Dec. 8, 1931. J. C. BREKER 1,835,691

LOCK

Filed Oct. 9, 1929 2 Sheets-Sheet 1

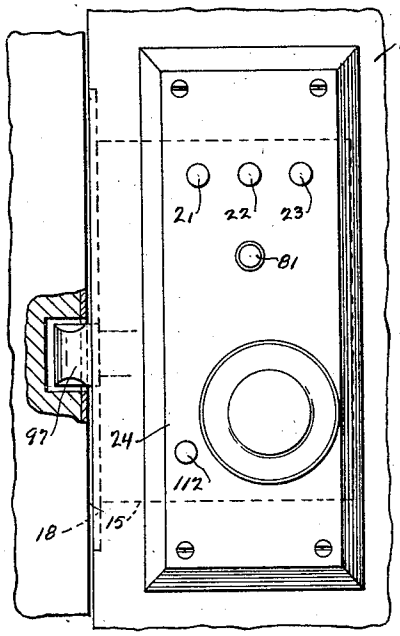


Fig. 1.

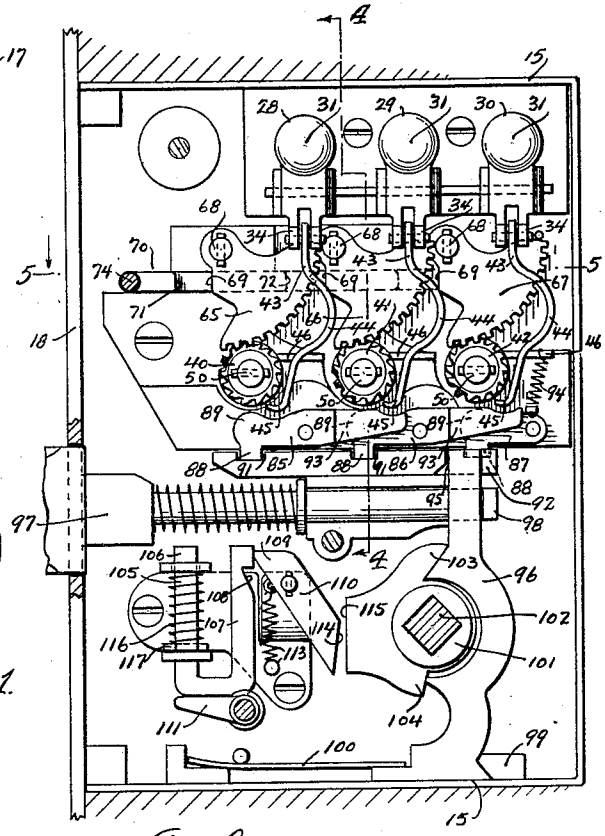


Fig. 2.

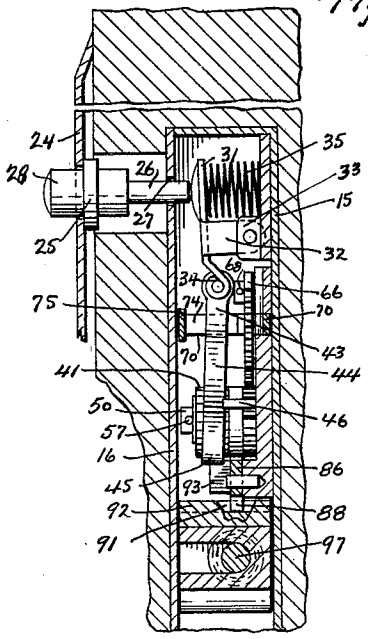


Fig. 4.

