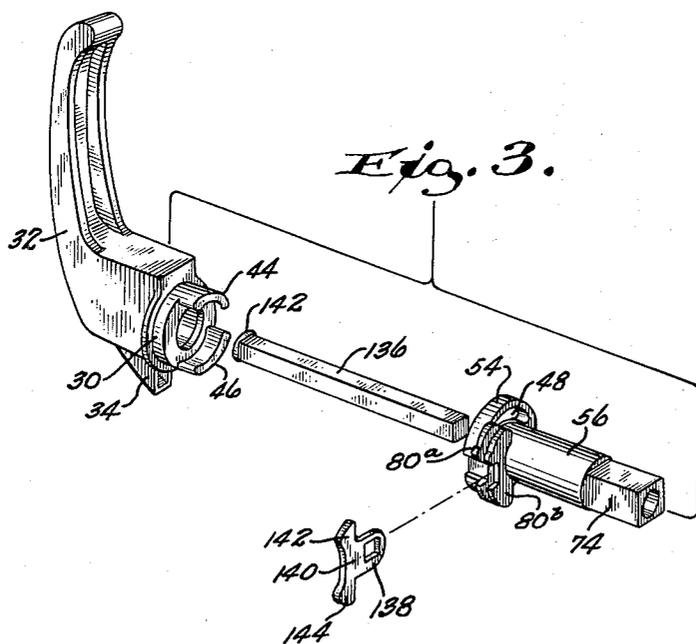
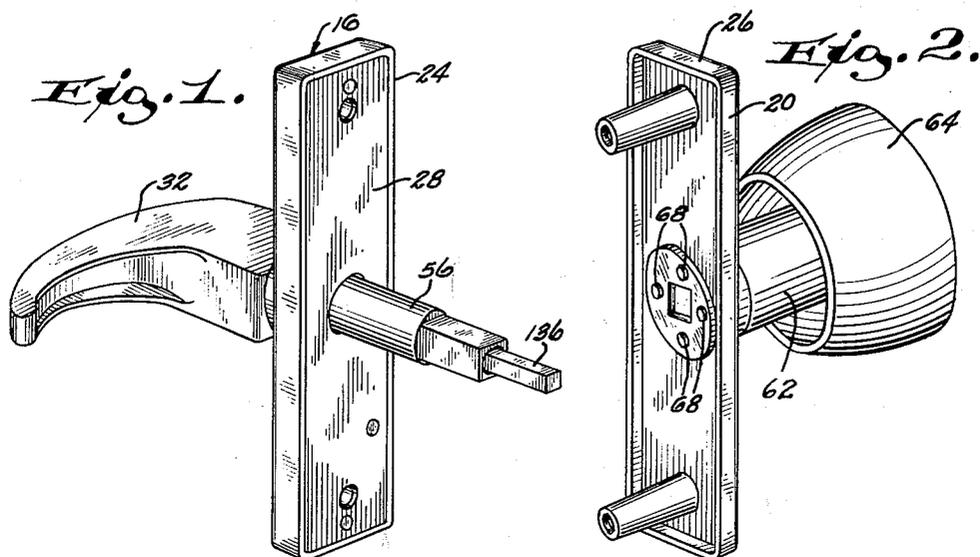
A. J. SCHULZ

3,159,994

DOOR LATCH AND LOCK

Filed March 1, 1962

3 Sheets-Sheet 1



INVENTOR.

ALFRED J. SCHULZ

BY

Wheeler, Wheeler & Wheeler
ATTORNEYS.

