(No Model.)

A. B. STEEN.

PERMUTATION PADLOCK.

No. 601,801. Patented Apr. 5, 1898.

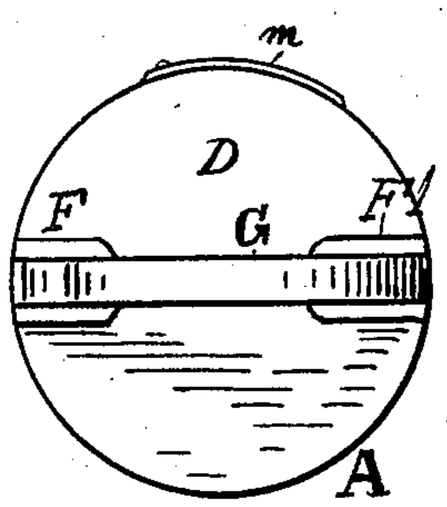

Fig. 1.

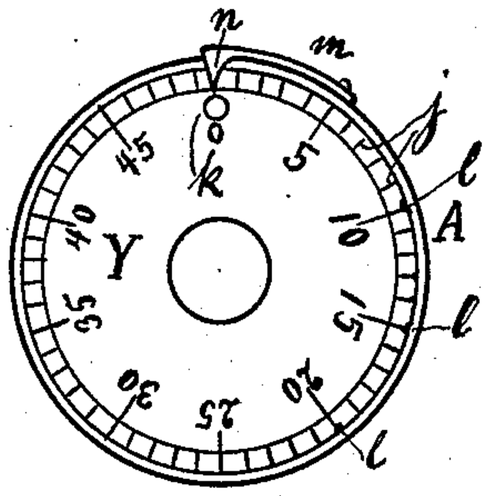

Fig. 2.

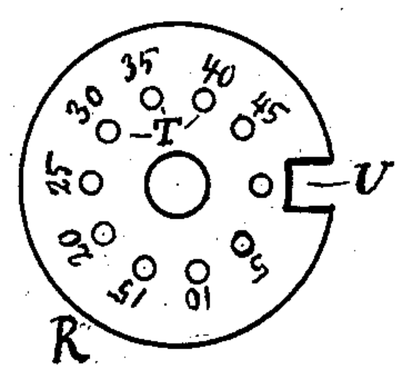

Fig. 5.

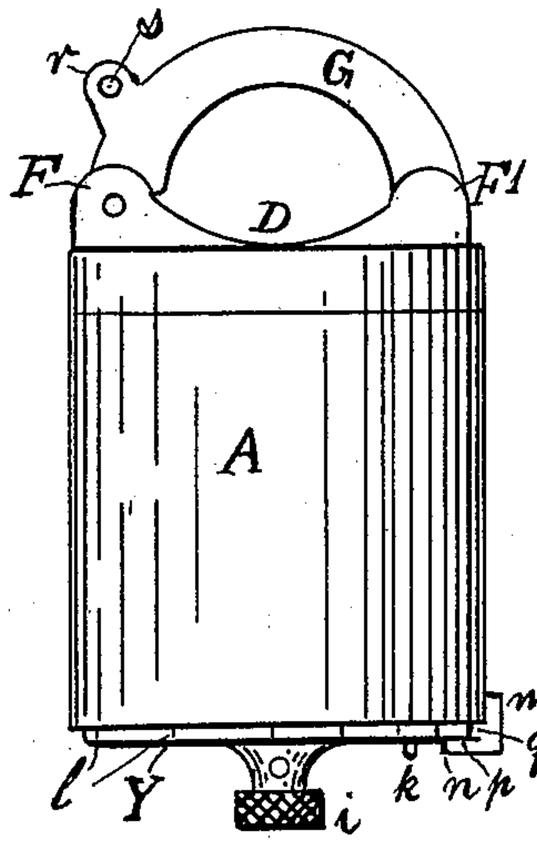

Fig. 3.

