H. C. HOVEY.

Combination-Lock.

No. 167,764. Patented Sept. 14, 1875.

Fig. 1.

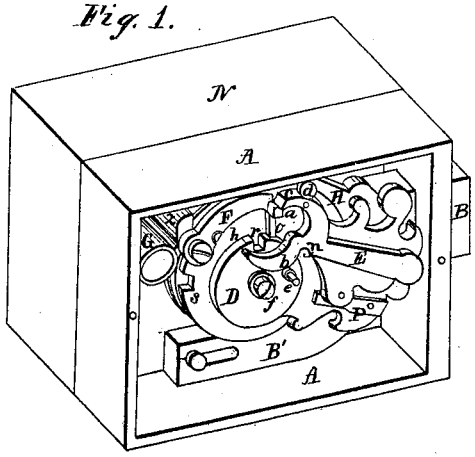


Fig. 2.

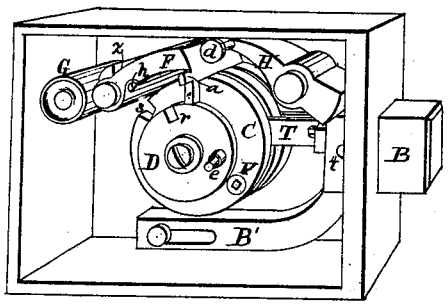


Fig. 3.

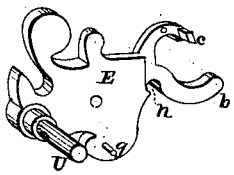


Fig. 4.

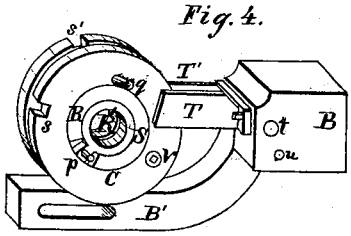
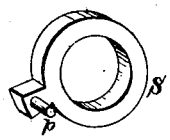


Fig. 5.



Witnesses:

W. C. Nutting
Geo. W. Sanderson.

Inventor:

Horace C Hovey.

H. C. HOVEY.

Combination-Lock.

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Fig. 6.

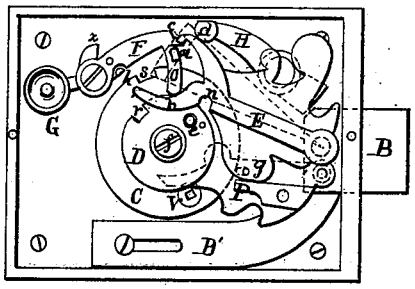

Fig. 11.

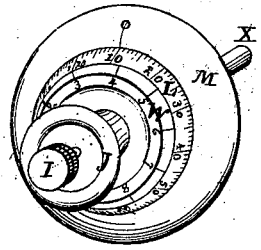

Fig. 7.

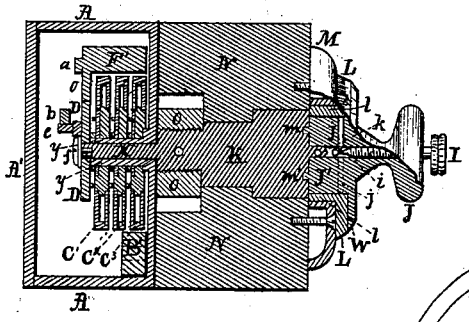

Fig. 10.

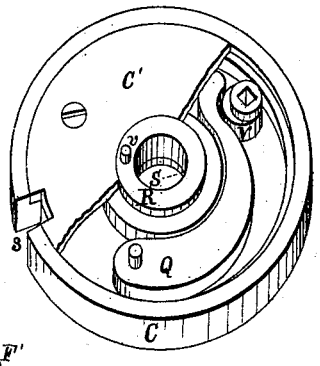

Fig. 8.

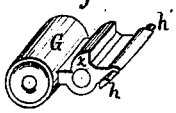

Fig. 9.

Witnesses:

W. C. Nutting

Geo. W. Sanderson.

Inventor:

Horace C. Hovey.

UNITED STATES PATENT OFFICE.

HORACE C. HOVEY, OF AYER, MASSACHUSETTS.

IMPROVEMENT IN COMBINATION-LOCKS.

Specification forming part of Letters Patent No. **167,764**, dated September 14, 1875; application filed April 21, 1875.

To all whom it may concern:

Be it known that I, HORACE C. HOVEY, of Ayer, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Combination-Locks; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings making a part of this specification, in which—

Figure 1 is a perspective view with the lid removed, showing the interior of the lock. Fig. 2 is also a perspective view of the same with the locking-arm removed. Fig. 3 is a perspective view of the locking-arm reversed. Fig. 4 is a perspective view of the bolt with the distributing-arms T T attached, showing their operation or connection with the combination-wheels C^1 C^2 C^3. Fig. 5 is a perspective view of the transmitting ring and pin. Fig. 6 is a plan view of the lock. Fig. 7 is a transverse section of the same. Fig. 8 is a perspective view of the weighted lever detached from the detent-pawl. Fig. 9 is a perspective view of the detent-pawl. Fig. 10 is a perspective view of one of the combination-wheels, with part of the cap broken away to show the interior construction of the wheels. Fig. 11 is a perspective view of the knob and dial work.