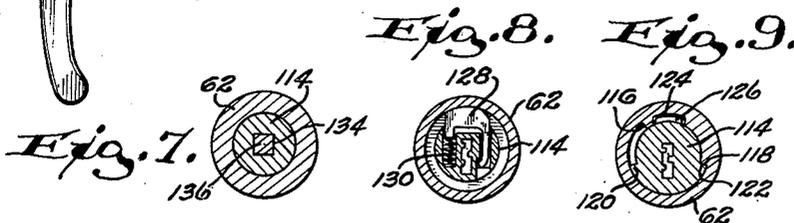
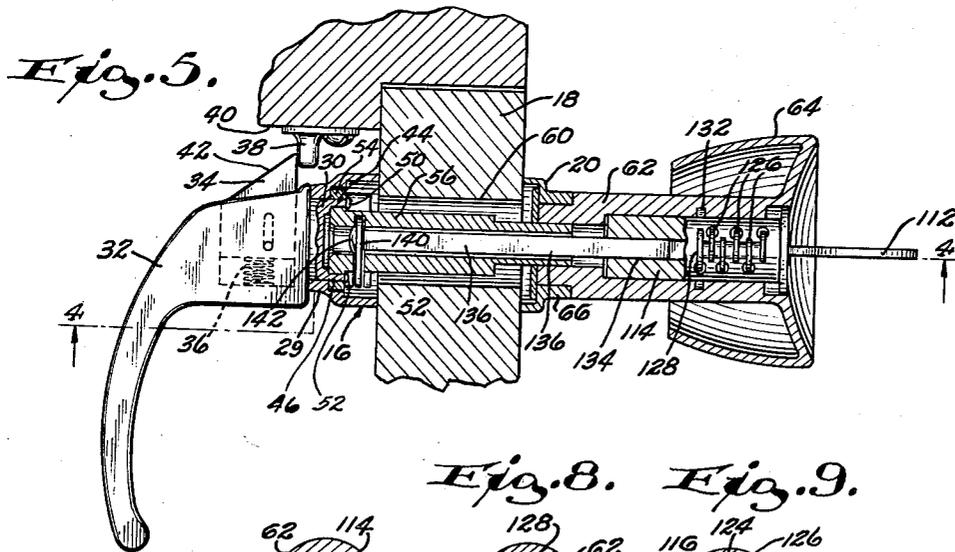
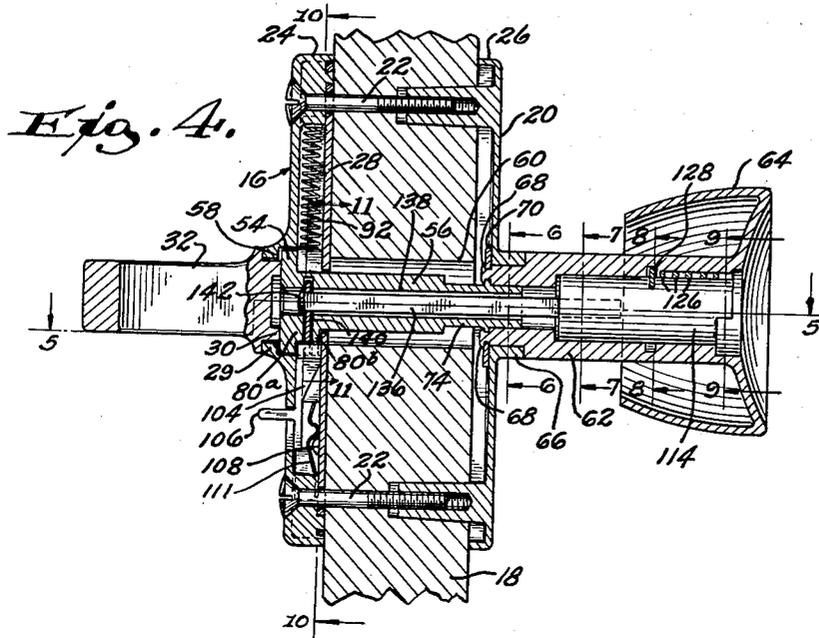
Dec. 8, 1964

A. J. SCHULZ
DOOR LATCH AND LOCK

3,159,994

Filed March 1, 1962

3 Sheets-Sheet 2



INVENTOR.
ALFRED J. SCHULZ

BY

wheeler, wheeler, wheeler
ATTORNEYS.

