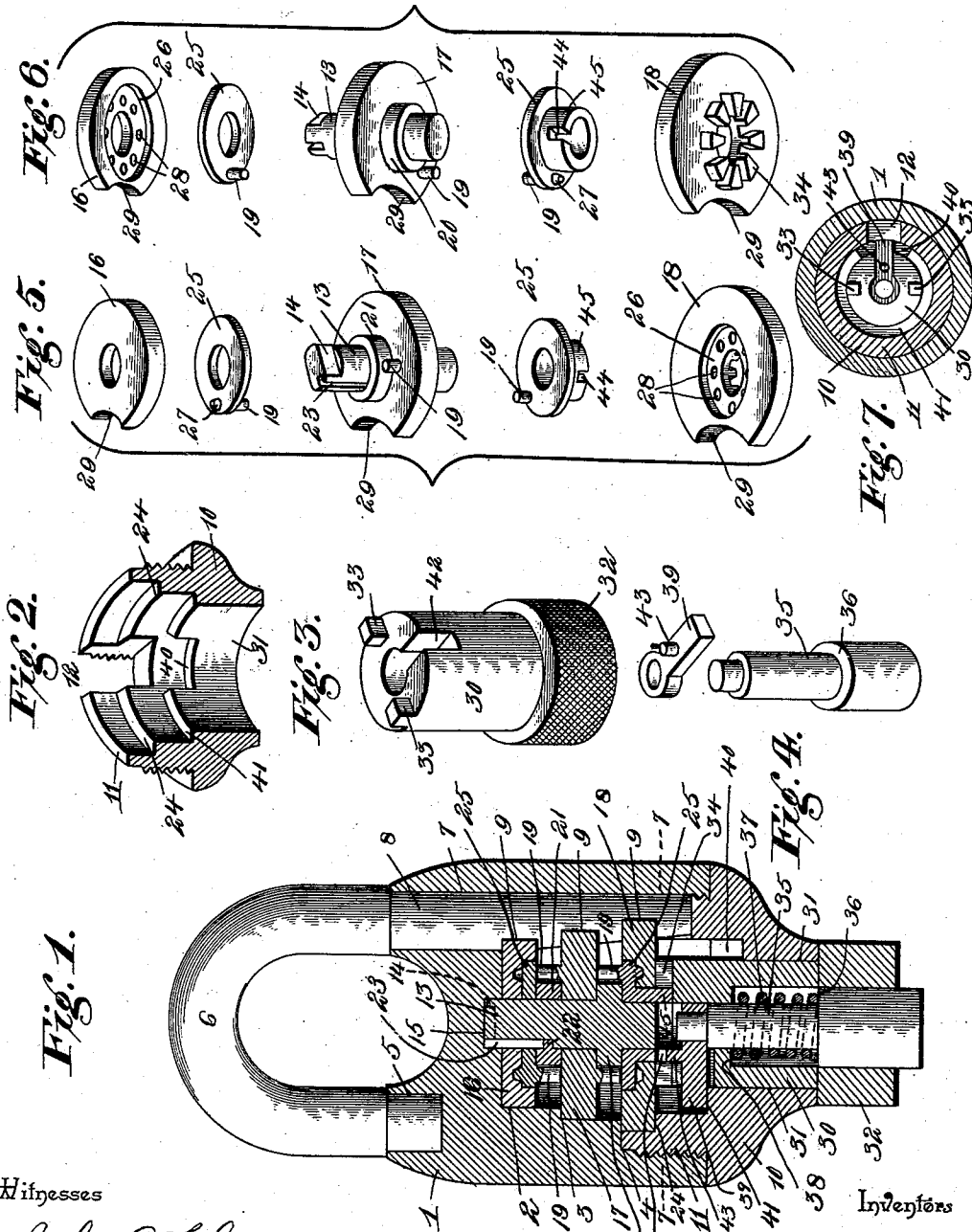


(No Model.)

J. E. SPENCER & J. C. SANDERS.
COMBINATION PADLOCK.

No. 531,656.

Patented Jan. 1, 1895.



Witnesses

John C. Shaw
[Signature]

By their Attorneys,

Joseph E. Spencer
John C. Sanders,

Chas. H. [Signature]

Inventors

UNITED STATES PATENT OFFICE

JOSEPH E. SPENCER AND JOHN C. SANDERS, OF HAVRE DE GRACE,
MARYLAND.

COMBINATION-PADLOCK.

