

S. N. FRIEDMAN.

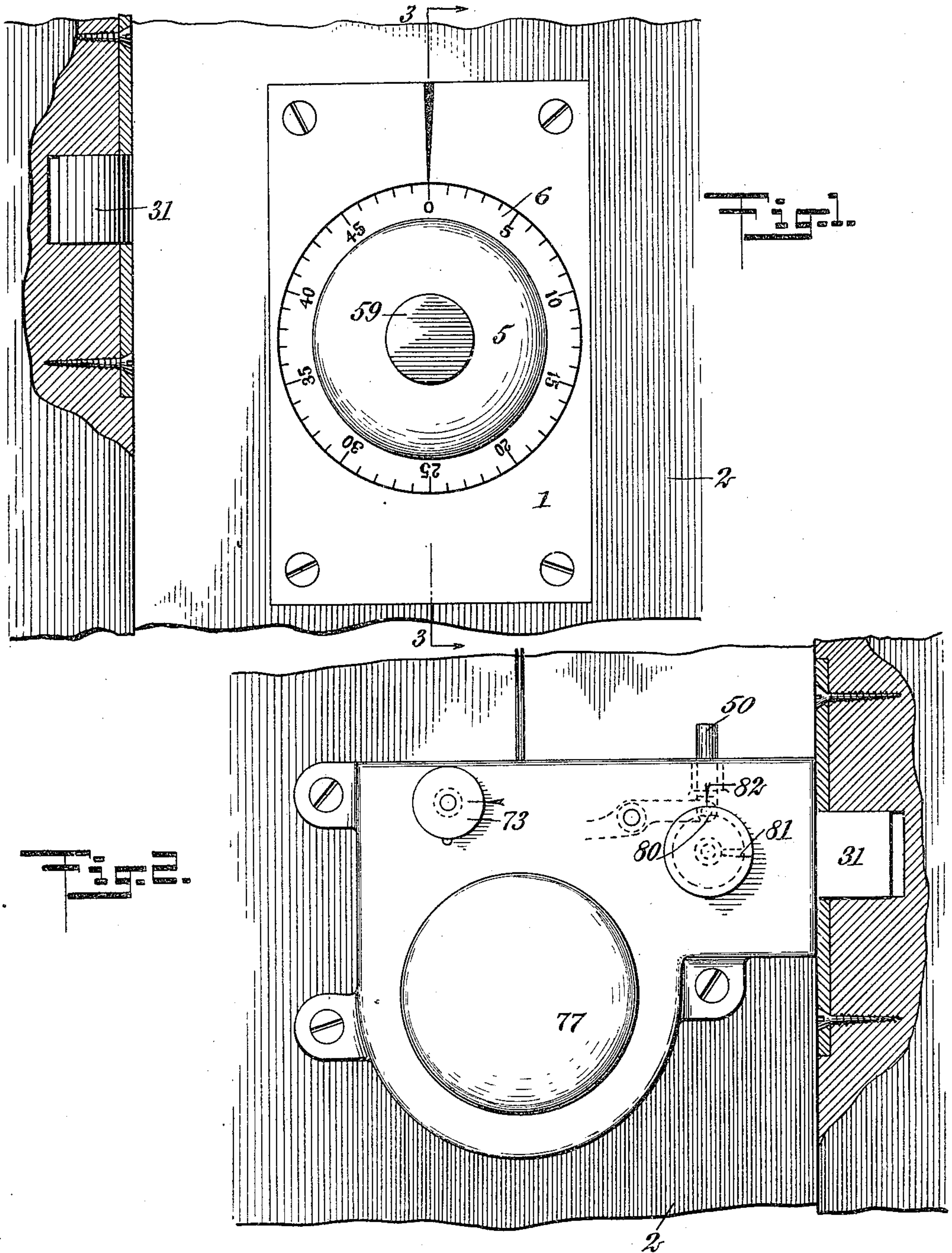
COMBINATION LOCK.

APPLICATION FILED MAY 6, 1909.

Patented Mar. 22, 1910.

4 SHEETS—SHEET 1.

952,797.