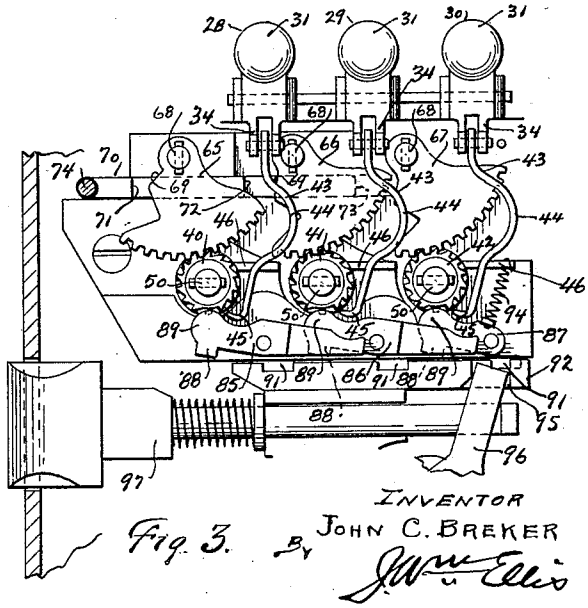


Fig. 3.

INVENTOR
JOHN C. BREKER
By
ATTORNEY

Dec. 8, 1931. J. C. BREKER 1,835,691

LOCK

Filed Oct. 9, 1929 2 Sheets-Sheet 2

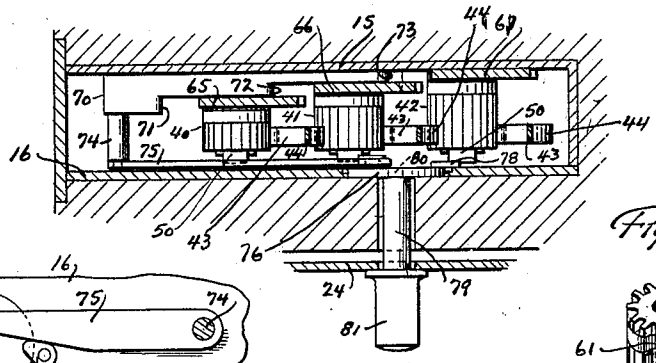


Fig. 5.

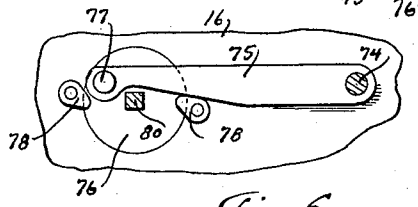


Fig. 6.

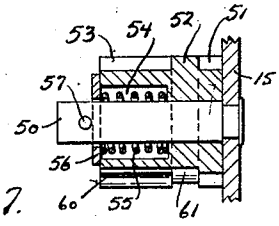


Fig. 7.

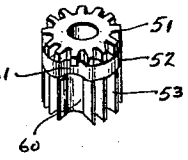


Fig. 8.

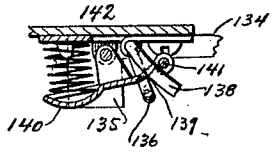


Fig. 10.

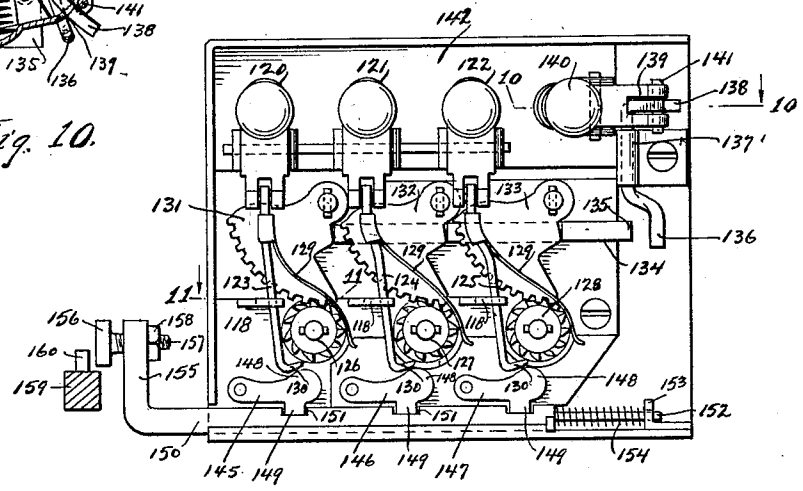


Fig. 9.

