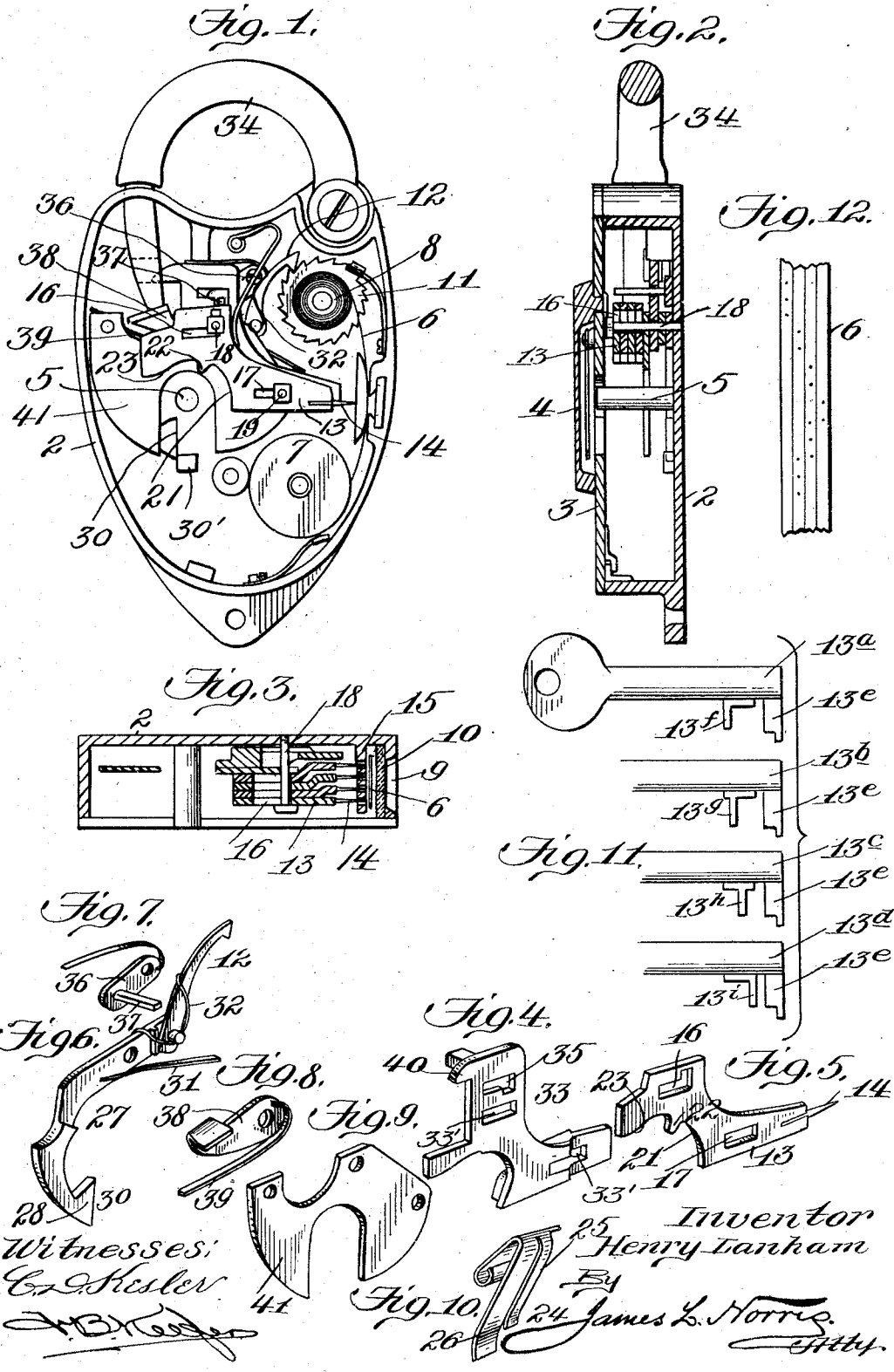


H. LANHAM.
SELF REGISTERING LOCK.
APPLICATION FILED JULY 10, 1906.



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UNITED STATES PATENT OFFICE.