WITNESSES

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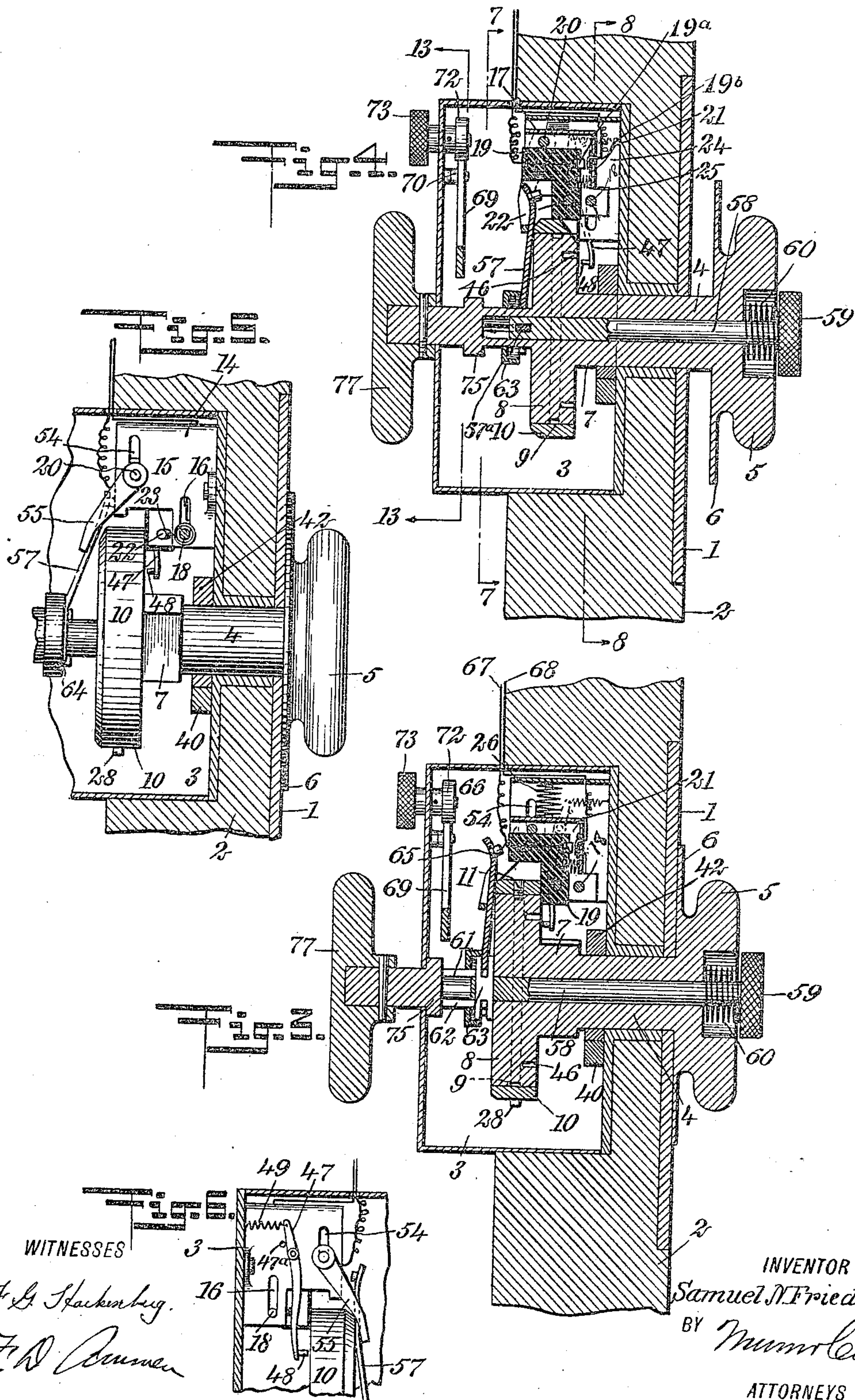
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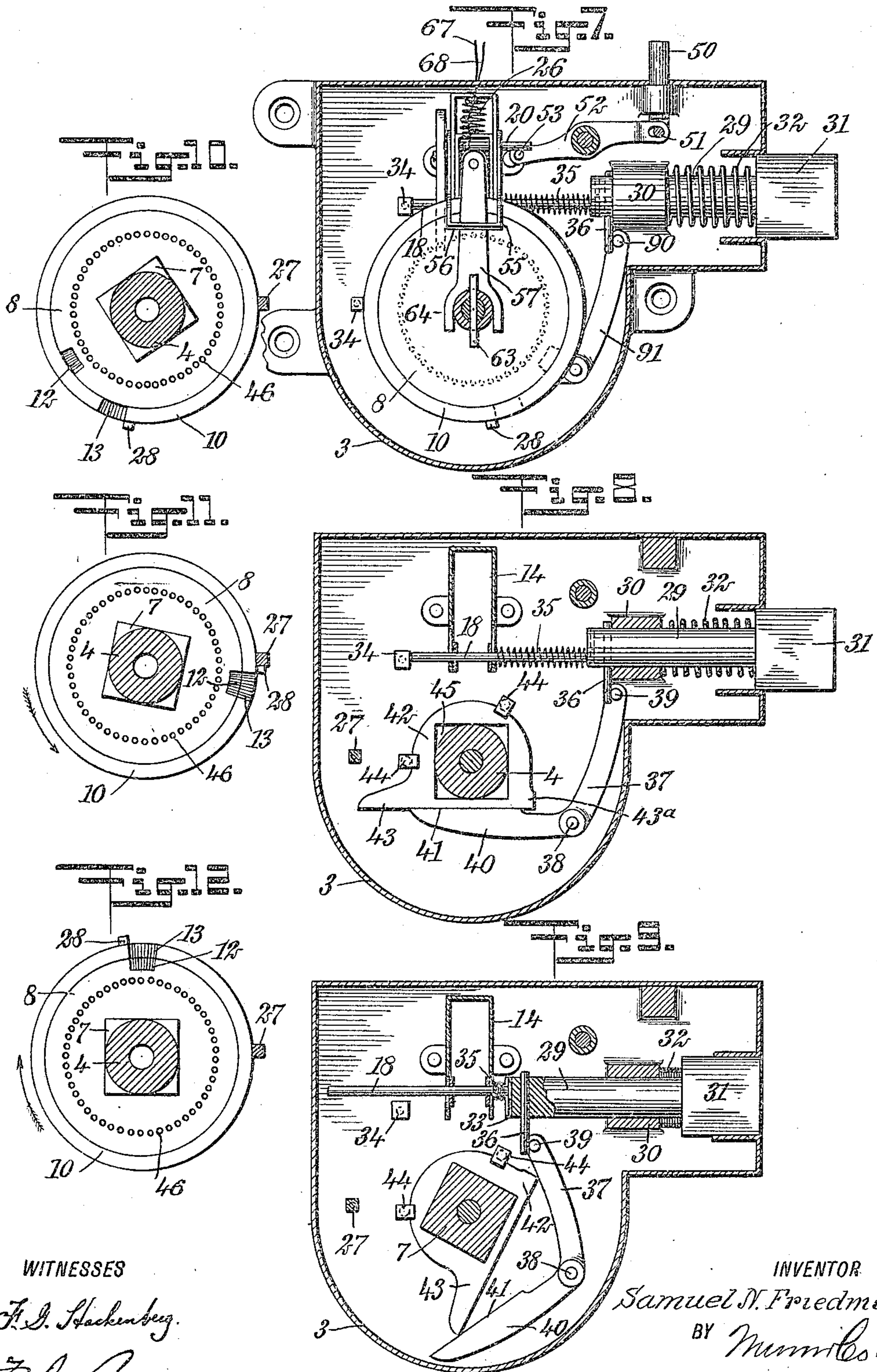


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4 SHEETS—SHEET 3.



