

No. 883,991.

PATENTED APR. 7, 1908.

E. F. WELLS.
INDICATOR LOCK.

APPLICATION FILED SEPT. 3, 1907.

2 SHEETS—SHEET 1.

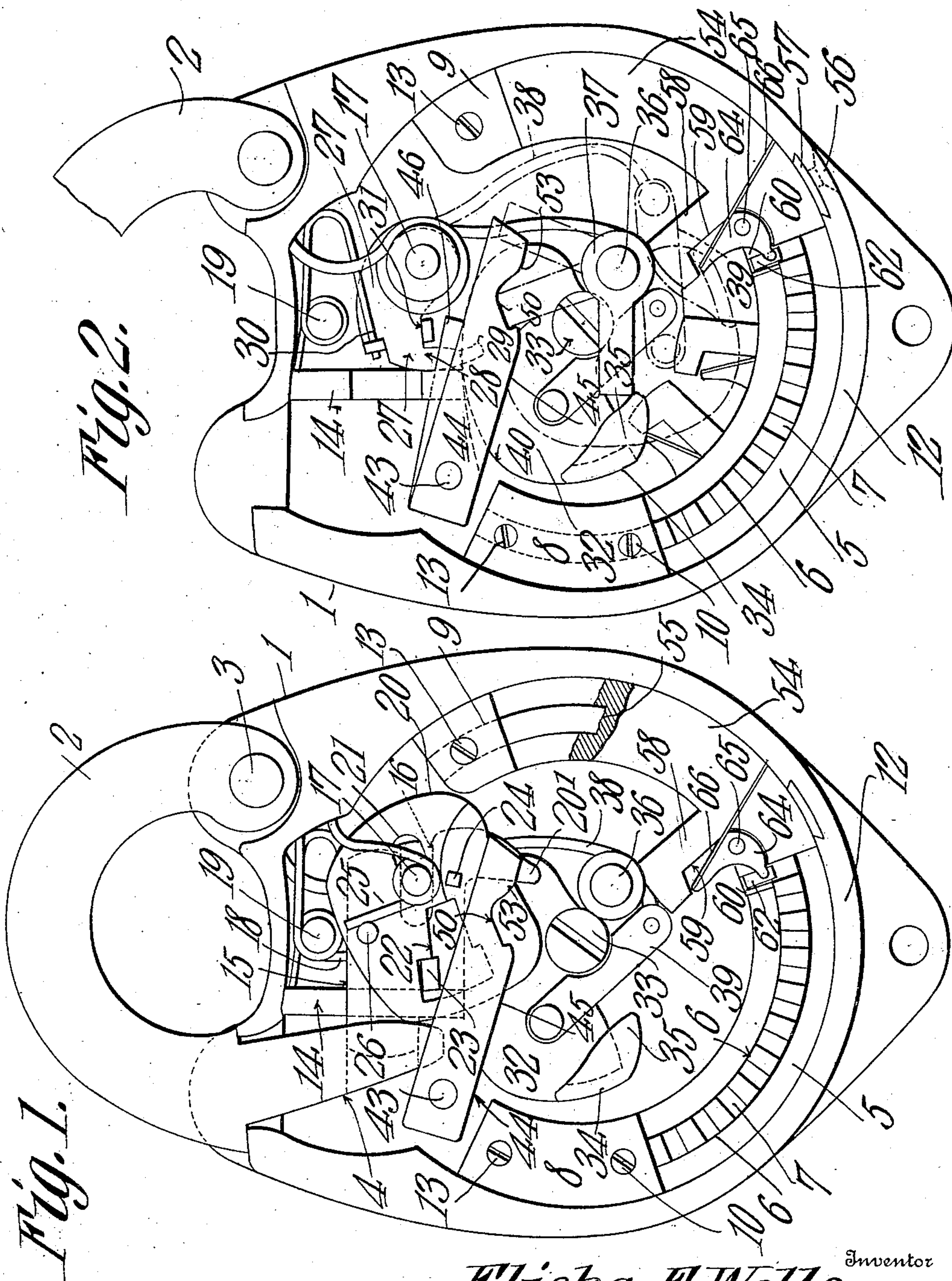


Fig. 1.

Fig. 2.

