

A. LEONARD.

LOCK.

APPLICATION FILED JUNE 18, 1908.

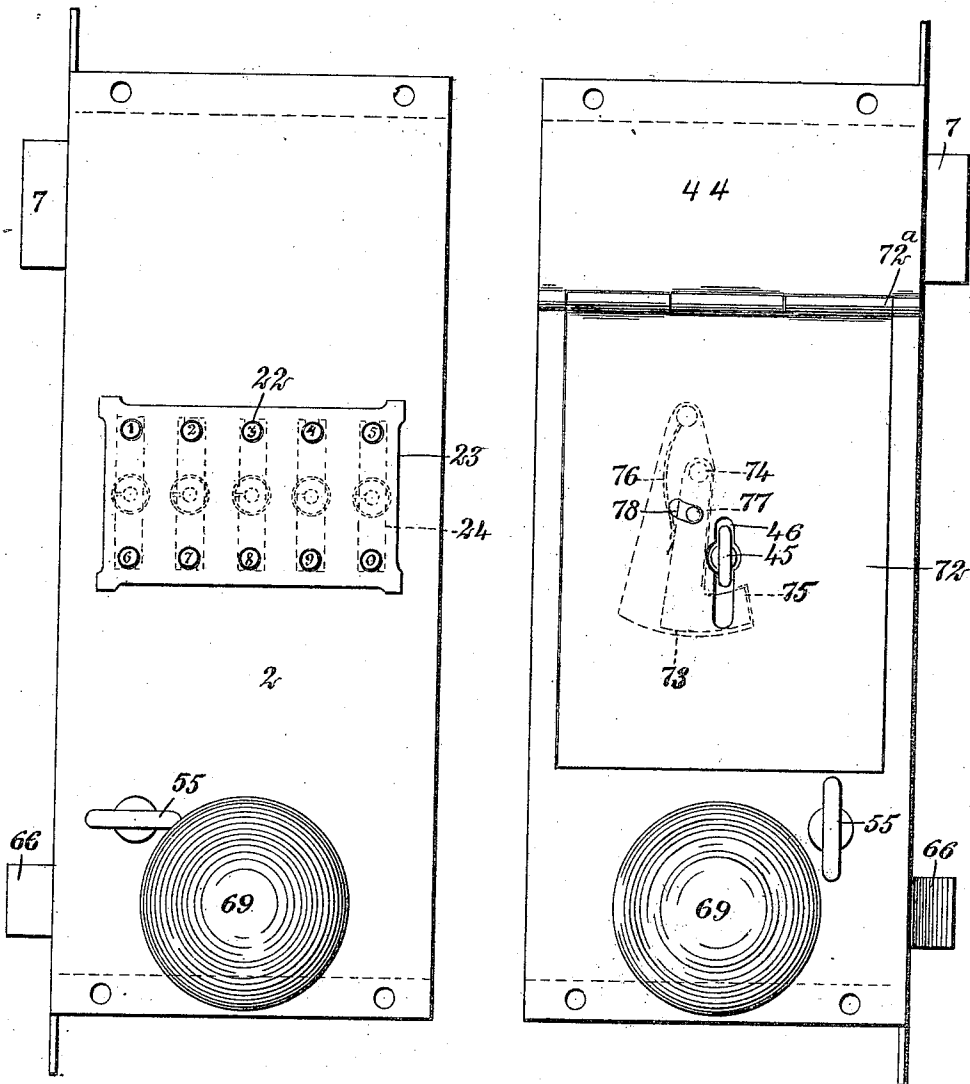
934,193.

Patented Sept. 14, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

Fig. 2.