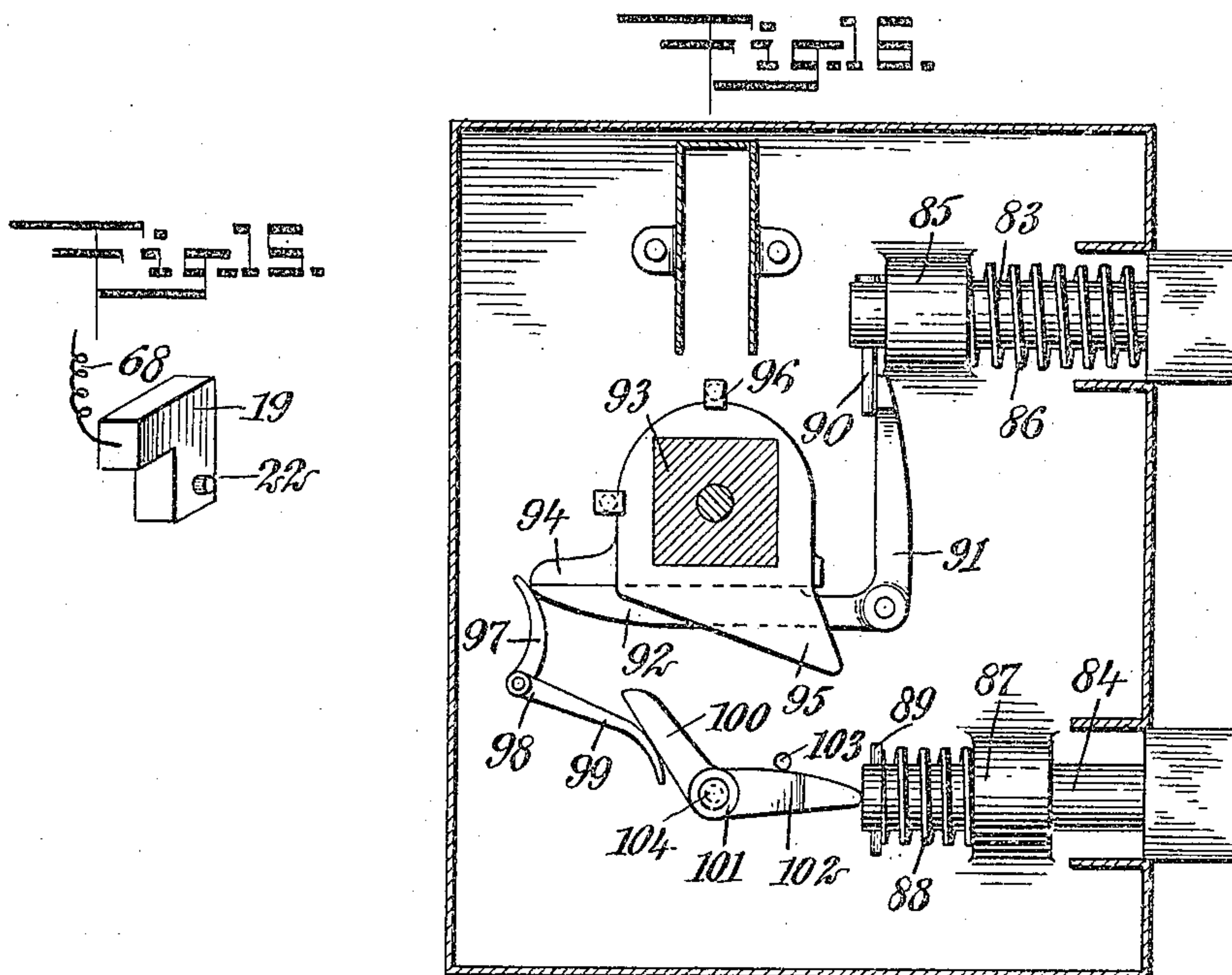
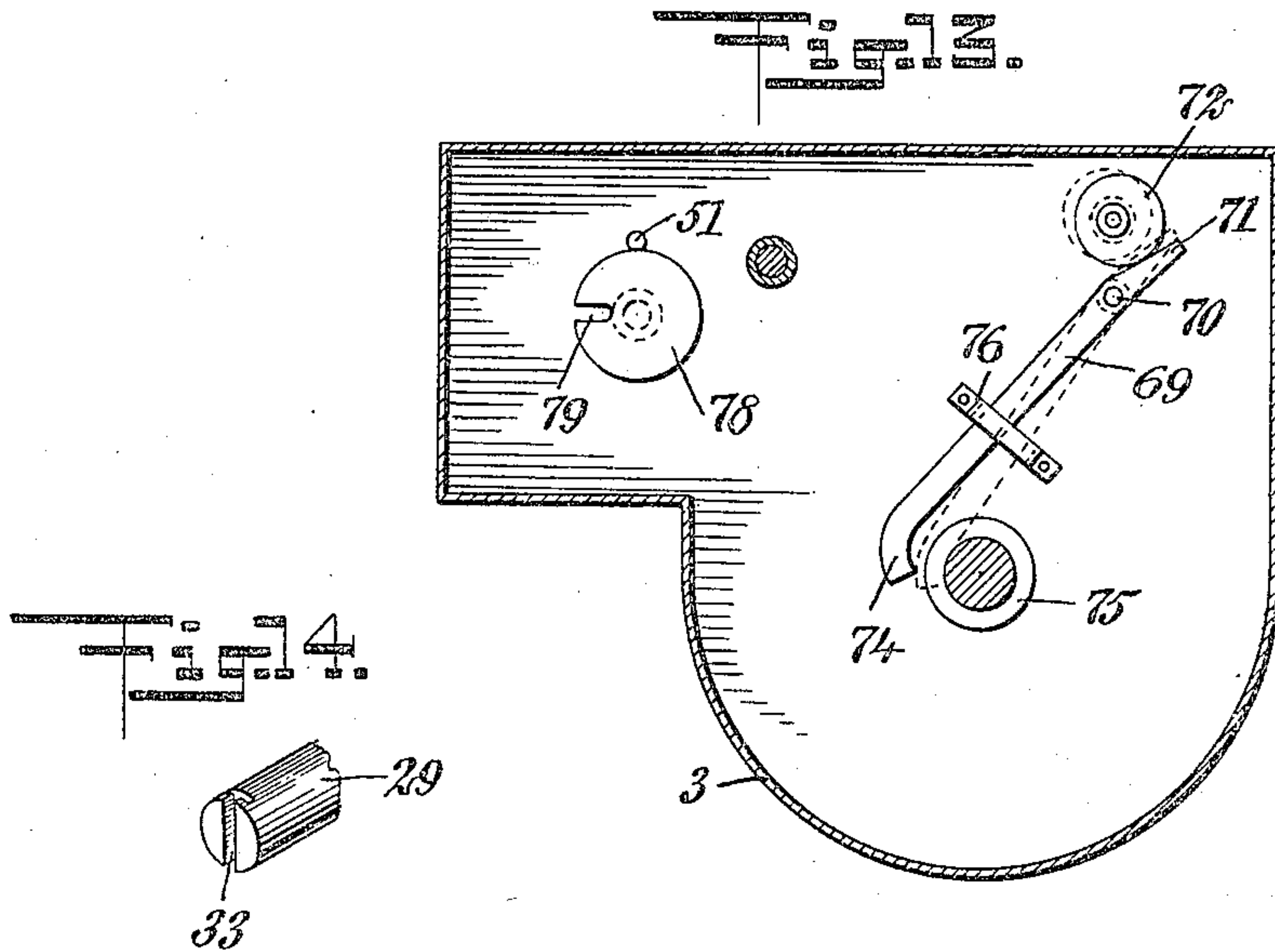
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WITNESSES