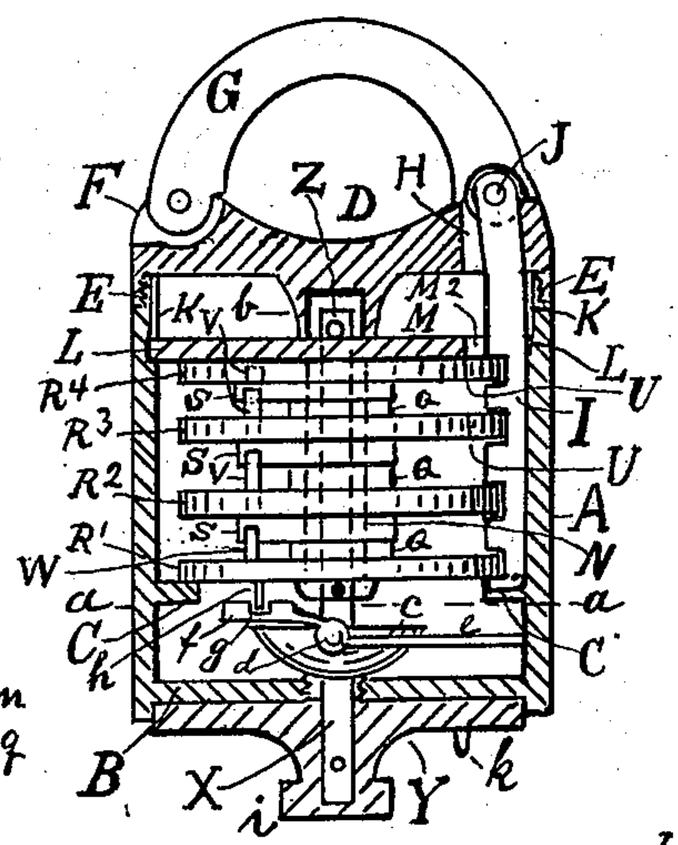

Fig. 4.

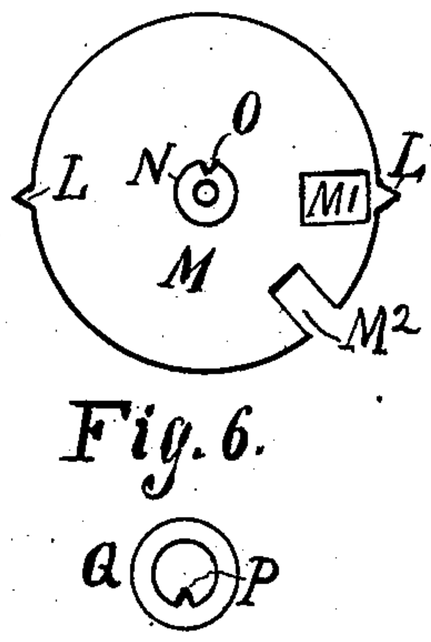

Fig. 6.

Fig. 7.

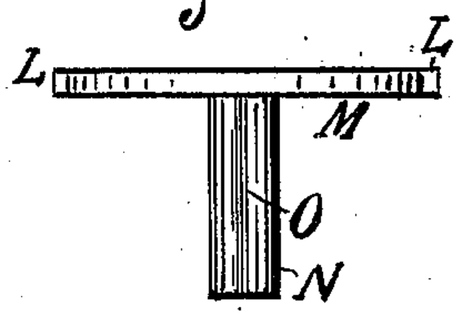

Fig. 8.

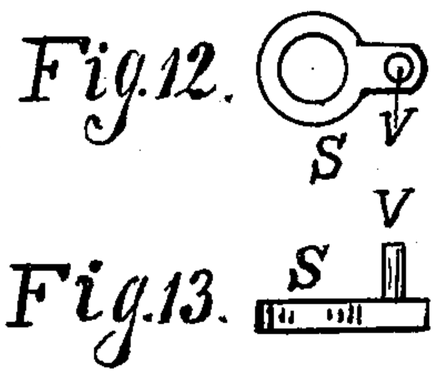

Fig. 12.

Fig. 13.

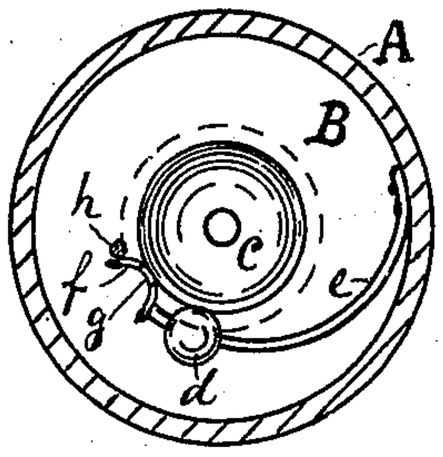

Fig. 9.

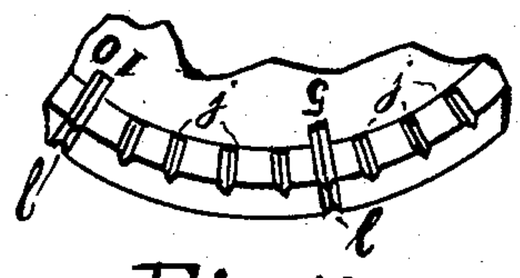

Fig. 10.