SPECIFICATION forming part of Letters Patent No. 531,656, dated January 1, 1895.

Application filed January 31, 1894. Serial No. 498,644. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH E. SPENCER and JOHN C. SANDERS, citizens of the United States, residing at Havre de Grace, in the county of Harford and State of Maryland, have invented a new and useful Combination-Padlock, of which the following is a specification.

Our invention relates to combination padlocks, and has for its object to provide a device which may be operated either to lock or unlock by the sense of touch rather than by sight, in order that the operation may be accomplished in the dark.

A further object of our invention is to so improve and simplify the lock as to reduce to a minimum the risk of displacement of the parts and also to reduce the cost of manufacture.

Further objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claims.

In the drawings:—Figure 1 is a vertical central section of a lock embodying our invention. Fig. 2 is a sectional perspective of the removable cap detached. Fig. 3 is a detail view in perspective of the operating stem. Fig. 4 is a similar view of the push-rod with its lateral arm detached from the shank. Fig. 5 is a detail view in perspective of the system of tumblers and tumbler-carried adjustable disks disassembled showing the upper sides of the parts. Fig. 6 is a similar view showing the lower sides of the parts. Fig. 7 is a horizontal section on the line 7—7 of Fig. 1, showing the construction and arrangement of the parts carried by the removable cap.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 designates the casing of the improved lock, the walls of the cavity of which are formed with a series of steps or shoulders 2, 3 and 4, respectively. A socket 5, which is formed in one side of the upper end of the casing, is adapted to receive the extremity of the short leg of the shackle 6, and the extended socket 7 at the opposite side of the casing is adapted to receive the long leg 8 of the shackle, such leg being provided in its

inner side with a series of spaced notches 9, the intervals between which correspond with the intervals between the steps or shoulders upon the walls of the cavity in the casing.

Threaded in the lower end of the casing is the cap 10, the threaded flange 11 of which extends to and bears upon the shoulder 4, and is provided at a point aligning with the elongated socket 7 in the casing with an opening or notch 12, into which fits the extremity of the long leg of the shackle when the latter is in place to prevent the removal of the cap when said shackle is locked therein.

13 represents a spindle, which is arranged axially in the cavity of the casing, and is provided with a squared or flattened end 14, which fits in a correspondingly shaped depression 15 in the upper end of the casing, whereby said spindle is held from rotation, and upon the spindle are rotatably mounted the tumblers 16, 17 and 18, which are seated respectively upon the shoulders or steps 2, 3 and 4, and carry upon opposite sides the pins 19, which are adapted to engage with each other to communicate rotary motion from one tumbler to the next. The intermediate tumbler 17 is held in place upon the spindle 13 by means of collars 20 and 21 respectively, of which the former may, as shown in the drawings, be fixed to or integral with, the spindle, while the latter is fixed against rotary movement by means of a feather 22 engaging a groove 23. The upper and smallest tumbler 16 is arranged above the removable collar 21, and the lower and largest tumbler 18 is arranged below the lower collar 20, and is supported by a shoulder 24 upon the threaded flange 1 of the cap.

In order to allow for changing the combination of the lock or changing the relative positions of the pins 19 whereby motion is communicated from one tumbler to another, we arrange said pins upon adjustable disks 25, which are fitted in cavities 26 in the faces of the tumblers and are provided with lugs 27 to engage either of a series of depressions 28 formed in the floors of the cavities 26. By fitting the lugs in different depressions, the positions of the pins 19 with relation to the notches 29, which are arranged to register with the extended socket 7 in the casing, are

changed. In the drawings we have shown the intermediate tumbler provided with non-adjustable pins 19, said pins being fixed directly to the tumbler, but it will be understood that the construction shown in connection with the terminal tumblers 16 and 18 and embodying the adjustable disks 25 carrying the pins and lugs may be applied to said intermediate tumbler, and, furthermore, that the number of intermediate tumblers may be multiplied to suit the requirements, the size of the lock, &c.

30 represents the operating-stem, which is tubular and is rotatably and slidably mounted in a bearing 31 at the center of the cap 10, said operating stem being provided at its outer end beyond the cap with a milled head 32 and at its inner end with projections 33 arranged at diametrically opposite points and adapted to engage the teeth of a circular rack 34, which is arranged upon the under surface of the terminal tumbler 18, whereby motion may be communicated from the operating-stem to the first tumbler of the series and from thence through the intermediate tumblers to the opposite terminal tumbler 16, in order that the said parts may be set and unset as required. This operating stem is capable of a limited longitudinal or sliding movement, whereby its projections 33 may be engaged with or disengaged from the teeth of the said rack 34 as may be required.