Witnesses

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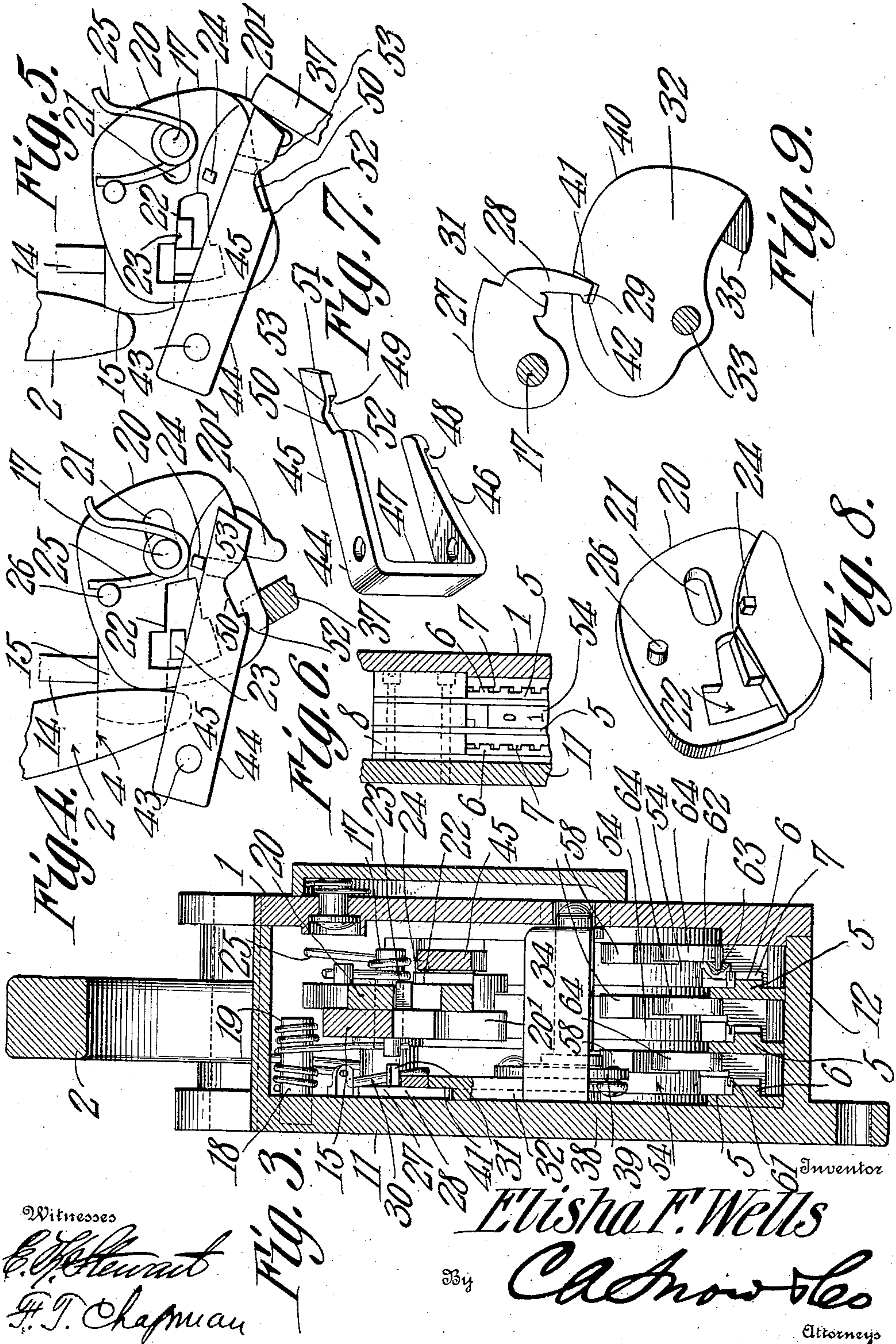
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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

ELISHA FORD WELLS, OF MIAMI, FLORIDA, ASSIGNOR OF ONE-HALF TO JOHN NEWTON LUMMUS, OF MIAMI, FLORIDA.

INDICATOR-LOCK.

No. 883,991.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed September 3, 1907. Serial No. 391,169.

To all whom it may concern:

Be it known that I, ELISHA FORD WELLS, a citizen of the United States, residing at Miami, in the county of Dade and State of Florida, have invented a new and useful Indicator-Lock, of which the following is a specification.

