C. D. JUDD.

Combination-Lock.

No. 168,094. Patented Sept. 28, 1875.

Fig. 3.

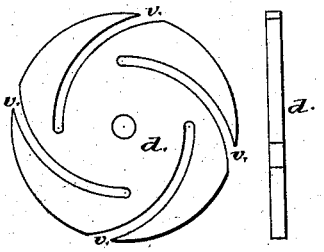

Fig. 4.

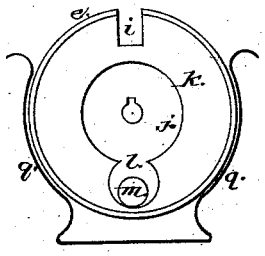

Fig. 5.

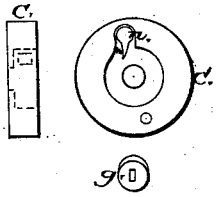

Fig. 1.

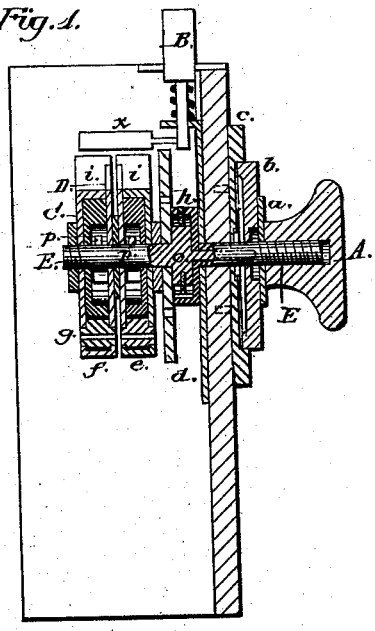

Fig. 2.

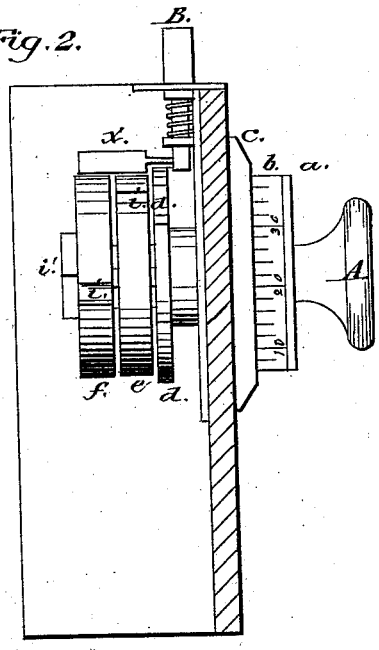

Fig. 6.

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CHARLES D. JUDD, OF EAST HAVEN, CONNECTICUT.

IMPROVEMENT IN COMBINATION-LOCKS.

Specification forming part of Letters Patent No. **168,094**, dated September 28, 1875; application filed April 28, 1875.

To all whom it may concern:

Be it known that I, CHARLES D. JUDD, of East Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Combination-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawing, which forms part of this specification.

My invention relates to that class of locks in which the parts may be set on numbers, so that it will lock and unlock only on those numbers; and consists in a novel construction and arrangement of parts, hereinafter more fully set forth and claimed.

In the drawing, Figure 1 represents a vertical section of the lock. Fig. 2 is a side view of the lock, a portion of the case being removed. The shaded surfaces represent the section of the case. Fig. 3 is a view of the circular plate provided with the curved slots for operating the bolt. Fig. 4 is a view of one of the tumblers. Fig. 5 is a view of one of the wheels and one of the eccentrics, which are placed in countersinks in the tumblers. Fig. 6 is a view of the spindle made in two parts.

The relative position of most of the parts of the lock, when it is together, is illustrated in Figs. 1 and 2.

A is the knob, provided with the circular plate *a*, and is attached to the spindle. This circular plate *a* has a line or mark across its edge for setting the graduated plate *b*. The graduated plate *b* is divided on its edge into one hundred parts with numbers to indicate the number of parts. This graduated plate is free to turn on the spindle. The circular stationary face-plate *c* is slightly countersunk on its front side, and the graduated plate *b* fits into the countersink. The bolt B of the lock is provided with a spiral spring, and with the fence-piece *x* at right angles to the bolt, which rests on the tumblers *e* and *f*, and keeps the bolt out or locked, except the slots in the tumblers are in line and under it, when it rests on the circular slotted plate *d*, and is moved in and out, carrying the bolt with it, by means of the curved slots *v* in the same, a portion of the piece *x* being made to fit in the curved slot. The plate *d*, with the curved slots *v*, is attached to the outer portion of the spindle E. The tumblers *e* and *f* are also shown in Figs. 1 and 2, with a slot, *i*, in the edge of each, into which slot the fence-piece *x*, attached to the bolt, drops. The two tumblers *e* and *f* are both alike, and are more clearly shown by a side view of the same in Fig. 4, where one of them is shown having a slot, *i*, in its edge, and two central countersinks, *j* and *k*, in its side, in the smallest of which the wheel C, Fig. 5, is placed, and a cap, D, for inclosing the wheel C, is placed in the larger countersink *k*. In the same Fig. 4 another countersink, *l*, in the tumbler is shown, cutting into the smaller of the two countersinks before mentioned, and is of the same depth. A circular hole, *m*, is made through the tumbler, in which the eccentric *g* turns. A corresponding hole is made in the cap D for the same purpose. The eccentric *g* (shown in Figs. 1 and 5) is provided with a slot, through which a key passes to operate it, and clamp the wheel C to the tumbler. Through the central holes in both the tumbler and cap D the spindle E passes. The circular wheel C, Fig. 5, has a central countersink in it larger than the spindle, and a slot or hole near its outer edge extending into said countersink. In this slot or hole is placed a catch, *n*, having its inner end beveled, and provided with a spiral spring for operating it, as shown in Fig. 5. Figs. 1 and 6 show the spindle E made in two parts, to the outer part of which the knob A and circular plate *d* are attached, and on which the graduated plate *b* turns; and it is provided on its inner end with a flange, *h*. A hole is drilled into its inner end, and the flange *h* is countersunk, as shown in Fig. 1. A pin from the edge of the flange extends into the countersink, also shown in Fig. 1. In this Fig. 1 the inner part of spindle E is also shown, the smaller part of which enters the drilled hole in the outer part and the larger part *o* of which enters the countersink in the flange on the outer part of the spindle. The pin on this larger part *o* engages the pin in the countersink of the flange, and turns the inner part of the spindle. The tumblers *e* and *f* are free to turn on this in-

