2 Sheets--Sheet 1.

H. WINN.

Lock for Doors, &c.

No. 161,371. Patented March 30, 1875.

Fig. 1

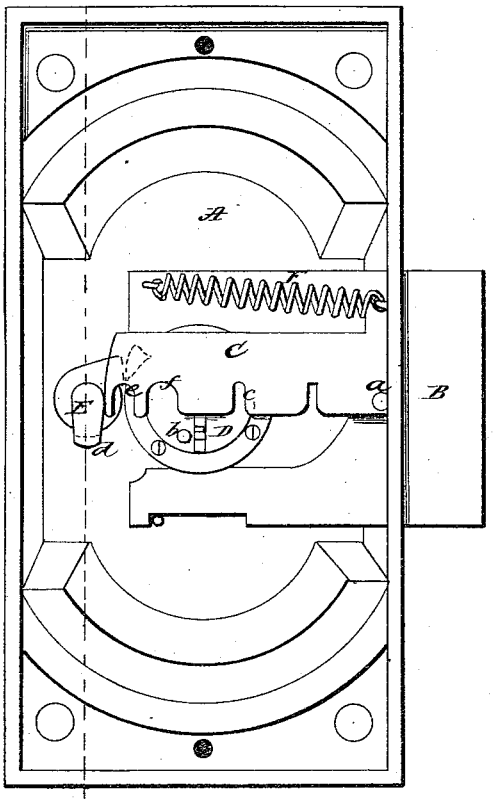


Fig. 2.

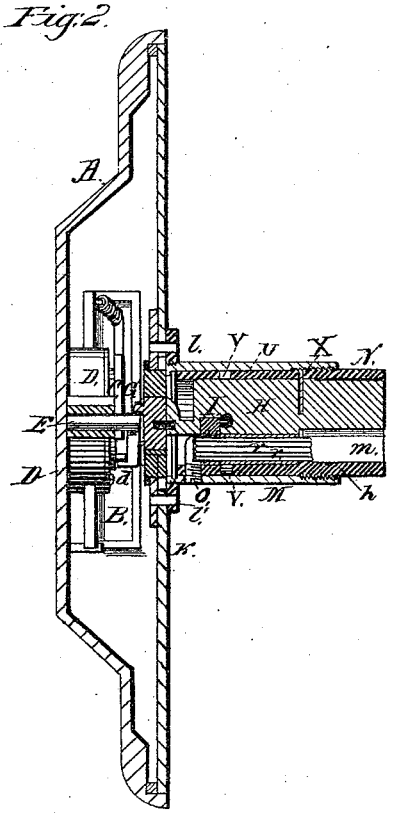


Fig. 3.

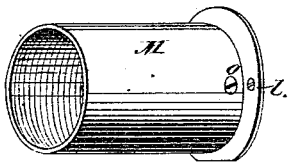


Fig. 4.

Fig. 6.

Fig. 7.

Fig. 5.

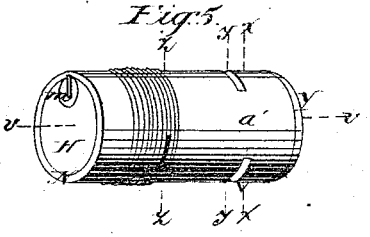
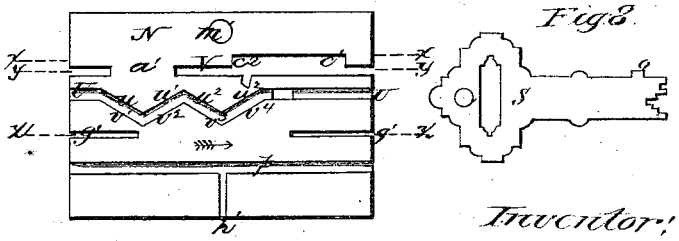


Fig. 8.



Witnesses:

F. R. Pratt

Daniel Powers

Inventor:

Henry Winn

2 Sheets--Sheet 2.

H. WINN.

Lock for Doors, &c.

No. 161,371. Patented March 30, 1875.

