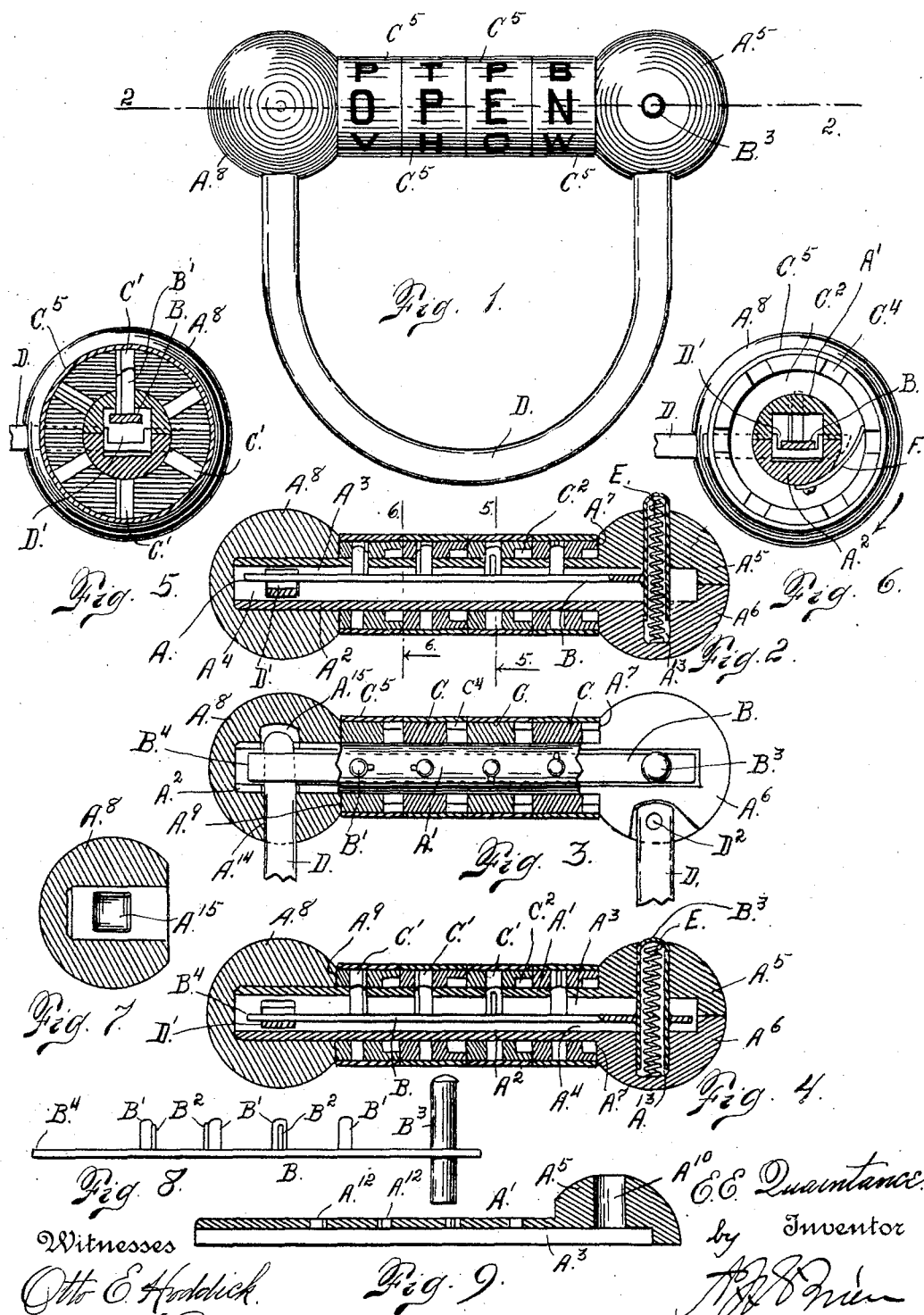


E. E. QUAINANCE.  
COMBINATION LOCK.

APPLICATION FILED MAY 12, 1904.



Witnesses  
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Fig. 9.

E. E. Quainance.  
by Inventor  
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# UNITED STATES PATENT OFFICE.

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## COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 785,834, dated March 28, 1905.