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SELF-REGISTERING LOCK.

No. 876,201.

Specification of Letters Patent.

Patented Jan. 7, 1908.

Application filed July 10, 1906. Serial No. 325,541.

To all whom it may concern:

Be it known that I, HENRY LANHAM, a citizen of the United States, residing at Rome, in the county of Floyd and State of Georgia, have invented new and useful Improvements in Self-Registering Locks, of which the following is a specification.

This invention relates to self-registering locks.

A lock involving my invention may be advantageously put to many different uses and it is of such a character that an inspection thereof will indicate which of several keys operated the lock. From this it will be evident that said lock is operable by a plurality of keys; there may be a great number of these keys and in the present instance the keys cause through intermediate means the permanent indication upon a slip or tape of a record. In addition to this, means are provided for operating through the key or keys said slip or tape, step-by-step, the slip or tape being moved uniformly each time the lock is operated. Means are provided for preventing positively retracted movement of a key after the same has been turned to cause the operation of the lock, by reason of which the holder of a key must operate the lock before he can withdraw his key therefrom.

In the drawings accompanying and forming a part of this specification, I show one form of embodiment of the invention, which to enable those skilled in the art to practice the invention, I will set forth in detail, in the following description while the novelty of such invention will be included in the claims succeeding said description.

I have described in a brief way a lock involving some of the features of my invention; other features thereof will be particularly set forth in said description. As indicated hereinbefore the lock may be employed with advantage in many different connections, for example, it may be used as a switch-lock, by virtue of which there will be obtained a positive indication of the key which operated the lock in connection with said switch to release the latter, so that in case of accidents from misplaced switches or from other causes, the cause therefor can be easily traced. The lock is also of advantage upon freight car doors or other places where valuable property is stored.

I do not restrict myself to the incorporation of the invention in any particular type of lock, although for convenience of illustra-

tion I have shown in the invention as embodied in a padlock, the shackle of which constitutes the keeper for the lock.

Referring to the drawings, Figure 1 is an elevation of a lock including my invention with the face plate of said lock removed. Fig. 2 is a vertical sectional view of said lock and Fig. 3 is a horizontal section of the same. Figs. 4 to 10, inclusive, are details in perspective of certain parts, Fig. 4 being the locking detent or bolt, Fig. 5 a tumbler, Fig. 6 a lever and pawl, Fig. 7 a pawl, Fig. 8 a throw-out device, Fig. 9 guard-plate, and Fig. 10, a spring. Fig. 11 is a view of the four keys, and Fig. 12 a view of a portion of the tape.

Like characters refer to like parts throughout the several views.

The operative parts of the lock are housed in a suitable casing or boxing. The casing shown in the drawings is denoted in a general way by 2 and it has a removable face plate or cover as 3, by which access may be had to the interior of the lock. In the present case this face plate has a slot through which the key to operate the lock is thrust, the slot being normally closed by the plate 4 pivotally mounted upon the face plate or cover 3 for swinging movement. By swinging back the plate 4 access may be had to the said key-hole slot. When a key is introduced through said slit into the casing 2 it fits over a stud or pin 5 rigidly associated with and extending perpendicularly from the inner face of the back plate of the casing, said stud constituting a pivot upon which said key can make a full turn. The stems of the respective keys are counterbored as is usual to receive such stud.