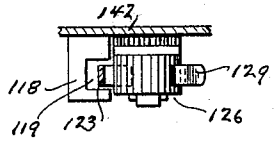


Fig. 11.

INVENTOR
JOHN. C. BREKER
BY
ATTORNEY

Patented Dec. 8, 1931

1,835,691

UNITED STATES PATENT OFFICE

JOHN C. BREKER, OF BUFFALO, NEW YORK, ASSIGNOR TO HEIM BREKER MANUFACTURING COMPANY, OF BUFFALO, NEW YORK

LOCK

Application filed October 9, 1929. Serial No. 398,535.

My invention relates in general to locks for use on doors of various kinds, and in partcular to a combination lock.

An object of my invention has been to provide a device of this nature, so constructed that its combination can not be detected by the senses.

Another object has been to provide a lock capable of many combinations, and one simple and durable in construction.

Moreover, my lock, because of its compactness of design, may be conveniently inserted in the doors of enclosed automobiles.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings, of which:

Fig. 1 is a face view of my complete lock assembled in a door.

Fig. 2 is enlarged face view of my lock with the cover plate removed.

Fig. 3 is a fragmentary view, similar to Fig. 2, showing the parts of the lock in their unlocked positions.

Fig. 4 is a fragmentary, sectional, view taken on line 4—4 of Fig. 2.

Fig. 5 is a transverse, sectional view, taken on line 5—5 of Fig. 2.

Fig. 6 is a fragmentary, inner face view of the cover plate showing a portion of the reset mechanism.

Fig. 7 is an enlarged, longitudinal, sectional view, taken through one of the tumbler elements.

Fig. 8 is a perspective view of one of the tumbler elements in inverted position.

Fig. 9 is a face view of a modified form of lock with the cover removed.

Fig. 10 is a fragmentary, sectional view, taken on line 10—10 of Fig. 9.

Fig. 11 is a fragmentary, sectional view taken on line 11—11 of Fig. 9.

Reference is now made to the form of invention shown in Figs. 1 to 8, inclusive, where I show a lock of the mortise type, designed to be used in wooden doors.

This form of the device comprises a casing 15 having the usual cover 16, which casing with its attached cover is mortised into the door 17 in the customary way. The usual plate 18 at the face of the casing is also mortised into the door and the lock is thereby secured by means of suitable screws.

My device is actuated by means of a number of operating buttons 21, 22, and 23 which pass through and are slidably mounted in an escutcheon plate 24, arranged on the outside of the door 17. In the forms of invention shown and described in this application, I have shown but three operating buttons and co-acting parts, but obviously two, or more then three might be used if desired. Each operating button is preferably provided with a flange or collar 25 which engages with the inner face of the escutcheon plate and thus limits the outward movement of the button. Each button is also formed preferably with a reduced peripheral portion 26 on its inner end which is slidably carried by an engaging aperture 27 formed in the cover 16.

Arranged under the apertures 27 of the cover 16 are the operating levers 28, 29 and 30, of my device, engageable respectively with the operating buttons 21, 22 and 23. Each of these operating levers is provided with a head 31, depending arms 32, which are pivotally attached to lugs 33 carried by the casing, and with a lower end 34 arranged at the side of the arms 32 which is opposite the head 31. A helical spring 35 is arranged under each of the heads whereby the head is kept in its elevated position and in contact with the operating button. The operating buttons are also kept in their extreme outward positions by means of the springs 35. Since the pivotal connection of the arm 32 of the levers is some distance below the head 31 and the lower end 34, the end 34 will be moved upwardly toward the buttons as the head of each is depressed, for purposes to be hereinafter described.