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UNITED STATES PATENT OFFICE.

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COMBINATION-LOCK.

952,797.

Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed May 6, 1909. Serial No. 494,235.

To all whom it may concern:

Be it known that I, SAMUEL N. FRIEDMAN, a subject of the German Emperor, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Combination-Lock, of which the following is a full, clear, and exact description.

This invention relates to combination locks, and especially to a simple type of lock which is adapted to be used for locking a door of a room.

The object of the invention is to produce a keyless lock of simple construction, having a simple combination which must be known before the lock can be opened.

A further object of the invention is to provide the lock with a push button attachment by means of which an electric bell or annunciator may be rung, and to provide an arrangement whereby the electric bell may be rung if the knob of the lock is tampered with by a person who does not know the combination.

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 showing the escutcheon and a portion of the outer side of the door; a side portion of the jamb is shown in this view in cross section; Fig. 2 is an elevation showing a portion of the inner side of the door and showing the lock; in this view a portion of the jamb is shown in cross section; Fig. 3 is a vertical central section through the lock taken on the line 3—3 of Fig. 1; this view shows the parts of the lock in their normal position; Fig. 4 is a view similar to Fig. 3, but showing the parts of the lock in the relation which they assume when the lock is being opened; Fig. 5 is a vertical section through the case of the lock, and showing the parts of the lock generally in elevation; Fig. 6 is a vertical section through a portion of the lock case and showing the opposite side of the parts of the mechanism which are shown in Fig. 5; Fig. 7 is vertical section

through the lock taken on the line 7—7 of Fig. 4, and further illustrating the details of the construction; Fig. 8 is a vertical section taken on the line 8—8 of Fig. 4, and showing particularly the mechanism for actuating the bolt, this view showing the bolt in its extended position; Fig. 9 is a view similar to Fig. 8, but showing the bolt in its withdrawn position; Fig. 10 is a cross section through the spindle, and showing the tumblers in their normal position; Fig. 11 is a view similar to Fig. 10, but showing the manner in which the tumblers are brought to alinement for opening the lock; Fig. 12 is a view similar to Fig. 11, but showing the position in which the tumblers move before the spindle can be connected with the bolt; Fig. 13 is a section through the lock case, looking from the reverse side, and particularly illustrating the means for controlling the spindle irrespective of the combination, the section being taken on the line 13—13 of Fig. 4; Fig. 14 is a perspective showing the inner or butt end of the bolt, and particularly illustrating the slot by means of which it is connected with the locking pin; Fig. 15 is a perspective of the block which in being raised, raises the locking pin; and Fig. 16 is a vertical section through the lock, showing a modified construction in which the spindle may withdraw two bolts simultaneously.

Referring more particularly to the parts, 1 represents the escutcheon of the lock, which is in the form of a substantially rectangular plate attached to the outer face of the door 2. On the inner side of the door, and recessed into the same, there is provided a lock case 3, and passing through this lock case and through the escutcheon, there is provided a spindle 4. On the outer side of the door and adjacent to the escutcheon, this spindle 4 is provided with a knob 5, and this knob is made integral with a dial 6, which normally seats against the face of the escutcheon, as shown in Fig. 3. The body of the spindle 4 is round, but on the interior of the case the spindle is formed with an angular or square neck 7. Beyond this neck 7 the spindle is expanded so as to form a tumbler wheel or disk 8. This tumbler disk 8 is provided on its periphery with a continuous groove 9, and this groove affords means for receiving a tumbler ring 10 which seats over the main tumbler 8, as shown.

The tumbler ring 10 is provided with a small set screw 11 which projects into the groove, as shown. As indicated most clearly in Figs. 10 to 12, the tumbler 8 is provided on its inner face with a notch 12 having an inclined bottom, and a similar notch 13 is formed in the outer tumbler ring 10. These notches are adapted to be alined with each other, as indicated in Figs. 11 and 12, at which time their inclined bottoms form a substantially continuous inclined face, as indicated in Fig. 4. In the upper portion of the case I provide a box or guide bracket 14, which is preferably formed of a bent plate. It presents vertical side plates 15, and these side plates are provided on opposite sides with alining slots 16. On the interior of the guide or box 14 there is mounted a shoe 17, which is preferably formed of metal, and through the lower part of this shoe a locking pin 18 passes, and this pin extends a considerable distance on each side of the box, as shown in Fig. 7, passing through the alining slots 16, as indicated in Fig. 5. This pin normally is disposed behind the bolt of the lock, and is adapted to be shifted upwardly in order to release the bolt. The mechanism for enabling the pin to be shifted upwardly will now be described.

On the interior of the shoe 17 there is provided a block 19, the form of this block being clearly shown in Fig. 15. The upper face of the block is disposed against a transverse pin 20 which connects the side plates 21 of the shoe. The lower portion of the block is provided with a transverse pin 22, and this pin is received in short horizontal slots 23 in the side plates 21, as shown in Fig. 5. Between the back plate 24 and the back of the block, a small spring 25 is provided, which tends to hold the lower portion of the block in a forwardly disposed position; the action of the spring is, of course, limited by the slots 23. This construction permits a slight rearward tilting of the block at its lower extremity. The purpose of this mounting is to give an easy operation of the block when actuated by the tumblers. In the upper part of the guide above the shoe, a spring 26 is provided, which tends to force the shoe and the block downwardly toward the position in which they are indicated in Fig. 3, and this is the normal position of the shoe when the lock is not set and the spindle is unconnected with the bolt for operating the latter.