Fig. 9

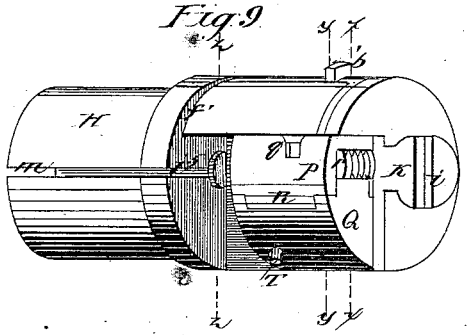


Fig. 10.

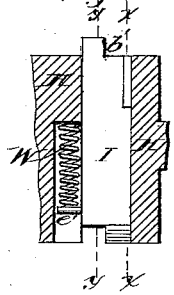


Fig. 11

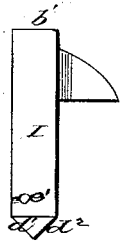


Fig. 12.

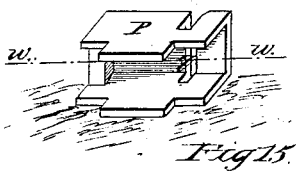


Fig. 13.

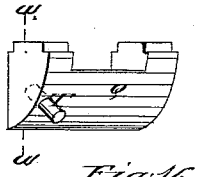


Fig. 14.

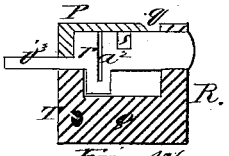


Fig. 15.

Fig. 16.

Fig. 17.

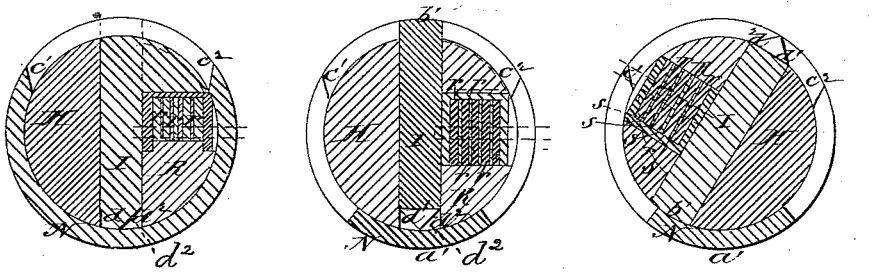
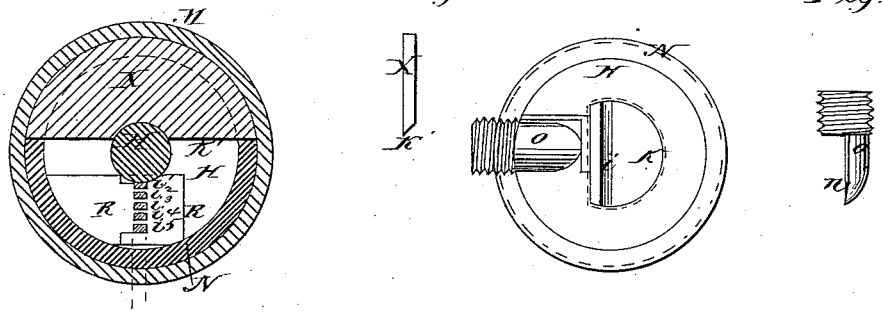


Fig. 18.

Fig. 19.

Fig. 20.

Fig. 21.



Witnesses:

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Daniel Porter

Inventor:

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UNITED STATES PATENT OFFICE.

HENRY WINN, OF SHELBURNE, MASSACHUSETTS.

IMPROVEMENT IN LOCKS FOR DOORS, &c.

Specification forming part of Letters Patent No. **161,371**, dated March 30, 1875; application filed August 5, 1874.

CASE G.