This invention has reference to improvements in indicator locks of the type shown in my United States Letters Patent No. 844,702, granted February 19, 1907.

The lock is of the type wherein a large number of keys may be used, each key being capable of moving the latch mechanism to the unlocked position and each key moving an indicating mechanism to a different extent from any other key designed for the lock, so that each key may be numbered and will move the indicating mechanism to a corresponding extent to display a similar number. The lock is designed more particularly for use where a large number of people will be provided with keys differently numbered, so that it will be a simple matter to identify the person last using the lock by the number registered therein.

The lock is especially adapted for use as a switch or signal lock, and all those having legitimate access to the lock will be provided with keys, each bearing a different number, so that it will be an easy matter to identify the employee last using the lock should said lock have been improperly manipulated.

In the lock of my prior patent the key, after being inserted, is turned in a direction to throw the latch-bolt, but before the latch-bolt is thrown the key releases a restoring plate which moves all the indicator bars, whether there be one, two, three or more, to a zero position, after which the key withdraws the latch-bolt from the shackle, the lock being shown of the padlock type, and then the key is immediately locked against any return movement so that in order to withdraw said key its forward movement must be continued until it reaches the position it had when first inserted in the lock. This forward movement carries the indicating bars away from the zero position to extents corresponding to the length of the bits on the keys, over which the indicator bars finally escape and are immediately locked in position by friction catches, while the restoring

plate is moved only to an extent corresponding to the longest travel of any one of the indicator bars under the control of the particular key and a spring used to actuate the restoring plate is put under corresponding tension, the restoring plate being locked in the position to which it has been moved by the key acting through the indicator bars. The position of the restoring plate, therefore, agrees with the highest digit of the member of the key and will vary with different keys.

By the present invention the indicator bars are all positively locked in the adjusted positions, differing in this respect from the structure of the prior patent where these bars are frictionally locked. Also, the indicator bars are differently mounted than in the prior patent.

The restoring plates is, in accordance with the present invention, always moved to the same extent and has but one locked position, the spring always being under the same tension. Furthermore, in a lock constructed in accordance with the present invention the trip lever which governs the restoring plate not only locks the restoring plate against the action of its spring but also has means for preventing the key from turning backward before it has tripped the restoring plate and before the bolt has been moved from the shackle, and, also, this trip lever coacts with other parts of the lock in such manner as to prevent the trip lever from being picked, whether the lock be open or closed.

The invention will be best understood by a consideration of the following description, taken in connection with the accompanying drawings forming part of this specification, in which,—

Figure 1 is a plan view of the lock, with the top plate and parts of the mechanism omitted; Fig. 2 is a similar view, with some of the parts omitted from Fig. 1 in place and some of the parts shown in Fig. 1 omitted; Fig. 3 is a central longitudinal section of the lock with all the parts in place; Figs. 4 and 5 are detail views of a portion of the lock mechanism in different positions of operation; Fig. 6 is a detail section through the lock casing adjacent to one of the ends of the slideways for the indicator bars, showing a face view of one of the bars in place; Fig. 7 is a perspective view of the trip lever; Fig. 8

is a perspective view of the latch-bolt locking tumbler; and Fig. 9 is a view from the under side of the restoring plate and lock member therefor.

5 The lock shown in the drawings is constructed to register keys numbered from 1 to 999, inclusive, but by the addition of other indicating segments the number of keys may be correspondingly increased, or by using a
10 less number of segments the number of keys which may be used in the lock may be correspondingly decreased.

Referring to the drawings, there is shown a lock casing 1 shaped like that of an ordinary
15 padlock, it being customary to use locks of this shape on railway switches or signals, to which use the present lock is particularly adapted although by no means confined to such use. When the invention is applied
20 to other types of locks the structure of the parts is, of course, correspondingly changed to adapt the invention to the particular shape of lock called for by the other types.

In the following description the lock will
25 be considered as an ordinary padlock, with the understanding, however, that the invention is not confined to such a type of lock.

The padlock is provided with an ordinary shackle 2 mounted upon a pivot 3 in the
30 ordinary manner and having its other end formed into an eye 4 as is usual in this type of lock.