In order to enable the tumblers to have their notches 12 and 13 aline, adjacent to the outer tumbler a fixed stop post 27 is provided, and the peripheral face of the tumbler ring 10 is provided with a stop pin 28 which is adapted to engage the post as this tumbler rotates.

In setting the combination, the spindle is

rotated in the direction of the arrow in Fig. 11 so as to bring the stop pin 28 against the post 27, and the rotation is continued according to the combination until the notches 12 and 13 both aline at this point. The spindle is then given a reverse rotation, as in the direction of the arrow indicated in Fig. 12. The second number of the combination is such as to bring the two notches 12 and 13 into alinement adjacent the lower extremity of the block 19. In this connection it should be understood that the tumbler ring 10 is free to turn on the inner tumbler, but when it is not held it will rotate when the inner tumbler rotates. When the notches 12 and 13 of the tumblers have been alined at the lower end of the block, the knob 5 can then be pulled outwardly, and as the inclined bottom faces of the notches 12 and 13 engage the lower edge of the block they force the block and shoe upwardly into the position shown in Fig. 4. In this way the shoe is made to raise the locking pin which releases the bolt in a manner which will now be described.

The bolt 29 is mounted to slide in a guide lug 30 on the case, and is provided with a head 31 which normally projects from the case, as indicated. Around the bolt 29, and thrusting against the head 31 and the lug 30, a spring 32 is provided, which tends to hold the bolt extended, as will be readily understood. The butt end of the bolt 29 projects beyond the lug 30 on the side adjacent to the shoe, and this end of the bolt is provided with a diametrically disposed T-slot 33, as indicated most clearly in Fig. 14. The locking pin 18 is provided with a T-head which engages this slot and is adapted to slide therein, as indicated in Fig. 9. When the locking pin is in its lowermost position, as indicated in Figs. 7 and 8, its butt end lies adjacent to the forward face of a fixed post or backing post 34 so as to prevent the pin from sliding. In this way the locking pin normally forms an obstruction behind the bolt to prevent its withdrawal. From this arrangement it will be evident that when the pin is raised clear of the post 34, the bolt can be withdrawn so that the parts will assume the relation shown in Fig. 9. In order to assist the spring 32 in returning the bolt, the locking pin 18 is provided with a spring 35 which thrusts against the side of the box at its rear end and against the butt end of the bolt at its forward end. The forward movement of the bolt is limited by a downwardly projecting trigger 36 which is fastened in its butt end, and which comes against the rear side of the lug 30, as shown. This trigger 36 affords means for withdrawing the bolt by means of a bell crank lever 37 which is pivoted at 38 on the interior of the case. The vertical arm of this bell crank lever has

a dog pin 39 which normally rests against the forward side of the trigger 36, as shown. The horizontal arm 40 of this lever extends under the spindle and presents a flat face 41 which normally rests against a flat edge presented by the under side of a hub 42. This hub 42 has toes 43 and 43^a projecting in the same direction as the arm 40. The upper portion of the hub is of curved form, and at the edge of the hub guide pins 44 are provided which assist in holding the hub in position, but permit its being rotated by the spindle. This hub can, however, be normally not rotated by the spindle on account of the opening 45 which is formed through it which is of angular or square form, while the normally adjacent part of the spindle is round. However, when the knob 5 is pulled forwardly so as to raise the locking pin 18 to release the bolt, at the same time the square neck 7 can be projected into the opening 45 so as to lock the spindle to the hub. When the spindle has been locked to the hub in this manner the rotation of the spindle in either direction will rock the bell crank lever 37 and withdraw the bolt, as indicated in Fig. 9. In this case the toe 43 actuates the lever; with an opposite rotation the toe 43^a will rock the lever. It should be understood that once the shoe 17 has been raised by the inclined notches in the forward movement of the tumblers, the lower edges of the shoe and the block will rest on the edge of the tumbler 10 and be supported thereby, and they will therefore offer no obstruction to the free rotation of the spindle in operating the hub 42.

On the side face of the box, as indicated most clearly in Fig. 6, a lever 47 is provided, and this lever has a pin 48 which is in alignment with the openings 46 and constrained toward these openings by means of a spring 49 which is attached to the upper end of the lever. A stop pin 47^a is provided against which the lever rests, and this pin limits the forward movement of the pin 48 and keeps it from engaging perforations 46 which are arranged circumferentially in the adjacent face of the tumbler 8. The pin 48 lies very near the perforations, so that the slightest advance of the tumbler 8 toward the pin will bring the pin into one of the perforations. When the tumblers move forwardly after the combination is set, this pin 48 will enter one of the perforations and will hold the spindle against being rotated until the spindle has slid sufficiently to enable the square neck 7 to enter the opening 48. When this has taken place, the edge of the tumbler ring 10 will engage with the edge of the lever 47 and force the pin 48 out of engagement with the tumbler 8. In this way it will be evident that the lever operates simply to hold the spindle temporarily in its proper alining position, but it is auto-

matically released by the continued advance of the tumbler as the square neck of the spindle comes into engagement with the hub. In addition to this the pin 48 has another function which will appear from the following. Suppose a person not knowing the combination attempts to aline the tumblers by rotating step by step and thus attempt to open the lock by "feeling" the combination. If this should be attempted, as soon as the tumbler 8 is pulled forward it would be locked against rotation by the pin.