To all whom it may concern:

Be it known that I, HENRY WINN, of Shelburne, in the county of Franklin and State of Massachusetts, have made certain new and useful Improvements in Locks, whereof the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a front view of the lock with the cover and parts connected therewith removed. Fig. 2 shows a vertical section of the lock on line x' x' of Fig 1. Fig. 3 shows the outer stationary shell, which is attached to the cover. Fig. 4 shows the roll-back. Fig. 5 shows the inner stationary shell with the parts contained therein, and the supporting-disk at the rear end thereof. Fig. 6 shows the connecting-bar. Fig. 7 shows a plane projection of the interior of the inner stationary shell. Fig. 8 shows the key. Fig. 9 shows the rotating shell with the fence and the other parts contained therein except the cut-off. Fig. 10 shows a horizontal section of the rotating shell taken through the line *v v* of Fig. 5, and a side view of the fence and the spring actuating it. Fig. 11 shows a front view of the fence. Fig. 12 shows one of the two parts which compose the tumbler-box. Fig. 13 shows the other of said parts and the actuating-pin. Fig. 14 shows a section of the tumbler-box taken through the line *w w* of Figs. 12 and 13, and a side view of a tumbler therein, and a section of the actuating-pin. Fig. 15 is a vertical section taken through the line *x x* of Figs. 5, 7, 9, and 10. Fig. 16 is a vertical section taken through the line *y y* of Figs. 5, 7, 9, and 10. Fig. 17 is a vertical section taken through the same line as Fig. 16. Fig. 18 is a vertical section taken through the line *z z* of Figs. 5, 7, and 9, including the cut-off. Fig. 19 is a side view of the cut-off. Fig. 20 is a rear end view of the inner stationary shell with the parts contained therein and the restorer. Fig. 21 is a side view of the restorer.

In Figs. 9, 10, 15, 16, 18, and 20 the parts are in their relative positions as at the beginning of an operation of the lock, but in Fig. 17 they have the position assumed after such operation has been partially completed. The dotted lines projecting beyond the outer shell in Figs. 15, 16, 17, and 18 show where the plane of the key-hole, if extended, would cut the parts. The key-hole in this lock is either on the upper side of the rotating shell, as seen in Fig. 5, or on the lower side, as seen in Fig. 18, according as the shell M may be attached by its screws to the cover; but if it is desired that the fence shall operate by gravity alone, one of the slots in which the connecting-bar works must be constructed at right angles to its present position in its part, and the exterior stationary shell must be fastened to the cover with a quarter turn from its present position, so that the uncut part a' (see supra) shall be uppermost.

In the drawings the same letters refer to the same parts.

A is the lock-case. B is the bolt, which is operated by the lever C, pivoted on the bolt at *a*, and actuated by the pin *b* on the interior lock D working in the talon *c*, and by the under arm *d* on the wing E working in the talon *e*. Said lever locks out the bolt in the usual way by a projection abutting against a stump on the case, against which it is held by a spring, F. Said lever locks in the bolt by its depression *f* fitting on the wing E. Said wing E is actuated by the roll-back G being located in the socket *g* thereof, which socket is larger at its lower end than said wing, and consequently causes it to act as a lazy-arm, by compelling a partial rotation of said roll-back before it is rotated. This prevents the bolt from being acted upon before the rotating shell H is dogged by the fence I, when the tumblers are not correctly set. The roll-back G, which works in the cover K, is rotated by the connecting-bar L, which enters a slot, *h*, therein and also enters a slot, *i*, in the projection *k* on shell H. M is the outer stationary shell, which is fastened by screws to the cover through the screw-holes *l l'*, with the key-hole *m* either on the upper or lower side of shell H, as preferred. N is the inner stationary shell, which is screwed into the shell M, and is fastened from turning in it by the restorer O, the outer part of which is threaded, and screws into both shells M and