Dec. 8, 1964

A. J. SCHULZ

3,159,994

DOOR LATCH AND LOCK

Filed March 1, 1962

3 Sheets-Sheet 3

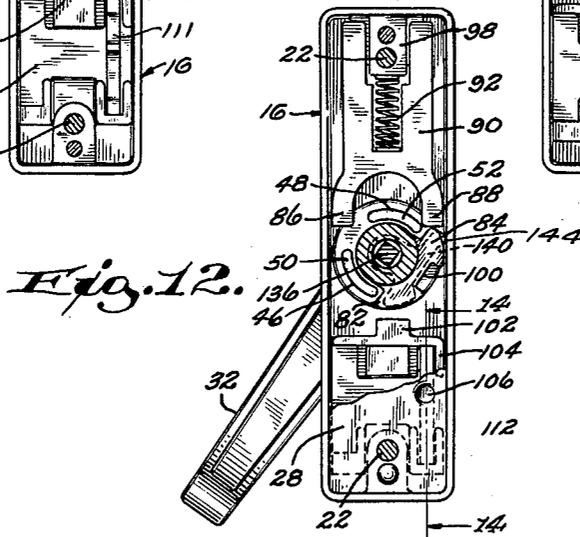
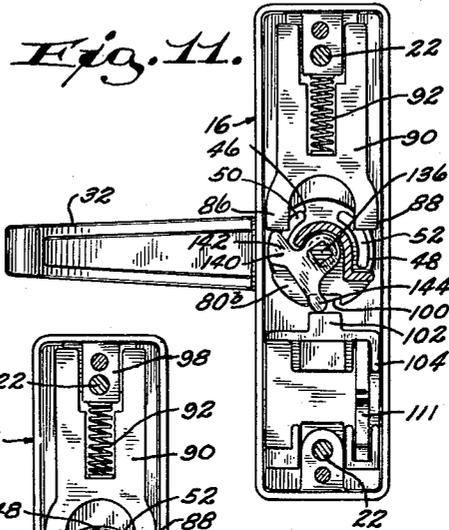
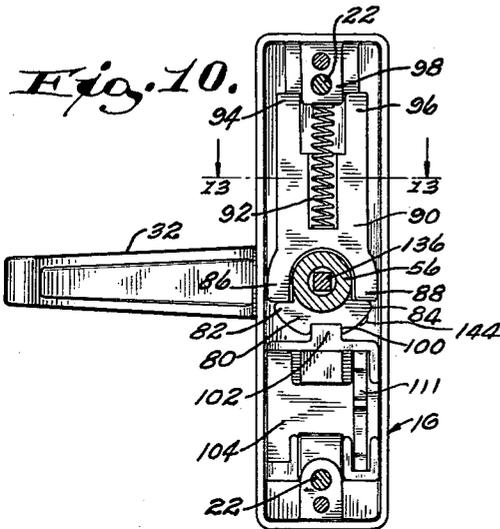


Fig. 13.

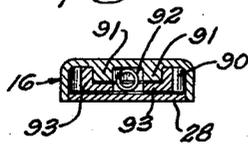


Fig. 14.

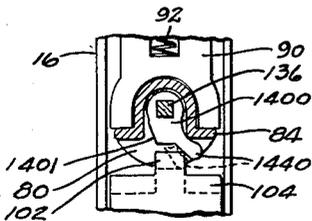
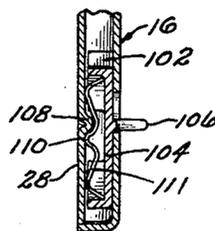


Fig. 15.

INVENTOR.
ALFRED J. SCHULZ

BY

Wheeler, Wheeler & Wheeler
ATTORNEYS.

1

3,159,994

DOOR LATCH AND LOCK

Alfred J. Schulz, Wauwatosa, Wis., assignor to S-B Manufacturing Company, Wauwatosa, Wis., a partnership of Wisconsin

Filed Mar. 1, 1962, Ser. No. 176,650

11 Claims. (Cl. 70-146)

This invention relates to a door latch and lock. The embodiment disclosed is of a type commonly used in connection with screen and storm door sash, the mechanism being on, rather than in, the stile.

The general organization is well known. Mounting frames in the form of shallow housings applied to opposite faces of the door stile are connected together through the stile. The inner and outer door handles or knobs are rotatably mounted on these frames and connected together by a spindle extending through the stile. The latching mechanism comprises a bolt mounted in the interior handle and engaged with a strike on the door frame to be released by oscillation of the handle. Locking is achieved by a slide within the housing frame on which the interior handle is mounted and which, when engaged with the handle or its spindle, prevents rotation thereof in a direction to release its bolt from engagement with the strike. When the slide is thus engaged, the spindle can not be operated and the door is locked. The present invention is concerned with means whereby a key may be used, preferably in a cylinder incorporated in the exterior handle of the door to cam aside the slide which locks the spindle against rotation, thereby permitting either handle to be used to disengage the bolt from the strike and permit the door to be opened.

