(Model.)

J. M. GRAU.

PERMUTATION LOCK.

No. 346,542. Patented Aug. 3, 1886.

Fig. 1.

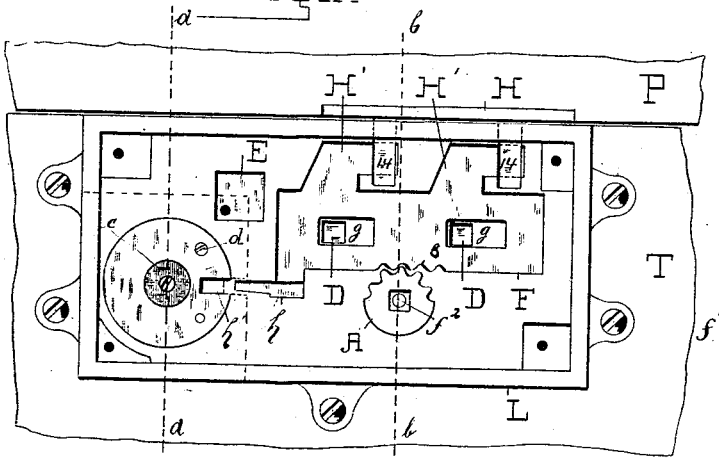
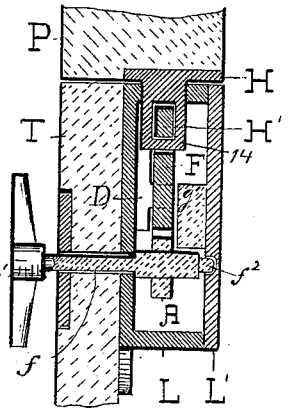


Fig. 2.



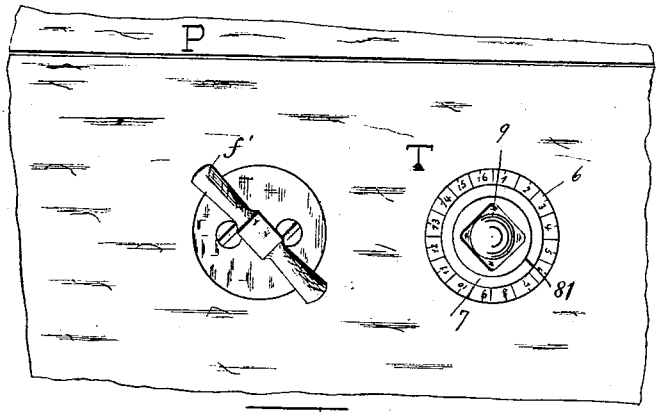


Fig. 3.

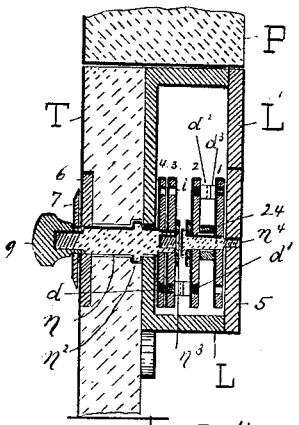


Fig. 4.

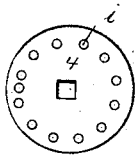


Fig. 5.

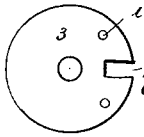


Fig. 6.

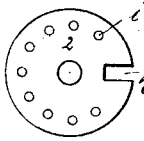


Fig. 7.

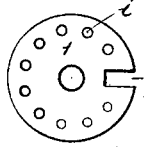


Fig. 8.

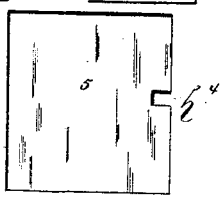


Fig. 9.

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UNITED STATES PATENT OFFICE.

JOHN M. GRAU, OF FORT LEAVENWORTH, KANSAS.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 346,542, dated August 3, 1886.

Application filed March 2, 1886. Serial No. 193,706. (Model.)

To all whom it may concern:

Be it known that I, JOHN M. GRAU, of Fort Leavenworth, Leavenworth county, Kansas, have invented certain new and useful Improvements in Permutation-Locks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to certain improvements in permutation-locks that may be applied to trunks, office-desks, &c., the object being to provide a compact, simple, and efficient combination-lock that is devoid of springs.

My invention consists in the combination of a metal casing, and a back plate made in two sections, the former serving as a bearing for the end of the bolt-spindle, and the latter as a bearing for the pin, carrying a number of tumblers and provided with a slot, whereby the position of the tumblers may be determined from the back of the lock, all of which will be more fully described hereinafter, and pointed out in the claim.

In the drawings, Figure 1 is an elevation of my lock attached to a portion of a trunk or a desk, the rear cover-plates being removed. Fig. 2 is a section through the same on vertical line *b b*, Fig. 1. Fig. 3 is a front view of a portion of a trunk having the lock attached. Fig. 4 is a section on line *a a*, Fig. 1. Figs. 5, 6, 7, and 8 are detail views of the combination-disk that is located next to the front plate of the lock-casing, a tumbler that is attached to said disk, a combined combination-disk and tumbler that is located between the tumbler and an outer disk, and the outer combination-disk and tumbler, respectively; and Fig. 9 represents a section of the outer or back plate, which carries a portion of the combination.

In describing my preferred construction I wish to call the different devices making up the combination that is carried by the knob-spindle the "lower" combination, and the devices that are carried by a pin located in a portion of the back plate the "upper" combination; and the reason why I wish to do this is because the back plate of the lock will be upward when it is removed from the trunk and placed in a position for removing the back plate.