WITNESSES

Open office
J. R. [Signature]

INVENTOR

Albert Leonard

BY

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ATTORNEYS

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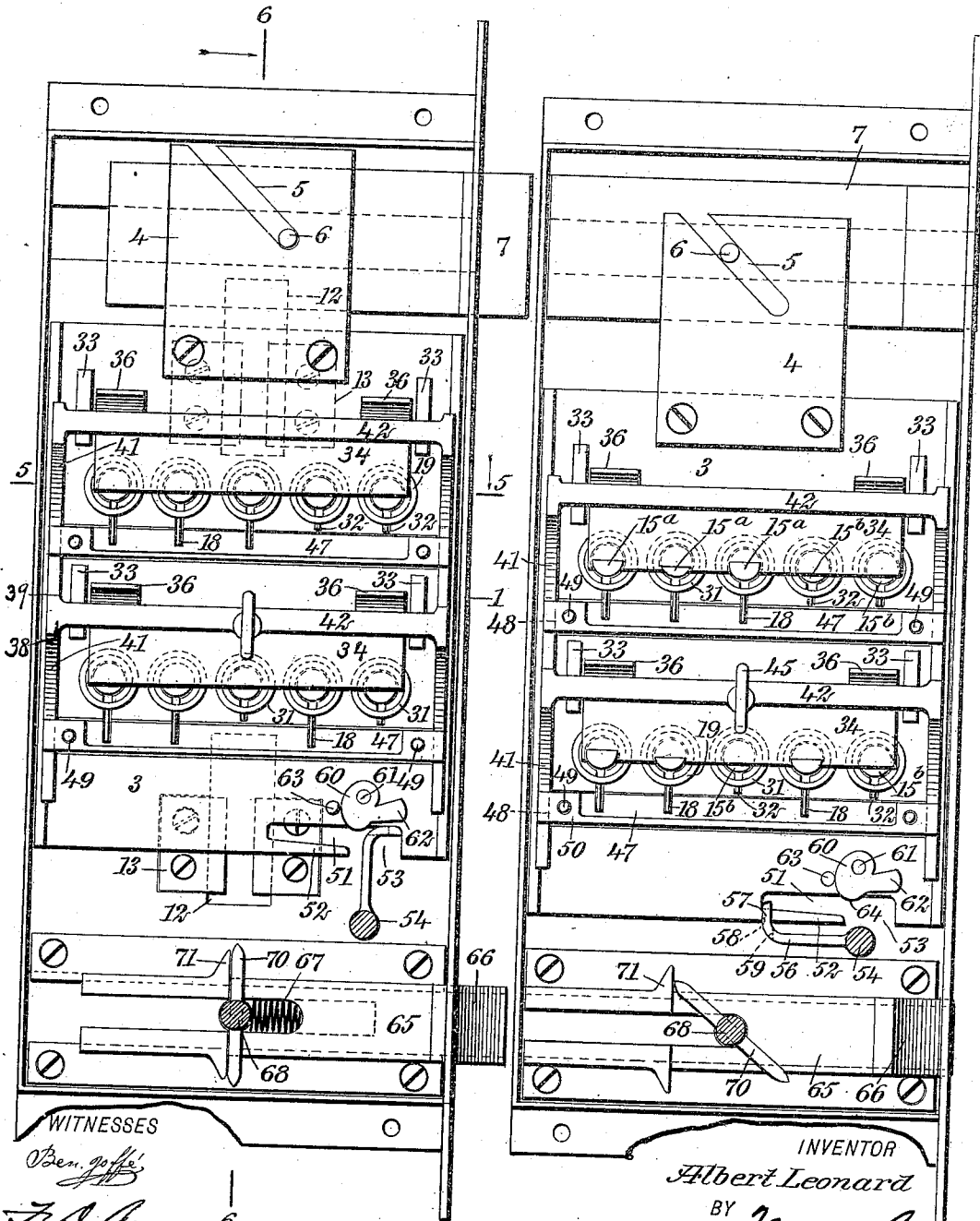
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3 SHEETS—SHEET 2.

Fig. 3.

Fig. 4.