Slidably fitted in the axial bore of the operating-stem is a push-rod 35 which projects at its outer end slightly beyond the extremity of the milled head of the stem and is shouldered, as shown at 36 to bear against the outer end of a return spring 37 arranged in the bore of the operating stem around the push-rod and bearing at its inner end against the shoulder 38 formed by the reduced upper end of the bore. This spring is adapted to normally hold the push-rod extended with the arm 39 arranged in the sector-shaped recess 40 in the floor of the cap, but by pressing the push-rod upward or inward to raise said arm 39 above the plane of the shoulder 41, said arm is disengaged from the sector-shaped notch or recess, thus permitting the operating stem to be rotated. The arm 39 operates in a radial slot 42 in the operating stem, whereby the push-rod and operating stem rotate in unison and therefore when the push-rod is in its retracted position and is in engagement with the sector-shaped recess 40 the operating-stem is locked against rotation. The arm 39 carries a pin 43, which is adapted to engage a notch 44 in a rim 45, which is carried by the adjustable disk 25 attached to and carried by the terminal tumbler 18.

This being the construction of our improved lock, the operation thereof is as follows:—The first step necessary in order to adjust the tumblers to bring the peripheral notches in alignment with the extended socket 7 of the casing is to engage the projections 33 of the operating stem with the proper teeth of the rack 34. To accomplish this, when the oper-

ating stem is in its extended position with its projections out of engagement with the rack, the stem is pushed upward and then the push-rod is pushed in to cause its pin 43 to engage the notch 44. If said notch is in alignment with the pin 43 the push-rod may be elevated sufficiently to disengage the arm 39 from the recess 40, thus permitting the operating stem to be rotated and showing that the operating stem is in engagement with the proper teeth of the rack 34; and therefore that the first step of the operation is completed; but if the pin 43 strikes against the edge of the rim 45 the push-rod cannot be moved inward a sufficient distance to disengage its arm 39 from the recess 40, and therefore the operating stem cannot be rotated. The size of the recess 40 is sufficient to allow a slight rotary movement of the operating stem when the arm 39 is in engagement with the recess, the extent of such movement being equivalent to the distance between two adjacent teeth of the rack 34. Therefore if upon elevating the operating stem and extending the push-rod it is found that the pin 43 does not engage the notch 44, the operating stem is rotated to the right as far as the width of the recess 40 will permit, is then drawn outward to disengage its projections 33 from the rack, and is turned to the left as far as said width of the recess 40 will allow, is then pushed inward again and engaged with the rack as before, in this case obviously engaging with different teeth than before. If the pin 43 still fails to engage the notch 44 the operation above described is repeated until the terminal tumbler 18 has been turned sufficiently to bring about the necessary registering of the parts. Having found by this means the proper relative positions of the operating stem and the terminal tumbler adjacent thereto, the operation of aligning the peripheral notches of the tumblers proceeds as with ordinary rotary tumbler-locks, namely: by turning alternately in opposite directions and causing the pins 19 to engage successively to set the tumblers, beginning with that which is most remote from the application of movement, but as the push-rod is spring-actuated it will be understood that the arm 39 will spring into the recess 40 and lock the operating stem at the end of each complete rotation, thus indicating the number of rotations and enabling the operator to judge of the extent of movement imparted to the various tumblers comprising the lock. This enables the lock to be operated without the assistance of sight. If during the operation of the lock, after the proper relative positions of the operating stem and adjacent tumblers have been attained, the stem is allowed to drop out of engagement with the rack 34 and is rotated independently of the said adjacent tumbler, said proper relative positions are lost and must be sought, as above described, but in this connection it should be noted that after the arm 39 has been disen-

gaged from the recess 40 and is elevated sufficiently to pass over the shoulder 41, thus permitting the rotation of the stem, the spring 37 will serve to hold the operating stem in engagement with the rack 34. The notched ring 45 by which, in connection with the pin carrying arm 39 of the push rod, the proper relative positions of the operating stem and contiguous tumbler are ascertained, being carried by the disk 25, the pin 19 of said contiguous tumbler is adjusted simultaneously with the changing of the combination, thus avoiding an independent adjustment thereof.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

Having described our invention, what we claim is—

1. In a device of the class described, the combination with a series of rotary tumblers, and means for communicating motion from one to another, of a rotary and longitudinally movable operating stem provided with projections to engage a rack upon the contiguous terminal tumbler, a notched rim carried by said tumbler, an arm slidably mounted and held from lateral movement in the operating stem and provided with a pin to engage said notched rim, and means to engage and stop said arm when its pin is disengaged from the notch in the rim, substantially as specified.