In the present instance I secure a permanent record of each operation of the lock by a key and for this purpose a tape as 6 may be advantageously employed, said tape being unwound from the spool or reel 7 and being wound onto the spool or reel 8, said tape being given a step motion on each operation of the lock by a key. The tape 6 may be made from any desirable material, such as paper or foil, and in traveling from the spool 7 onto the spool 8 it passes across a sight opening as 9 shown as formed in one side of the casing 2. This sight opening 9 may be covered by some suitable transparent medium as a piece of glass 10 suitably held within the casing and which protects the tape. In some cases if desirable, such as where the public should

not have access to the record tape, the sight opening 9 need not be formed. The two spools or reels 7 and 8 are rotatively mounted in some suitable way within the casing 2 and

5 I prefer to positively operate one of them such as the spool 8, for which purpose said spool is shown as furnished with a ratchet-wheel 11 cooperative with a key-actuated pawl 12.

10 In the present instance the lock is organized for operation by four different keys, and each key operates a tumbler as 13, the tumblers being arranged side by side within the casing and being adapted for operation by

15 separate keys. For example, one tumbler will be operated by a key of one character, while the next adjacent tumbler will be operated by a key of a different character, and so on. From what has been hereinbefore

20 stated it will be evident that I may employ any number of these tumblers. They are represented as disposed side by side and as capable of slightly vertical and longitudinal movements, the vertical movement being for

25 the purpose of releasing or locking the tumblers, while the longitudinal movement is for the purpose of securing an indication by means carried by the tumblers on the tape or ribbon 6. The indicating devices for the

30 tumblers may be of any desirable character, although they are represented as consisting of pins 14, each tumbler being shown as equipped with such a pin which extends outward from the outer end thereof. When

35 therefore a tumbler is advanced the pin carried thereby is caused to puncture or penetrate the tape or ribbon 6. I prefer to separate the tape longitudinally into four divisions which register or coincide with the res-

40 spective pins 14. It will be understood that the divisions correspond in number with the pins and for simplicity these divisions may be numbered 1 to 4 inclusive at the ends of the tape or at any desirable point or points in

45 length thereof, these being matters of individual preference. I may, of course, employ other indicating means, although the one described is of a simple and effective nature.

I have shown as situated between the pin

50 tumblers 13 and the glass 10, the flange 15 having minute perforations through which the pins 14 respectively pass so as to properly guide said pins on the advancing and backward movement of the several pin tumblers.

55 The perforations in said flange 15 prevent bending of the pins during the puncturing of the tape thereby. Each pin tumbler has therein an L-shaped slot 16 and a straight slot 17. A pin as 18 extends through the

60 several L-shaped slots 16, while a pin as 19 extends through the several straight slots 17, said pins being rigidly fastened to and extend outward from the inner face of the back of the casing 2. The pin 18 is located

65 above and at one side of the pin 19. Each

tumbler 13 has a curved edge portion 21 concentric with the axis of the stud 5 and which is intersected by a projection 22. Said curved portion 21 terminates at its upper or inner edge in a cam 23, the cam 23 and projection 70 22 being adapted for successive engagement by an auxiliary bit such as 13^r, 13^g, 13^h, and 13ⁱ (Fig. 11) on each key. When the tumblers 13 are in their retracted positions, the pin 18 will extend through the vertical 75 portions of the L-shaped slots 16 so as to positively hold said tumblers in such positions. It will be assumed that a key has been introduced. When such key has been introduced its auxiliary bit will engage against 80 the cam portion 23 of a cooperating tumbler 13, and thereby lift said tumbler until the pin 18 is out of the vertical portion of the L shaped slot in said tumbler. As said key turns, said auxiliary bit traverses the 85 curved face 21 and during such travel comes into engagement with the projection 22 and then engages said projection. When the projection 22 is thus engaged the particular tumbler is advanced so as to cause the pin 90 19 on the outer end of the same to puncture the tape 6. As indicated, there are four keys and each has an auxiliary bit; these bits being located at different points respectively in the length of the stems thereof. 95

Within the casing is a spring as 24 shown as doubled on itself to present branches of unequal length, the shorter branch being fastened suitably in place, while the longer branch is divided to present two portions 100 25 and 26, the portion 25 being shorter than the adjacent portion 26 and bearing against all the tumblers 13 in order to return the tumblers when released to their original or retracted positions. It will be understood 105 that the tumblers are independently movable.

