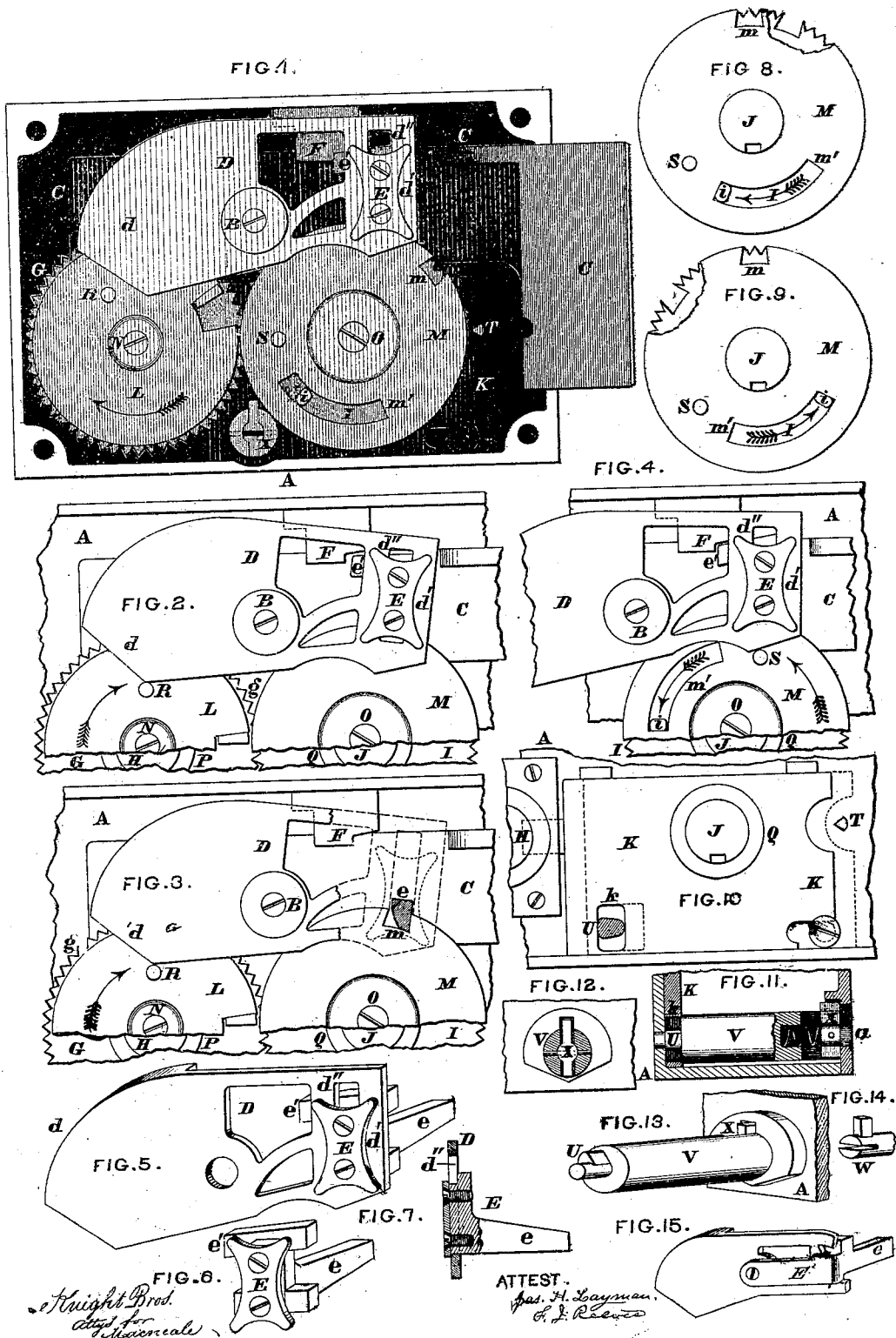


N. Macneale,

Permutation Lock.

No. 105,102.

Patented July 5, 1870.