N, (through the screw-hole m' in shell N,) and thereby fastens them together, and is itself fastened in position, the thread on it being so cut that the restorer is driven home at a time when the flat surface n upon it is turned toward the tumblers. P and Q are two parts which form together the tumbler-box R, which box may be in one piece, but, for convenience of manufacture, is made in two parts. S is the key, having a projection, o, which works in the groove p of shell N, passing into the same by the entrance h'. An opening, q, in the tumbler-box R admits the fence to the tumblers $r\ r\ r\ r\ r$, which are in said box, and have fence-notches $s\ s\ s\ s\ s$. Between the tumblers are friction plates or furrings $t\ t\ t\ t$. The tumbler-box R, carrying the parts therein, is actuated by the pin T working on eight inclined surfaces in groove U of shell N, four of which, $u\ u^1\ u^2\ u^3$, carry it forward, and four of which, $v^1\ v^2\ v^3\ v^4$, carry it backward. The shell N is cut away leaving the slot V and a portion of its arc a' in the same vertical plane uncut. The head b' of the fence works in the smaller part of said slot V, which slot has an enlargement or secondary slot limited by its ends $c^1\ c^2$, and making the slot V wide enough between said ends to admit the lower end of the fence. The inclined surfaces $d^1\ d^2$ on the fence work against said ends $c^1\ c^2$, which are also inclined surfaces, and would lift the fence even if it had not the inclinations $d^1\ d^2$. Said fence I has also a pin, e', on which bears a spring, W, to drive toward the fence-notches the arm which enters them, and work the fence. The shell H is held in place by the hardened-steel cut-off X, which is located in a turned-down bearing, f', of said shell, and is firmly held in place by fitting in the slot g' of shell N, and by the shell M which fits upon the top of it when shells M and N are screwed together. Y is a disk, the form of which is indicated by the dotted lines, Fig. 20, surrounding projection k, and on the outer edge of shell N. Said disk is held against the rear end of shell N by a shoulder in shell M, (indicated by the dotted lines, Fig. 3,) and has an opening fitting closely on projection k of shell H. The purpose of said disk is to support the metal about slot i and to prevent the tumblers from being driven by external force beyond the point where they support the fence. The tumblers have projections $i^1\ i^2\ i^3\ i^4\ i^5$ extending forward beyond the box R (before the operation of the lock) to the point where the key-hole m enters the cut-off bearing f'. Each tumbler has also a supplementary nick or notch, a^2, located in front of the fence-notch, and long enough to cover the same, presenting a face transverse to the plane of the tumbler, and located in position to cut the plane of the key-hole m if projected through box R, to engage any picking-tool inserted between the tumblers. It lies between the key-hole m and notch s.

The unlocking process is as follows: The parts are supposed to be in their relative positions, seen in Figs. 1, 9, 10, 15, 16, 18, and 20, the pin T being located at the junction of the inclined surfaces $u^1\ u^2$ in groove U. When degrees are mentioned herein reference is had to degrees of revolution of the key S and shell H. The key first enters the key-hole m, its projection o entering groove p, which holds the key in such position that a key-bit of maximum length just reaches the junction of the key-hole m and bearing f', and touches the end of a tumbler.

The unlocking direction is indicated by the arrows, Figs. 5 and 7. During the first forty-five degrees the pin T in the groove U is driven forward by the inclined surface u^2 to the junction of the inclined surfaces $u^2\ u^3$, thereby drawing forward the tumbler-box R, and projecting the tumbler-projections $i^1\ i^2\ i^3\ i^4\ i^5$ into the key-hole m and against the key-bits until the fence-notches $s\ s\ s\ s\ s$ are set in line under the opening q in said box. During the next forty-five degrees the pin T is driven back by the inclined surface v^4, drawing back the tumbler-box R, with the tumblers set therein, until the forward ends of the tumbler-projections $i^1\ i^2\ i^3\ i^4\ i^5$ are all as far back as the edge k' of the cut-off X, and ready to pass under the same. During the next twenty-two and a half degrees the inclined surface v^4 at first continues to drive back the pin T and box R until the tumblers are all carried far enough back to pass entirely behind the cut-off X, at which point the tumbler-box R reaches its farthest projection backward, its rear end being flush with the rear end of shell H, (but not of projection k,) and the opening q, with the fence-notches in line under it, is brought under the arm of the fence that is to enter it, and pin T enters the part of groove U not helical, after which the tumbler-projections $i^1\ i^2\ i^3\ i^4\ i^5$ are rotated entirely behind the cut-off X, which completely covers and closes up the inner opening of the key-hole m at its junction with the bearing f', and cuts off all communication through the key-hole m with the tumblers. During the next one hundred and thirty-five degrees the point of fence I, at the junction of its surfaces $d^1\ d^2$, driven by spring W, first descends the inclined surface c^2 in slot V, and the arm of the fence enters the opening q and the tumbler-notches, when the head b' of the fence I passes inside the inner surface of the uncut part a^1. The shell H then operates and locks in the bolt, as described, after which the inclined surface d^2 strikes the inclined surface c^1, which drives the fence-arm out of the fence-notches, and opening q and the head b' of the fence into the smaller part of slot V again. During the next twenty-two and a half degrees the pin T is brought to the inclined surface u, and begins to move on the same, the tumbler-projections emerge from behind the cut-off X, and the key-hole m is removed from said cut-off so that its opening into the bear-