Since the body of the lock is of general circular outline, there are provided arc-
35 shaped guide plates 5, each of which is flat on one face and on the other face is provided with a central rib 6 each extending from one end to the other of the plate, and each rib through a certain portion of its length is
40 provided with a series of radial notches 7. The plates 5 are spaced apart at the ends by spacing blocks 8—9, and a screw 10 passing through the blocks and plates between them enters the back 11 of the casing and so se-
45 cures the plates together and to the casing, with the outer edges of the plates against the curved wall 12 of the casing. The blocks 8 are further secured together to clamp the plates 5 by other screws 13. With-
50 in the casing, adjacent to the point where the eye 4 of the shackle enters, there is secured a short guide plate 14 for supporting one end of the lock-bolt 15, the other end of which is provided with a recess 16 receiving a fixed pin or stud 17 projecting upward
55 from the back-plate 11 of the casing. The lock-bolt is under the normal control of a spring 18 supported by another pin or stud 19 rising from the back of the casing. The
60 lock-bolt is further provided with a projection 20' which is ultimately engaged by a bit on the key when the latter is inserted in the lock and turned in the proper direction. This locking or latch-bolt is in all essential

particulars the same as that shown in my
aforesaid Letters Patent. Mounted upon the
stud 17 is a tumbler plate 20 having an
elongated eye or slot 21 for the passage of
the stud 17, and this tumbler plate is also
provided with a stepped locking recess 22
70 into which enters a lug 23 on the latch-bolt. In all essential particulars this tumbler is similar to the tumbler shown in my aforesaid Letters Patent, except that there is a pin 24
projecting from one face thereof, which pin
75 will be hereinafter referred to. This tumbler is under the control of a spring 25 having one end in engagement with the casing and after encircling the stud 17 has its other
end engaging a pin 26 on the tumbler. 80 Mounted upon the stud 17 between the latch-bolt and the back wall 11 of the casing there is a pawl plate or detent 27 having a projecting finger 28 terminating in a hooked
end 29, the purpose of which will herein- 85 after appear. This detent 27 is under the normal control of a spring 30 carried by the stud 19, and formed on the said detent is a lug 31, the purpose of which will also here-
90 inafter appear.

Pivotally mounted at the axis of the arc-
shaped bars 5 is a restoring plate 32 the func-
tion of which is in general similar to that of
the restoring plate in my aforesaid Letters
Patent. The pivotal support of the restoring
95 plate may be a screw 33 or any other suitable means, and this restoring plate has an up-
turned arm 34 terminating in a cam-shaped head 35. Adjacent but displaced with rela-
tion to the pivot screw 33 is a stud or pin 36
100 designed to receive a key 37, which key, being in all respects similar to the keys shown in my aforesaid Letters Patent, need not be particularly shown or described herein. The
restoring plate is under the normal control of
105 a spring 38 connected thereto by a link 39, the tendency of the spring being to rotate the restoring plate counter clockwise as viewed in Figs. 1 and 2. The restoring plate has a
cam edge 40 and on its face is formed with a
110 notch 41 one edge of which is formed with a recess 42. The notch 41 is designed to receive the hooked end 29 of the finger 28 of the detent 27, the hook entering the recess 42.

Pivotally supported upon a pin or screw 43
115 rising from the back plate 11 near the blocks 8 is a U-shaped frame 44 having two parallel arms 45—46 and a connecting yoke 47. This frame will for convenience be termed a trip lever. The arm 46 engages under one
120 end of the guide plate 14 and is of sufficient length to be brought into engagement with the lug 31 on the detent 27, and on the under side of this arm 46 there is formed a groove
48 through which the finger 28 of the detent
125 27 may pass. The other arm 45 of the trip lever is also provided on its under face with a groove 49 and on one side with a notch 50,

while its free end 51 may be beveled as shown. The edge of the arm 45 approaching the notch 50 is slightly curved, as shown at 52, and the other wall of the notch away from the edge 52 is likewise curved, as shown at 53, all for a purpose which will presently appear.

