Macneal & Dodds,

Permutation Lock.

No. 36,908. Patented Nov. 11, 1862.

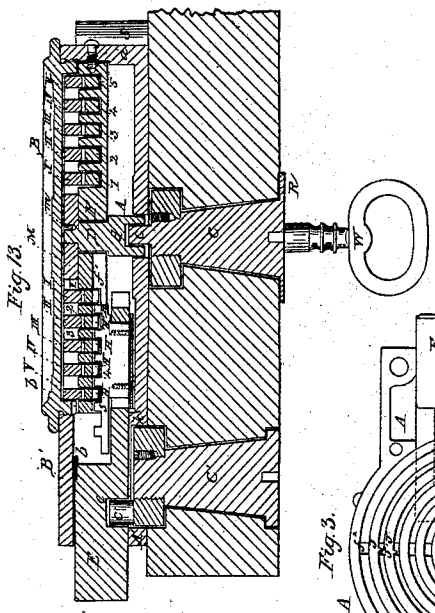
Fig. 13.

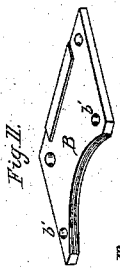
Fig. 11.

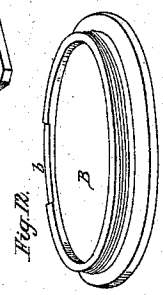
Fig. 12.

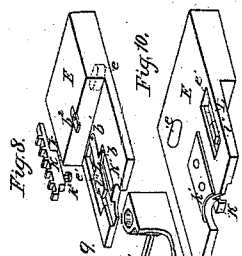
Fig. 8.

Fig. 10.

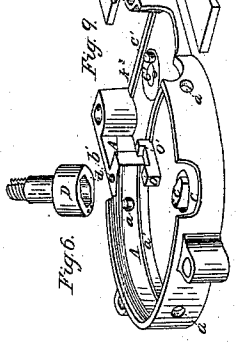
Fig. 9.

Fig. 6.

Fig. 7.

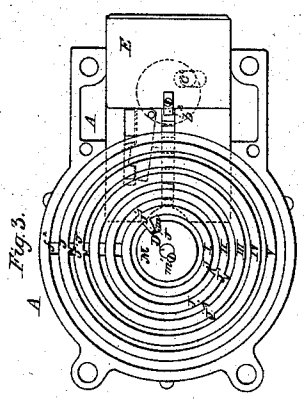
Fig. 3.

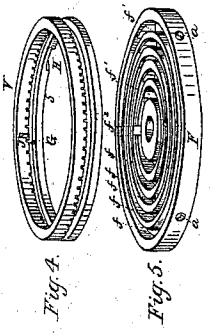
Fig. 4.

Fig. 5.

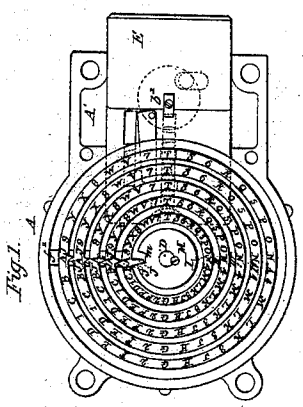
Fig. 1.

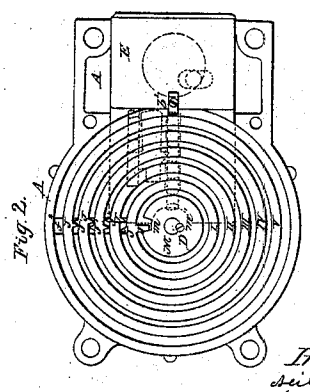
Fig. 2.

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AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

NEIL MACNEALE AND WILLIAM B. DODDS, OF CINCINNATI OHIO.

IMPROVEMENT IN LOCKS.

Specification forming part of Letters Patent No. **36,908**, dated November 11, 1862.