WITNESSES

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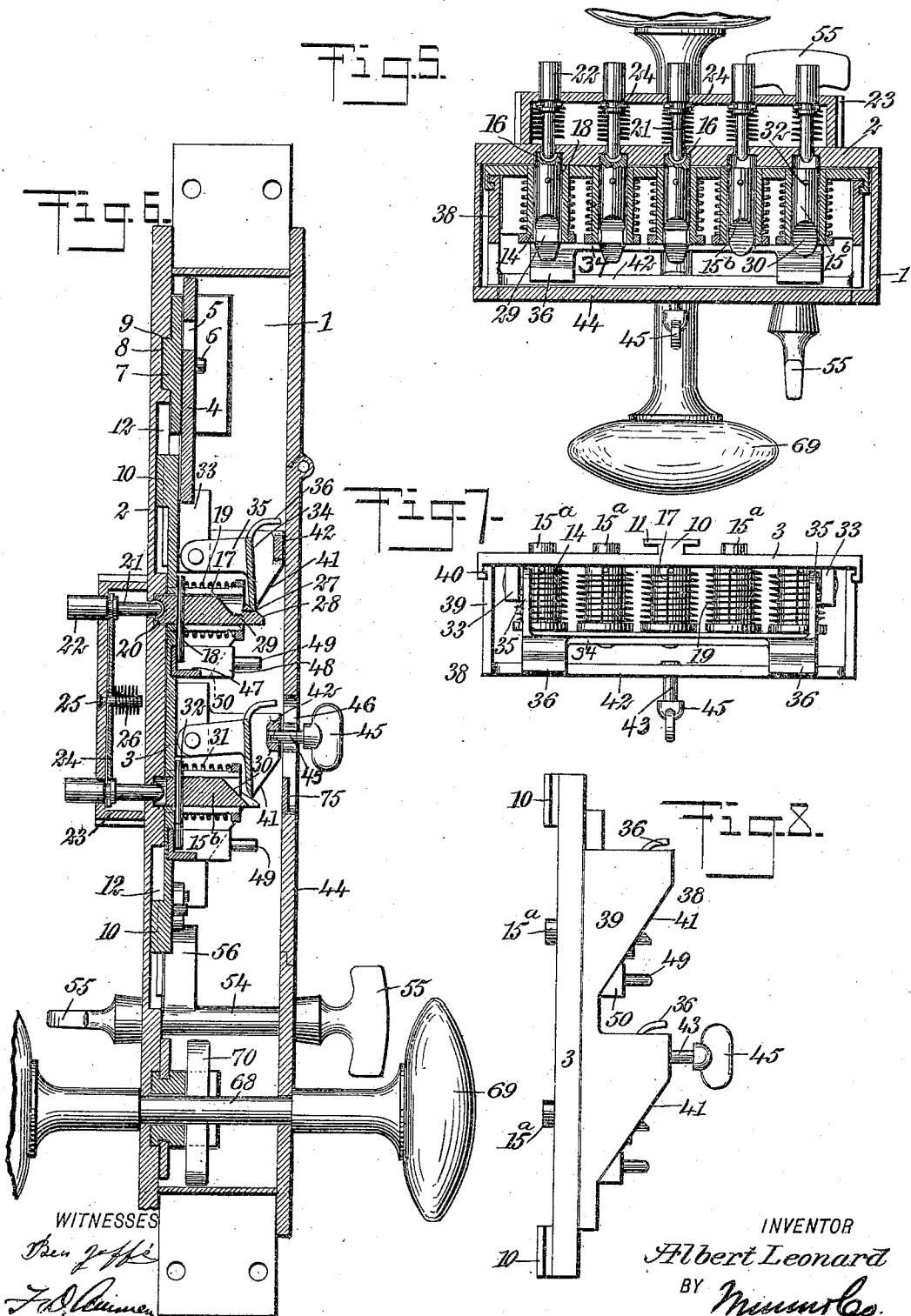
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

ALBERT LEONARD, OF ASHLAND, WISCONSIN.

LOCK.

934,193.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed June 18, 1908. Serial No. 439,100.

To all whom it may concern:

Be it known that I, ALBERT LEONARD, a citizen of the United States, and a resident of Ashland, in the county of Ashland and State of Wisconsin, have invented a new and Improved Lock, of which the following is a full, clear, and exact description.

This invention relates to locks such as used on doors, windows, drawers, and in similar places.