The pin 18 constitutes a pivot for the lever 27 which rocks contiguous to the inner face of the back plate of the casing 2, the said 110 pin being so located with respect to the lever that the latter presents two arms of unequal length, one of the arms being of substantially elbow form and terminating at its free end in a hook or shoulder 28. To the short arm 115 of this lever the pawl 12 is pivoted. The hook or shoulder 28 is beveled as at 30 and a spring as 31 is suitably connected with the longer arm of said lever 27 to hold this beveled portion 30 against a suitable stop as 30^r 120 and in the path of the main or unlocking bit 13^e of each key. The pawl 12 is held in engagement with the teeth of the ratchet-wheel 11 by a spring as 32. The lever 27 constitutes, as will hereinafter appear, a de- 125 tent for preventing positively backward movement of each key after the same has moved a certain distance, whereby beyond such point it will be absolutely necessary for the key to make a full turn before the same 130

can be withdrawn from the lock. On the full motion of the key a record thereof is obtained. Upon the introduction of a key into the lock and when said key is turned the main bit thereof will traverse the beveled portion 30 to thereby rock the lever 27 and draw the pawl 12 downward whereby said pawl 12 becomes effective for rotating the ratchet-wheel 11 a distance equaling the length of one tooth. When the key passes out of contact with the lever, the latter is returned to its original position by the spring 31 and the pawl 12 rides over and behind a tooth following that which it had just engaged, whereby the pawl will be in position to move the ratchet-wheel another step on the succeeding operation of the lever 27.

As previously indicated the main bit of the key rides along the beveled portion 30 and when it passes out of contact therewith, the hook or shoulder 28 is released by the key so that such hook or shoulder can be swung under said main bit to positively prevent backward motion of the key.

The parts in the present case are so positioned that the initial operation that takes place by the key is the operation of the lever 27. Immediately following this is the operation by said key of a tumbler 13 and the particular tumbler to be operated will depend upon the particular location of the auxiliary bit or tumbler operating bit. After a tumbler has been operated I actuate the detent 33 which directly cooperates with the shackle 34, said shackle being shown as of the pivoted type and having its free portion extended through a slot in the top of the casing 2. Near the free end of said shackle is a notch to receive the nose of the locking detent 33 when the latter is in its effective position, whereby the shackle will be held locked. It will be remembered that the spring has two portions 25 and 26, the portion 25 acting against the tumblers 13 to hold the latter in their retracted positions. The portion 26 of the said spring holds the detent in its effective position, this result being aided by a positive holding device, as will hereinafter appear. The portion 26 of said spring also moves the said detent 33 to its operative position when said detent has been released by a key. After a key has operated a tumbler 13, said key becomes effective for releasing the holding device hereinafter described for said detent 33 and for then moving said detent to its shackle releasing position. The detent 33 has longitudinal slots 33' for the passage of the pins 18 and 19 and in addition to these two slots is a third slot 35 shown as of right angular or approximately L-form, one branch of said slot 35 extending downward vertically from the other. Between the back of the casing 2 and the detent 13 is shown as pivoted a spring actuated pawl 36 having a

projection 37 extending laterally therefrom, through the slot 35 and across the tops of the several tumblers 13, said projection 37 being arranged for operation by each of said tumblers. When the detent 33 is in its effective position the projection 37 of the spring actuated pawl 36 will be in the vertical portion of the slot 35 in order to prevent movement of the detent 33 except by a proper key. From this it will be evident that the lock cannot be picked.