Carried upon the plates 5 are curved indicator bars 54 having one face plain and the other provided with a groove 55, into which fits the rib 6 of the corresponding plate 5, the plates 5 and ribs 6 thus supporting the indicator bars 54 and constraining them to move in curved paths. On the outer edges of these bars are suitable numerals, say from zero to 9, and these are visible through openings 56 in the curved wall 12 of the casing while a transparent protecting plate 57 may be seated on the inner face of this curved wall opposite the openings 56. Formed on each indicator bar near one end thereof is a radial extension 58 having a recess 59 on one side and the bar has also an extension 60 in the line of its curvature and on the inner side of the groove 55. Seated in a radial groove 61 in this extension 60 is a block 62 engaged by a finger 63 projecting from a bell-crank lever 64 pivoted at 65 in the recess 59, while a leaf spring 66 so constrains the lever 64 as to tend to move the block 62 in a direction radially outward from the axis or center of the indicating bars 54. These blocks 62 are of such size as to fit the radial notches 7 in the ribs 6 of the plates 5. The arm 34 of the restoring plate is so located that when the restoring plate is moved about its axis this arm will engage the bell-crank levers 64 and move them against the action of the springs 66 so as to withdraw the blocks 62 from the notches 7 with which they are in normal engagement.

Now, let it be supposed that the shackle is in the locked position and that the restoring plate has been moved against the action of its spring until it is also locked by the engagement therewith of the finger 28 of the detent 27. When a key 37 is inserted in the lock, the keyhole being so located as to permit the insertion of the key only in the position shown in Fig. 2, and such key is turned in a clockwise direction, one bit of the key will first engage the curved edge 52 leading to the notch 50 and another bit of the key will engage the tumbler 20. Both the trip lever and the tumbler are moved about their pivots for a distance depending upon the length of the respective key bits. When the tumbler 20 is thus moved its movement is against the action of the spring 25, while the trip lever has been moved against the action of the spring 30 because its arm 46 engages the lug 31 and moves the detent 27 about its pivot but not sufficiently to release the restoring plate. The tumbler, however, has

been moved about its pivot for a sufficient distance to release the lug 23 on the latch-bolt. In the described movement of the tumbler 20 about its pivot 17 the lug or pin 24 on the tumbler has been brought into coincidence with the groove 49 on the under side of the arm 45 of the trip lever, these two last-named parts being out of coincidence in the ordinary relative position of the arm 45 and the tumbler 20. As the movement of the key progresses the tumbler is not further moved since the edge with which the key bit engages is curved on a suitable arc. As soon as the key bit engaging the curved edge 52 has passed the same the key bit is lodged in the recess 50 because of the action of the spring 30 in urging the trip lever in the proper direction until it is stopped by the engagement of the end of the key bit with the end wall of the recess 50. The wall of this recess coincident with the curved edge 52 has, however, an abrupt wall forming a shoulder and when the end of the key bit is once housed in this recess 50 it cannot be again moved backward toward its initial position because it is locked by the shouldered end of said recess 50. The key can therefore be withdrawn from the lock only by moving it in the forward or clockwise direction. This results in the key bit housed in the recess 50 engaging the curved or cam wall 53, thus moving the trip lever upon its pivot in a direction to cause the arm 46 in engagement with the lug 31 to move the detent 27 on its pivot against the action of the spring 30. This movement is sufficient to withdraw the end 29 of the finger 28 out of the recess 41 and the restoring plate is now freed to the action of the spring 38 and therefore is moved about its pivot 33 and by means of the arm 34 carries all the indicator bars to the zero position before described. During this movement the appropriate key bit has been brought into engagement with the projection 20' on the latch-bolt and the latter is moved so as to free the shackle. As soon as the key has passed beyond the trip lever the end 51 thereof is moved by the action of the spring 30 into the path of the key and thus again prevents any further backward movement of the key. Now, the forward movement of the key being continued, other appropriate bits of the key engage the arms 58 on the indicator bars and move the same, together with the restoring plate, in a clockwise direction, the restoring plate maintaining the blocks 62 out of engagement with the notches 7.

