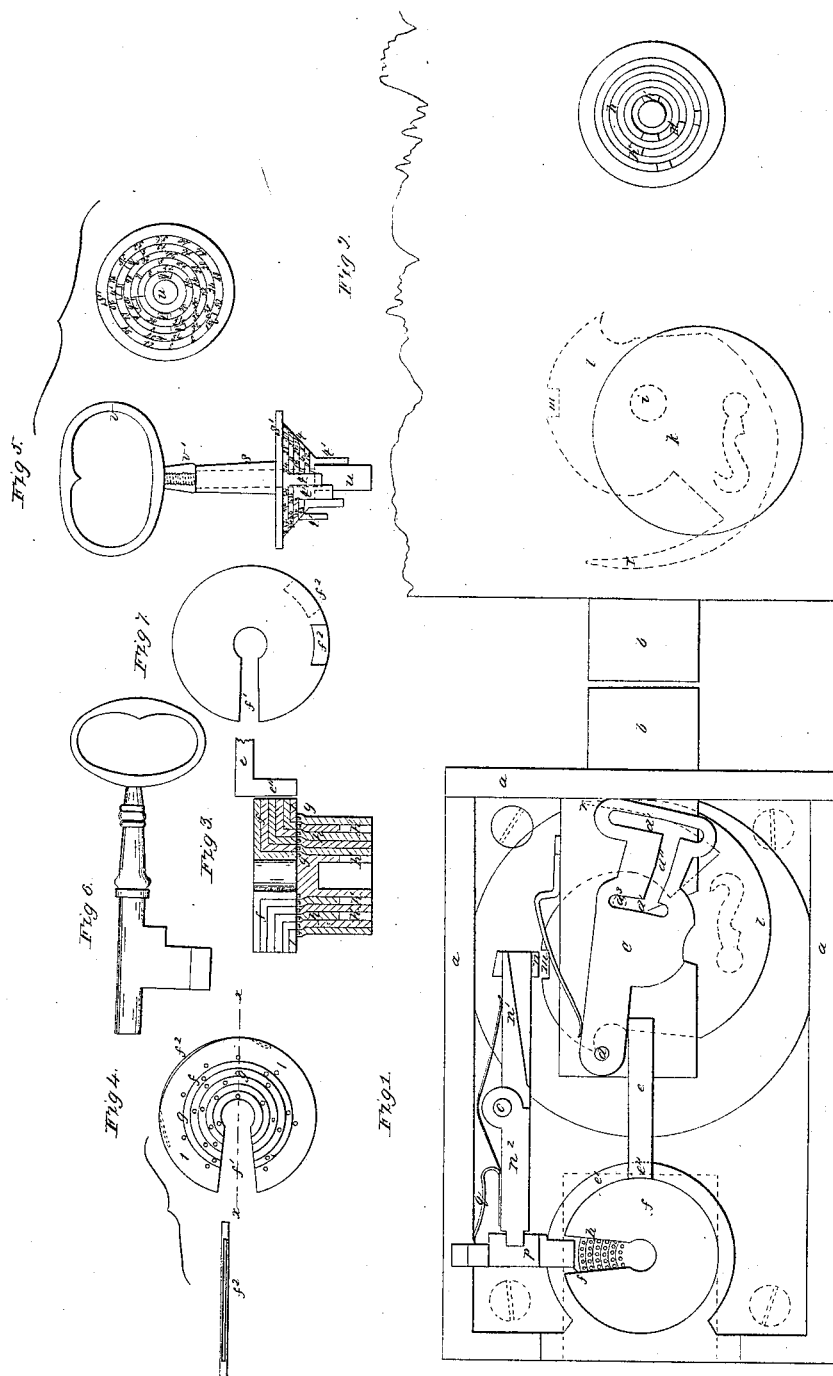


S. L. Chase,

Permutation Lock.

N^o 5,359.

Patented Nov. 6, 1847.



UNITED STATES PATENT OFFICE.

S. L. CHASE, OF LOCKPORT, NEW YORK.

COMBINATION LOCK AND KEY.

Specification of Letters Patent No. 5,359, dated November 6, 1847.

To all whom it may concern:

Be it known that I, S. L. CHASE, of Lockport, in the county of Niagara and State of New York, have invented an Improved Combination-Lock for Banks and other Purposes; and I do hereby declare that the following is a full, clear, and exact description of the principle or character thereof which distinguishes it from all other things before known and of the manner of making and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is an elevation of the interior of the lock, the cap plate being removed; Fig. 2, is the front of the lock or outside of the door on which it is placed showing the revolving wards and the boss or escutcheon that covers the key hole; Fig. 3, is a section through the revolving tumblers and wards on the line *x x* of Fig. 4, which is a plan of the underside of the tumblers next to the wards; Fig. 5, is a representation of the key that turns the tumblers to their proper position; Fig. 6 is the one used to throw the bolt; Fig. 7 shows a modification of the revolving ward.