United States Patent Office.

NEIL MACNEALE, OF CINCINNATI, OHIO.

Letters Patent No. 105,102, dated July 5, 1870.

IMPROVEMENT IN PERMUTATION LOCKS.

The Schedule referred to in these Letters Patent and making part of the same

I, NEIL MACNEALE, of Cincinnati, Hamilton county, Ohio, have invented a new and useful Permutation Lock, of which the following is a specification.

Nature and Objects of the Invention.

This is an improvement in the class of locks which comprises a primary set of permutating disks capable of being set up to any predetermined combination of letters or figures, and of being placed in gear with a series of secondary disks or tumblers, whose gated peripheries, except when placed in proper range to receive the detent, prevent any retraction of the main bolt, thus restricting the use of the lock to persons in possession of the selected formula; and my improvement is especially designed for that class of "single hub" permutation locks whose detent is pivoted to and moves with the main bolt in the acts of locking and unlocking.

The first part of my invention relates to an arrangement of detent, which, never resting upon the gated or secondary tumblers, except when forced thereupon by the direct action of a pin or projection from the primary disks, affords no opportunity of clandestine interference with the lock by any person "feeling" or otherwise manipulating it from without.

The second part of my invention relates to the combination with the aforesaid detent of a supplementary disk or guard-plate, which serves to close the range of gates, and to prevent any contact of the detent with the tumblers until the final movement of opening the lock.

The third part of my invention relates to a supplementary lock, whereby a change of "combination" can be effected only by one in possession of a key specially provided for disengaging the secondary disks or tumblers from the primary or permutation disks.

General Description with Reference to the Drawing.

Figure 1 is a rear elevation of a lock embodying my invention, the cap having been lifted, the bolts shot, and the detent being in its normal or inactive position.

Figure 2 is a rear elevation of the detent with its accessories, said detent being depressed but not yet gated.

Figure 3 is a similar elevation with the detent gated, a portion of said detent being shown by dotted lines.

Figure 4 is a rear elevation, showing the detent being returned to its normal or inactive position.

Figure 5 is a perspective view of my detent detached.

Figure 6 shows my sliding fence detached.

Figure 7 is a partially sectionized side elevation of my sliding fence.

Figures 8 and 9 show my guard-plate or disk, with the contiguous tumbler in two positions.

Figure 10 is a rear view of the sliding arbor of my tumblers.

Figures 11, 12, and 13, are respectively a side elevation, a transverse section, and a perspective view of the tumbler-shifting mechanism.

Figure 14 shows the head or operative end of the key for operating said mechanism.

Figure 15 is a perspective view of a modification of my detent.

A is the inclosing-shell or case of my lock.

A stud-shaft, B, which projects horizontally from the shank of the main bolt C, constitutes the pivot or arbor of a rocking-plate or dog, D, which has a preponderating weight at its rear end *d*, so as, whenever left at liberty, to elevate its front or operative end *d'*.

Confined within a vertical slot, *d''*, in said front end of the dog, is my sliding fence or racking-stump E, whose horizontally-projecting arm *e*, resting on the periphery of the guard-plate, to be presently described, whenever the said plate and its series of tumblers are not completely "in gate," causes its head *e'* to impinge against the fixed stump F, as in figs. 1, 2, and 4, so as to prevent the retraction of the main bolt, but which, when said plate and tumblers are properly in range, drops into gate, so as to fall clear of said fixed stump, and to permit the main bolt to be retracted, as in fig. 3.

The fixed stump F is further useful in retaining the sliding fence to the lower end of the slot in the dog, whenever the latter is elevated, as in fig. 4.

The arm *e* of the sliding fence, being chamfered along its rear lower edge, is enabled to escape easily from the tumblers, by continuing their rotation after the main bolt is thrown forward, after which the tumblers may be scattered, so as to disturb the combination, and to prevent unlocking by unauthorized persons.

The dog D and fence E I style collectively the detent D E.

The fence may, instead of sliding as above, be pivoted to the dog, as at E', fig. 15.