Fig. 11

WITNESSES:

A. J. Carlsen.

E. C. Carlsen

INVENTOR

Anker B. Steen

BY his ATTORNEY

A. M. Carlsen

UNITED STATES PATENT OFFICE.

ANKER B. STEEN, OF BUXTON, NORTH DAKOTA.

PERMUTATION-PADLOCK.

SPECIFICATION forming part of Letters Patent No. 601,801, dated April 5, 1898.

Application filed April 16, 1897. Serial No. 632,397. (No model.)

To all whom it may concern:

Be it known that I, ANKER B. STEEN, a citizen of the United States, residing at Buxton, in the county of Traill and State of North Dakota, have invented certain new and useful Improvements in Permutation-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 permutation-locks, and has for its main object to enable a person who knows the combination of the lock to open it without light, which feature is desirable in many instances, but especially when applied to padlocks to be used for locking the wheel of a bicycle or for doors of sheds, outhouses &c., which frequently have to be opened in the dark.

Another object is to provide a permutation-lock which may be opened and its combination changed without tools.

These and other objects I attain by the novel construction and arrangement of parts illustrated in the accompanying drawings, in which—

Figure 1 is a top view, Fig. 2 a bottom view, and Fig. 3 a side elevation, of a permutation-padlock embodying my improvements. Fig. 4 is a substantially sectional side elevation of the lock with the interior working parts not in section. Fig. 5 is a plan view of one of the locking-disks. Fig. 6 is a bottom view, and Fig. 8 a side view, of the stud upon which the disks revolve and the plate from which said stud centrally projects. Figs. 7, 11, 12, and 13 are detail views. Fig. 9 is a sectional top view, as on the line *a a* in Fig. 4. Fig. 10 is a perspective view of an enlarged portion of the dial of the lock.

Referring to the various parts in the drawings by letters of reference and showing my improvements as applied to a padlock, A designates the casing of the lock and is preferably made cylindrical both inside and outside and provided with the rigid bottom B a short distance from its lower edge.

C is an annular rim formed upon the inner side of the casing some distance from the bottom B. This rim may not be continuous, but in short sections or even reduced to three or more pegs.

D is the cover of the casing, and is screw-threaded at E upon the latter. Between the lips F of the cover is pivoted one end of the shackle G, of which the other end is cap-shaped, so as to cover the opening H, formed between the lips F′ in the cover for the reception of the notched locking-bar I, which is pivotally secured at J to the swinging end of the shackle.

In the oppositely-located grooves K, formed in the inner face of the casing, are inserted the guiding projections L of the disk M, which may have a hole, as M′, or a notch, as M^2, for the locking-bar, and is provided with a central tubular stud or sleeve N, having a longitudinal side groove O, adapted to receive the internal tooth P of the antifriction-washers Q, (best shown in Fig. 7,) which are placed upon the sleeve N to prevent the disks R from turning by frictional contact with the tumblers S, all of which are placed upon said sleeve N in the order shown in Fig. 4 and may be of any desired number. Each of the locking-disks R, except the lowest one, is provided with a circular series of numbered holes T (see Fig. 5) and a notch U for the locking-bar I to pass up and down through. These notches are deeper in each disk from the bottom to the top end of the lock, so as to allow the locking-bar I to follow the segmental motion of the end of the shackle G, to which it is pivoted.

When the lock is assembled, the pin V of each tumbler projects through one of the holes T in the adjoining disk and engages the next tumbler, which again has its pin projecting upward through the next disk and engages the next tumbler S, and so on, until the pin of the uppermost tumbler engages directly the holes in the top disk R^4. The lowest disk R′, which is supported on the rim C of the casing, is provided with a pin W, engaging the tumbler S next above it, and is itself secured on the spindle X, which is provided at its lower end with the numbered dial Y, and may be extended, as shown in Fig. 4, up through the sleeve N and have a removable spring-pin Z inserted transversely through

its upper end, so as to prevent the disks from dropping out accidentally when the cover D, which by its central hub *b* may keep the disks from moving upward, is removed in order to change the combination.

