Rickards & Flanders,

Permutation Lock.

No. 8,593. Patented Dec. 16, 1851.

Fig. 5.

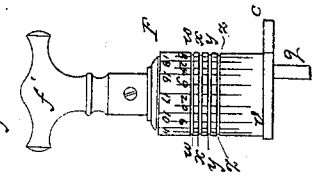


Fig. 3.

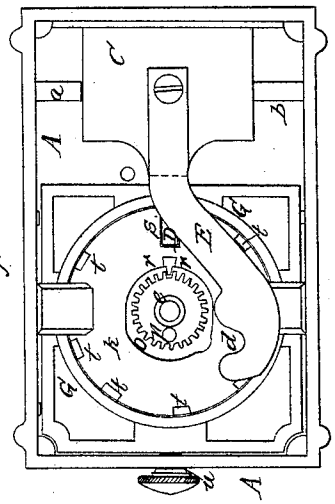


Fig. 4.

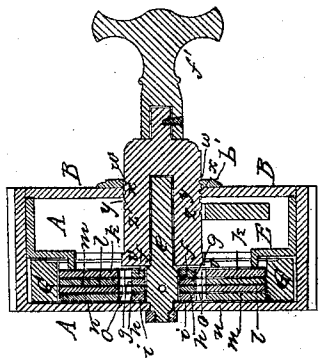


Fig. 1.

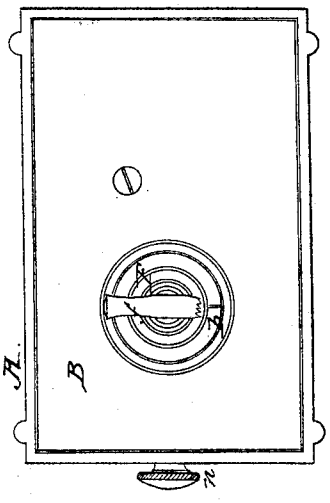
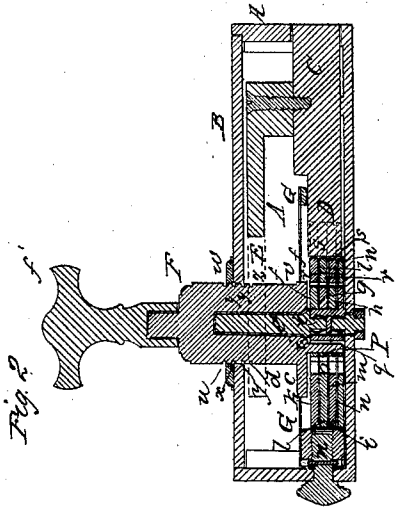


Fig. 2.



UNITED STATES PATENT OFFICE.

DAVID H. RICKARDS AND JOS. F. FLANDERS, OF NEWBURYPORT, MASSACHUSETTS.

ROTATING-TUMBLER LOCK.

Specification of Letters Patent No. 8,593, dated December 16, 1851.

To all whom it may concern:

Be it known that we DAVID H. RICKARDS and JOSEPH F. FLANDERS, of Newburyport, in the county of Essex and State of Massachusetts, have invented a new and useful or Improved, Permutation and Powder-Proof Lock for the Doors of Safes, Bank-Vaults, &c.; and we do hereby declare that the same is fully described and represented in the following specification and accompanying drawings, letters, figures, and references thereof.

Of the said drawings, Figure 1 denotes an external view of our improved lock. Fig. 2 is a central, longitudinal, and horizontal section of it. Fig. 3, is a view of it as it appears when its cover plate and permutation cylinder are removed. Fig. 4 is a transverse section of it taken through the arbor of the graduated permutation cylinder.

In the said drawings A represents the case or box of the lock, of which B is the cover plate. C is the bolt which slides between guides *a*, *b*, and not only has a tail piece of projection D, but an arm E extended back from it and shaped as seen in the drawings. The arm E, is for the purpose of enabling a cam or tooth *c*, which projects from the inner end of the permutation cylinder F, to throw the bolt or move it forward or backward as occasion may require; such tooth or bit *c* being made to operate within a recess *d*, made in the arm E, as seen in the drawings. The said permutation cylinder F is not only placed and made to rotate freely on a stationary arbor *e*, but it is so adapted to the arbor that it can be moved or slid longitudinally back and forth on it, or in a direction either away from or toward the series of change gears *f*, *g*, *h*, *i*, each of which gears is placed and made to rotate freely on the arbor *e*. These change gears arranged side by side are disposed within a series of flat circular rings or tumblers, *k*, *l*, *m*, *n*; the cavity *o*, through the middle of each of the said tumblers being made of a greater size in its horizontal breadth than the extreme diameter of any one of the change gears.

A hole *p* is made through each change gear at a like distance from its center, so that when the gears are placed on the arbor and the several holes are brought in a line with one another, they may correspond in size and form, as it were, one cavity or hole through the entire series of change gears. These holes are for the purpose of receiving a long round pin or stud *q* which is made to project from the inner end of the permutation cylinder as seen in Figs. 2 and 5, the latter figure being a side view of the permutation cylinder as it appears when it is detached from the arbor on which it turns.