To all whom it may concern:

Be it known that we, NEIL MACNEALE and WILLIAM B. DODDS, both of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Bank and other Locks; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

The first part of our said invention consists in an improved construction and combination of concentric tumblers and the casing in which they work.

The invention further relates to a device for the prevention of picking by what is known as the "tentative" process or by feeling.

The invention further consists in an arrangement of concentric tumblers which permit the unrestricted choice of any succession of letters or figures, even to the repetition of the same or consecutive character, whereas in locks of this class as heretofore constructed the operator is obliged to exercise discretion in avoiding certain successions of the same figure.

The invention further consists in an improved construction of the lock-casing.

The invention also relates to an improved manner of constructing, applying, and connecting the hubs or shafts by which the lock is operated, the object of this part of the invention being to prevent the injury of the lock by hammering or other violence from the exterior or by the introduction of explosives.

The last part of our invention consists in a device to prevent the removal of the cap while the bolt is unshot.

In the accompanying drawings, Figure 1 is a rear view of the lock without the cap, the bolt being shot and the outer tumblers set for unlocking. Fig. 2 is a similar view with all the tumblers set for locking or unlocking and with the bolt thrown back. Fig. 3 is a similar view showing the bolt advanced and locked and the pivoted dog in operation. Fig. 4 is a perspective view of one of the circular tumblers and its graduated index-ring, hereinafter described. Fig. 5 is a perspective view of the grooved plate in which the said tumblers work. Fig. 6 is a perspective view of the thimble by which the tumblers are rotated. Fig. 7 is a perspective view of the lock-case with the operating parts removed and portions of the side of the casing broken away to expose the interior. Fig. 8 is a perspective view of the sliding stump, hereinafter described, detached from the bolt. Fig. 9 is perspective view of the rear side of the bolt (without the sliding stump) in position corresponding with that of the lock-case shown in Fig. 7. Fig. 10 is a perspective view of the other or front side of the bolt, on a larger scale showing the stump in position therein. Fig. 11 and 12 are perspective views of the caps, hereinafter to be described, in inverted position. Fig. 13 is a horizontal section representing the lock in position upon a door.

Similar letters of reference indicate corresponding parts in the several figures.

To enable others skilled in the art to which our invention appertains to fully understand and use the same, we will proceed to describe its construction and operation.

The part A of the lock-case which contains the tumblers is of cylindrical form, and is closed by a circular cap, B, screwed within it. This cap is represented in an inverted position in Fig. 12. The bolt E is held and guided by a rectangular projection, A′, which is closed by a simple flat plate, B′, screwed to the case. This plate is represented in an inverted position in Fig. 11. A notch, *b*, in cap B acts in connection with a spur, *b′*, on the bolt to prevent the removal of said cap while the bolt is retracted. Two conical apertures in the case contain conical steel hubs C C′, of which the hub C terminates in a spud, *c*, which occupies an oblong cavity, *d*, in the shaft D. The hub C′ terminates in an eccentric wrist, *c′*, which occupies a blind-slot, *e*, in the bolt E.

F is a circular plate fitted upon and sustained by a shoulder, *a′*, within the case, and containing a series of concentric annular grooves, *f*, to hold and guide the annular tumblers 1 2 3 4 5 and their graduated index-rings I II III IV V, made to revolve with said tumblers by a tongue, G, on each tumbler occupying one series of notches on the ring, corresponding in number and position to the several characters which are marked upon the latter. The marking of the rings I II III IV V is represented in Fig. 1 and omitted in Figs. 2, 3, and 4. At a suitable angular distance from the tongue on each tumbler the under side of the tumbler is formed with a groove, slot, or gate,

H. These gates, when in suitable range, corresponding with the bridge or radial slot f' in the plate F, permit the throw of the bolt either in or out, as will be hereinafter more particularly explained. Each index-ring has two talons, J J'—one, J, on the concavity and the other, J', opposite to it on the periphery—except the outermost ring, which has none on the periphery. Each ring is also marked with the same letters or numbers at uniform distance and corresponding to an external revolving index-plate, R, in manner familiar to the trade, the said index-plate being attached to the outer end of the hub C.