Now, because the pin 36 upon which the key turns is eccentric to the axis of the restoring plate, the bits engaging the arms 58 are ultimately withdrawn from the path of these arms. The key bit which engaged the trip lever ultimately engages the cam end 35

of the arm 34 of the restoring plate and maintains it in engagement therewith even after the several bits which first engaged the arms 58 have passed out of engagement with said arms. As the indicator bars are dropped by the key, the restoring plate being still urged in a clockwise direction by the key, the bell-crank levers 64 are relieved from the pressure of the arm 34 and their springs 66 then act to force the blocks 62 into the corresponding notches 7, thus positively locking each indicator bar in whatever position it was dropped by the key. Ultimately the key bit engaging the cam end 35 of the arm 34 is, because of the eccentric relation of the key to the axis of the restoring plate, moved out of the path of this cam end, but the parts are so proportioned that this last movement of the key with relation to the cam end 35 does not occur until the recess 41 in the restoring plate has been brought into coincidence with the finger 28 and the latter then snaps into said recess under the action of the spring 30. When the restoring plate is being moved against the action of its spring 38 by the final movement of the key the cam edge 40 of the restoring plate engages the end of the finger 28 and moves the detent 27 about its pivot against the action of the spring 30 until the recess 41 has, as before described, been brought into coincidence with the finger 28. The key bits acting upon the arms 58 of the indicator bars are so proportioned as to drop these bars at the proper point in their clockwise travel so as to cause them to display the desired numbers at the openings 56 in the same manner as has already been set forth in my aforesaid Letters Patent, but because the locking structure is, in this case, of a positive nature there is no danger of displacing these bars by shocks or jars as might occur were the locking done frictionally, as in my aforesaid Letters Patent.

It will be seen that when a key is once inserted in the lock it cannot be removed therefrom after having been rotated to a sufficient extent to bring it in a position where it will act to perform any function tending toward the unlocking of the shackle, since the key is positively locked against return movement, before it has reached a position of operative relation to the locking mechanism. The user of the lock is therefore compelled to unlock the shackle and set the indicator to a position showing the number of his key before the key can be withdrawn from the lock. When the shackle is in the locked position the groove 49 is so located with reference to the pin or stud 24 as to be out of coincidence therewith and the pin or stud 24 will not enter the groove 49 when the trip lever is moved about its pivot 43. Now, when the shackle is unlocked the action of the spring

25 tends to throw the tumbler 20 in a direction toward the shackle and thus the pin or stud 24 is again moved out of coincidence with the groove 49. It is only when the tumbler 20 has been engaged by a key and turned sufficiently to release the stud 23 on the latch-bolt that the pin 24 is coincident with the groove 49. Therefore, any attempt to surreptitiously move or pick the trip lever is resisted by the engagement of the pin 24 with the edge of the arm 45 to one side or the other of the groove 49, and any attempt to change the indication of the lock without the use of a proper key is thus prevented.

I claim:—

1. In an indicator lock, indicator bars, each carrying a sliding lock-block, a guide plate for each bar having spaced notches to receive the block on the respective indicator bar, and a restoring plate for controlling the lock-blocks on the indicator bars and for moving said bars to a predetermined position.

2. In an indicator lock, arc-shaped indicator bars each having an arc-shaped groove and carrying a locking block, arc-shaped guide plates for the indicator bars each having a rib entering the groove in the respective indicator bar, said rib being provided with a number of spaced notches for receiving the block on the indicator bar, and means for moving the locking block out of engagement with the notches in the guide plate.

3. In an indicator lock, a movable indicator bar carrying a locking block movable at right angles to the path of said bar, a spring-actuated angle lever carried by the bar and engaging the locking block, a guiding plate for the bar having notches in the path of the locking block on the bar, and means for actuating the lever to withdraw the locking block from the notches in the guide plate.

4. In an indicator lock, a number of arc-shaped indicator bars, each carrying a radially disposed locking block and a spring-actuated angle lever engaging said block and projecting to one side of said arc-shaped indicator bars, arc-shaped guiding plates for the indicator bars, each guiding plate having an arc-shaped rib provided with spaced notches in the path of the locking block of the respective indicator bar, and a pivoted spring-actuated restoring plate moving about the axis of the indicator bars and having an arm for engaging the levers controlling the locking blocks of the indicator bars.

5. In an indicator lock, a movable indicator having a radially inwardly extending arm, a spring-actuated lever carried thereby, a locking block also carried by the indicator and controlled by the spring-actuated lever, a spring-actuated restoring plate pivoted in the axis of movement of the indicator and

having a projecting member arranged to engage the lever on the indicator, a detent for holding the restoring plate in an inactive position against the stress of its spring, and means engageable by an inserted key for moving the detent out of engagement with the restoring plate in advance of each registering operation.