Tumbler elements 40, 41 and 42 are provided, respectively, for each of the operating levers 28, 29 and 30. An operating link 43 is provided for each of the operating levers and the upper end of each is pivotally attached to the lower end 34 of each of the operating levers. Each of the operating links 43 is arranged preferably at one side of the center of the tumbler element, having its lower end disposed adjacent the element and each

link may be provided with a curved portion 44 extending in the direction opposite to the tumbler element, whereby the weight of this curved portion will tend to move the operating links toward the tumbler elements. Each of the operating links is provided on its lower end with a hook 45 for engagement with the tumbler element, as hereinafter described. Each of the operating links is supported and guided near its lower end by means of a narrow support 46, the upper working edge of which is raised some distance above the bottom of the casing.

Each of the tumbler elements, 40, 41, and 42 is rotatably mounted upon a stud 50 carried by the casing 15. Each of the elements comprises a gear portion 51, which is arranged at the end of the element which is toward the bottom of the casing; a cam portion 52; and a ratchet portion 53 (see Figs. 7 and 8). The ratchet portion 53 is at the top of the element and its face is considerably wider than either the gear portion or the cam portion. The upper end of each of the tumbler elements is provided with a counterbore 54 in which is mounted a helical spring 55. The top of the counterbore is closed by means of a washer 56 which is held in place by means of a pin 57 passing through the upper end of the stud 50. The washer 56 is thus kept in contact with the helical spring 55 which spring is thereby slightly compressed so as to cause a fractional resistance to the turning of the tumbler element. The ratchet portion 53 of each tumbler element is engaged by the hook 45 of the co-acting operating link 43, when the link is reciprocated in an upward movement by the depression of the operating lever connected therewith. The amount of reciprocal movement of each link is such as to move the tumbler element a distance equal to the pitch of the ratchet teeth formed on the element. At one point in the ratchet element a recess 60 is formed by cutting away one of the ratchet teeth, whereby when the hook 45 of the operating link reaches this recess, the tumbler will not be rotated further even though the link is operated repeatedly. The cam portion 52 of each of the tumbler elements is provided with a depression 61 which may be in line with the recess 60 of the ratchet portion of the device or preferably slightly in advance in the direction of rotation of the element.

Reset gear segments 65, 66 and 67 are provided for moving the tumbler elements to their normal locked positions, and these segments engage, respectively, with the gear portions 51 of the tumbler elements 40, 41, and 42. These segments are arranged in stepped relation, so that they can overlap one another when being operated, the segment 67 being next to the bottom of the casing, and the segment 65 being farthest from the bottom, (see Fig. 5). The gear portions 51 of the tumbler elements 40, 41, and 42 are likewise arranged in stepped relation. Each of the segments is pivotally carried by a stud 68, rigidly supported by the casing and each of these segments is provided with a reset surface 69, which surfaces are substantially parallel with each other when the locking parts are in their normal, locked positions, as shown in Fig. 2. Arranged underneath the segments 65 and 66 is a reset bar 70. This bar as shown more clearly in Fig. 5 has two stepped surfaces 71 and 72 which engage respectively with the reset surfaces 69 of the gear segments 65 and 66. The end 73 of the reset bar engages with the reset surface 69 of the gear segment 67. The surfaces 71 and 72 and end 73 are all engageable with the reset surfaces 69 of the gear segments when the segments are in their normal positions as shown in Fig. 2. When, however, the gear segments are operated as hereinafter described, the surface 69 of the gear segment which is first operated, engaging with the co-acting surface of the reset bar, will move the reset bar to the left as viewed in the drawings. If the next gear segment is operated one or more times beyond the one first operated, then the reset bar will be moved in accordance with the excess of movement of the second gear segment beyond the operation of the first. If the third segment is operated a greater distance than the first or the second, then the reset bar will be operated in accordance with such further movement. An upstanding pin 74 is carried at the outer end of the reset bar, and this is pivotally engaged by a reset link 75. This reset link (see Figs. 5 and 6) is arranged adjacent to the cover 16 of the casing and has its inner end pivotally attached to a rotating disc 76 by means of a pivot pin 77, carried by the disc. The disc 76 is rotatably supported by the cover 16, lugs 78 being provided for keeping it in place. A reset stud 79 having a square-shaped inner end 80 is carried by the escutcheon plate 24 and engages with a square-shaped aperture formed in the disc whereby the disc may be rotated by the rotation of the stud. A reset knob 81 is formed on the outside of the reset stud, whereby the stud may be rotated.

