(Model.)

O. E. PILLARD.

Permutation Lock.

No. 238,608. Patented March 8, 1881.

Fig. 1.

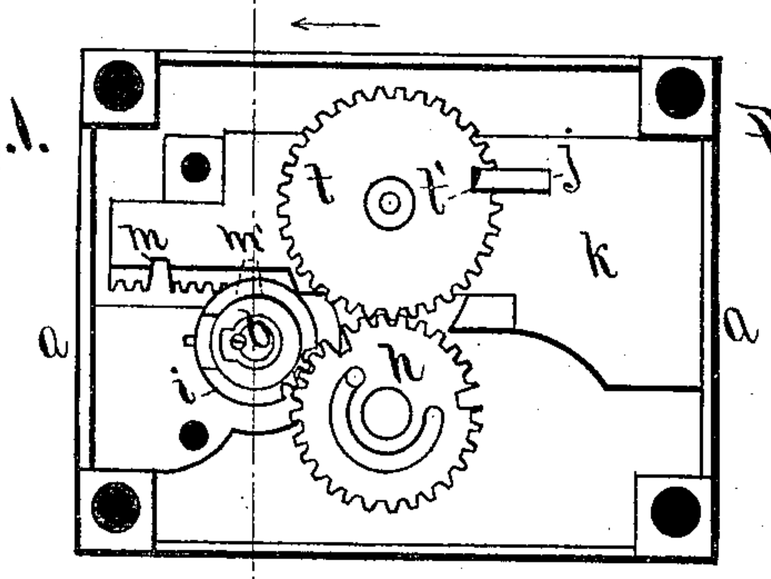


Fig. 2.

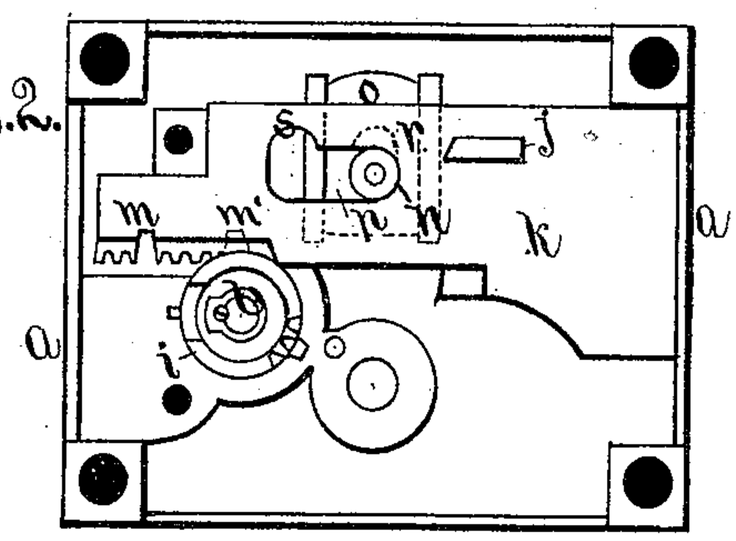


Fig. 3.