K is a sliding rack-stump, having a short reciprocating motion in a slot, K', in the bolt. From the under side of the stump K projects a plate or stud, k, which, when the inner end of the stump K meets with an obstruction, strikes an oblique-faced spur, l, on the dog L, which is pivoted to the bolt at l', and causes the tooth l'' of the said dog to engage a fixed stump, O, in the lock-case. Whenever the dog is thus raised sufficiently to engage to the slightest extent with the fixed stump, the acute end and oblique face of the tooth l'' and the corresponding form of the fixed stump cause the dog to rise completely clear of the racking stump K by a continued backward pressure upon the bolt, so that the stump K is left entirely free and the tumblers relieved of even the slight pressure exerted against them in throwing up the dog. An outward movement of the bolt brings the inclined back of the tooth l'' against a second fixed stump, O', which acts to push back the dog L to its lower or closed position. The sliding stump K is secured within the slot K' by means of screws k^2, passing through a plate, k', which slides upon the face of the bolt as the stump slides within the slot. As the bolt is advanced, the square end of the plate k', striking a shoulder, k^3, on the lock-case, limits the outward motion of the sliding stump, and thus permits the redescent of the dog, as before explained.

M is a head or flange screwed upon the inner end of the shaft D, and prevented from turning thereon by a screw-key, m'. The talon J of the inner ring engages in a notch, m, in the head M, so that any rotation imparted to the head M by the shaft D will be communicated to the ring I. In order to enable similar or consecutive characters to be used in succession, I make the notch m in the shaft-head M to exceed in its width the inner talon, J, of the ring I an angular distance equal to that subtended by the aggregate angular width of the several talons on the interiors of the tumblers. The width of the notch m has, of course, to be made sufficient for the outer rings,, and is, consequently, somewhat in excess of what is necessary for those nearer to the center. This discrepency is cured by the simple expedient of gating the inner tumblers at a less angular distance from their respective tongues equivalent to that of the talons on the outer rings.

f^2 represents a shallow radial groove, which may be formed in the rear face of the plate F at any part for the purpose of exposing the tongue G more clearly to view and facilitating the adjustment of the rings I II III IV V upon them, as will be presently explained.

S S are sockets, by which the lock may be fixed upon a door or elsewhere.

W represents a key or wrench of common construction, by means of which the hubs C C' may be rotated.

To put the lock together, the bolt E is first placed within the case, the slot e fitting over the wrist c' and the slot e' over the stumps O O', and the bolt left in its extended position. The shaft D having been placed in the central aperture in the plate F, and the head M applied and secured, as before explained, the said plate and shaft may be placed within the case, care being taken that the slot f' occupies a position to permit the passage of the stump K upon the bolt, and that the shaft is placed in correct position upon the spud c, for which purpose corresponding marks are made upon the said spud and shaft, as shown in Figs. 6 and 7. The plate F is secured in correct position within the case by means of screws inserted from the outside of the case in holes a. The plate B' is then placed over the bolt and secured to the lock-case by screws inserted in holes b'. The tumblers 1 2 3 4 5 may be placed in their places within the plate F either previous to placing the said plate in the case or subsequently. The lock is then ready for setting, which is effected by placing the graduated rings I II III IV V in any positions determined by the user. This done, the circular cap is screwed into the case, covering the rings, and the lock is ready for use.

The operation and manner of using the lock are as follows:

To set the lock on any new combination, the circular cap B must be removed, while the bolt E is advanced. The rings I II III IV V are then taken out, and the tumblers 1 2 3 4 5 may, for convenience, be turned so as to bring all the tongues G over the slot f^2, though the position of the tongues or slots of the tumblers within the plate F at the time of setting is immaterial. Any combination of letters or figures having been fixed on, the operator first places the inner ring, I, over its tumbler 1, with the inner talon, J, of the said ring within the notch m, and with the tongue G of the tumbler 1 within that notch in the edge of the ring I which is immediately beneath the letter or figure upon the face of the ring I, which is the last in the combination. The ring I is then applied in like manner with the last letter but one of the combination over the tongue G of the tumbler 2, and so on with all the successive rings, the outer ring, V, being placed with the first letter or figure of the combination over the tongue G of the tumbler 5. This manner of applying the rings to the tumblers will be understood by the illustration of the outer pair given in Fig. 4.