I provide means for raising the locking pin 18 from the inner side of the door without having recourse to the combination of the lock. For this purpose, on the upper side of the case, as indicated in Fig. 7, I provide a depressible plunger 50 which projects above the case, as indicated. The lower end of this plunger has a pin and slot connection 51 with a lever 52, the remote arm of the lever 52 being provided with a dog pin 53, which dog pin normally engages the lower side of the pin 20 aforesaid, which projects from the side of the box 14, passing through alining slots 54 formed in the side plates 15 of the box, as shown. This pin 20 has been referred to, and is clearly observable in Fig. 4, forming a stop for the upward movement of the block 19. It is mounted in the shoe in a horizontal position. Upon this pin there is hung a shackle 55 which normally hangs down so that its transverse bar 56 is disposed near the upper rear edge of the tumbler ring 10. This shackle affords means for supporting a finger 57 in a substantially vertical position, which finger is instrumental in closing a circuit to enable an electric bell to be rung through the medium of the lock, if desired. For this purpose the spindle 4 is provided with a centrally disposed sliding stem 58, the outer extremity of which projects from the knob 5 and is provided with a thumb head or push button 59. Under this button a spring 60 is provided, which normally tends to force the stem outwardly with respect to the knob, as shown in Figs. 3 and 4. The inner extremity of the stem 58 projects slightly beyond the position of the tumbler 8, and at this point the bore 61 of the spindle is provided with diametrically oppositely disposed slots 62. The inner extremity of the stem at this point is provided with a feather or spline 63 which has outwardly projecting bifurcated extremities extending through the slots 62. The lower extremity of the finger 57 is formed into a yoke 64 which straddles the spindle at this point, as shown. This yoke engages one or the other of the bifurcated ends of the spline or feather 63, as indicated in Figs. 3 and 7. The forks of the yoke 64 are extended downwardly, as shown, so that as the spindle rotates, one or the other of its bifurcated ends

will always be in engagement with the spindle. This arrangement permits the free rotation of the spindle and the stem while maintaining an engagement with the finger 57. The finger is supported in its upright position by the shackle 55, as will be readily understood. On the spindle near the spline 63 a loose collar 57^a is provided, the edge whereof projects toward the tumbler. When the stem 58 is forced rearwardly this collar backs up on the spindle and then its edge acts as a fulcrum for the finger; so that the upper extremity of the finger will travel toward the right, as indicated in Fig. 5. And the upper end of the finger is provided with a stud 65 which projects toward the block 19. On the rear face of the block a contact point 19^a is provided, and a similar insulated contact point 19^b is provided on the back of the shoe. A circuit wire 67 is connected with contact 19^a, while a second circuit wire 68 is connected with contact 19^b. When the upper end of the finger is forced toward the block by pushing in the stem 58 it forces the block back so that the contacts 19^a and 19^b engage each other. This closes the circuit and the bell rings. Furthermore, if the knob 5 is pulled outwardly without setting the combination the tumblers engaging the lower end of the block will force the block back and ring the bell. This mode of operation will appear from an inspection of Fig. 3. In this way the bell can be rung by a caller by means of the push button, and will be rung by any one attempting to open the lock as described.

I provide means on the inner side of the door for enabling the spindle to be latched in its outer position, that is, with the neck 7 in engagement with the hub 42. For this purpose, referring especially to Figs. 4 and 13, on the inner side of the case I provide a cam lever 69 which is pivotally mounted at 70 and provided with a toe 71, the face of which is pressed by an eccentric cam 72. This eccentric cam is rigidly mounted on the stem of a turn button 73 which is disposed on the outer wall of the case on the inner side of the door. The lever 69 is hung so that its lower extremity, which is in the form of a hook 74, tends by gravity to move toward the spindle 4, which at this point is of reduced diameter, as shown. The spindle at this point is provided with a collar 75 against the side face of which the hook 74 is adapted to come, as indicated by the dotted lines in Fig. 13, when the cam 72 is rotated in a proper direction. Near the lower end of the lever 69, a guide bracket 76 is provided on the case, as shown. When the knob is pulled out, as indicated in Fig. 4, if the hook 74 is advanced against the side of the spindle, it will engage the collar 75 and prevent the spindle from being thrust inwardly. In other words, it holds the spindle in operative

connection with the bolt. When the spindle is held in this position it can be readily rotated so as to unlatch the door, when desired, by means of a knob 77 which is attached to the inner end of the spindle on the interior of the door. This knob 77 operating in conjunction with the push plunger 50, evidently enables the bolt to be completely controlled from the inner side of the door without having recourse to the combination.

I provide a safety device by means of which the plunger 50 may be locked against being depressed. This device is adopted so as to prevent a person on the outside from drilling through the door, and then simply opening the lock by depressing the plunger. For this purpose, as indicated most clearly in Fig. 13, I provide on the interior of the lock case, just below the pin 51, a rotatable disk 78, which has a notch 79 in the edge thereof. The upper edge of this disk is disposed near the lower side of the pin 51, and when the disk is in the position shown in Fig. 13, it will prevent the pin 51 from descending. However, if the disk is rotated so as to bring the notch 79 in alignment with the pin, then the plunger can be depressed. The disk 78 is rigidly connected with a thumb head 80 which projects from the case on the interior of the room, as indicated in Fig. 2. Opposite the notch 79 this thumb head 80 is provided with a mark 81. When this mark is in a vertical position opposite to a similar mark 82 on the case, the plunger can be depressed.

In Fig. 16 I show a modified construction in which I provide two bolts 83 and 84. The bolt 83 is mounted in the same manner as the bolt 29 described above, that is, it is constrained forwardly toward its locking position by a spring 86; its rear end slides through a lug 85. The bolt 84 slides through a lug 87 similar to the lug 85, but its butt end extends beyond this lug, and a spring 88, coiled about it tends to hold the bolt in a withdrawn position. The rear end of the spring thrusts against a cross pin 89 for this purpose. The butt end of the bolt 83 is provided with a pin 90 similar to the pin 36. Coöperating with the pin 90 there is provided a bell crank lever 91, the vertical arm of which is adapted to engage the pin 90 upon its forward side. The bell crank lever has a horizontal arm 92 which extends under the axis of a spindle 93. On the spindle 93 two hubs are provided, as shown, one of which has a toe 94 adapted to depress the end of the arm 92 when the spindle is turned toward the left; the other hub has a toe 95 which projects downwardly toward the right. The upper halves of these hubs are circular and their edges are engaged by guide pins 96 which hold the hubs though permitting them to rotate. The extremity of the arm 92 is convexly curved

and rests against a cam arm 97 on a bell crank lever 98. This bell crank lever 98 has a lower arm 99 which extends downwardly and is curved, as shown. The end of this arm 99 lies against the upwardly extending arm 100 of a stop lever 101. This stop lever has an arm 102 which normally engages the butt end of the bolt 84 so as to prevent the bolt from being withdrawn by the spring. In this position the arm 102 lies against the edge of a stop pin 103 which is attached to the wall of the case. When the spindle is rotated toward the left, that is, in an anti-clockwise direction, the bolt 83 will be withdrawn through the action of the toe 94 on the bell crank lever 91. At the same time the arm 92 of the bell crank lever 91 operates through the cam arm 97 and the arm 99 to rotate the bell crank lever 101 in a right-hand direction, that is, clockwise. In this way the arm 102 is removed from behind the bolt 84 and the bolt is then drawn back by the spring 88. In this connection it should be observed that the pivot pin 104 of the bell crank lever is disposed on the axis of the bolt 84.