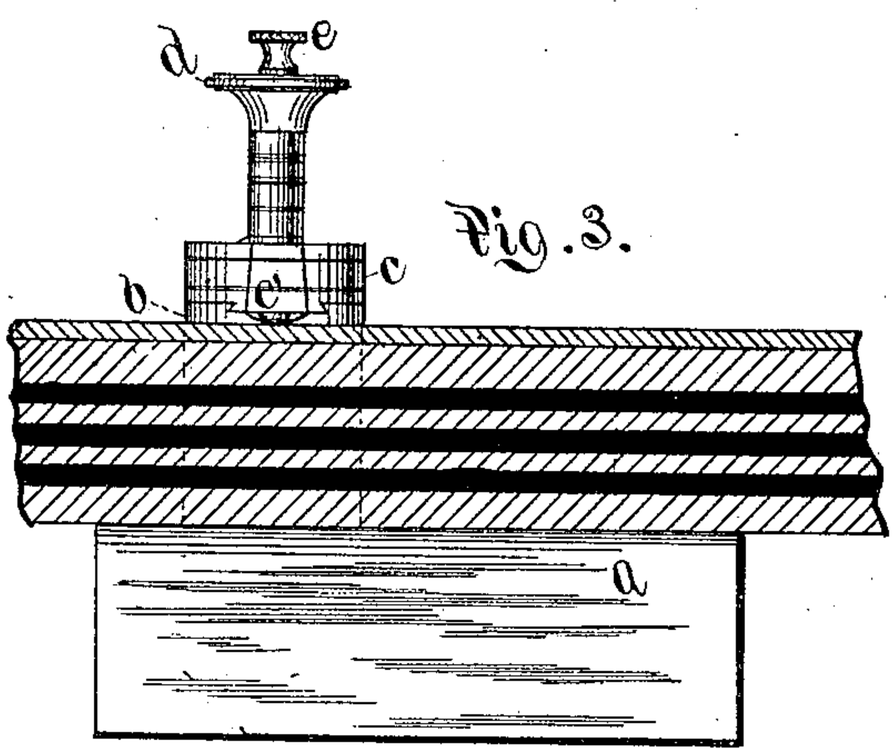
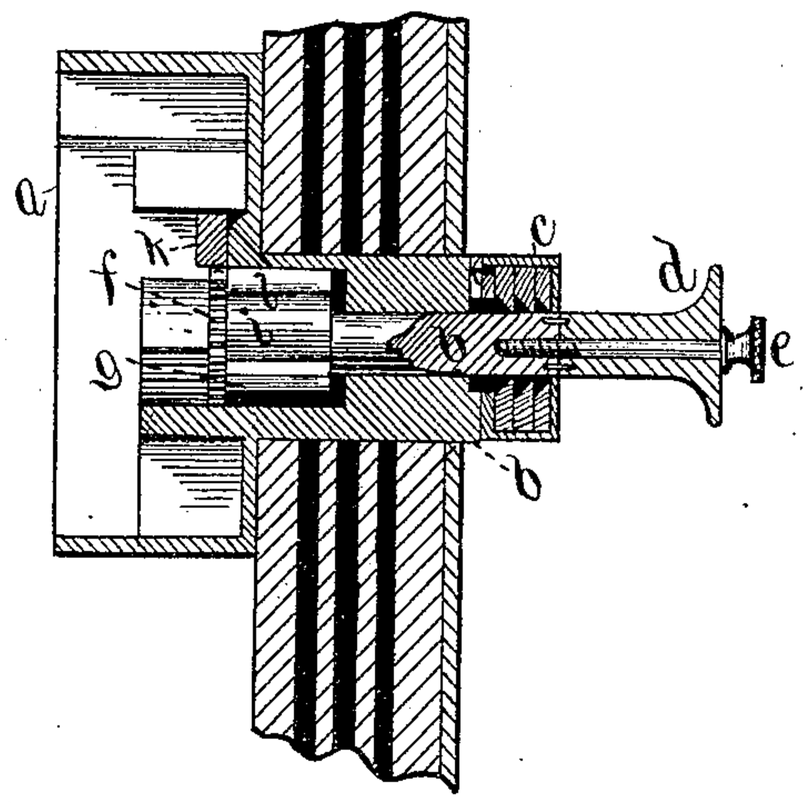


Fig. 4.



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UNITED STATES PATENT OFFICE.

OLIVER E. PILLARD, OF BOSTON, MASSACHUSETTS.

PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 238,608, dated March 8, 1881.

Application filed July 26, 1880. (Model.)

To all whom it may concern:

Be it known that I, OLIVER E. PILLARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Combination-Locks, of which the following is a description, reference being had to the accompanying drawings, where—

Figure 1 is a view of the interior of a lock from the back side with the covering-plate and cap-block removed. Fig. 2 is a view the same as Fig. 1, except that the pile of gears overlying the bolt is represented as removed. Fig. 3 is a view of the lock from above. Fig. 4 is view of the lock in vertical cross-section on plane *x x*.

This is an improvement upon that kind of combination-lock described in Letters Patent of these United States to E. M. McPherson and myself, dated April 24, A. D. 1877, and numbered 189,902. In the use of the lock described in that patent the operator throws (locks) the bolt by the rotation of the key-shaft, then disarranges the combination by subsequent rotations of the key-shaft, and then removes the key—a collection of open centered disks contained within a cylindrical case. It sometimes happens that the operator thinks he has done all this, when, as a matter of fact, he nearly threw the bolt, then drew it back in disarranging the combination, and removed the key, leaving the lock unlocked.