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*To all whom it may concern:*

Be it known that I, ELSWORTH E. QUAINANCE, a citizen of the United States of America, residing at Como, in the county of Park and State of Colorado, have invented certain new and useful Improvements in Combination-Locks; and I do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in combination-locks, my object being to provide a device of this character which shall be simple in construction, economical in cost, reliable, durable, and efficient in use; and to these ends the invention consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is an elevation of my improved lock. Fig. 2 is a longitudinal section of the same on the line 2 2, Fig. 1, the parts being shown in the unlocked position. Fig. 3 is a similar view, partly in elevation and partly in section, taken at right angles to the section of Fig. 5. In this view one extremity of one member of the spindle is broken away, showing the locking-bar in elevation. Fig. 4 is a section taken on the same plane as Fig. 2, but with the parts in the locked position. Fig. 5 is a section taken on the line 5 5, Fig. 2, the parts being shown on a larger scale. Fig. 6 is a section taken on the line 6 6, Fig. 2, the parts, however, being shown in the locked position and on a larger scale than in Fig. 2. Fig. 7 is a sectional view in detail of the knob applied to one extremity of the spindle. Fig. 8 is an elevation of the locking-bar. Fig. 9 is a detail view of one member of the hollow spindle.

The same reference characters indicate the same parts in all the views.

Let A designate a spindle composed of two parts A' and A<sup>2</sup>. Each of these spindles is

longitudinally recessed, as shown at A<sup>3</sup> and A<sup>4</sup>. These two longitudinal recesses register, making a hollow spindle, in which is located the locking-bar B. The two spindle parts are respectively provided with knob extremities A<sup>5</sup> and A<sup>6</sup>, which when the parts are assembled form a ball extremity, as indicated in the drawings. This ball extremity is provided with an offset or shoulder A<sup>7</sup>. To the extremity of the spindle, remote from the parts A<sup>5</sup> and A<sup>6</sup>, a ball A<sup>8</sup> is applied, the said ball, as shown in the drawings, consisting of an integral piece of material recessed to receive the spindle and when in place holds the two spindle parts in operative relation. The ball or knob A<sup>8</sup> is provided with a shoulder or offset A<sup>9</sup>, surrounding the spindle. Between the offsets or shoulders A<sup>7</sup> and A<sup>9</sup> is located a number of tumblers C, which are mounted to rotate on the hollow spindle. Each tumbler is provided with a number of recesses C', of slightly different shape, arranged in a circular zone. One recess of each tumbler is adapted to receive a pin B' of the locking-plate B when the tumbler is rotated to bring the proper recess C' into position to allow the pin to enter.

Attention is called to the fact that only one recess C' of each tumbler is shaped to receive the pin B', located in the same cross-sectional plane. The recesses C' do not pass entirely through the tumbler, but terminate at the outer shell of the latter, upon which are formed letters or other suitable characters. (See Fig. 1.) The tumblers may be so arranged on the spindle that when any particular combination of letters on the outer shell of the tumblers is brought together the lock may be opened. To open the lock, it is necessary that the locking-bar B be actuated to release its extremity B<sup>1</sup> from a bend or offset D', formed in one extremity of the hasp D, the other extremity of the hasp being pivotally connected with the knob extremity of the spindle, as shown at D<sup>2</sup>.

To the extremity of the locking-bar opposite B<sup>1</sup> is applied a tube B<sup>3</sup>, adapted to enter recesses formed in the knob parts A<sup>5</sup> and A<sup>6</sup> of the spindle. One of these recesses—namely, that designated A<sup>10</sup>—extends entirely through

the knob part to allow the closed extremity of the tube B<sup>3</sup> to protrude when the locking-bar is in the unlocked position. (See Fig. 2.) The recess A<sup>13</sup> of the knob part A<sup>6</sup> is closed at its outer extremity to form a seat for a coil-spring E, whose opposite extremity engages the closed end of the tube B<sup>3</sup>. By virtue of this construction the spring, which is under suitable tension, has a tendency to throw the locking-bar to the unlocked position and will so actuate the locking-bar when the tumblers are turned to permit this action or into such position that the recesses C' are properly arranged to allow the corresponding pins B' to enter them. When it is desired to lock the device, the tubular part B<sup>3</sup> is pressed downwardly sufficiently to disengage the pins B' from the recesses C', whereby the extremity B<sup>4</sup> of the locking-plate is made to engage the offset D' of the hasp, after which one or more of the tumblers is turned to bring its recess C' out of line with the correspondingly-shaped pin B' of the locking-bar.