It will be assumed that the detent 33 is in its operative position and the other parts of the lock are in their normal positions. To unlock the lock a key of proper kind will be inserted thereinto and then turned. First of all the lever 27 is operated as hereinbefore described to positively operate through the intermediate means the tape 6. After this the auxiliary bit on said key will operate a cooperating tumbler 13 in the manner previously set forth. When a tumbler is operated it is first of all lifted and as such a tumbler is lifted it raises the projection 37 out of the vertical portion of the slot 35, and thereby releases the detent 33 from the influence of the spring actuated pawl 36. The detent, however, is still maintained in its operative position by the spring portion 26. After the auxiliary bit of said key has operated a cooperating tumbler 13 and after the detent 33 has been released by the pawl 36, the main bit of the key will ride against the detent 33 and positively retract the same so that said detent will release the shackle 34. As soon as the lever 27 and a tumbler have been operated by the auxiliary bit on the key, said lever and tumbler are at once returned to their primary positions in the manner hereinbefore described and the same statement applies to the detent 33 when it is released by the main bit on said key. Within the casing is shown as pivoted a positively operating shifting or throw-out device for the shackle, said device consisting of a pivoted arm 38 adapted to engage under the free end of the shackle and being operable by a spring as 39. When the shackle is held locked by the detent 33 the arm 38 is held downwardly thereby and the spring 39 for said arm is under tension, whereby when the detent 33 is disengaged from the shackle, the shifting device or arm 38 may be thrust upward by its spring so as to forcibly move the free portion of the shackle from out of the casing. When this takes place the free end of the shifting device or arm 38 is moved under the nose 40 of the detent so as to hold the shifting device in position to be returned to its original position as the free portion of the shackle is moved into the casing for engagement by the detent. I interpose between the detent 33 and the tumblers 13 a spacing member or plate 41 which holds the tum-

blers separated from said detent. From what has been stated I need employ but one spring for the detent 33 and all the tumblers 13. The plate 41 in addition to spacing or
 5 separating the detent and tumblers also serves as a guard for the detent, whereby the detent cannot be actuated without proper key. The detent 33 is of the nature of a locking bolt, in that it subserves the function
 10 accomplished by a locking bolt in locks of the usual kind.

A lock involving my invention is simple in construction, effective in action; it has numerous safe-guards to prevent surreptitious
 15 operation thereof; it can be inexpensively made and its parts can be readily assembled.

I have stated that the tumblers 13 are independently operative. By this I mean that they are capable of movement independently
 20 of each other. In some cases instead of operating one of them at a time I may operate them in series, and in this way with say four tumblers I can get fifteen different combinations so that fifteen keys may be adapted for
 25 opening the lock, provided that the main bits of said fifteen keys are alike. The auxiliary bits, as will be understood, will be different.

In Fig. 11 I have shown in detail the four
 30 keys, they being denoted by 13^a, 13^b, 13^c, and 13^d, respectively. Each key has a main or unlocking bit and as they are of similar construction all of them will be denoted by 13^e. In addition to these main or unlocking bits,
 35 the keys have auxiliary bits as 13^f, 13^g, 13^h and 13ⁱ adapted to act against the tumblers 13. The bit 13^f operates the first or outermost tumbler, while the bit 13^g operates the next tumbler, etc. This arrangement, how-
 40 ever, may be varied as will be understood from what I have already stated, for the auxiliary bit of a key may be so formed as to operate two, three or four of the tumblers 13 simultaneously so as to get the combinations
 45 to which allusion has been made. The tape 6 is ruled in parallelism so as to produce blank spaces or columns arranged side by side across said space. These spaces or columns
 50 may be numbered at the ends of the tape or at any other place in the length thereof to designate not only the columns or spaces, but to identify the punch tumbler that pierces the tape, as well as the key that made the record in unlocking the lock. When two
 55 tumblers are operated simultaneously, or all of them are operated in such manner, such simultaneously operated tumblers puncture at the same time the tape.

What I claim is:

60 1. A lock of the class described having a casing, tape carrying spools in said casing, and a plurality of independently movable key-operated tumblers in said casing, each having means to puncture the tape between
 65 the spools.