It is the object and purpose of this present improvement to make it impossible for the operator to disarrange the combination and withdraw the key, except when the bolt is thrown and locked, a resulting advantage and purpose being that a meddler cannot, while the lock is unlocked, apply another key and lock the lock on a different and perhaps unknown combination.

In the drawings, the letter *a* denotes the lock-case, *b* the key-shaft on the front side thereof to pass through the safe-door.

c denotes the key as a whole, attached upon the end of sleeve *b* by a dovetail-tenon, *c'*, sliding vertically or radially into a corresponding dovetail-mortise in the end of the sleeve.

d denotes the knob, which the operator grasps to give the requisite rotary and longitudinal motions to the key-shaft, made temporarily fast to the key-shaft by the central set-screw *e*. The movements of the key-shaft for locking and unlocking are governed by the disks and slots in the disks within the key, as is well known in the art.

Near its inner end the key-shaft bears the gear *f*, having both the rotary and the longitudinal movements of such shaft. This shaft also bears on the inner side of gear *f* the gear-lock *g*, having the longitudinal but not the rotary motions of the key-shaft, the office of which is to lock such of the pile of gears *h* as are on the inner side of gear *f*, and not in mesh therewith, from rotation for the time being. This key-shaft also bears on the outer side of gear *f* the gear-lock *i*, having the longitudinal but not the rotary motions, of the key-shaft, the office of which is to lock such of the pile of gears *h* as are on the outer side of gear *f*, and not in mesh therewith, from rotation for the time being. In locking and unlocking, the gear *f* acts successively upon the different ones of gears *h*, and these, in turn, act successively upon the different ones of gears *t*, and move them to requisite position and adjustment, the proper position in unlocking, for instance, being that in which all the mortises *t'* coincide and are in position to admit the dog or pawl *j* on bolt *k*.

The gear-lock *i'* bears a feather, *l*, which, when the bolt *k* is out, (locked,) and at no other time, coincides with mortise *m* in the bolt, and, consequently, this is the only time when endwise motion of the key-shaft inward (and this is the movement it must have in disarranging the combination preparatory to removing the key) is permissible or possible. In the former or old construction of this lock there was a mortise similar to mortise *m* in the bolt at *m'*, (denoted in dotted lines,) and it was this mortise at *m'* which enabled the operator to disarrange the combination and remove the key improperly, as stated in the preamble. This mortise at *m'* in the former construction was necessitated by the fact that the combination was made changeable when the bolt was in, (unlocked,) it being necessary, in changing the combination, to rotate the gears *h* while unmeshed from gears *t*, and the unmeshing was effected while the bolt was in. To effect this unmeshing the gears *t* are hung on a short shaft, *n*, fixed to the vertically-moving slide *o*; but this shaft *n* passed through a horizontal slot, *p*,

made in the bolt, which prevented any vertical movement of this shaft, and (in the former construction) it was only when shaft *n* coincided with a vertical slot, made at *r*, (denoted in dotted lines,) that this vertical movement of shaft *n* and gears *t* was possible. In the present construction I have put a vertical slot, *s*, at the rear end of slot *p*, with which shaft *n* coincides when feather *l* coincides with mortise *m*, so that the combination can be changed at such time; and it is in this manner that I avoid having a slot like slot *m* at any other point in the bolt.

In a still earlier form of lock, of this same general construction, than that shown in the patent referred to, it was possible, while the lock was unlocked, to make a different combination on the key, generally through ignorant intermeddling, and therewith lock the lock on an improper and, perhaps, unknown combination, and means were provided in the patent referred to to prevent such trouble. In the present construction the key cannot be removed from the key-shaft sleeve except when the lock is locked, and as such removal is necessary in order to change the combination of the key, consequently such intermeddling is not, in the present construction, possible.

I claim as my improvement—

1. In combination, the vertically-moving shaft carrying gears *t*, and the bolt *k*, provided with the horizontal slot *p* and the vertical slot *s* at the rear end of slot *p*, all substantially as described, and for the purposes set forth.

2. The bolt *k*, provided with the vertical slot *s* at the rear end of horizontal slot *p*, and also provided with the single mortise *m*, in combination with the vertically-moving shaft *n*, carrying gears *t*, the gears *h*, the key-shaft *b*, carrying gear *f*, the gear-lock *g*, and the gear-lock *i*, carrying the feather *l*, all substantially as described, and for the purposes set forth.

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Witnesses:
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