In the bottom B of the casing is secured the central stem of a bell *c*, upon which strikes the hammer *d*, secured on the spring-arm *e* to the casing, and is provided with the segmental flat arm *f*, having a central notch *g* in its upper edge. *h* is a pin secured in the lower side of the lowest locking-disk R'. When the said disk is turned by the dial-knob *i* in either direction, the pin *h* in passing the arm *f* forces the hammer away from the bell till said pin reaches the notch *g*, which it slips through, and the hammer strikes the bell. In turning the disk farther the pin passes outside and by the arm *f*, simply springing it slightly toward the center of the bell. The dial Y may be graduated into any desired number of marks corresponding with that of the locking-disks. In the present instance it is divided into fifty marks *j*, commencing and ending at *o*, near which is secured in the dial the outwardly-projecting touching-pin *k*. All of the graduation-marks upon the face of the dial are made pretty deep and V-shaped, and every fifth one of them is extended across the outer peripherical edge of the dial, as best shown at *l* in Fig. 10. To the casing is secured a spring-arm *m*, which is provided at its angularly-bent free end with an indicator-point *n*, pointing to the marks on the dial, and two knife-edges *p* and *q*, of which *p* is adapted to touch the notches *j* upon the face of the dial and the edge *q* to touch the notches *l* in the very edge of the dial. In the normal position this spring-arm *m* may, but need not, touch any of the notches in the dial.

In operation or using the lock the dial Y is turned by its knob *i* back and forth, as usual in permutation-locks, according to the predetermined combination, and ordinarily the indicator *n* is used to indicate the desired numbers and marks upon the dial; but if the lock is to be opened in the dark the operator turns the touching-pin *k* to the point of the indicator *n*, which gives him the starting-point and the striking-point of the hammer upon the bell, which point of course is never changed in changing the combination. He then turns the dial alternately to the right and left, counting the full turns of the dial by the strokes of the bell, and if the dial is to be turned a few marks farther than the full revolution he presses with his finger on the spring-arm *m* toward the face of the dial, and feeling the lowering of the knife-edge *p* into the notches *j* he counts the necessary number of them. Should the number of notches thus needed be pretty high—say eighteen—he facilitates the counting by pressing the spring-arm toward the very edge of the dial and counts five marks at a time—say five, ten, fifteen—and then presses against the notches *j* and counts one, two, three or sixteen, seventeen, eighteen, which gives him the eighteen. Turning in the opposite direction he can add eighteen or any other number by counting as above, if he so fixes the combination upon his mind, or, if he prefers, he may count backward—say on the notches *l*—forty-five, forty, thirty-five, and three notches *j*, which brings the desired number, (thirty-two.) Should storm or other noise or deafness hinder the operator from hearing the sound of the bell, which in small locks will be very small, he may set the bell out of consideration and count the full revolutions of the dial by placing one finger over the indicator *n* in such a manner as to feel the passing by of the touch-pin *k*, and then use the double-edged spring-arm *m*, as above explained.

In changing the combination the cover D is unscrewed from the casing while the shackle is open and the locking-bar I extracted from the lock. The pin Z (if used, but it may be dispensed with) is then removed, the disks turned and placed with different holes T upon the pins V of the tumblers, and the lock and casing put together again, which may all be done without tools, as the cap D need not be very tightly screwed on. It can never be removed, anyway, so long as the locking-bar I is in its locked position, and no one can open it without knowing the combination. On the shackle G, I provide the lip *r* with the hole *s* in it, which enables one to fasten the lock with a chain to the place where it is to be used or to the one end of a chain adapted to have its free end passed around the spoke or tire of a bicycle-wheel and some part of the bicycle-frame and then secured upon the shackle of the lock.

It is obvious that the graduation of the dial may be divided into ten instead of five or in any other convenient manner, and that the number of locking-disks may be varied and the bell and hammer may be dispensed with, and even the extension of the spindle X up through the sleeve or stud *n* may, especially in a cheap grade of the locks, be dispensed with, all without diverging from the spirit of my invention.

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

1. In a combination or permutation lock, the combination with an operating-dial having the touching-pin *k*, the deep and numbered graduations *j*, upon its side and the deep graduations *l*, farther apart upon its outer edge or circumference, of a spring-arm having two edges adapted to be pressed one against the graduations *j*, and the other against the graduations *l*, substantially as and for the purpose set forth.

2. In a permutation-padlock, the combination with the casing A, having the screw-top D, adapted to be screwed upon the casing and having the hole H, the curved shackle G, pivoted to one edge of the cover and having the notched locking-bar I, pivoted to its swinging

end and adapted to be inserted through the hole H, in the opposite edge of the cover and means for guiding it inside the casing, so as to prevent unscrewing of the cap, when the locking-bar is inserted, and notched locking-disks for locking the bar I, inside the lock, the said notches for the locking-bar being deeper as they approach the cover or top of the lock, substantially as and for the purpose set forth.

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

ANKER B. STEEN.

Witnesses:

B. L. SKRIVSETH,

O. S. HANSON.