The letter L represents the lock-casing which incloses the different parts of the mechanism, and which should be affixed securely to the body of the trunk or desk T by means of screws or other suitable devices.

The back plate of the lock is made in two sections—a main section, L′, in which the end f^2 of the bolt-spindle *f* has a bearing, and a smaller section, 5, which is removable independently of the main section, and which carries the upper portion of the combination.

The letter P represents a portion of a trunk-lid which carries the hasp-plate H. This plate may be provided with one or more hasps, 14, for engaging a corresponding number of lugs, H′, formed on the bolt F. The bolt F has two or more longitudinal slots, *g*, formed in its body, for engaging a corresponding number of guiding-lugs, D, which project from the inner side of the casing L. Said lugs are preferably cast integral with said casing.

On the lower edge of the bolt F a series of teeth or a rack, 8, is formed, so as to engage the pinion A, that is carried by the bolt-spindle *f*. The bolt is also formed with a projection or lug, *h*, at one end, for engaging the slots in the tumblers. A stop-piece, E, projects from the inner side of the casing L, at one end of the bolt F, for the purpose of limiting the longitudinal movement of the latter when thrown out of engagement with the hasps 14. The bolt-spindle *f* projects out through the body of the trunk or desk, as the case may be, and a handle, *f′*, is located on its outer end for the purpose of rotating it and controlling the movement of the bolt.

In proceeding to describe the combination mechanism, it will be observed that the knob-spindle *n* does not extend through the lock to the back plate, but that it projects through the front plate of the casing only sufficiently far to accommodate the lower combination-disks, 3 and 4. Said knob-spindle is formed with a shoulder, n^2, about at the middle of its length, which bears against the back plate of the casing L, and forms a safeguard against the spindle being driven inward. Upon the spindle a knob, 9, is mounted, and carried by this knob, or secured to the knob-spindle in any approved way, is a plate, 7, that is provided with a pointer or a mark, 81. Just inside the disk 7 and secured to the body

of the trunk is a plate, 6, having on its face a series of figures or letters. The lower combination-disk, 4, is rigidly secured on the knob-spindle as near as possible to the front plate of the casing, and the lower tumbler, 3, is also mounted on said spindle so that it may turn freely. Said combination-disk 4 and the tumbler-disks 1 and 2 each have a number of perforations, *i*, arranged in a circle at some distance from the spindle. The lower tumbler, 3, is adjustably secured to the disk 4 by means of a screw, *d*, which passes through a perforation, *i*, in the tumbler. In order to change the combination at any time, said screw can be loosened and the tumbler 3 can be moved around on the spindle until the aperture in it registers with another one of the series of apertures in the disk 4, as may be desired; or the combination can be changed in another way, as will be explained further on. Screwed into the removable or small section of the back plate 5 is a pin, n^4, which carries the tumblers 1 (one) and 2. These are held at a little distance apart by means of a washer, 24, also carried by said pin, and they are adapted to rotate freely on the pin.

In Fig. 1 the small section 5 of the back-plate is removed, together with the upper combination.

The head of the screw *d*, which secures the disk 3 to the disk 4, projects a sufficient distance to engage with the head of a screw, *d'*, that is located in one of the series of apertures in the tumbler 2; and the screws d^2 and d^3, which are located to project from opposite sides of the respective tumblers 1 and 2, are adapted to engage with each other when tumbler 2 is rotated. Thus it will be seen that the devices comprising the upper and lower combinations are connected together, and, besides, the upper combination can be removed with the small section 5 of the back-plate, for the purpose of changing the combination or for examination without disturbing any other part of the lock.

The respective tumblers 1, 2, and 3 are each provided with a slot—such as h', h^2, and h^3—into which the lug *h* of the bolt F is carried by rotating the pinion A. It is obvious, however, that unless the combination be complete the lug on the bolt cannot enter the slots in the tumblers.

In order that the position of the tumblers may be determined from the outside of the lock before the lid of the trunk has been closed down, a slot, h^4, is made in one edge of the removable back-plate section 5.

The letter n^3 represents a washer located on the inner end of the knob-spindle *n*, for the purpose of securing in place the tumbler 3.

The letter *c* represents a washer located on the pin n^4, for the purpose of securing the tumblers 1 and 2 on said pin.

Another way of changing the combination of this lock is to change the position of the screws located in the tumblers 1 and 2. In this way a large number of changes may be made, and the number will only be limited to the number of apertures in the tumblers.

To prevent too much side-play of the bolt F on the guiding-lugs D, another guiding-lug, *g'*, is located on the inner side of the main back plate L', so that one side of the bolt can slide against it.

The numbers of the combination necessary to open the lock can be obtained by turning the knob 9 to the right until the slot h^3 in the tumbler 1 registers with the slot h^4 in the back plate 5, when the number on the dial 6 should be noticed; then turning it to the left until the slot h^2 in tumbler 2 registers with the first mentioned, and so on, no matter if more than three tumblers are used in the lock.

The way in which the tumblers are rotated should be particularly noticed, and it will be observed that upon turning the knob toward the right—or in either direction, for that matter—the screw *d* comes in contact with the screw *d'*, and screw d^2 engages screw d^3.

Having thus described my invention, what I claim is—

In a combination-lock, a metal casing, L, having a back plate made in two sections, L' and 5, the former serving as a bearing for the end of the bolt-spindle, and the latter as a bearing for the pin carrying a number of tumblers and provided with a slot, h^4, whereby the position of the tumblers may be determined from the back of the lock, substantially as shown and described.

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

JOHN M. GRAU.

Witnesses:

JULIUS BURDICK,

OSCAR F. SHULTZ.