ing f' is unobstructed. During the next forty-five degrees the pin T is brought to the junction of the inclined surfaces u w^1, which carries forward the tumblers until the rear ends of the same are all as far forward as the surface n on the restorer O, because said surface n is located so as just to touch the said rear ends, when in the position seen in Fig. 9, and when the pin T is at the junction of the inclined surfaces w^1 w^2, its starting-point, and because the inclined surface u has equal inclination and length with the inclined surface v^4, (by which alone said rear ends have been projected backward,) and, therefore, carries them as far forward as they were at starting. At the close of said forty-five degrees said rear ends have been advanced in rotation to such point that farther rotation will instantly pass some part of each of them in front of said surface n, which is narrowed toward the center of the lock so that the rear ends of the tumblers nearest the center of rotation, having less motion, will pass into or away from the front of it at the same time as the rear ends of those more remote, and said surface n is wide enough, so that the next forty-five degrees, does not rotate said rear ends away from it out into the position shown in Fig. 20. During the last forty-five degrees the inclined surface v^2 drives back pin T, and consequently box R, (which always moves identically with pin T,) to their starting-points, which they reach at the end of said forty-five degrees; and, as said surface n is stationary, the restorer O being affixed to the stationary shell N, the box R assumes the same position relative to said surface n which it had at starting. This backward motion of box R projects the tumblers in it back spirally upon surface n until, when box R reaches its starting-point, they are entirely restored, for the tumblers started from the restored position with their rear ends in contact with surface n, and when the box R, which contains them, reaches the same position relative to said surface n, from which it started, projecting their rear ends against said surface, they must assume the position from which they started, which was their restored position. It is obvious that, if at the point above indicated, when the arm of the fence enters the fence-notches, said notches had not been correctly set—as if a false key had been used—said arm would not enter said notches, but, resting on the tumblers, would hold out the head b^1 of the fence, which in the revolution would impinge against the uncut part a^1 of shell N and the dog-shell H before the bolt could be operated thereby.

The locking operation is sufficiently obvious from the above description, shell H being rotated in the reverse direction by the key, the shape, arrangement, and action of parts being similar to the same, as described in the unlocking process.

All the parts seen in Figs. 9 and 10 partake of the rotary motion of the key through its revolution, the box R having the additional back and forward motion described, in which it is guided by a bearing in shell H, and which it imparts to the tumblers, except as their motion is limited by the key-bits and the restorer O.

The whole of shell H back of the cut-off might be used as a box by severing it from the part of said shell in front of the cut-off, extending an arm from the part behind the cut-off into said part in front through the section of said shell, (seen in Fig. 18,) in such way as to make the two parts rotate in common, cutting away the shell N where the head b' would impinge upon it in its back and forward motion, and solidly attaching box R to shell H at the point where the arm of the fence would drop into opening q. In this case the bearing for the box would be in shell N.

Locks are picked by the feeling process by the sensation communicated through the tumblers when their notches pass or reach a fence that bears upon them. The cut-off X is intended to prevent this mode of picking, by closing up the opening of the key-hole into the chamber containing the tumblers, cutting off all access to them during all the time when the fence may be made to bear upon them; for the fence is held away from the tumblers by resting on the inner surface of shell N during the first one hundred and twelve and a half degrees, as described, when the end of it reaches the enlargement of slot V, and the tumblers are rotated entirely behind the cut-off X, and the opening of the key-hole into the chamber containing them is entirely closed up by it between the first ninety degrees and the first one hundred and twelve and a half degrees, as described, continuing so during the one hundred and thirty-five degrees, when the fence can be made to touch them.