Arranged below the tumbler elements 40, 41, and 42 are the tumblers 85, 86, and 87. Each of the tumblers is provided with a detent 88 and with a circularly-shaped head 89. These tumblers are disposed in different planes and in lapped arrangement, so that the head of each will come opposite the cam portion 52 of the co-acting tumbler element, and in engageable position with the depression 61 thereof. Each of these tumblers is pivotally mounted some distance behind the head thereof, and the detents thereof are engageable with slots 91 formed in a lock bar 92, when the device is locked. The tumblers 85 and 86 are preferably provided on the end

opposite the head 89 with a counterweight 93 whereby the head 89 is kept normally pressed in an upward direction when the lock is in position within a door. Due to the compact arrangement of my lock, there is not room for a counterweight for the tumbler 87 and therefore this tumbler is provided with a light spring 94. Obviously, if desired, each of the tumblers may be provided with a spring instead of the counterweights as shown.

The lock bar 92 is slidably mounted within the casing below the tumblers 85, 86 and 87 and is provided near its rear end with a slot 95 with which the upper end of a follower arm 96 engages. Slidably arranged beneath the lock bar is the usual latch bolt 97 which is provided at its rear end with a lug 98 engageable with the follower arm 96. The follower arm is held in place against the bottom wall of the casing by means of a lug 99 and a spring 100. A follower 101 is provided for my device which has bearing support in the casing 15 and cover 16 as is customary in locks of this nature. This follower has the usual square-shaped bore which is designed to fit the door knob shaft 102. The follower has arms 103 and 104 for engagement with the follower arm 96, whereby the arm may be operated in either direction as is customary. Where my device is to be applied to a lock of this type which is to be operated with a split or two-piece door knob shaft, the follower may be made in two pieces, as well as the follower arm, the follower arm on the inside part of the lock being of such a length that it will not engage the slot 95 of the latch bar 92, whereby the latch bolt may be withdrawn by turning the inner knob even though the lock is in its closed position.

As shown in Fig. 2 I may provide my lock with means for preventing an unauthorized person from forcing a thin implement in between the door and door jamb and thereby moving the latch bolt inwardly within the lock. Such means preferably comprises a detent bar 105 slidably mounted within the casing and having its upper end 106 movable into the path of the latch bolt 97. The detent bar is U-shaped, as shown, the leg 107 thereof having a notch 108. Engageable with the notch 108 is the upper end 109 of a latch 110. Such engagement comes about when the detent bar is moved upwardly to its locked position. An operating dog 11 is pivotally carried by the casing, and is connected with an operating knob 112 on each side of the door. By rotating either knob the dog is elevated so as to push the detent bar upwardly whereupon the end 109 catches in the notch 108 and holds the detent bar in its operative position. A helical spring 113 serves to keep the upper end 109 of the latch urged toward the leg 107 of the detent bar. When the latch is in engagement with the detent bar, an inclined surface 114 formed on its lower end will engage the surface 115 of the follower 101. The surface 115 is flat and preferably at right angles to a horizontal center line drawn through the center of the follower so that when the follower is rotated in either direction, it will cause the latch to be moved, thereby disengaging its upper end 109 from the notch 108 of the detent bar and allowing the bar to be moved downwardly to its normal position. A helical spring 116 is arranged on the detent bar 105 and bears against a pin 117 carried thereby, whereby the bar is normally urged downwardly.