The same letters represent the same parts in all the figures.

This lock consists of a case or frame, A, Fig. 1, and sliding bolt B, to which is attached the connecting-arm E, by the shaft U, Fig. 3, which passes through the head of the bolt and turns therein. The locking-arm has a notch, *n*, in its lower edge, also a curved projection, *b*, and a detent, *c*, seen more plainly at Fig. 3. This detent engages with the detent *a* on the detent-pawl F. Shown more fully at Fig. 9. The detent-pawl is a forked lever, the two ends of which are connected by a fence-bar, F′. It also has a finger, O, projecting downward, so as to ride on the driving-wheel D, and hold up the detent-pawl F from the combination-wheels or tumblers C^1 C^2 C^3. The detent-pawl F swings on a spindle screwed firmly into the lock-case A. This spindle passes through holes in the two ends of the forked detent-pawl F, one of which is seen at Fig. 9. Between the two arms of the detent-pawl, and playing on the same spindle, is connected the weighted lever G, Fig. 8. This weighted lever has two projections, *h h′*, which engage with the under side of the detent-pawl F, for the purpose of raising the fence of the pawl from out the notches *s* in the combination-wheels, when it has dropped into them, and disengaged the connecting-arm E. This allows the combination-wheels to be thrown from their position when the bolt is drawn in, independent of the locking-arm. The weighted lever G has also a projection, *z*, which engages with a pin on the inside of the detent-pawl F, when the lock is turned from its horizontal position, so as to keep the detent in its position. The driving-wheel D has attached in its outer face the driving-pin *e*, Figs. 1, 2, and 6, which enters the notch *n* of the connecting-arm E, when it is disengaged from the finger of the detent-pawl, and serves to draw back the bolt when the wheel is revolved in the direction of unlocking the lock, and also to force out the bolt when the wheel is turned in the opposite direction. This wheel D also has a notch, *r*, in its periphery, into which drops the finger O of the detent-pawl F, when the notches *s*, Figs. 1, 2, 6, 7, and 10, of the combination-wheels C^1 C^2 C^3 have been brought into position beneath the bar F′ of the detent-pawl. This driving-wheel D is rigidly secured to the small part X of the spindle K, which passes through the hollow cylinder *y*, Fig. 7, which is cast to the frame A of the lock, and on which revolve the combination-wheels C^1, C^2, and C^3, motion being communicated to the combination-wheels by means of a transmitting-pin placed in the inner face of the driving-wheel D. This pin engages with the transmitting-pin *p*, Figs. 4 and 5, in the transmitting-ring S, which is placed in the faces of each of the inner disks R of the combination-wheels, Figs. 4 and 5, and revolves about the cylinder *y* with the combination-wheels, but has a motion in a recess prepared for it, shown at Fig. 4, concentric with the combination-wheels and independent of them, equal to twice the diameter of the transmitting-pin *p*, so as to allow of a complete revolution of each combination-wheel in each direction before one combination-wheel can start

the next one The interior disk R has in its opposite face a stationary pin, *v*, Fig. 10, which communicates motion to the transmitting-ring in the next combination-wheel. H, Figs. 1, 6, and 2, is a detent-lever, and is turned behind the bolt, as seen at Fig. 2, to prevent the bolt from being forced back until the lock is ready to be unlocked. This detent-lever has a projection, *d*, which rests on the top of the connecting-arm E, and is operated by the rising and falling of said connecting-arm E. N represents a portion of the door. (Seen more plainly at Fig. 7.) The spindle K, Fig. 7, is made conical, and has on its inner portion a strong thread cut, on which is screwed the nut O, Fig. 7, to prevent the spindle from being drawn out. On the outer portion of the spindle is a small projection, *k*, which enters into the portion J′ of the knob J, and is secured by a pin which passes through J′ *k*. There are also on the portion J of the knob two small pins, *m m′*, which project into the spindle K, so that if the dial should become broken off accidentally or otherwise it could be replaced by another dial, so as to unlock the lock. The outer dial W is attached to the knob firmly, or cast thereto, so as to move with it. This dial W is seen at Figs. 7 and 11. Underneath this dial, and cencentric with it, moves a graduated ring or dial, L, which has a flange, *l*, fitting around the portion J′ of the knob J, and extending inward to the face of the door N. This graduated ring L moves in a third face-ring, M, which is rigidly secured to the door by two screws. (Seen at Fig. 7.)