Spring means in the mounting frame on the exterior of the door stile restores the spindle and the interior and exterior handles to their normally centered positions following each operation, thus assuring that the bolt will be in a position to latch the door by engaging the strike when the door closes. The bias of the spring is transmitted to the spindle through interacting cam surfaces on the spring follower and the spindle. The present invention is specifically concerned with an arrangement whereby additional cams are provided within the limited space available within the mounting frame to displace the locking slide and, additionally, to restore to its normally centered position an inner spindle controlled by the key, following each operation of the key to release the lock.

In the drawings:

FIG. 1 is a view in perspective of the inner mounting frame and inside door handle assembly.

FIG. 2 is a view in perspective of the outer mounting frame and outside door handle assembly.

FIG. 3 is a view in perspective showing relatively separated component parts of the inner and outer spindle and cams.

FIG. 4 is a view on a larger scale through a door stile and showing the mounted latch assembly in section on the line 4-4 of FIG. 5.

FIG. 5 is a view fragmentarily illustrating the stile and jamb in section and showing the latch mechanism as viewed on the line 5-5 of FIG. 4.

FIG. 6 is a detail view in cross section on the line 6-6 of FIG. 4.

FIG. 7 is a detail view in cross section on the line 7-7 of FIG. 4.

FIG. 8 is a detail view in cross section on the line 8-8 of FIG. 4.

FIG. 9 is a detail view in cross section on the line 9-9 of FIG. 4.

FIG. 10 is a view in elevation of the externally mounted frame and handle assembly as viewed in the plane indi-

2

cated at 10-10 in FIG. 4, the lock slide being in locking position.

FIG. 11 is a view similar to FIG. 10 showing the key operated spindle and cam oscillated to force the lock slide to its retracted position, portions being broken away on the line indicated at 11-11 in FIG. 4.

FIG. 12 is a view similar to FIG. 10 and FIG. 11 showing the exterior door handle oscillated to release the latch bolt from the strike, such oscillation being permitted by the retracted position of the lock slide.

FIG. 13 is a detail view taken in section on the line 13-13 of FIG. 10.

FIG. 14 is a detail view taken in section on the line 14-14 of FIG. 12.

FIG. 15 is a fragmentary detail view in the same plane as FIG. 11 showing a modified key operable cam, which is illustrated in full lines in its retracted position.

The mounting frame 16 at the inside face of the stile 18 and the mounting frame 20 of the outside face of the stile are connected together by bolts 22 in the usual way. The respective frames have the form of shallow pans having marginal flanges 24 and 26, respectively, which abut the faces of the stile 18. In addition, the frame 16 has an inner closure 28 to confine the parts hereinafter described.

Journalled in a boss 29 of frame 16 is bearing portion 30 of handle 32 at the inside of the door. Socketed in this handle is a bolt 34 reciprocable subject to the bias of spring 36 to engage a strike 38 on the face of jamb 40 as shown in FIG. 5. As the door, of which stile 18 is a part, swings to a seat against the jamb, the beveled surface 42 of the bolt cams the bolt past the jamb and the bolt springs back to the position of FIG. 5 as soon as the jamb is cleared, thereby latching the door in its closed position. The bolt is released from the strike 38 by rotating the handle 32 in either direction in boss 29.

The bearing portion 30 of the handle has integral arcuate lugs 44 and 46 which project axially as best shown in FIG. 3. They pass through corresponding openings 48 in head flange 54 of a tubular spindle 56 and are upset or riveted as shown at 50 and 52 in FIGS. 11 and 12 to assemble the handle with the head flange, the assembly being best illustrated in FIG. 5. A counterbore 58 in the boss 29 receives the head flange 54 to confine the spindle 56 and handle 32 for rotation coaxially respecting the mounting housing and to center the spindle in the opening 60 bored through the door stile 18 for the spindle.

Externally of the door the hub 62 of doorknob 64 is similarly journalled in the boss 66 of the external mounting frame or casing 20. Lugs 68 projecting axially from hub 62 are headed to engage a retaining disk 70 as best shown in FIG. 4 to retain the hub rotatably in the bearing provided by boss 66. The reduced extremity 74 of the tubular spindle 56 is squared and fits an opening 76 of corresponding square cross section in the hub 62, whereby the knob 64 on the outside of the door and the handle 32 on the inside are connected to rotate in unison.