G represents the rearmost of a series of permutation disks, which may be of customary form and construction, and be journaled about a customary hollow stud or hub, H, through which the main arbor passes to the driving-plate L.

The permutation disks are geared, by means of cogs *g*, in the usual way, to a series of customary secondary disks or tumblers, of which the outer one, I, only is shown.

The arbor or stud-shaft J of the tumblers projects from a slidable plate, K, which is capable of a slight shift or movement from left to right, or the reverse,

so as to throw the said tumblers either in or out of gear with the said permutation disks.

The series of tumblers has a guard-plate, M, whose periphery protects the cogged and gated peripheries of the said tumblers from contact with the fence, except when set for unlocking, as hereafter explained.

The plates L and M are secured by screws and washers N and O, and each plate has a pin or projection, E S, of which the pin R on the plate L serves, at the proper moment, to depress the effective end of the dog, by lifting of its rear end, as seen in figs. 2 and 3, and the pin S serves to insure the elevation or return of said effective end, as seen in fig. 4.

The plate M, called the guard-plate, is gated at *m* to correspond with the gatings of the tumblers.

It has also a concentric slot, *m'*, to receive a stud, *i*, on the adjacent tumbler, the length and position of which slot are such as to constantly present an unintended portion of the guard-plate's periphery opposite to the gated portion of said tumbler, except at the concluding movement for unlocking, when the said gating in the guard-plate comes, at the proper juncture, opposite that of the said tumbler, so as to enable the arm of the fence to drop into the rank of gatings.

In order to insure the proper coaction of the guard-plate and said tumbler, it is necessary that the last figure of the combination should always be the same one, although the others may be varied at will.

This guard-plate is useful in preventing the possibility of "feeling" the gratings by any person clandestinely manipulating the lock, and is also useful in protecting the cogged peripheries of the tumblers and the arm of the sliding fence from wearing one another out in use.

In other respects my tumblers may be substantially the same as those described in the patent granted to myself and W. B. Dodds as my assignee, on the 5th day of July, 1864, and require no more specific description.

The tumblers are held against displacement while out of gear with their primary disks by a customary V-edged post or stump, T.

The arbor of the tumblers is shifted and firmly held to right or to left by the instrumentality of an eccentric, U, which occupies a slot, *k*, in the arbor-plate K, and whose shaft, V, is pivoted in the front plate and the cap of the lock.

The shaft V is reached and operated by a special key, W, which, being introduced through a proper key-hole, *a*, in the cap, depresses a spring guard, X, which may be of precisely similar construction to that of the common Bramah night-latch.

It will hence be seen that the lock cannot be changed in its combination by irresponsible persons, but requires the possession of the proper key.

A spring might be employed, either in conjunction with or in substitution of the levity of the operating end of the detent to retain it in its normal position.

I am aware that permutating locks have been made with a dog or detent, hinged on the main bolt and provided with a fence or tooth that engages with the tumblers of the lock, and thus both liberates and becomes the means of throwing the bolt, but I believe such dog has invariably been hinged or pivoted by its rear end, so that in its normal position its front or effective end always rested upon the tumblers, and caused it to be constantly dropping into their gates in the acts of setting, and of adjusting the lock, and also, in the opinion of some persons, afforded an opportunity of picking the lock by measuring the weight or friction caused by the dog on the tumblers.

On the other hand, my dog is so hinged or pivoted that the weight is in excess at the end remote from the fence, so as to prevent the latter resting upon the

tumblers, and I act on the dog by the positive motion of a revolving pin, thus producing the effective stroke of the dog by a positive motion, independently of weights or springs, and hence, when the gatings of the tumblers are all in range, the fence is pushed into them by positive action of other parts of the lock, as, for instance, by the pin R; and as this positive motion communicated to the dog would, when the tumblers are not "in gate," be productive of serious and destructive effects without a suitable yielding provision, the fence is so constructed and arranged as to slide or yield backward when an attempt is made to force it into the ungated tumblers, (see fig. 2;) and in order to insure this yielding fence returning to its proper position on the dog, the pin S is so arranged as to push the dog back into its normal condition, in case its gravity fails to do this, after the fence has been expelled from the gatings.