If the fence were not held away from the tumblers by shell N, it would be by box R, which guards the entry of the fence into the tumbler-notches until some of the tumblers are covered by the cut-off, and if inclined surfaces u u^3 v^1 v^4 were slightly elongated, and the fence and part not helical of groove U were placed slightly farther back, opening q would not be in position to admit the fence until the inner end of the key-hole would be entirely covered by cut-off X.

The cut-off may be attached to any part of the lock, or have any motion other than that of shell H, if it is located in the position described, to separate the key-hole and the tumblers or parts receiving the impression of the key when the fence bears on the tumblers to enter their notches.

The applicant is aware that cut-offs closing up the key-hole have been used in locks with keys having detachable bits, or with stationary key-holes, or with tumblers stationary when separated from the key-hole by a cut-off; but those constructions are complicated, requiring extra mechanism or motion to throw

the bolt, extra dogs to dog the rotating shell, or expensive keys. But in this lock the cut-off is combined with a key of which the bits and shank rotate together, and with tumblers rotating in common with the rotating shell when separated from the key-hole by the cut-off at the time the fence must enter its notches, whereby a fence of simple construction is used, and one shell suffices to hold the fence and tumblers, and convey the impulse of the key to the bolt, and other advantages accrue.

A further improvement consists in so constructing the fence, as shown, that the head b^1 is not in the same vertical plane as the part at the junction of surfaces d^1 d^2, which holds the fence away from the tumblers on the surface of shell N. When said parts are in the same vertical plane, the uncut part a^1 of shell N must perform both functions of dogging the head b' when a false key is used, and of holding the fence away from the tumblers. In that case, the maximum arc of the uncut part a^1 must be less than one hundred and eighty degrees on shell N, or it would strike one end of the fence before leaving the other. As it would be required to hold away the fence in both directions of locking and unlocking, it could only be held away therefrom ninety degrees each way—too small an arc to admit of the practical use of the cut-off, as the tumblers could not be set and rotated behind the cut-off in that arc without reducing their combinations or giving new motions to the key, owing to the great inclination which would be required for the inclined surfaces of groove U. On the other hand, if it were required in a lock to throw a heavy bolt and obtain leverage therefor by taking hold of it at an early part of the revolution, and to dog the rotating shell, if a false key were used, before so taking hold, the arc of the enlargement of slot V could be greatly lengthened with this construction of the fence, which would allow the arc of uncut part a' to be correspondingly lengthened to much more than one hundred and eighty degrees on shell N, if required, and would cause the rotating shell to be dogged at an early part of the revolution, as required.

In a former application the inventor described a shell containing tumblers moved back and forth by a similar device. In that lock the tumblers rotated with the key only, before the fence could bear on them; hence each tumbler required two points to receive the key's impression, as the key made a complete rotation. The restorer could not be used, as the tumblers did not move back after operation of the fence. This invention extends the use of the device to move the tumblers back and forth to the class of locks wherein each tumbler rotates with the key through its rotation, and hence requires but one point to receive the key's impression, thereby saving cost. Said class also admits the use of the improved fence. The use of said device is accomplished and applied to the reverse rotations of shell H, and the use of the cut-off admitted by using four more inclined surfaces, two giving forward and two backward motion to pin T, and by leaving a space open through which said pin rotates when it gives no motion to the tumblers. If the cut-off were not used, only the four inclined surfaces w^1 w^2 v^2 v^3 would be necessary in this lock, the part not helical of groove U being located farther forward, and elongated to unite with the ends of said inclined surfaces. In this lock the inclined surfaces of groove U may be transferred to box R by reversing their inclinations and fixing pin T in the exterior shell N, and turning down a groove in shell H, so as not to interfere with the pin when said shell rotates. In this case box R should be held from displacement, after leaving pin T, by the fence falling in slot q or other device. If the cut-off is used, box R would need to be enlarged to admit the eight described inclined surfaces, and have a slot to move upon the lower end of the fence, or said surfaces must have greater inclinations to the axis of shell H; but, without the cut-off, inclined surfaces w^1 w^2 v^2 v^3 might easily be located as described in box R. The same device to move the tumblers back and forth may be used with non-rotating tumblers, if the part of shell H in front of the cut-off is detached and attached to shell N, which is made to rotate and work the bolt while the remainder of shell H is made stationary. If the tumbler-ends i^1 i^2 i^3 i^4 i^5 are enlarged, so that the key will not leave them before setting them, and the inner part of the key-hole is enlarged to prevent collision with them—the invention only requiring that of the two parts, box R and shell N, one having the inclined surfaces and the other the pin—one shall rotate with the key at a time when the other does not.