It will be apparent that the bolt 34 may be released from strike 38 by rotating the handle and the knob and the connecting spindle 56 in either direction from the normally centered position in which the parts are illustrated in FIGS. 1, 4, 5, 10, and 11. This normally centered position is maintained by providing spindle 56 integrally with a cam 80 having lobes at 82 and 84 which are nearly diametrically opposite as shown in FIG. 10. These lobes engage the ends 86, 88 of a bifurcated cam follower slide 90 which are subject to the bias of the compression spring 92. The slide 90 is guided on ribs 91 of casing 16 which provide a way engaged by flanges 93 of the slide as best shown in FIG. 13. The ends 94,

96 of the slide embrace a spring seat 98 upon which the spring 92 is seated. If the handle assembly is rotated in either direction from the position shown in FIG. 10, one or the other of its cams 82 or 84 will engage the complementary end 86 or 88 of the slide 90 to displace the slide in a direction which compresses spring 92 as shown in FIG. 12. Upon release of the handle assembly, the reaction of spring 92 will return the handle assembly to the position of FIGS. 10, 4 and 5. As indicated in FIG. 5, this is a position of the handle assembly in which the door is latched when shut, the bolt 34 carried by the internal handle 32 being engaged with strike 38.

To lock the door, it is only necessary to retain the handle assembly in the position of FIG. 5. To this end, cam 80 has a notch at 100 dimensioned to receive a locking lug 102 of lock slide 104. FIG. 10 shows the slide 104 advanced into locking engagement with cam 80. The slide is reciprocally guided between the side flanges 24 of casing 16 and has a thumbpiece 106 that projects through an appropriate slot in the casing member 16 as best shown in FIG. 4 and FIG. 14. The plate 28 which serves as a closure for the inner side of the casing 16 has a protuberance at 108 engaged by the convolution 110 of leaf spring 111 fitted into slide 104, the arrangement being such that the spring snaps across the protuberance 108 when the slide is reciprocated. Thus the spring, in cooperation with projection 108, serves as a yieldable detent tending to hold the slide 104 in the position to which it has been adjusted.

The current invention contemplates key operated means for enabling a person on the outside of the door to move lock slide 104 from the locked position of FIG. 10 to the unlocked position of FIG. 12 in order that the door may be opened by manipulating the handle assembly. A person on the inside of the door needs no key, since the thumbpiece 106 is available to him as a means of retracting the lock slide. The key operated mechanism is as follows:

In the preferred practice of the invention, the key 112 controls a lock cylinder 114 fitted for limited rotation in the hub 62 of handle 64. Shoulders 116 and 118 within the hub 62 are engaged by complementary shoulders 120 and 122 which are formed at a lesser angular spacing on the cylinder 114 to limit the rotation of the cylinder. An axial slot 124 receives the tumblers 126 of cylinder 114 as shown in FIG. 4. When the key 112 is inserted, the tumblers are retracted in known manner to free the cylinder for rotation. There is one tumbler 128 which is pressed outwardly by spring 130 into an internal peripheral groove 132 by means of locking the cylinder within the hub 62. Once inserted, the cylinder cannot be withdrawn, as tumbler 128 is not key-retractable.

A non-circular socket 134 in cylinder 114 receives an inner spindle 136 of complementary cross section. This spindle extends through the tubular spindle 56, being free to rotate therein as shown in FIGS. 4, 5 and 6. The inner spindle 136 passes through an opening 138 of corresponding non-circular form in a cam 140 which is separately illustrated in FIG. 3 and which is retained on the end of the inner spindle 136 by heading the spindle at 142 (see FIGS. 4 and 5).

In order to provide adequate bearing surface for the cam lobes 82, 84 of the outer spindle 56, the outer spindle cam 80 is made in two component parts 80^a and 80^b which are spaced slightly as best shown in FIG. 3 to receive the cam 140 between them. When the handle assembly is used to rotate the spindle 56 and cam 80, the cam 140 goes with cam 80 as is shown in dotted lines in FIG. 12. However, if the key 112 is used to rotate the inner spindle 136, the cam 140 moves independently of cam 80 as shown in FIG. 11. In clockwise operation, one lobe 142 engages the end 86 of the slide 90 to compress spring 92 while the other lobe 144 of the key operated cam 140 engages the locking lug 102 on lock slide 104 to push the lock slide to its retracted position, disengaging

the lug from the notch 100 and thereby freeing the handle for rotation to unlatch the door.