2. A lock of the class described having a casing, tape-carrying spools in said casing, a plurality of independently movable key-operated tumblers in said casing, each having means to puncture the tape between the
 70 spools, a ratchet wheel connected with one of said spools, and a key-operated pawl for the purpose of turning said ratchet wheel step by step.

3. In a lock of the class described, means
 75 for carrying a tape and a plurality of tumblers disposed side by side, each having a pin to puncture the tape and each having a curved face provided with a projection, the latter for engagement by a key to operate
 80 the same for the purpose of puncturing the tape.

4. In a lock of the class described, the combination with tape carrying means, a flange over which the tape passes, said flange hav-
 85 ing perforations, and a plurality of independently movable key-operable tumblers each having a pin to extend through one of said perforations for puncturing the tape.

5. In a lock of the class described, the combination of two spools, a flange between the
 90 spools over which the tape passes from one spool to the other, said flange having perforations, and a plurality of independently movable key-operable tumblers provided
 95 with pins to extend through the respective perforations for puncturing said tape.

6. A lock of the class described having a casing, tape-carrying means in said casing, a
 100 plurality of independently movable key-operated tumblers in said casing, each having means to puncture the tape, and key-operated means for feeding the tape.

7. In a lock of the class described, the combination of tape carrying means and a plu-
 105 rality of independently movable key-operable tumblers to act against the tape carried by said tape carrying means, each of said tumblers having a straight slot and a substantially angular slot, and pins to extend
 110 through the two series of slots to hold the tumblers in side-by-side relation.

8. In a lock of the class described, the combination of tape carrying spools, a ratchet
 115 connected with one of the spools, a key-operated pawl for turning the ratchet wheel step by step, a fixed member between the spools and over which the tape passes in traveling from one spool to the other, said
 120 fixed member having a row of perforations, and a plurality of independently movable key-operable tumblers having pins to extend through said perforations for puncturing
 125 said tape.

9. In a lock of the class described, the combination of a casing, tape carrying means in
 130 the casing, and a plurality of independently movable key-operable tumblers having pins to puncture the tape, said tumblers being movable toward the tape from one side
 135

thereof, and said casing having a sight opening through which said punctures can be seen, at the opposite side of said tape.

10. In a lock of the class described, the combination of tape-carrying spools, a ratchet wheel connected with one of the spools, a pawl, a lever carrying said pawl, the lever having a shoulder and being operable by a key to cause the motion of said pawl for turning the ratchet wheel, and said shoulder when said key is turned a certain distance serving to prevent backward turning motion of the key, and a key-operated indicating device for acting against the tape carried by said spools.

11. In a lock of the class described, the combination of a plurality of pins, an indicating device having slots for the passage of said pins, one of the slots being of approximately right-angular form, and means for positively holding the pin which extends through said right-angular slot in one branch of said right-angular slot to thereby prevent accidental movement of said indicating device.

12. In a lock of the class described, the combination of a locking detent and an indicating device, both key-operated, and a spring having two parts, one acting against the detent, and the other against the indicat-

ing device to hold said two parts in their retracted positions.

13. In a lock of the class described, the combination of a locking bolt, a positive locking device for said locking bolt, a key-operated indicating device, said key-operated indicating device serving to operate said locking device to release the locking bolt, and the latter being positioned for operation by said key after it is thus released.

14. In a lock of the class described, the combination of a locking bolt having slots, one of which is L-shaped, pins extending through said slots, a pawl carrying the pin which extends through the L-shaped slot, the pawl-carried pin being normally located in one branch of the L-shaped slot to positively hold the locking bolt against movement, and a key-operated indicating device adapted on its movement to lift the pin which extends through said L-shaped slot out of the branch thereof which it normally occupies, to release said locking bolt.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY LANHAM.

Witnesses:

JNO. R. BARCLAY,
J. C. PRINTOP.