The object of the invention is to produce a lock which can be operated without a key, and which will be of simple construction.

The lock is specifically a combination lock, and in its construction it comprises a number of pins or plungers which must be placed in a certain set position before the lock can be opened.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of the lock; Fig. 2 is a rear elevation of the lock; Fig. 3 is an elevation showing the inner mechanism of the lock as if the cover plate at the rear were removed, this view shows the lock with the bolt extended, that is, it shows the mechanism in the relation existing when the door is locked; Fig. 4 is a view similar to Fig. 3, but showing the parts in the unlocked position; Fig. 5 is a cross section through the lock taken on the line 5—5 of Fig. 3; Fig. 6 is a vertical section through the lock taken on the line 6—6 of Fig. 3; Fig. 7 is an end view showing part of the inner mechanism of the lock; and Fig. 8 is a side elevation of a sliding frame which operates to set the lock in a released position so that its bolt may be extended or withdrawn.

Referring more particularly to the parts, and especially to Figs. 3 to 6, 1 represents the case of the lock, which has the form of a box, as shown, adapted to be set in the edge of a door in the usual manner. This case is of rectangular form, its longitudinal axis being disposed vertically, as indicated. On the forward wall or escutcheon 2 of the case which is on the outside of the door, a slide plate, or slide 3 is mounted. This slide

plate is of substantially the same width as the case and is adapted to slide longitudinally therein. To the upper end of the slide 3, a cam plate 4 is attached, which plate has an inclined slot 5 which engages a pin 6 carried on the face of the bolt 7. This bolt is formed on its face with a tongue 8, as indicated in Fig. 6, which runs in a horizontal guide groove 9 formed in the inner side of the escutcheon. As illustrated in Fig. 3, the slide 3 is shown in its elevated position, at which time the inclined slot 5 operates to project the bolt through the side of the case. In the depressed position of the slide the bolt is in a withdrawn position, as indicated in Fig. 4.

The slide 3 is illustrated in Fig. 7. On its inner face and on its central axis, it is provided with guide heads 10 which have projecting flanges 11, and these guide heads are received in guide slots 12 formed in the rear face of the escutcheon. At the sides of these guide grooves 12, keeper plates 13 are attached, which project over the flanges 11 and hold the slide in position. On the side of the slide 3 which is toward the interior of the case, a plurality of tubular guides 14 are provided, and in these guides, pins 15 are mounted to slide, as shown. There are ten of these pins illustrated, arranged in two rows, five pins being in each row. These pins are of two kinds or sets, the kind indicated specifically by the reference numeral 15^a are working pins, while the pins indicated by the reference numeral 15^b are blank pins. The pins 15^a project through the slide 3 and their butt ends are normally received in pockets or recesses 16 formed in the inner face of the escutcheon. As indicated most clearly in Fig. 6, the guide tubes 14 are formed with oppositely disposed slots 17, and transverse pins or triggers 18 are rigidly fixed in the pins and run in the slots 17. About the bodies of the tubes or tubular guides 14, helical springs 19 are provided, which thrust against the triggers 18 and tend to hold the pins with their butt ends in the recesses 16, as will be readily understood. The butt ends of the pins 15^a are formed with rounded sockets 20 and these sockets are adapted to receive setting studs 21 which pass through the escutcheon, as indicated. These setting studs are formed with enlarged heads 22 which project through the outer wall of a stud case or stud box 23, as indi-

cated in Fig. 1. These studs are connected in pairs by leaf springs 24 which engage under their heads and tend to hold them in a withdrawn position, as indicated in Fig. 6.

5 These leaf springs 24 are held in position by centrally disposed fastenings 25, having coil springs 26 arranged thereabout. These coil springs are fixed at their inner ends to the fastenings 25, and thrust against the inner

10 faces of the leaf springs so as to hold them in the position shown in Fig. 6. The pins 15^b have no sockets in their ends, and their butt ends are substantially flush with the inner face of the escutcheon. It may facilitate the disclosure of the invention to state

15 at this time that the pins operate to lock the slide to the case normally so as to prevent the lock from being opened. If the pins 15^a are advanced by the studs, they will free the slide from the case so that it may be moved.