6. In an indicator lock, a number of movable indicator bars, all movable to the same extent and also movable to relatively different extents, and a restoring plate always movable to the same extent irrespective of the extent of movement of the indicator bars.

7. In an indicator lock, a number of movable indicator bars, all movable to the same extent and also movable to relatively different extents, a restoring plate always movable to the same extent irrespective of the extent of movement of the indicator bars, a detent for the restoring plate for holding the same at the limit of its movement in one direction, and means under the control of an inserted key for actuating said detent to release the restoring plate before the mechanism of the lock is engaged by said key and moved to the unlocked position.

8. In an indicator lock, a pivoted restoring plate having a notch with a recess formed in one edge, a spring-actuated detent having a hooked end arranged to enter the notch and engage said recess, and means under the control of an inserted key for moving said detent out of the recessed notch in the restoring plate.

9. In an indicator lock, a pivoted restoring plate having a cam face terminating at a recess formed in said plate, and a spring-controlled detent having a hooked end in the path of said cam face and adapted to enter the recess in the restoring plate.

10. In an indicator lock, an indicator bar having indicating characters on one face and having a range of movement sufficient to embrace all the indicating characters and also movable to lesser extents than its full range to display any one of the indicating characters, a restoring plate for the indicator bar having a range of movement commensurate with the full range of movement of the indicator bar, and a single detent engaging said restoring plate and holding the same against movement only at one limit of its range.

11. In an indicator lock, a number of arc-shaped indicator bars movable about a common center, positive locks on the indicator bars for holding them at any one of a predetermined number of intermediate positions in a predetermined range of travel, a spring actuated restoring plate movable about the same axis as the indicator bars and arranged to engage the locks of all the bars to move said locks to the unlocked position, means in said indicator lock for receiving a key and

directing the same in a path eccentric to the axis of the indicator bars and restoring plate, and projecting parts on both the indicator bars and restoring plate in the path of the key during a portion of its travel and moving out of the path of the key during the remaining portion of its travel.

12. In an indicator lock, indicator bars having a range of movement about a common center, key-receiving and directing means in said lock arranged eccentrically to the axis of the bars, said bars having projecting parts in the path of an inserted key during a portion only of its movement in the lock, a restoring plate for the indicator bars movable upon the same axis as the bars and having a projecting part also in the path of the key during a portion of its travel in the lock, and a detent for engaging and holding the restoring plate coincident with its escape from engagement with the inserted key.

13. In an indicator lock, indicator bars, a spring actuated restoring plate for moving the same to the zero position, a detent for holding the restoring plate against the action of its spring and in inoperative position, and a locking member for an inserted key in operative relation to the detent controlling the restoring plate and arranged to lock the key against reverse movement prior to the release of the restoring plate.

14. In an indicator lock, indicator bars, a spring-actuated restoring plate for the same, a detent for holding the restoring plate in inoperative position against the action of its spring, and a trip lever in operative relation to the detent and in the path of an inserted key, said trip lever being provided with means for locking the key against return movement prior to moving the detent to release the restoring plate.

15. In an indicator lock, indicator bars, a spring-actuated restoring plate for the same, a detent for holding the restoring plate in inoperative position against the action of its spring, and a trip lever in operative relation to the detent and having a member provided with a shouldered notch in the path of an inserted key, the notch being located to engage and lock the key against return movement before the trip lever actuates the detent to release the restoring plate.

16. In an indicator lock, a latch-bolt mechanism having a tumbler provided with a projecting pin or stud, indicator bars, a restoring plate therefor, a detent for the restoring plate, and a trip lever for actuating the detent to release the restoring plate, said trip lever having a notch or groove said notch or groove being in the path of the stud on the latch tumbler only when said tumbler is actuated by an inserted key.

17. In an indicator lock, indicator bars, a restoring plate therefor, a detent for the re-

storing plate, means under the control of an
inserted key for releasing the restoring plate
from the detent, and means for preventing
the movement of the detent actuating means
5 to an extent sufficient to release the restoring
plate except when under the control of an in-
serted key.

In testimony that I claim the foregoing as
my own, I have hereto affixed my signature
in the presence of two witnesses.

ELISHA FORD WELLS.

Witnesses:

RAY A. McLEOD,
C. L. HUDDLESTON.