To set the tumblers so that the bolt may be either advanced or retracted, the wrench is applied to the hub C and the latter turned from right to left four entire revolutions, to insure that the outer ring is reached and set in motion. This revolution of the rings is then continued in the same direction (indicated by the arrow in the rear view in Fig. 1) until the letter or figure on the index-plate answering to the first of the combination reaches the fixed pointer on the exterior of the door. This position of the parts is shown in Fig. 1. The motion is then reversed and continued three entire revolutions, to reach the ring IV, and as much farther as is necessary to bring the second letter or figure of the combination under the fixed pointer; then again reversed and continued two revolutions, to reach the ring III, and enough farther to bring the third letter or figure of the combination under the fixed pointer; then again reversed one entire revolution, to reach the ring II, and enough farther to bring the fourth letter or figure under the fixed pointer; then again reversed until the last letter or figure of the combination reaches the fixed pointer. The tumblers are then in position to permit the throw of the bolt either in or out, which is effected by removing the key from the hub C and applying it to the hub C′. The retraction of the bolt prevents the removal of the cap, as has been before explained, so that after the door has been opened the index-plate may be rotated slightly, to throw one or more of the tumblers out of position, and the removal of the cap to inspect or tamper with the lock effectually prevented.

From an inspection of Fig. 13 it will be seen that hubs C and C′ (being the only parts having external exposure) are so fitted within the door and connected with the lock that any violence—such as hammering—applied to the exterior will be sustained exclusively by the door itself and cannot effect the lock in any degree, the hubs having no endwise bearing against the lock. It will also be seen that no opportunity is afforded for the introduction of an explosive substance.

Having thus described our invention, the following is what we claim as new therein and desire to secure by Letters Patent:

1. The combination of two series of concentric rings of corresponding diameters, one behind the other, the one series provided with gates for the passage of the stump and the other with radial talons to impart rotation from one to another of the concentric rings, the corresponding rings of the two series being connected together in any relative positions desired by notches and tongues, substantially as described.

2. The plate F, formed with a radial channel for the passage of the stump and with concentric slots for the reception and guidance of the rings above referred to, when the said plate is fitted in a lock-case, A, of the contruction described, and held between a shoulder, *a′*, and cap B, substantially as set forth.

3. The combination of the dog L, fixed stump O, and sliding stump K, constructed substantially as described, and employed to transfer pressure against any of the rings to a single fixed bearing.

4. The loose longitudinally sliding or racking stump K, constructed and operating as herein shown and described.

5. The dog L, formed with an oblique tooth, *l″*, to elevate it completely clear of the racking stump K by backward pressure upon the bolt, substantially as explained.

6. A stud, plate, or equivalent device operating in any manner, substantially as described, to limit the forward motion of the sliding stump K, and thus permit the descent of the dog into a suitable position to engage with the said stump at the next backward motion.

7. The combination of the hub C, spud *c*, and shaft D, constructed and connected, substantially as described, so as to prevent injury to the working parts of the lock by hammering or other violence on the exterior.

8. The notch *m* or equivalent device, employed to permit a certain limited play of the shaft D in relation to the inner talon, J, of the ring I, substantially as explained, in order to compensate for the thickness of the talons.

9. The stud b^2 and notch *b*, employed in any manner, substantially as described, to prevent the removal of the cap B while the bolt is retracted.

In testimony of which invention we hereunto set our hands.

NEIL MACNEALE.
W. B. DODDS.

Witnesses:
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