It will be observed that the arm 99 is not capable of returning the bell crank lever 101 to its normal locking position. This function is performed by the toe 95 of the outer hub. As the spindle is rotated in a right-hand direction with the square neck 7 in the outer hub, this toe 95 engages the arm 100 and replaces the mechanism controlling the lower bolt in its normal position.

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

1. In a lock of the class described, in combination, a case, a spindle having a tumbler adapted to be set according to a combination, a bolt, a movable block adjacent the edge of said tumbler, said tumbler having a notch in the edge thereof adapted to raise said block when said tumbler is moved longitudinally of the axis of said spindle, and means for controlling said bolt from said block.

2. In a lock of the class described, in combination, a spindle having a main tumbler, an outer tumbler carried by said first tumbler, said spindle being adapted to be shifted longitudinally, a block adjacent to the edge of said second-named tumbler, said tumblers having notches in the edges thereof adapted to aline when the combination is set and adapted to aline with said block, said notches presenting inclined faces adapted to displace said block when said spindle is shifted longitudinally, a bolt, and means for controlling said bolt from said block.

3. In a lock of the class described, in combination, a case, a spindle mounted in said case and adapted to shift longitudinally

therein, a tumbler carried by said spindle and adapted to be set by the combination, a movable block disposed near the edge of said tumbler, means for displacing said block by said tumbler when said spindle is shifted longitudinally, a bolt, and a member normally disposed behind said bolt and locking the same against withdrawal, said block affording means for displacing said member.

4. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longitudinally therein, a tumbler carried by said spindle and adapted to be set according to a combination, a bolt, a locking member normally holding said bolt against withdrawal, and means for actuating said locking member by said tumbler when said spindle is shifted longitudinally.

5. In a lock of the class described, in combination, a case, a spindle rotatably mounted therein and adapted to shift longitudinally, a tumbler mounted on said spindle and adapted to be set according to a combination, a bolt, a locking pin normally disposed behind said bolt and holding the same against withdrawal, and a movable block adapted to be engaged by said tumbler when said spindle is shifted longitudinally, said movable block being connected with said locking pin and affording means for raising the same when said spindle is shifted longitudinally.

6. In a lock of the class described, in combination, a case, a spindle adapted to be shifted longitudinally in said case and rotatable therein, a tumbler carried by said spindle and adapted to be set according to a combination, a bolt, means actuated by said tumbler for releasing said bolt, a hub on said spindle for actuating said bolt, and means for forming an operative connection between said spindle and said hub by the longitudinal shifting of said spindle.

7. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longitudinally therein, said spindle having a tumbler with a notch in the edge thereof presenting an inclined face, a second tumbler rotatably mounted on said first tumbler and having a notch in the edge thereof presenting an inclined face and adapted to aline with said first notch, a shoe with which said notches may aline, a bolt, and a locking pin normally disposed behind said bolt and adapted to prevent the withdrawal thereof, said locking pin being connected with said shoe whereby the displacement of said shoe releases said bolt.

8. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longitudinally, a bolt, a hub having an opening therein receiving said spindle and normally permitting the free rotation thereof, said

spindle having a neck adjacent to said hub adapted to interlock with said opening when said spindle is shifted longitudinally so that said spindle may rotate said hub, a tumbler
5 carried by said spindle and adapted to be set according to a combination, and means for releasing said bolt by said tumbler when shifted longitudinally with said spindle, said neck being adapted to enter said opening when said spindle is shifted and afford-
10 ing means for actuating said bolt.

9. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longi-
15 tudinally, tumblers controlled by said spindle and adapted to be set to a combination, a bolt, means for releasing said bolt by said tumblers when set to a combination, and a hub having an angular opening, mounted on
20 said spindle and normally permitting the independent rotation of said spindle and adapted to actuate said bolt, said spindle having an annular neck adjacent to said hub and adapted to engage said opening when
25 said spindle is shifted.

10. In a lock of the class described, in combination, a case, a spindle rotatably mounted therein and adapted to be shifted longitudi-
30 nally, a tumbler formed on said spindle, a second tumbler carried by said first tumbler, said tumblers being adapted to be set according to a combination, a bolt, locking means for holding said bolt against withdrawal, means for actuating said locking means by
35 said alining tumblers when said spindle is shifted longitudinally, and a hub having an angular opening receiving said spindle and normally permitting the independent rota-
40 tion of said spindle, said hub affording means for actuating said bolt, said spindle having an angular neck adapted to engage said opening when said spindle is shifted to lock said spindle to said hub.

11. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longi-
45 tudinally therein, a hub receiving said spindle and normally permitting the independent rotation thereof, said spindle having tumblers adapted to be set to a combination, said hub having an angular opening, said spindle having an angular neck which may enter said angular opening when said spin-
50 dle is shifted longitudinally, and means for temporarily maintaining the angular position of said spindle when being shifted to bring said angular neck into said angular opening.

12. In a lock of the class described, in combination, a case, a spindle rotatably mount-
60 ed in said case and adapted to be shifted longitudinally, a tumbler formed on said spindle and having a notch in the edge thereof, a second tumbler carried on said
65 first tumbler and having a notch adapted to

aline with said first notch, a shoe mounted in said case and having a block normally projecting across the forward edges of said tumblers, a spring tending to hold said shoe in a depressed position, said notches being
70 adapted to aline with said block and presenting inclined faces adapted to engage said block to raise said shoe when said spindle is shifted longitudinally, a bolt, lock-
75 ing means normally holding said bolt against withdrawal, said shoe affording means for releasing said locking means when raised by said block, a resilient connection between said block and said shoe, and means
80 for actuating said bolt by said spindle when released.

13. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be
85 shifted longitudinally therein, a tumbler formed on said spindle, a second tumbler mounted on said first tumbler, said tumblers having notches adapted to aline and presenting inclined faces, a shoe guided in
90 said case to slide in a radial direction from the axis of said spindle, a spring tending to hold said shoe depressed, said notches affording means for raising said shoe when said spindle is shifted longitudinally, a bolt,
95 a locking pin carried by said shoe and normally locking said bolt against withdrawal whereby the raising of said shoe releases said bolt, and means for actuating said bolt from said spindle.

14. In a lock of the class described, in combination, a case, a bolt mounted to slide therein, a fixed post behind said bolt, a pin normally disposed between said bolt and
100 said post and adapted to lock said bolt against withdrawal, means for shifting said pin laterally to clear said post and release said bolt, and means for actuating said bolt after its release.

15. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be
110 shifted longitudinally, a tumbler carried by said spindle and adapted to be set to a combination, a push button carried centrally on said spindle, means for closing a circuit by depressing said push button, a bolt controlled by said tumbler, and means for ac-
115 tuating said bolt by said tumbler.

16. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be
120 shifted longitudinally, a tumbler formed on said spindle and having a plurality of perforations on the forward face thereof, a second tumbler mounted on said first tumbler, a laterally shiftable shoe mounted in said case, means for shifting said shoe laterally
125 by said tumblers when set according to a combination, a bolt, a hub having an angu-

lar neck mounted on said spindle and normally permitting the independent rotation of said spindle, said spindle having an inclined neck adjacent to said hub adapted to be received in said angular opening, and a lever having a pin adapted to engage with said perforations respectively to lock said spindle against rotation when shifted longitudinally to bring said neck into said opening, said lever being pivotally mounted at a point remote from the edge of said second tumbler, whereby in the shifting movement of said tumbler with said spindle the edge of said tumbler displaces said lever and withdraws said pin.

17. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longitudinally, a tumbler mounted on said spindle, an insulating block mounted adjacent to said tumbler and adapted to be actuated thereby, a bolt, means for controlling said bolt by said block, said spindle having a bore, a stem slidably mounted in said bore, said bore having slots in the wall thereof beyond said tumbler, a finger connected with said stem through said slots, a contact point carried by said block, a second contact point carried adjacent to said first contact, and means for forcing said block back with said finger, whereby the inward movement of said stem will bring said contacts together to close an electric circuit.

18. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted therein, a tumbler formed on said spindle, a second tumbler cooperating therewith, said spindle having a bore with slots in its wall adjacent to said tumblers, a stem slidably mounted in said bore, a feather carried by said stem, having forked extremities projecting through said slots, a finger having a yoke engaging said forked extremities and adapted to be shifted laterally thereby when said stem is advanced inwardly, a block adapted to be shifted by said tumblers when alining according to a combination, a contact point carried by said block, a second contact point cooperating with said first contact point, and a shackle loosely engaging the outer portion of said finger and holding the same against rotation when said spindle rotates.

19. In a lock of the class described, in combination, a case, a spindle rotatable in said case and adapted to be shifted longitudinally, a bolt, a locking pin normally disposed behind said bolt to hold the same against withdrawal, tumblers carried by said spindle and adapted to aline according to a combination, a shoe carrying said locking pin and adapted to be shifted outwardly by said tumblers when alining, means for actuating said bolt by said spindle when

said bolt is released from said locking pin, and a depressible plunger projecting from the case and affording means for raising said shoe independently of said tumblers.

20. In a lock of the class described, in combination, a case, a bolt mounted to slide in said case, a locking pin having a sliding connection with the butt end of said bolt, a fixed post normally disposed behind said locking pin and holding said bolt against withdrawal, a sliding shoe carrying said locking pin, a spindle rotatable and slidable in said case, tumblers carried by said spindle adapted to aline according to a combination, said tumblers having means for raising said shoe to displace said locking pin, a hub mounted on said spindle which may interlock therewith to be rotated thereby, and means actuated by said hub for withdrawing said bolt.

21. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longitudinally, a bolt normally locked against withdrawal, means for releasing said bolt by a longitudinal movement of said spindle, said spindle having a neck, a hub mounted on said spindle and having an opening adapted to interlock with said neck to lock said hub to said spindle when said spindle is shifted longitudinally, means for actuating said bolt from said hub, and means for locking said spindle against longitudinal movement to maintain said neck in engagement with said hub.

22. In a lock of the class described, in combination, a case, a spindle rotatably mounted in said case and adapted to be shifted longitudinally therein, tumblers carried on said spindle and adapted to be set to a combination, a bolt, means for releasing said bolt by said tumblers when set to the combination, means for operatively connecting said spindle with said bolt by shifting said spindle longitudinally, and means for locking said spindle against longitudinal movement to maintain said operative connection between said spindle and said bolt.

23. In a lock of the class described, in combination, a case, a spindle mounted rotatably in said case, a bolt, a locking pin normally adapted to lock said bolt against withdrawal, a shoe carrying said locking pin, tumblers carried by said spindle, adapted to aline with said shoe and affording means for displacing said shoe, a plunger projecting from said case, means actuated by said plunger for raising said shoe independently of said tumblers, and locking means controlling said last means to render the same inoperative.

24. In a lock of the class described, in combination, a case, a spindle rotatably mounted therein, tumblers on said spindle and shiftable longitudinally, a block, nor-

mally in the path of said tumblers and adapted to be displaced thereby, and means for closing a circuit by the displacement of said block.

25. In a lock, in combination, a spindle having a knob, combination mechanism adapted to be actuated by said knob, a push button mounted in said knob, and means for closing an electric circuit actuated by said

push button and by said combination mechanism. 10

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

SAMUEL N. FRIEDMAN.

Witnesses:

JULIUS JOLOWITZ,
BERNHARD FRIEDMAN.