Each tumbler is provided with a circumferential recess C<sup>2</sup>, into which projects a leaf-spring F, the said springs being attached to the member A<sup>2</sup> of the hollow spindle. In the drawings only one of these springs is shown—namely, in Fig. 6; but further illustration is not thought necessary, since the springs are all alike. These springs normally or temporarily hold the tumblers in the adjusted position and at the same time prevent them from rotary movement in the wrong direction. The outer extremities of these springs F engage the outer walls of the circumferential recesses C<sup>2</sup> and engage recesses C<sup>4</sup>, formed at suitable intervals in the tumblers, whereby there is a distinct click every time a recess C<sup>4</sup> of the tumbler passes a spring.

Attention is called to the fact that the member A' of the hollow spindle is provided with orifices A<sup>12</sup>, corresponding in shape to the pins B' of the locking-bar, whereby these pins are allowed to pass freely through the openings A<sup>12</sup>. Indeed the outer extremities of the pins B', even when the locking-bar is in the unlocked position, engage the openings A<sup>12</sup> of the hollow spindle member A'.

The outer part C<sup>5</sup> of each tumbler is made fast to the inner body portion of the tumbler, but, as shown in the drawings, consists of a distinct piece which is shrunk or otherwise secured to the tumbler.

In assembling the parts the spring E is first placed in the tube B<sup>3</sup> of the locking-bar, after which the open extremity of the said tube is dropped into the recess A<sup>13</sup> of the knob extremity of the spindle member A<sup>2</sup>. In this event the body of the locking-bar B is located within the recess A<sup>1</sup> of the spindle member A<sup>2</sup>. The spindle member A' is then placed in position, so that the closed extremity of the tube B<sup>3</sup> enters the opening A<sup>10</sup> and so that its

openings A<sup>12</sup> are engaged by the pins B' of the locking-bar. The tumblers C' are then placed in position on the spindle, one of them abutting against the shoulder A<sup>7</sup> of the knob extremity of the spindle. The knob A<sup>8</sup> is then applied to the extremity of the spindle remote from the knob parts A<sup>5</sup> and A<sup>6</sup>, whereby the tumblers are held between the two knob extremities of the spindle. The knob A<sup>8</sup> may be secured in position in any suitable manner, or it may be simply made to fit tightly on the spindle end. The tumbler should be so put in place that the locking-bar is in the locked position. After the knob A<sup>8</sup> has been applied the tumblers may be turned to bring their recesses C' into register with the pins B' to allow the locking-bar to assume the unlocked position. The extremity of the hasp containing the offset or bend D' is then inserted in an opening A<sup>11</sup>, formed in the knob A<sup>8</sup>, whereby the bend or offset D' of the hasp is brought into position to allow it to be entered by the extremity B<sup>4</sup> of the locking-bar B, after which the locking-bar may be thrown to the locking position by pressing inwardly on the outer extremity of the tube B<sup>3</sup>. Then by turning one or more of the tumblers the locking-bar is retained in the locked position. If it is desired to leave the lock so that it can be unlocked in the dark, one of the tumblers should only be shifted a short distance—for instance, the space between the recesses C<sup>4</sup>. This will be known by the click of the spring F when its extremity enters the first recess C<sup>4</sup>. As there are six of these recesses, the operator will know that when he turns this tumbler five clicks, or a sufficient distance to hear the click of the spring E five times, the tumbler will again be in the unlocked position. This is an important feature in a lock of this character.

As shown in the drawings, the different shapes of the pins B' result from applying a feather or tongue B<sup>2</sup> to the said pins on different sides. Of course any other suitable manner of accomplishing this object may be employed. Attention is also called to the fact that the tumblers are temporarily locked in place by the outer rounded extremities of the pins B', which slightly enter the recesses C' of each tumbler every time a recess is brought into register with the pin extremity, since the feathers B<sup>2</sup> of the pins B' are slightly shorter than the pins. This engagement of the outer rounded extremities of the pins with the recesses C' causes a distinct click every time a recess C' passes a pin.