20 The pins 15^b are blank pins, that is, they have not the function of assisting in locking the slide to the case. The inner ends of the pins 15^a project over the tubular guides or

25 tubes 14, and are formed with catches 27 presenting inclined faces 28 respectively, as shown. Each catch is formed with a notch 29 for a purpose to appear more fully hereinafter. The blank pins 15^b simply present

30 inclined faces 30 at their inner ends and have no catches. These pins 15^b are, however, pressed by springs 31 which are similar to the springs 19, and arranged about their tubular guides, and these springs 31 thrust

35 against triggers 32 which are formed with pins like the pins 18, but these triggers 32 do not project as far as the triggers 18. If any blank pin is pressed after some of the pins of the combination are set, it will release all the pins which have been set by the

40 action of its inclined face 30 which will raise the detent bar.

Near the side edges of the slide 3, ears 33 are provided which afford means for mounting pivotal detent plates 34. These detent

45 plates have arms 35 at their ends which are pivotally attached to the ears 33, as indicated. The bodies of these detents are disposed in a substantially vertical position and extend transversely of the case, as indicated

50 in Figs. 3 and 4. Their lower edges are beveled and normally rest against the inclined faces 28 of the pins 15^a. On the upper edges the detents 34 are provided with fingers

55 36 which project laterally, as indicated. It should be understood that if the pins 15^a are advanced by their plungers 21 as suggested above, the notches 29 will come under the detent plates 34 so that the detent plates will

60 hold the ends in this withdrawn position. In this position of the pins the slide 3 may advance.

I provide means for releasing all of the pins 15^a simultaneously from their withdrawn position when desired, and I also pro-

vide means for withdrawing and simultaneously locking all of these pins in their withdrawn position. For this purpose, on the slide 3 there is provided a releasing frame 38, which comprises side plates 39, the edges

70 whereof have a tongue and groove connection at 40 with the side edges of the slide 3. The side plates 39 are cut so as to present two inclined edges 41, as shown in Fig. 8, and the side plates 39 are connected by trans-

75 verse releasing bars 42, as indicated most clearly in Fig. 6. One of these releasing bars is provided with a stem 43 which projects through the cover or cover plate 44 of the case and is formed with a thumb head 45.

80 The stem 43 passes through a slot 46 formed vertically in the cover plate, as shown. By means of the thumb head 45 the setting and releasing frame 38 may be slid up or down. When it is slid upwardly, the releasing bars

85 42 will strike the fingers 36 so as to raise the detent plates 34 clear of the notches of the pins. In this way the frame 38 may release all of the pins 15^a simultaneously. In order to enable this frame to withdraw all

90 of the pins 15^a to lock them in their withdrawn position, I provide transversely disposed setting bars 47 which lie close against the face of the escutcheon and engage under the projecting ends of the triggers 18, as

95 indicated in Fig. 6. The ends of these setting bars 47 are formed into cross heads 48 which are guided on guide pins 49 at the sides of the case, as shown. These cross heads are formed with inclined shoulders 50

100 which engage over the inclined edges 41, as will be readily understood. From this arrangement, when the frame 38 is forced downwardly the cross heads 48 ride up on the inclined edges 41, and the bars 47 draw

105 the triggers and the pins outwardly so that when they are moved outwardly sufficiently, the detent plates engage the notches 29 by the action of gravity.

It should be understood that when the pins

110 15^a are all locked in their withdrawn position, the slide 3 may be moved up and down so as to advance or withdraw the bolt 7. In order to move the slide in this manner, the lower edge of the slide is provided with a

115 slot 51, the under side of the slot being formed by a horizontally projecting tongue 52, as indicated. This tongue projects toward the right so that at the right of the slot an opening or throat 53 is formed at

120 the lower edge of the slide. Just below the throat 53, a transversely disposed stem 54 is provided, which projects through both sides of the case, and is provided on each side with a thumb head 55 for rotating the same.