It will be understood that the mere insertion of the key in this type of lock is sufficient to retract the tumblers, leaving the cylinder 114 free for rotation. Thereupon the rotation of the cylinder unlocks the handle assembly. However, the key cannot be withdrawn from the cylinder until the cylinder is restored to a position in which the tumblers register with the slot 124 in the barrel which, in this instance, is the hub 62 of the knob or handle 64 at the outside of the door. So that conscious attention on the part of the operator will not be required to restore the cylinder to a position such that the key may be withdrawn, the centering of the cylinder is effected by the bias of spring 92 which also serves to center the handle assembly when the handle assembly has been displaced. Thus the spring 92 will center either the locking mechanism or the latching mechanism or both, whenever the operator releases the handle or the key following an unlocking or unlatching manipulation.

Another reason for returning the key operated cam from its advanced position is to prevent it from interfering with the subsequent manipulation of the lock slide 104 into locking position. As will be seen, the lobe 144 of cam 140 is in a position, in FIG. 11, in which it is aligned between the locking lug 102 and the spindle 136 so that no amount of pressure on the slide 104 will return the cam 140 out of the path of lug 102.

In cases in which elimination of this difficulty is more important than the return of the key to centered position, the lobe 142 of the cam 140 can be omitted. FIG. 15 shows this construction in which the cam 1400 is shouldered at 1401. This limits the movement of the lobe 1440 to a range between the retracted position shown in full lines and the advanced position shown in dotted lines. It will be observed that even in the advanced position of clockwise rotation of the key operated cam 1400, the lobe 1440 will not reach dead center and the next manual advance of the slide 104 readily pushes the key operated cam back to its retracted full line position, without requiring any spring bias to accomplish this objective.

I claim:

1. In a door lock the combination with latch mechanism and a spindle and handle assembly having mechanism for releasing said latch mechanism upon the rotation of the assembly, of means for releasably locking the assembly against rotation, a rotor for releasing said locking means and a single spring actuated means for biasing said assembly and said rotor to predetermined positions of rotation, the assembly and the rotor having parts engaged by said single spring actuated means.

2. A door lock according to claim 1 in which the said parts comprise cams disposed side by side, the cams having lobes and said single spring actuated means comprising a spring biased member having cam follower portions with which said lobes are normally engaged.

3. A door lock according to claim 2 in which the spindle of said assembly is tubular, said rotor comprising a second spindle within the tubular spindle, the tubular spindle bearing one of said cams and the second spindle bearing the other, the tubular spindle having a lateral opening through which said other cam projects from the second spindle.

4. In a door lock the combination with inner and outer stile-applied frame members, of substantially aligned inner and outer handles rotatably mounted on the respective members, a tubular spindle connected for rotation with one of said handles and having a non-circular portion in telescopic engagement with a corresponding socket with which the other handle is provided, the assembly of said spindle and handles being unitarily rotatable, latch means connected with said assembly to be released upon rotation of the assembly, lock means on one of said frames having a portion movable toward and from said assembly between retracted and assembly-locking posi-

tions, said assembly and the said portion of said lock means having engageable parts constituting means for precluding rotation of said assembly in the locking position of said lock means, a second spindle movable within the spindle first mentioned, a cam connected with the second spindle and engageable with said lock means part in the locking position thereof for displacing said lock means toward its unlocked position in the course of movement of said inner spindle, and key-controlled means for imparting movement to the second spindle, the said assembly and the second spindle having normally retracted positions from which they are movable respectively to release said latch means and to release said lock means, and a single member movably mounted on one of said frames and having a biasing spring and engaged with said assembly and said inner spindle in a direction to bias them both toward said normally retracted positions.

5. A door lock of the type comprising inner and outer stile-applied frames, the inner applied frame constituting a shallow casing, and a handle assembly comprising handles individually mounted upon respective frames for rotation and a spindle connecting the rotatably mounted handles for rotation in unison, a cam member on the spindle within the said casing, a biasing slide reciprocable in the casing and engaged with said cam member, a spring seated in the casing and acting on the slide in a direction to urge it toward the cam member, a locking element movable in the casing and having a normally retracted portion movable toward said assembly, the assembly and the said portion having interengageable locking parts, a cam having a lobe beside the cam first mentioned and engaged with said biasing slide and urged thereby toward a normally retracted position, and remote means for actuating said second cam in a direction to displace said locking element to disengage it from said spindle.