From what has already been stated it will be understood that the combination of the lock may be changed by changing the relative position of the tumblers upon the spindle. This may of course be done by removing the knob A<sup>8</sup> and taking off two or more tumblers.

The knob A<sup>8</sup> is provided with a recess A<sup>15</sup>,

located directly opposite the opening A<sup>14</sup>, to receive the extremity of the hasp which protrudes beyond the offset D'.

Having thus described my invention, what I claim is—

1. In a lock, the combination of a hollow spindle having a knob at one extremity provided with a transverse recess open at its outer end, a locking-bar located within the hollow of the spindle and having a transverse tube entering the recess of the knob extremity of the spindle, a coil-spring located in said tube and of sufficient tension to have a tendency to cause the tube to protrude through the open extremity of the recess, the locking-bar being provided with pins of different shape adapted to enter openings formed in the spindle, a number of tumblers mounted on the said spindle, each tumbler having a number of openings one of which is adapted to receive a pin of the locking-bar when the tumbler is properly adjusted, a knob applied to the extremity of the spindle remote from the knob extremity of the latter, a hasp pivotally connected with the knob extremity of the spindle and adapted to enter an opening formed in the detachable knob of the spindle, the extremity of the hasp remote from its pivoted end having an offset adapted to be engaged by the locking-bar when in the locked position.

2. In a lock, the combination of a hollow spindle having a knob at each extremity, tumblers mounted on the spindle between the knobs, each tumbler being provided with a number of recesses, a locking-bar located and having a transverse movement within the hollow of the spindle, the said bar having a number of pins of different shape located in the zones of the recesses of the respective locking-bars, the spindle being provided with openings to receive the pins of the locking-bar, one recess of each tumbler being shaped to receive a pin of the locking-bar, a spring acting on the locking-bar with a tendency to normally cause its pins to enter the recesses of the different tumblers by a transverse movement within the spindle, and a hasp pivotally connected with one extremity of the spindle, the opposite extremity being provided with an opening to allow the opposite end of the hasp to enter, the last-named end of the hasp being shaped to engage the locking-bar when the latter is in the locked position.

3. In a lock, the combination of a hollow spindle having a knob at each extremity, one

knob being detachable, a number of tumblers revolubly mounted on the spindle and having a number of recesses, a spring-actuated locking-bar located within the hollow of the spindle and provided with pins shaped to enter one recess of each tumbler, the spindle also having openings to receive the respective pins of the locking-bar, the latter having a transverse movement within the spindle to allow it to assume the locked or unlocked position, a hasp pivotally connected with one extremity of the spindle, the opposite extremity of the latter having an opening to receive the free extremity of the hasp which is shaped to interlock with the locking-bar when the latter is in the locked position.

4. In a lock, the combination of a hollow spindle having enlarged shouldered extremities, tumblers revolubly mounted on the spindle between the said shoulders, each tumbler being provided with a plurality of recesses, a spring-actuated locking-bar located within the hollow of the spindle and having a number of pins one for each tumbler, the said pins being located to enter the recesses of the tumblers, one recess of each tumbler being adapted to receive the pin of the locking-bar located in the zone of the recesses of the said tumbler, the said bar having a transverse movement within the spindle to allow it to assume the locked or unlocked position, and a hasp movably connected with the spindle extremities, one extremity being shaped to engage the locking-bar.

5. The combination of a hollow spindle having enlarged shouldered extremities, tumblers located between the extremities of the spindle and revolubly mounted thereon, each tumbler having a number of recesses, a spring-actuated locking-bar located within the spindle and having a pin for each tumbler, the pins being shaped to enter one recess of each tumbler, each tumbler having also a circumferential groove surrounding the spindle, and a number of recesses formed in the outer wall of the groove, and a number of leaf-springs corresponding with the number of tumblers, the said springs being attached to the spindle and protruding into the said grooves.

In testimony whereof I affix my signature in presence of two witnesses.

ELSWORTH E. QUAINANCE.

Witnesses:

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THOS. W. MOORE.