ner part of the spindle, which is provided with the pins *p p*, which engage the spring-catches *n* in the wheels C of the tumblers, and give motion to the tumblers in opposite directions by means of the bevel on the catches, when the spindle is turned in opposite directions. In Fig. 2 *i'* is the nut holding the tumblers on the inner part of the spindle. In Fig. 4 the springs *q* are shown, which hold the tumblers from turning except when moved by the pins *p p* on the spindle. These springs *q* are attached to the case, and extend more than half-way around the tumblers.

To explain the operation of my lock I will suppose it to be locked on the numbers 20, 30, and 40. To unlock it hold the graduated plate *b* while you turn the knob and circular plate *a* until the mark on the circular plate *a* corresponds with the number 20 on the graduated plate *b*. Then release the graduated plate *b*, so that it may move with the spindle and knob. Then turn the knob to the right at least three revolutions. Stop when the number 30 on the graduated plate *b* corresponds with the mark on the face-plate *c*. This operation sets the front tumbler.

The reason of the three revolutions is in the construction of the lock. The two parts of the spindle are connected in such a way that the outer part may be turned nearly a revolution before it moves the inner part. So, too, the inner part may make nearly a revolution before the tumbler begins to move. Nearly a third revolution may be made or required to set the tumbler.

The next step is to turn the knob to the left at least three revolutions, and stop when the number 40 on the graduated plate *b* corresponds with the mark on the face-plate *c*. This operation sets the back tumbler. Then turn to the right again, and the bolt will be brought back unlocked. To lock, turn the knob one or two turns to the left.

The number 20 may be left to correspond with the mark on the circular plate *a*, and only the other two numbers used to operate the lock. The first number of the combination must always correspond with the mark on the circular plate *a*, or it will not unlock on the other two numbers, as will hereafter more fully appear. There are two methods of changing the numbers of the combination—one on the outside by means of the graduate plate *b*, another on the inside by means of a key. To change the numbers by the first method from 20, 30, and 40 to 15, 25, and 35, hold the graduated plate *b* and turn the circular plate *a* to the left until the mark on it corresponds with 15 on the graduated plate *b*. To change from 20, 30, and 40 to 25, 35, and 45, turn the circular plate *a* until the mark on it corresponds with 25 on the graduated plate *b*. To every number that you turn the circular plate *a* to the right from the old number 20, so many numbers must be added to the other two numbers, 30 and 40, and when turned to the left, subtracted.

In changing the numbers by the key or second method, only the last two numbers are changed. To change these numbers turn the circular plate to the left ten numbers, or make the first number of the combination less by ten. As the lock was set on 20, 30, and 40, turn the graduated plate until the number 10 corresponds with the mark on the circular plate *a*. Then proceed in exactly the same way as before described to unlock. This operation brings the key-hole in the cover of the lock and in the two eccentrics in the same line. Insert the key as far as it will go, about half its length; turn the key to the left. Push the key in some distance farther, and turn the key to the right. These operations release the tumblers, so that they do not turn with the knob and spindle, and, of course, can be set anew. Turn the knob at least three revolutions to the right, and until the desired number corresponds with the mark on the face-plate *c*. Then turn the key to the left, hard, and draw it half-way out. This operation sets the front tumbler on the desired number. To set the back tumbler, turn the knob to the left at least three revolutions, and until the desired number corresponds with the mark on the face-plate *c*. Then turn the key to the right, hard, and withdraw it. These operations set the tumblers on the new numbers. Turn back to the right the circular plate *a* ten numbers, and the lock is ready to operate on the new numbers or combination of numbers.

Having thus described my lock, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The circular plate *d*, attached to the outer spindle, and provided with curved slots for engaging the piece *x*, attached to the bolt B, and moving the bolt B back and forth, in the manner described, substantially as set forth.

2. The spindle made in two parts and connected by pins, in the manner described, allowing the outer part to be turned nearly a revolution before the pins again engage each other to move the inner part of the spindle, substantially as set forth.

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