6. In a lock, the combination with inner and outer stile-applied frames, the inner frame constituting a shallow casing, handle members rotatably mounted in substantial alignment on the respective frames, a tubular spindle connecting the handle members for unitary rotation, means in said casing providing a first way, a biasing slide reciprocable along said way, a spring seated upon the casing and upon the slide and urging the slide toward said spindle, the tubular spindle having cam lobe means normally engaged with the slide and adapted to be urged by the bias of said spring to a normally centered position, latch means connected with the inner door handle and releasable when the handle and spindle are displaced against the bias of said spring from said normal position, means providing a second way in said casing, a lock slide reciprocable on the second way, means for advancing the lock slide toward said spindle, said spindle and lock slide having parts interengageable to restrain the spindle against rotation from said position, a second spindle within the first spindle, cam means mounted on the second spindle and engageable with the lock slide for displacing the lock slide in a direction to release the first spindle for rotation from said position, and key controlled means for actuating the second spindle in a direction to effect such release.

7. A door lock according to claim 6 in which the key controlled means is mounted in the outer handle.

8. A door lock comprising the combination with inner and outer stile-applied frames, of means for mounting the frames, and inner and outer handles rotatably mounted on the respective frames in substantial alignment, the inner handle having latch means connected therewith and normally in latching position and being releasable upon the rotation of said handles, said inner handle having a tubular spindle connected with it and having

telescopic non-rotatable connection with the outer handle, whereby the handles and said tubular spindle constitute a unitary assembly for releasing said latch means through the manipulation of either handle, a lock cylinder mounted in the outer handle and having key-controlled tumblers normally restraining it against rotation; of an inner spindle within the tubular spindle having telescopic non-rotatable engagement with said cylinder, cams connected with the respective spindles and disposed side by side in the plane of the inner frame aforesaid, a slide reciprocably mounted on said frame and having portions engageable with both of said cams, means providing a way on said frame wherein the slide is reciprocably guided, spring means biasing said slide toward engagement of its said portions with said cams, the spring biased slide constituting means normally maintaining said spindles in predetermined positions of rotation from which the spindles are independently rotatable against the bias of said slide and spring, and means for locking said assembly against rotation, said locking means having a cam follower movable between locking and unlocked positions of said locking means and disposed in the locked position thereof in the path of the cam connected with the inner spindle, said last mentioned cam being adapted upon the independent rotation of the inner spindle, to displace said locking means to its unlocked position thereby freeing the tubular spindle and handle assembly for rotation.

9. In a door lock a subassembly which comprises the combination with a locking slide having an internal cavity, of means providing a way upon which said slide is reciprocable, a leaf spring disposed within the cavity and having its ends engaged with the slide, said spring having intermediate such ends a detent convolution, and detent means with which said convolution is engaged for positively resisting the displacement of said slide.

10. In a door lock, the combination with latch mechanism and latch releasing means including a handle and spindle assembly rotatable for latch release, of means for locking the said assembly against rotation, a key releasable rotor rotatable for unlocking the locking means, a first camming means connected with the spindle assembly, a second camming means connected with the rotor, and a single spring biased cam follower engageable with the first and second camming means for returning to a predetermined starting position whichever of said camming means is displaced from such position.

11. In a door latch and lock the combination with latching mechanism and a spindle for the release thereof, of a casing from which said spindle projects, a cam on the spindle, a slide reciprocable in the casing and having a biasing spring urging it toward said cam, said slide being displaced against the bias of said spring by operation of the cam when the spindle is rotated from a predetermined position for the release of the door latch, means for locking the spindle against rotation, a second cam located adjacent the first cam and engageable with said locking means for the displacement thereof from locking engagement with the spindle, a second spindle upon which the second cam is mounted and which is normally in centered position and rotatable from said position to displace said locking means, said second cam also being acted upon by said slide, whereby said biasing spring is effective through said slide to return each of said cams to a normally retracted position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,801,869	George	Aug. 6, 1957
2,873,990	Friedman et al.	Feb. 17, 1959
2,961,866	North et al.	Nov. 29, 1960