The provision of the stump F, against which the yielding fence strikes, prevents the latter being forced upward in company with the dog, when moved by the pin S, as described, and the same stump also serves to prevent the main bolt being pushed back before the gatings are in position to receive the fence.

The construction of one or more tumblers of this class of locks with a guard-plate, disk, or ring, deriving its motion from the tumblers proper in the manner represented, and so arranged that, when revolving the tumblers in either direction, the gatings of the plate and tumblers will not be coincident, but so that the gatings in the tumblers proper will be protected by the intact periphery of the guard-plate, imparts a special feature of security to the lock, in the manner already explained.

The actual improvement in this part of my invention may be stated as follows: that whereas in other locks, when the gatings of any of the tumblers are adjusted in position, and the gates left open for the entrance of the fence, there is an opportunity afforded for the practice of lock-picking devices; on the other hand, in tumblers constructed with this guard-plate, the gate is not left open until the final movement of opening the lock.

The advantages of the third part of my invention are, that whereas, in previous devices, any one understanding the lock could, by the aid of a simple key or wrench, change the combination at any time when the door was open; on the other hand, the combination in my lock can be changed only by some person having possession of the key adapted to fit a particular lock specially provided for that purpose.

Directions to Unlock.

Let the lock be supposed to have been set on the combinations 10, 20, 30, 40, 14.

First, turn the dial or handle from left to right four or five entire revolutions, or a sufficient number to insure the taking up of all the tumblers. Stop when 10 is at the mark.

Second, reverse and turn from right to left until 20 comes to the mark for the fourth time.

Third, reverse and turn from left to right until 30 comes to the mark for the third time.

Fourth, reverse and turn from right to left until 40 comes to the mark for the second time.

Fifth, reverse until 14 comes to the mark.

The guard-plate and all the tumblers proper except the outer one being now in position, the operator reverses slowly, so as to bring the gating of the outer tumbler I in range with the gatings of the other tumblers, thus permitting the fence to drop into the tumblers, until the bolt is retracted.

To Lock.

The door of the safe being thrown open, turn the

dial from left to right, so as to shoot the bolt, and make several entire revolutions, so as to scatter the tumblers.

To Change the Combination.

When the main bolt is thrown fully forward, set the tumblers according to the old combination, but do not reverse to throw back the bolt.

First, take the key W and insert it as far as it will go in the hole *a* in the back of the lock. Turn half a revolution toward the right, so as to throw the tumblers out of gear with their primary disks and in gear with the stump T.

Second, operate the dial according to the new combination you desire to set the tumblers on making the same revolutions described in the instructions to unlock, and substituting the figures of the new combination in place of the old ones, taking the precaution, however, to retain the last figure of the old combination, which, for the reason already given, may not be changed.

Third, turn the key W back to its original position, and take it out of the hole.

The lock is now set on the new combination.

Claims.

I claim as new and of my invention—

1. The rocking dog D, pivoted on the main bolt, and resting out of contact with the gated tumblers, and being provided with a yielding fence, E, in combination with the fixed stump F, and the rotary pin or tappet R, having a positive action on said rocking dog, as and for the purpose set forth.

2. In combination with the detent D E, pivoted to the main bolt and arranged as specified, and the fixed stump F, the rotating pin or tappet S, for the purpose designated.

3. In combination with the dog D and fence E, constructed and arranged to operate as specified in claim 1, and with the gated tumblers I, the guard-plate M, operating as and for the purposes specified.

4. The combination of the eccentric U, shaft V, spring-guard X, and sliding plate K, with the arbor J of the tumblers, substantially as and for the purposes set forth.

In testimony of which invention I hereunto set my hand.

NEIL MACNEALE.

Witnesses:

GEO. H. KNIGHT,
JAMES H. LAYMAN.