The form of invention shown in Figs 9–11, inclusive, is designed primarily for use upon an automobile car door. In this form of invention the operating levers are shown at 120, 121 and 122. These are connected respectively to the operating links 123, 124 and 125. These links engage respectively with the tumbler elements 126, 127 and 128. These tumbler elements are similar in construction to the elements described in connection with the other device. The operating links 123, 124 and 125 of this form of device are preferably held in working contact with the ratchet portions of the tumbler elements by means of a light, leaf spring 129. Each of these springs is secured at its inner end to the upper end of the operating link and has its lower end in bearing contact with the tumbler elements on the side opposite to the hook 130 of the operating link, whereby the link and the hook will be gently urged toward the tumbler element.

The operating links 123, 124 and 125 in this form have their lower ends mounted in supports 118 and are passed through slots 119 formed therein. Reset gear segments 131, 132, and 133 are provided respectively for the tumbler elements 126, 127 and 128. The reset bar 134 of this form of the device is similar to the form hereinbefore described so far as its stepped arrangement is concerned. This bar, however, is provided at its outer end with an upstanding lug 135 with which a crank 136 is engageable. The crank is pivotally carried by a bearing 137 and is provided with an upstanding curved arm 138 at the end opposite the end having the crank. This arm passes through a slot 139 formed in the outer end of a reset lever 140. A pin 141 passes through the extreme outer end of the lever and serves to hold the arm 138 within the slot 139 of the arm. The lever is pivotally attached to the casing 142 and its head is engaged by a suitable button (not shown). The button for operating this lever as well as those for actuating the operating levers 120, 121, and 122 are similar to the buttons 21, 22 and 23 carried by the escutcheon plate 24 of the other form of device, and these buttons are slidably

carried by the door to which the lock is attached. Obviously, when operating the reset lever 140, the arm 138 will be drawn upwardly toward a vertical position, thus operating the crank 136 to move the reset bar 134 to its normal position.

Tumblers 145, 146 and 147 are provided respectively for the tumbler elements 126, 127 and 128. Each of these tumblers is pivotally secured at its inner end to the casing and each has a head 148 and a detent 149 formed at its outer end. The heads are engageable with the recesses formed in the cam portions of the tumbler elements as in the other form of invention. Slidably arranged in the bottom of the casing of this device is the lock bar 150 which is provided with slots 151 for engagement with the detents 149 of the tumblers. The detents are held within the notches 151 by gravity and are easily pushed out of engagement by the inward movement of the lock bar when the tumbler elements are in their unlocked positions. If desired, light springs (not shown) may be employed to move the heads of the tumblers upwardly and into engagement with the notches of the tumbler elements. The inner end of the lock bar is provided with a pin 152 which has sliding contact with a bearing 153 whereby the rear end of the bar is guided and retained in position. A helical spring 154 serves to force the bar outwardly to its normal position. The outer end of the bar is provided with an upturned portion 155 which carries a detent pad 156. This pad is carried by a screw 157 which is screw-threaded into the end 155 of the lever, whereby adjustment is provided for. A lock nut 158 serves to fix the pad in its adjusted position. As shown in Fig. 9 the latch spindle of the car door is represented at 159, and the only alteration to this latch spindle when using my lock is the provision of a detent pin 160. When being assembled the lock is placed so that the detent pad 156 comes opposite the detent pin 160, as shown in Fig. 9, whereby when the latch spindle 159 is rotated the pin will engage with the detent pad and prevent further movement of the latch spindle except when the device is unlocked.

It is obvious that in either form of my device, it is a relatively simple matter to change the combination, it only being necessary to remove the pin 57 from the stud 50 and to lift the tumbler element until the teeth of the gear section 51 thereof disengage from the reset gear segment, whereupon the tumbler element may be rotated in either direction, requiring either a greater or lesser number of movements to operate it, as is desired. Furthermore, it is not necessary when operating my lock to operate the tumbler elements in any definite sequential arrangement, since each is independent of others.