The same letters indicate like parts in all the figures.

Many attempts have heretofore been made to construct safety locks by a combination of revolving disks that were required to be set before the bolt could be slipped but they have all been found to be so defective in their practical operation or so easily picked as to be useless in practice. By my combination of independent tumblers and wards together with the lock for the escutcheon to the keyhole I form a combination of such an infinite variety of changes as to prevent the possibility of its being fraudulently opened and the manufacturer of my lock has no advantage over any other person to open it.

This lock can be made of any size and strength to adapt it to the purposes required. The case is an oblong box (*a, a,*) in which the bolt (*b*) is fitted in the ordinary manner; on this bolt there may be fastened any number of tumblers (*c*) of a construction usual in many locks now in use; these tumblers turn on a pin (*d*) which attaches them to the bolt. They have two slits (*d'*) in them parallel to each other and formed on curved lines made from the pin (*d*) as a center. These slits are joined

by a third (*d''*) which intersects them at any distance from the bottom; a pin (*d³*) upon the plate of the lock enters these slits which prevents the bolt from being moved until the tumblers are raised.

On the inner end of the bolt there is a slim projecting piece (*e*) that extends back to the case (*e'*) of the revolving tumblers (*f*) the side of which it enters, the end (*e''*) being as broad as the thickness of all the tumblers used (see Fig. 3, *e''*). The case (*e'*) is of circular form and within it the tumblers (*f*) are placed; of these there may be any number but in Fig. 3 six are represented, the first or lower one marked (1) is a plain flat ring, the second, of the same outer circumference, is extended inward far enough to turn down at right angles with a flanch the lower edge of which is flush with the underside of the ring (1). The succeeding ones are made in the same way each extending inward far enough to project a flanch from it down even with the first. A plan of the under side of these flanches is shown in Fig. 4, in which it will be seen that from the edge of each flanch, one or more short pins (*g*) stand out which enter holes in a series of cylinders (*h*) equal in number to the tumblers. All the tumblers are cut through on one side to the center forming a notch (*f'*) the use of which will be hereafter explained. Each of the tumblers is furnished with a spring in its edge to prevent its turning; this spring consists of a piece of steel wire (*f²*) clearly shown in Fig. 4, the ends of which enter holes in the edge of the tumblers between which there is a recess for the spring to lay in.

The cylinders or wards (*h*) turn on each other and are made to flare a little on their inner ends next the tumblers so that they cannot be withdrawn. A view of a portion of the inner ends is shown in Fig. 1, where it will be seen there is a row of holes on each which extend entirely around the circle and it is obvious that either of the tumblers can be turned so that the pin (*g*) thereon shall enter either of the holes of the ward with which it is in connection. The inner end of the center ward is made solid so that no communication with the interior can be had in that way, the outer ends of the tubes or wards (*h*) have each a slit or notch (*h'*) cut into it a little distance. These outer ends are shown in plan at Fig. 2, and it is obvious that by putting an iron pin into

either of these notches that particular ward and the corresponding tumbler connected with it can be turned to any position; to slide the bolt back they must be turned so as to bring all the notches in the tumblers to correspond with each other as shown in Figs. 1 and 4, and then to turn them down so that the notches will be opposite the end of the projection (*e*) on the bolt which can then be made to slide into them to the center by means of the key Fig. 6, acting on the bolt when the tumblers can be turned again into any position to derange their order so that when the lock is standing unlocked the position of the notches in the wards cannot be taken, as is the case with those locks that most nearly resemble mine.

As an additional security I fasten a boss or escutcheon over the key hole in the following way. To a pin shown in Fig. 2, by the dotted lines (*i*) I attach a knob (*k*) eccentrically so that when it is turned it shall rise above the key hole. This pin extends through into the inside of the lock and on its inner end there is an eccentric (*l*) see Figs. 1 and 2, in the surface of which there is a notch (*m*) which when the keyhole is fastened up as shown in the figures is on the upper side and directly under the catch (*n*) on a vibrating arm (*n'*) that has its fulcrum on a pin (*o*) on which there is also another arm (*n²*) that extends back over the revolving tumblers (*f*) above described; these two arms (*n'*) and (*n²*) are fitted together with a rule joint so that neither can fall below a straight line with the other but either of them can be raised without interfering with the other.