The mode described of restoring the tumblers only requires that they be placed in a box to carry them and keep them from friction with external parts, which box is carried forward and back in the rotation of the key by the pin reacting on the inclined surfaces described, or by equivalent mechanism, carrying with it the tumblers, (except as their motion is limited by the key-bits and restorer) their backward motion being at the time when they are required to be restored, at which time a restorer shall be located behind them, or behind some part on each of them, in position for them to impinge against it, stopping their backward motion, while the backward motion of the box continues until their position in it is their restored position. In locks where the tumblers do not rotate, if a cut-off is required, the restorer must be attached to the rotating shell, or moved thereby, or by the key from behind the tumblers, to allow them to be projected back before operation of the fence, and must be brought behind them again, by said shell or key, when they are projected back for restoration. But if a cut-off is not

required, or if the tumblers are not withdrawn to avoid it, and in the cases described where only four inclined surfaces are used in groove U, the part of said groove not helical beginning at the junction of inclined surfaces v^3 v^4 and w^2 w^3 and ending at the junction of inclined surfaces v^1 v^2 and u w^1, (the cut-off being removed,) then any surface of the lock, stationary or not, located in position to touch the rear ends of the tumblers before they begin to advance, and in the same position behind them when they are projected back, will suffice as a restorer whether the tumblers rotate or not.

Parts receiving the impression of the key, and through which the contact of the fence with the fence-notches may be felt, are included in the general term tumblers when reference is made to the intervention of the cut-off between the tumblers and the key-hole.

What I claim as my invention, and for which I pray Letters Patent, is—

1. A fence, a rotating shell having a key-hole, a key composed of a bitted portion to set the tumblers, and a shank working in said key-hole to rotate said shell, of which key the bitted portion and the shank rotate in common, a system of tumblers, and a cut-off located in position to intervene between the key-hole and the tumblers when the fence enters their notches or impinges on their sides to enter the same, all combined together, when the tumblers partake of the rotation of the rotating shell at the time when the cut-off intervenes, as aforesaid.

2. The operative parts of the two ends of the fence arranged in different vertical planes, for the purposes described.

3. The enlargement from c^1 to c^2 of the slot V in shell N, for the purposes described.

4. The tumblers and a box containing them, moved back and forward for the purposes described, combined with a restorer, when said restorer is located in position to stop the backward movement of the tumblers at the time they are required to be restored, while the backward movement of the box continues pressing the tumblers therein against said restorer until said tumblers are in a restored position in said box.

5. A rotating shell having a key-hole and a system of tumblers, between which and said key-hole a stationary cut-off is made to intervene by the rotation of said shell and tumblers, which tumblers, if rotated (without other motion) from their position while being set, would collide with said cut-off, combined with said cut-off, a box containing the tumblers, a bearing for it and a stationary shell, when of said box and stationary shell the one has a pin or projection acting against one or more inclined surfaces of the other, said pin or projection and surfaces being arranged, relatively to each other and to the cut-off, to project said box and the tumblers therein, before they reach the cut-off in their rotation, into position to avoid the collision of the tumblers and cut-off, when said tumblers are farther rotated to cause said cut-off to intervene as described.

6. The supplementary nick a^2 in the tumbler r, for the purpose described.

7. A box containing tumblers and having a bearing, as described, combined with an outer shell, when the one rotates in common with the key throughout its rotation, while the other does not, and when the one has a pin or projection acting against four or more inclined surfaces of the other, whereby said box is projected forward and back, carrying the tumblers toward and from the bits of the key, all combined with said tumblers and key, and operating as described.

8. The fence I and slot V, with its enlargement in the stationary shell, combined with a rotating shell and a system of tumblers, partaking of the rotation of said rotating shell.

HENRY WINN.

Executed in presence of—

F. R. PRATT,

A. K. HAWKS.