125 Within the case the stem is provided with a bit 56 which consists of a radially disposed arm having a laterally projecting finger 57 formed at the extremity thereof. This finger 57 is cut away on its under side adjacent

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to the tongue 52 so that a toe 58 is formed adapted to run in the slot 51, and between the toe 58 and the end of the arm 56, a slot 59 is formed, which is adapted to receive the tongue 52, as illustrated in Fig. 4. At the upper edge of the slot 51, and over the throat 53, a detent cam 60 is pivotally mounted at 61. This cam is provided with a laterally projecting tail 62 which constitutes a counterweight which tends to hold the edge of the cam against a stop pin 63. In this way the cam is made to present a rounded nose 64 which projects just below the upper edge of the slot 51. Supposing that the lock is in its unlocked condition, by rotating the stem 54 toward the right, as viewed in Fig. 4, the toe 58 will travel along the slot 51 and raise the slide 3. After sufficient rotation has taken place, the toe 58 will pass beyond the projecting nose 64 and come into the position shown in Fig. 3. The parts of the lock will then have the relation shown in Fig. 3. In the opposite movement of the stem 54 to unlock the lock, as the toe 58 advances it will ride under the projecting nose 64 and raise the slide 3 slightly. This raising movement will bring the tongue 52 into alinement with the opening or slot 59 formed in the finger 57. In this way the tongue is guided clear of the arm 56 and does not offer any obstruction to the opening movement. As the arm 56 rotates, the toe 58 will descend and will permit the slide 3 to descend by gravity until the parts come again into the position in which they are shown in Fig. 4.

In the lower part of the lock, a latch bolt 65 is guided transversely of the case and so that its beveled nose 66 may project from the case in the usual manner. This latch bolt is constrained toward its extended position by a spring 67, as indicated in Fig. 3. At a suitable point a latch spindle 68 is formed, which extends through the case and is provided with knobs 69 for rotating the spindle. The spindle is provided with bits 70 which engage a cross head 71 on the rear end of the latch bolt. This cross head presents faces which lie against the sides of the bits 70, and from this arrangement it will be evident that when the spindle is rotated in either direction, one of the bits 70 will engage the cross head so as to withdraw the bolt.

The cover 44 of the lock, which is on the inner side of the door, is provided with a lid or shutter 72 which is connected by a hinge connection 72^a at the upper edge thereof, so that it may swing outwardly. On the inner side of this lid 72, a latch 73 is attached pivotally at 74 so that it hangs down, as shown, the lower end of this latch has a laterally projecting finger 75 which projects across the slot 46 and into the path of the stem 43, so as to prevent the frame 38 from being slid up and down when desired. A spring 76 is placed at a point which nor-

mally holds it over against the stem, as shown, and on the side of the latch, a pin 77 is provided which projects through a small slot 78 in the lid. From this arrangement, by taking hold of the pin 77 the latch may be pushed to one side so as to release the frame 38, and enable it to be drawn downwardly. It should be understood, however, that the normal position of the latch 73 is that in which it is shown in Fig. 2.

The mode of operation of the lock will now be described: A person desiring to pass inwardly must depress the proper studs 21, and the outer heads of these studs are provided with numbers, one to zero, as shown, so as to permit of the use of a certain combination. The inclined faces 28 of the catches have different elevations at the notches 29. In other words certain of the catches are higher than others, and from this arrangement it is necessary that the studs be pressed in a certain order. This follows because if after a detent has engaged a catch which is not deep, a pin having a deep catch is then pressed it will be disengaged from the detent already in engagement. In this way it is not only necessary to set the proper combination, but it is essential that the pins be set in a certain order. It should be understood, however, that the combination remains fixed. That is, the lock is not a permutation lock. When the proper studs have been pressed, as described the pins 15^a will be locked with their butt ends withdrawn from the recesses 16 in the escutcheon, and the slide 3 is then unlocked and free to slide. The thumb head 55 on the outer side of the door is then rotated in a proper direction so as to draw down the slide which withdraws the bolt. As the slide reaches the limit of its downward movement, the fingers 36 strike the releasing bars 42 of the frame 38, and the pins will all be released and ready to be advanced by their springs into the recesses 16. From this arrangement it follows that as soon as the slide is moved up to its locking position, it will not only project the bolt 7 into its extended position, as indicated in Fig. 3, but the pins 15^a will all spring into engagement with the escutcheon and lock the slide again against movement. In this way I utilize the latter part of the unlocking movement to release all the pins so that they can lock the slide immediately that it is returned to its normal position. If it is desired to set the lock so that the slide will be released from the escutcheon, this is accomplished by drawing the latch 73 to one side and forcing the frame 38 downwardly by means of the thumb head 45. Moving this frame as suggested, will lock all of the pins 15^a in their withdrawn position, and the slide may then be moved up to its locking position. From an inspection of Fig. 2, it will be apparent