Each of the tumblers is a flat circular ring or plate. They are made alike in size, and in number and thickness they correspond with the number and thickness of change gears. A small tooth *r*, extends from the inner surface of the opening or cavity *o* of each tumbler and is of a size capable of being introduced into the space between any two consecutive teeth of the change gear belonging to its tumbler.

Besides the above each tumbler is made with a long notch or opening *s*, which extends from its periphery toward its center, and is adapted to receive the tail piece or projection D of the bolt, and to the extent of back movement of the same. Each tumbler may be also provided with a series of shorter notches, *t*, *t*, *t*, cut or made on its periphery, and each having a width corresponding with that of the long notch or opening *s*. The tumblers so constructed are supported by and made to revolve within a sliding or movable frame G, which is arranged as seen in the drawings and properly sustained by guides, so as to be capable of being moved in a direction either toward or away from the bolt, its motion being produced by means of a screw *u*, properly adapted to it and the box of the lock, the milled head of the screw being outside of the box of the lock. The screw moves the frame far enough to throw the teeth *r*, *r*, &c., of the tumblers into or out of gear with the change gears. The tail piece or projection D extends through the frame G.

The permutation cylinder consists of a cylindrical block of metal having a flanch *v* projecting from its inner end, so as to prevent it from being drawn entirely out of the lock case. The cylindric or curved surface of the cylinder G, is provided with a series of creases *w*, *x*, *y*, *z*, extending around it at equal distances apart, and so arranged on it as to enable a person to know when the stud *q* is in any one of the gears. Suitable divisions and numbers to correspond with the number of teeth or cavities in each change gear are made on the curved surface

of the permutation cylinder as seen in the drawings. One or more springs a', is fixed to the arbor e, and operates against one or more friction pieces b', which is made to bear against the several change gears, the object of such spring, and the friction plate being to hold any change gear stationary while the change gear in contact with it is being revolved for the purpose of being set while the tumblers are held stationary.

From the above it will be seen that whenever the tumblers have their teeth thrown out of gear with the change gears, the latter may be rotated independently of the tumblers; and when the change gears are set with their holes p, p, p, p, in any chosen positions and such positions noted by the figures and divisions on the permutation cylinder we next turn the screw u, so as to move the sliding frame G in such manner as to cause the teeth of the tumblers to lock with or enter between those of the change gears, and thus connect the tumblers and change gears, so that the rotation or partial rotation of any change gear will create a corresponding movement of its tumbler. We next draw back the permutation cylinder far enough to cause its tooth c, to enter the recess d. We next throw the bolt forward or lock it, which having been done, we next move or slide the permutation cylinder inward, and so as to cause the pin q to pass into all the cavities or holes of the change gears. This done we next partially rotate the permutation cylinder and all the tumblers. Next we withdraw the permutation cylinder far enough to remove its pin q from out of the lowest change gear, and we again partially rotate the remaining change gears and their tumblers. Next we perform the same operation on each of the other change gears and their tumblers, and thus we have prepared the lock so that it cannot be opened until we have successively (beginning to operate on the last tumbler so moved) moved back (which we can do by means of the numbers and divisions on the permutation cylinder and an index mark b' on the lock plate) all the tumblers to their original positions. To the permutation cylinder a handle or key f' is adapted in order to enable it to be readily rotated.

The object of the second or auxiliary set of notches t, t, t, &c. is to deceive a picklock, and lead him to suppose that he has brought the long notch of a tumbler into its proper position, when he in reality may have only brought one of the shorter ones around so as to be in a position to receive the stud or tail piece of the bolt. In order to pick the lock he would in all probability by some means produce a backward pressure on the main bolt and while this was exerted he would endeavor to rotate any one of the tumblers until he heard or felt the notch of it come into the correct position. By this operation he would be very much more likely to bring into the required position a short notch rather than a long one.

We do not claim a combination of geared change wheels and notched circular plates applied together on one common arbor so that the said change wheels and circular plates shall lay side by side on the said arbor, by which arrangement of them they require to be removed from the arbor in order to change the catch of any one wheel from any notch or hole of its circular plate into any other of the notches or holes of the said plate; but

What we do claim as our invention is—

1. Combining with the rotary tumblers and the change gears (arranged as set forth) the projection or tooth r, (or its mechanical equivalent, and the sliding frame G, or its equivalent) for holding and guiding the tumblers during their rotations and for moving them out of or into connection with the change gears, all substantially as hereinbefore specified. And we also claim the arrangement of the tooth or bit c and the stud q on a sliding and turning shaft, in combination with the arrangement of the arm E and the tumblers; so that when a person tries to move the tumblers he cannot get end play on the bolt; and vice versa.

2. And in combination with the change gears and the arbor e, we claim the friction spring or springs a' and plate b' for the purpose above described.

In testimony whereof we have hereto set our signatures, this thirty first day of October A. D. 1851.

DAVID H. RICKARDS.
JOSEPH F. FLANDERS.

Witnesses:
R. H. EDDY,
JOHN NOBLE.