2. In a device of the class described, the combination with a series of rotary tumblers, and means for communicating motion from one to another, of a rotary and slidable operating stem provided with projections to engage a rack upon the contiguous terminal tumbler, a notched rim carried by said terminal tumbler, an arm mounted upon the operating stem and capable of longitudinal movement independent thereof and carrying a pin to engage a notch in said rim, and a shouldered casing having a recess to receive said arm in its retracted position and support the same in its extended position, substantially as specified.

3. In a device of the class described, the combination with a casing, a series of rotary tumblers, and means for communicating motion from one to another, of a rotary and longitudinally movable operating stem provided with projections to engage a rack upon the contiguous terminal tumbler, a push-rod slidably mounted in said operating stem and provided with a retracting spring, and an arm fixed to the inner end of said push-rod fitting the radial slot in the stem and provided with a pin to engage a notched rim carried by said terminal tumbler, said casing being provided with a shoulder 41, and a sector-shaped recess 40, substantially as specified.

4. In a device of the class described, the combination with a casing, a cap removably threaded in the lower end thereof and pro-

vided with a shoulder 41, a recess 40, and a central bearing, a series of rotary tumblers mounted in the cavity of the casing, and means for communicating motion from one tumbler to another, of a tubular stem mounted rotatably and slidably in said bearing in the cap and provided with projections to engage a rack upon the said contiguous tumbler, a push-rod mounted slidably in the bore of said operating stem, an actuating spring connected with said push-rod to normally hold it in a retracted position, an arm fixed to the inner end of the push-rod and fitting in a radial slot in the operating stem, and a pin carried by said arm to engage a notched rim carried by said tumbler, whereby when the push-rod is retracted the arm carried thereby is in engagement with said recess and the stem is held from rotary movement, and when said push-rod is pressed inward to engage the pin with a notch in the rim carried by the tumbler said stem may be rotated to cause the outer end of said arm to engage the surface of the shoulder, thereby maintaining the projections of the stem in engagement with the rack of the terminal tumbler, substantially as specified.

5. In a device of the class described, the combination with a casing, of a series of tumblers mounted upon a fixed axially disposed spindle, revolubly adjustable disks fitting in cavities in the faces of the tumblers and provided with lugs to engage depressions in the floors of said cavities, a notched rim fixed to and carried by the disk of the terminal tumbler adjacent to the lower end of the casing, an operating stem provided with projections to engage a rack upon said terminal tumbler, and a push-rod having an arm fitting in a radial slot in said operating stem and provided with a pin to engage a notch in said rim, substantially as specified.

6. In a device of the class described, the combination of a casing having the walls of its cavity provided with a series of steps or shoulders increasing in diameter toward the lower end of the casing, a series of tumblers mounted upon a central fixed spindle and bearing respectively upon said steps or shoulders, a removable cap having a threaded flange fitting in the lower end of the casing and provided at its inner surface with a shoulder to engage the under side of the adjacent terminal tumbler, a shackle having one of its legs provided with notches agreeing in arrangement to the steps or shoulders upon the walls of the casing and adapted to fit in a notch in said threaded flange of the cap, and means carried by the cap for operating the adjacent terminal tumbler, substantially as specified.

7. In a device of the class described, the combination with a casing having a shouldered cavity, of a spindle arranged axially in said cavity and having a flattened portion stepped in a corresponding depression in the end of the cavity, a series of tumblers rotat-

ably mounted upon said spindle and bearing
upon the shoulders of the cavity, collars ar-
ranged upon the spindle and interposed be-
tween contiguous tumblers, means carried by
5 the tumblers for communicating motion from
one to another, a shackle having one of its
legs notched to be engaged by the tumblers,
and means for operating a terminal tumbler,
substantially as specified.

In testimony that we claim the foregoing as
our own we have hereto affixed our signatures
in the presence of two witnesses.

JOSEPH E. SPENCER.
JOHN C. SANDERS.

Witnesses:

J. W. FOSTER,
L. A. VOSBURY.