When the parts of my device are in the positions shown in Fig. 2, the device is locked and the tumbler elements are in their normal, locked positions, having been moved to such positions by the resetting mechanism. The operating buttons 21, 22, and 23 are now operated by being pushed inwardly to the limit of their travel, a definite number of times, corresponding to the predetermined combination, which will bring the depression 61 of the cam portion of each of the tumbler elements in registering position with the head 89 of the co-acting tumbler, whereupon the head will enter the recess either by gravity, by spring tension, or, as in the case of the automobile lock, by the actuation of the lock-bar. When all of the heads 89 of the tumblers have entered the depressions of the respective tumbler elements, the detents 88 of the tumblers will be disengageable from the recesses 91 of the lock bar 92. When the follower 101 is now operated by rotating the door knob, the latch bolt 97 will be withdrawn by means of the follower arm which will carry with it the lock bar 92. If the detent bar 105 has been previously set by the operation of the dog 111, the end 109 of the latch 110 will be released from its engagement with the notch 108 by the operation of the follower 101, as hereinbefore described, thus allowing the detent bar to be retracted by the spring 116 and moved to its normal lower position, as shown in Fig. 2. When it is desired to lock the device, it is only necessary to rotate the reset knob 81, which through the medium of the disc 76 and link 75 will operate the rest bar 70, causing the reset gear segments (which have been previously moved to positions corresponding to the amount of movement of the engaging tumbler elements) to be moved back to their normal positions, as shown in Fig. 2, thus carrying with them the engaging tumbler elements, which are also thus moved to their normal, locked positions.

The operation of the form of device shown in Fig. 9 is similar to that above described except that when the depressions of the can portions of the tumbler elements are opposite the heads 148 of the tumblers, the tumblers may be moved upwardly by the actuation of the lock bar, whereby their heads will engage with the depressions. This movement is possible because of the fact that the detents 149 of the tumblers are arranged some distance to the right of the pivotal points of the tumblers. Obviously, the lock bar 150 of this form of invention is operated by the detent pin 160 carried by the door latch spindle 159, which, when it is moved engages with the detent pad 156, moving this pad with it and the lock bar which carries it. To reset this form of invention, it is only necessary to operate the reset lever 140 by pushing an additional button (not shown) similar to the operating buttons 21, 22 and 23 of the other

form of invention. The operation of the reset lever serves to operate the crank 136 to move the reset bar to restore the reset gear segments to their normal positions.

In the form of invention shown in Fig. 9, the reset bar 134 is moved to the right in accordance with the movement of the reset gear segments, such movement being brought about by the engagement of the reset surfaces of the reset gear segments with the reset bar. In the form of invention shown in Figs. 1 to 8, however, it is possible to operate the lock bar 70 positively in either direction by means of the reset knob 81. Under normal conditions, the reset gear segments, engaging during their operation with the steps of the reset bar, will be the means of moving the reset bar to the left as shown in Figs. 2, 3, and 5. As the bar is moved, the reset link 75 will be moved accordingly and cause the disc 76 to be rotated. However, for clearness of illustration, in Figs. 2, 3 and 5, the reset bar has been moved to its extreme left hand position.

While I have shown the ratchet portion of the tumbler elements as being formed with ratchet teeth, it is obvious that gear teeth may be provided instead. This change is possible because the lower hooked ends of the operating links are some distance below the axes of the tumbler elements and, therefore, they readily fall away from the engaging tooth on the return stroke. These and other modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not, therefore, wish to be limited to the exact embodiment herein shown and described, the form shown being merely a preferred embodiment thereof.

Having thus described my invention, what I claim is:

1. A lock comprising a plurality of independently rotated tumbler elements, having their axes spaced apart and parallel with each other, a plurality of slidably mounted operating buttons movable in planes parallel to the axes of the tumbler elements, means connecting the buttons with the tumbler elements, separately operating tumblers engageable with the tumbler elements, and a lock bar engageable with the tumblers.

2. A lock comprising a plurality of independently rotated tumbler elements, having their axes spaced apart and parallel with each other, a plurality of slidably mounted operating buttons movable in planes parallel to the axes of the tumbler elements, a plurality of operating levers, a plurality of operating links pivotally connected at their upper ends to the levers, the lower ends of the links being in engagement with the tumbler elements, separately operating tumblers engageable with the tumbler elements, and a lock bar engageable with the tumblers.