that when the frame 38 is moved downwardly in this way, the stem 43 will lie in the lower end of the slot 46, and will lie in the path of the lower end of the latch so as to prevent the latch from returning, but when the slide is moved upwardly, the stem 43 will pass above the laterally projecting part 75 of the latch so that on the next downward movement of the slide the pins will all release themselves again. While the blank pins have no function in unlocking the slide, they may operate by reason of their inclined inner ends to displace the detent plates upwardly and release the pins that have been already set.

Having thus described my invention, I claim as new and desire to secure by Letters Patent,—

1. In a lock, in combination, a case, a slide mounted therein, a bolt adapted to be actuated by said slide, a plurality of pins carried by said slide and projecting therefrom at their butt ends, said case having pockets normally receiving the butt ends of said pins to lock said slide thereto, means for advancing said pins and releasing the same from said pockets, means for locking said pins in their advanced position, and means for actuating said slide.

2. In a lock, in combination, a case, a slide therein, a plurality of pins mounted in said slide and projecting therefrom at their butt ends, said case having means for engaging said butt ends to lock said slide thereto, means for advancing said pins to disengage them from said case, means for locking said pins in an advanced position, means for moving said last means so as to release all of said pins simultaneously, a bolt actuated by said slide, and means for actuating said slide.

3. In a lock, in combination, a case, a slide movably mounted therein, a plurality of pins slidably mounted on said slide and normally engaging said case to lock said slide thereto, means for advancing said pins individually to permit said slide to move, said pins being disposed in a row, a detent bar normally engaging said pins, means whereby said detent bar may hold said pins in their advanced position to release said slide, a bolt actuated by said slide, and means for actuating said slide.

4. In a lock, in combination, a case, a slide movably mounted therein, a plurality of pins slidably mounted in said slide and normally engaging said case to lock said slide thereto, means for advancing said pins individually to permit said slide to move, said pins being disposed in a row, a detent bar normally engaging said pins, means whereby said detent bar may hold said pins in their advanced position to release said slide, a bolt actuated by said slide, means for actuating said slide, and means for moving

said detent bar to release said pins simultaneously.

5. In a lock, in combination, a case, a slide moving therein, a plurality of pins normally locking said slide, means for advancing said pins individually to release said slide, means for actuating said slide when released, a bolt actuated by said slide, and means for advancing said pins collectively in unison whereby said pins may be locked simultaneously in their releasing position for said slide.

6. In a lock, in combination, a case, a slide moving therein, a row of pins guided in said slide and normally locking the same to said case, said pins having catches formed thereupon, a laterally moving detent bar normally engaging said pins adjacent to said catches, means for advancing said pins individually to be locked by said detent bar, means for advancing said slide, a bolt actuated by said slide, and means for moving said detent bar to disengage said pins therefrom.

7. In a lock, in combination, a case, a slide mounted therein, a plurality of pins guided in said slide and normally locking said slide against movement, said pins having catches formed thereupon, said pins being disposed in a row, a pivotally mounted detent bar normally resting against said pins near said catches, said detent bar being adapted to engage said catches when said pins are advanced individually and affording means for holding the said pins in a position to release said slide, means for advancing said slide, and a bolt actuated by said slide.