When the keyhole is fastened up the catch (*n*) is in the notch (*m*) and the opposite arm (*n²*) is raised so as to raise a small bolt (*p*) that passes through the case of the tumblers up high enough to clear the said tumblers in their revolution; but when the notches (*f'*) in the tumblers (*f*) are all brought to the position shown in Fig. 1 directly under the bolt (*p*) that end which is the heaviest, and which may be aided by a spring (*q*) falls into and fastens the notches and raises the catch (*n*) on the opposite arm (*n'*) so as to relieve the eccentric (*l*) and allow the keyhole to be opened, the bolt and catch appear in this position in Fig. 1. When the eccentric is turned around far enough to open the key hole a hook (*r*) which is formed on said eccentric passes over the end of the arm (*n*) bears it down and raises the bolt (*p*) out of the notches of the tumblers so as to liberate them and allow them to turn around opposite the projection (*e*) on the bolt, which can then be thrown back by the key Fig. 6.

The operation therefore of this lock is as follows, the tumblers (*f*) can be set to any change on the wards (*h*) these latter are

then required to be set to the position that will bring all the notches of the tumblers coincident with each other by which means the notches (*h'*) in the outer ends of the wards are brought into the position caused by the combination and to this position the bits of the key about to be described are adjusted and with this the tumblers can be put in position to first relieve the escutcheon and secondly to allow the bolt to slide back.

The key is formed in the following way:—there is a stout tube (*s*) Fig. 5, having a disk (*s'*) affixed to it on which is placed a series of flat rings (*t*) corresponding in diameter and number with the movable wards; these rings may be chamfered off on their edges all around so as to form a cone as shown in the figure or they may be left square, but I prefer the former; on each of them an index is formed and from each a bit (*t'*) projects parallel with the shank of the key, these are held together and in place by a bolt (*u*) that passes through them and the tube (*s*) and terminates in a screw beyond as shown by the dotted lines; to the bow (*v*) of the key there is a nut (*v'*) affixed that screws on to the bolt (*u*) and holds all the pieces firmly together; the end of the bolt that projects beyond the bits enter the socket in the center ward and serves as a pivot on which the bits turn. To fit the key to the wards the screw is slackened and the bits are put into position to enter the notches in their corresponding wards, the screw is then turned so as to bind them fast in their places, their position is noted, and then when the door is locked and the order of the wards deranged the bits of the key can also be deranged, and it will be impossible to unlock the door without having the notation for the rearrangement of the bits. It is obvious that the changes can be indefinitely extended by this system and it is also obvious that no instrument can be introduced into the lock to pick it.

The face of the outer ends of the wards (*h*) are made of case hardened steel and a case hardened steel plate is introduced between the lock and the door to prevent drilling into the lock, a series of steel rings also hardened may be introduced between the wards and the tumblers as a further security against drilling, and by this means an additional variety of changes can be made by having holes made in said rings to receive the pins on the tumblers and pins to fit those in the wards; as this is so obvious I have omitted it in my drawings.

I have contemplated a modification of the tumblers which would give greater security to it by complicating the changes; a drawing of this modification is shown at Fig. 7, in which there are two series of notches formed in the tumblers, the one (*f'*) being

like that before described, the other (f^2) is made at some distance from it, the distance varying in each tumbler; these last named notches (f^2) are broader than the others and do not extend through to the center; their use is as follows—the key is first set so as to bring all the broad shallow notches into line and in position to receive the bolt (p) which then drops into them and relieves the eccentric (l) as before described, after which the key has to be again set for bringing the notches (f') into place to release the bolt, these last named notches are not in this case made large enough to receive the bolt (p).

Having thus fully described my invention what I claim therein as new and desire to secure by Letters Patent is—

1. A series of concentric revolving tumblers in connection with which are placed a similar set of revolving wards which are attached thereto, so as to be placed in a variety of positions in relation to the tumblers, eccentrically, in the manner described and so constructed that they can be turned without being deranged in an attempt to pick the lock, but cannot be put into position to construct a false key—or be unlocked

by the proper key without it is set to the proper numbers on the index to which the wards will correspond, the whole being constructed substantially in the manner and for the purpose set forth.

2. I claim the method of fastening up the key hole as above described, by means of a movable escutcheon and catch bolt as set forth,—in combination with the apparatus for freeing the tumblers for further change of position in drawing the bolt.

3. I claim throwing the projection on the bolt in to the center of the tumblers as described so that the wards can be disarranged when the door is unlocked to prevent an impression being taken from them.

4. I claim the key for setting the revolving tumblers constructed as above described having a series of concentric indexes for setting the disks and bits which are then firmly connected by a screw bolt passing through the center of them as above set forth.

S. L. CHASE.

Witnesses:

J. H. THAYER,
WM. H. BISHOP.