3. In a lock, the combination with a lock bar and a plurality of separately operating tumblers engageable with the lock bar, of a plurality of tumbler elements controlling the tumblers, each tumbler element comprising a ratchet portion, a cam portion for engagement with the tumblers, and a gear portion, reset means associated with the gear portions of the tumbler elements for resetting the tumbler elements and means for operating the tumbler elements.

4. In a lock, the combination with a lock bar and a plurality of separately operating tumblers engageable with the lock bar, of a plurality of tumbler elements controlling the tumblers, each tumbler element comprising a ratchet portion, a cam portion for engagement with the tumblers, and a gear portion, a plurality of reset gear segments engageable with the gear portions of the tumbler elements, means for returning the reset segments to their normal positions, and means for operating the tumbler elements.

5. In a lock, the combination with a lock bar, a plurality of tumblers engageable with the lock bar, and a plurality of tumbler elements, of means for operating the tumbler elements located above these elements comprising a plurality of operating levers having their pivotal axes at right angles to the axes of the tumbler elements, and a plurality of depending operating links pivotally connected to the lower ends of the levers and having hooked lower ends disposed below the horizontal axes of the tumbler elements; and for engagement therewith, the links being reciprocated by the arcuate movement of the lower ends of the operating levers.

6. In a lock, the combination with a lock bar, a plurality of tumblers engageable with lock bar, of a plurality of tumbler elements controlling the tumblers, the tumbler elements being arranged in different vertical planes and in stepped arrangement with each other, a plurality of reset gear segments engageable with the tumbler elements and arranged in stepped relationship with each other, a reset bar having surfaces in stepped arrangement for engagement with the reset segments, means for operating the reset bar, whereby the segments will be returned to their normal positions by the operation of the reset bar.

7. In a lock, the combination with a plurality of tumbler elements having their axes spaced apart and parallel to each other, and means for operating the tumbler elements, of a plurality of weighted and gravity actuated tumblers arranged one below each of the tumbler elements, each tumbler having a head and a detent, and a slidably mounted lock bar arranged adjacent to the tumblers, the bar being formed with a sepa-

rate notch for engagement with each of the detents of the tumblers, the heads of the tumblers being engageable with the tumbler elements.

8. In a lock, the combination with a plurality of tumbler elements having their axes spaced apart and parallel to each other, and means for operating the tumbler elements, of a plurality of tumblers, a slidably mounted lock bar engageable with the tumblers, an adjustable detent pad carried by the lock bar, a latch spindle arranged adjacent to the lock bar, and a detent pin carried by the spindle and engageable with the detent pad for moving the lock bar when the spindle is rotated.

9. In a lock, the combination with a plurality of tumbler elements having their axes spaced apart and parallel to each other, and means for operating the tumbler elements, of a plurality of gravity actuated tumblers arranged one below each tumbler element, each tumbler having a head and a detent, a slidably mounted lock bar arranged adjacent to the tumblers, the bar being formed with a separate notch for engagement with each of the detents of the tumblers, the heads of the tumblers being engageable with the tumbler elements, a latch spindle arranged adjacent to the lock bar, and a detent pin carried by the spindle and engageable with the lock bar to move it when the spindle is rotated.

10. In a lock, the combination with a lock bar and a plurality of separately operating tumblers engaging with the lock bar, of a plurality of tumbler elements controlling the tumblers, each tumbler element comprising a ratchet portion, a cam portion for engagement with the tumblers, and a gear portion, means for operating the tumbler elements, reset means associated with the gear portions of the tumbler elements for resetting the tumbler elements, a slidably mounted lock bar engageable with tthe tumblers, a latch spindle arranged adjacent the lock bar, and detent means carried by the spindle and engageable with the lock bar to move it when the spindle is rotated.

In testimony whereof, I have hereunto signed my name.

JOHN C. BREKER.