8. In a lock, in combination, a case, a slide moving therein, a plurality of pins guided in said slide and normally locking the same against movement, means for advancing said pins individually to release said slide, said pins being disposed in a row and having catches presenting inclined faces having different elevations, a transversely disposed movable detent bar resting against said inclined faces adjacent to said catches and adapted to engage said pins to detain the same when advanced, means for advancing said slide, a bolt adapted to be withdrawn when said slide advances, and means for displacing said detent bar to release said pins when said slide moves to unlock and withdraw said bolt.

9. In a lock, in combination, a case, a slide movably mounted therein, a plurality of pins guided in said slide and normally locking the same against movement, means for advancing said pins individually to release said slide, a member adapted to engage said pins to hold the same in their releasing position, means for advancing said slide when unlocked, a bolt actuated by said slide, and a member adapted to engage said first

member and affording means for releasing all of said pins when the slide moves to unlock said bolt.

10. In a lock, in combination, a case, a slide moving therein, a plurality of pins adapted to lock said slide against movement, means for advancing said pins individually to release said slide, a detent bar engaging said pins and affording means for locking the same in their advanced position, a sliding member mounted on said slide, means actuated thereby for advancing said pins collectively to their releasing position, means actuated by said member for releasing said pins simultaneously, means for advancing said slide when released, and a bolt actuated by said slide.

11. In a lock, in combination, a case, a slide movably mounted therein, a plurality of pins guided in said slide and normally engaging said case, detents normally holding said pins in their locking position for said slide, triggers carried by said pins, a setting bar engaging said triggers, means for advancing said setting bar to advance said pins, a member adapted to engage said pins to lock the same against return, means for actuating said slide, and a bolt actuated by said slide.

12. In a lock, in combination, a case, a slide moving therein, a plurality of pins guided in said slide and normally locking the same to said case, means for advancing said pins individually to their releasing position for said slide, a detent engaging said pins to lock the same against return when advanced, a moving member mounted on said slide, and means actuated thereby for advancing all of said pins simultaneously to their releasing position, said detent bar having a part disposed in the path of said moving member whereby said moving member may move said bar to release said pins simultaneously.

13. In a lock, in combination, a case, a slide moving therein, a plurality of pins guided in said slide and normally locking the same against movement, triggers carried by said pins, a setting bar engaging said triggers, means for guiding said setting bar, means for advancing said pins individually to their releasing position for said slide, a detent adapted to engage said pins to lock the same in their releasing position, a movable frame mounted on said slide affording means for actuating said setting bar to set

said pins simultaneously in their releasing position, said frame being adapted to engage said detent bar to release said pins simultaneously, means for advancing said slide, and a bolt actuated by said slide.

14. In a lock, in combination, a case, a slide movably mounted therein, a plurality of pins guided in said slide and normally locking the same against movement, means for advancing said pins individually, said pins having catches, a detent bar adapted to engage said catches to lock said pins against movement when advanced, triggers carried by said pins, a setting bar engaging said triggers, means for guiding said setting bar substantially parallel with said pins, a frame sliding on said slide having an inclined edge engaging said setting bar for advancing the same, said detent bar having a member projecting into the path of said frame whereby said frame may release said pins simultaneously, means for advancing said slide when released, and a bolt actuated by said slide.

15. In a lock, in combination, a case, a slide moving therein, a plurality of pins guided in said slide and having catches, means for advancing said pins individually, detent means for locking said pins in their advanced position to release said slide, a plurality of blank pins normally held in a releasing position for said slide, means for advancing said blank pins, and means for returning said blank pins to their normal position, said blank pins affording means to release said first pins.

16. In a lock, in combination, a case, a slide moving therein, a plurality of pins guided in said slide and having catches, means for advancing said pins individually, means for locking said pins in their advanced position to release said slide, a plurality of blank pins normally held in a releasing position for said slide, and means for advancing said blank pins, said blank pins having their inner ends disposed adjacent to said locking means for said first pins whereby said blank pins may release said first pins.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERT LEONARD.

Witnesses:

A. B. NOBLE,
A. J. HUOTTE.