The graduated ring L is made fast to the outer dial or knob by the clamp-screw I, Fig. 7, which passes through the knob J, and, being conical on its inner portion, serves to force out the levers *j*, Fig. 7, against the inner flange *l* of the graduated ring L, and thereby clamp the knob and ring together, or to loosen the same by unturning the clamp-screw I. The use of this ring L is to prevent burglars from using a registering apparatus successfully. The distributing-arms T T′ (seen at Figs. 2 and 4) are secured to the bolt B, as shown in the figures, so as to slide between the combination-wheels. When the bolt is drawn back they come in contact with pins *q* placed in the faces of the combination-wheels, and throw the combination-wheels from their position, when the wheels move on by their own impetus and come to rest in a mixed condition, thus preventing the possibility of the combination being picked up, when the lock is unlocked, by an expert, as may be done in other locks.

The operation of the lock is as follows: First, to unlock it, unclamp the clamp-screw I, and turn the number selected on the outer dial W until it comes opposite the number also selected on the graduated ring L, and clamp the two by turning the clamp-screw I up firmly. Then, turn the knob J around three or more times, bringing the first number of the combination up slowly to the zero-point on the face-ring M, care being taken not to pass the zero-point. By this operation the combination-wheels are all brought together, and the notch *s* of the first combination-wheel is brought directly beneath the fence-bar F′ of the detent-pawl F. Now, turn the knob back, passing the zero-point with the first number twice, and bringing up the second number to the zero-point. This sets the second combination-wheel. Now, reverse the motion, and pass the zero-point with the last number, and bring up the third number to the zero-point, when the last and outer combination-wheel will be set, and the notches *s* of the combination-wheels will all be directly beneath the fence-bar F′ of the detent-pawl. Now, reverse the motion, and bring the number in combination with the outer dial W up to the zero-point, when the notch *r* in the driving-wheel D will be brought beneath the finger *o* of the detent-pawl F. The notches *s* of the combination-wheels all being in position, the detent-pawl is now at liberty to drop and disengage the connecting-arm E. This is accomplished by detent *a* of the detent-pawl and the detent *c* of the connecting-arm E moving in two different arcs of motion, their intersection-point being the point of rest of the two detents *a* and *c*, when the lock is locked. The detent-pawl F is at the same time returned by the weighted lever G. The notch *n* of the connecting-arm E now comes to rest on the engaging-pin *e*, and by turning the knob in the direction of unlocking the lock, causes the bolt to be drawn in, when the arms T T′ come in contact with pins *q* on the combination-wheels, and throw them from their position.

To lock the lock, turn the knob to the left a full revolution. This causes the pin *e*, acting in the notch *n*, to force out the bolt, when the pin *e* separates from the notch *n*, and, as it moves around, engages with the projection *b* of the connecting-arm, which it causes to rise, when the detent *c* of the connecting-arm engages with the under side of the detent *a* of the detent-pawl F, and causes it to rise upward, when the two detents separate, owing to their different arcs of motion, and the detent-pawl falls, with its finger *o* coming to rest on the edge of the driving-wheel D, and as the connecting-arm returns backward its detent *c* comes to rest on the top of the detent *a*. The combination-wheels having been previously thrown from their position, the pawl cannot again release the locking-arm until the wheels are brought into position.

To change the combination, first set the lock, the same as for unlocking it, omitting to bring the zero of the outer dial W up to the zero of the face-ring M; then pass the combination-key through the hole in the lid, and in through the eccentrics V of the combination-wheels, holding the key with the directing-pin downward, taking care to force the key entirely in; then turn the key half around to the left. This loosens the clamping-lever Q,

which clamps the inner disk R, so that they may be turned around freely. Now, set the lock on the new numbers, the same as you would unlock on them, then turn the key back and withdraw it, and the combination is changed.

I do not claim the outer face-ring M, nor the spindle K, the cylinder *y*, the combination-wheels C^1 C^2 C^3, nor the bolt B, all these devices being in use in other locks.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The adjustable graduated ring L, with its flange *l*, in combination with the knob J, sliding pins *j*, and conical pointed set-screw I, whereby the graduated ring may be released and readjusted to any position desired, substantially as described.

2. The pawl F, with its detent *a* and finger *o*, the weighted lever G, with its projections *h h'*, and the connecting-arm E, with its detent *c*, in combination with the notched driving-wheel D, and the notched combination-wheels C^1 C^2 C^3, substantially as and for the purpose set forth.

3. The combination of the driving-wheel D, with its pin *e*, the connecting-arm E, with its curved projection *b* and detent *c*, the pawl F, with its detent *a*, and the locking-lever H, with its projection *d*, substantially as set forth.

4. The combination of the distributing-arms T T', connected with the bolt B, and the combination-wheels with their pins *q*, substantially as described.

HORACE C. HOVEY.

Witnesses:

W. C. NUTTING,

G. W. SANDERSON.