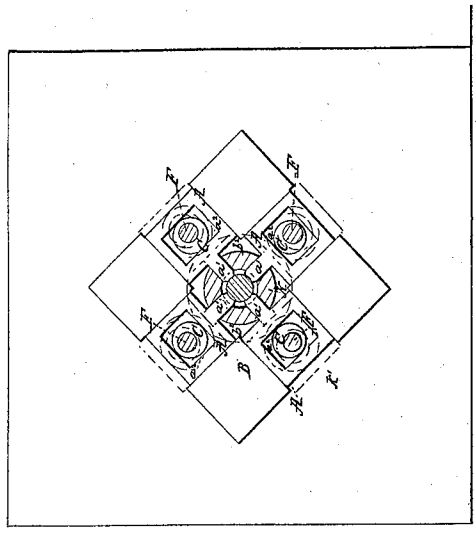
G. B. Atwood,

Permutation Lock.

No. 63,133. Patented Mar. 26, 1867.

Fig. 3.



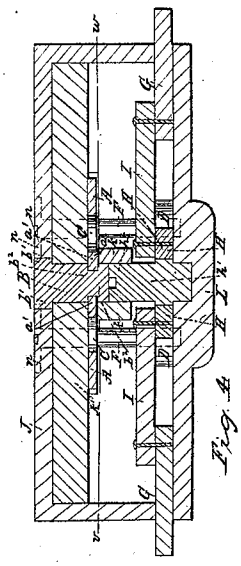


Fig. 4.

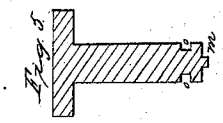
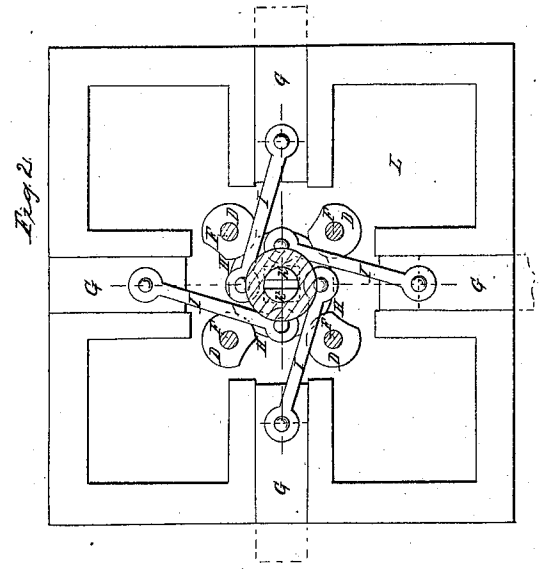


Fig. 5.

Fig. 2.



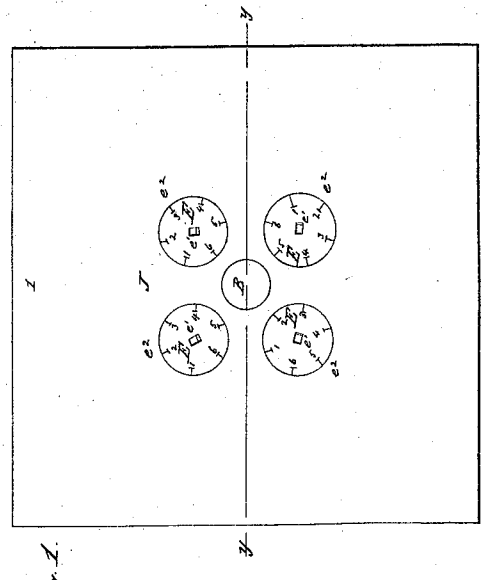


Fig. 1.

Witnesses:
Wm. R. Scott
R. R. Moore

Inventor:
Geo. B. Atwood,

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

UNITED STATES PATENT OFFICE.

GEORGE B. ATWOOD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO ALFRED A. OAT, OF SAME PLACE.

IMPROVEMENT IN PERMUTATION-LOCKS.

Specification forming part of Letters Patent No. **63,133**, dated March 26, 1867.

To all whom it may concern:

Be it known that I, GEORGE B. ATWOOD, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in the Plug-Lock for Safes, Vaults, &c.; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a plane view of the face of the said improved lock; Fig. 2, a like view of the bottom or back plate of the lock, together with the locking-bolts and the improved devices for operating and fixing them; Fig. 3, a like view of the inner or rear side of the face-plate of the lock, together with a section parallel thereto, on the dotted line *v w* of Fig. 4, of the plug and the improved devices for securing and releasing the same; Fig. 4, a central section, on the dotted line *x y* of Fig. 1, of the said parts as combined; and Fig. 5, a longitudinal central section of the separate hand-lever used in operating the locking-bolts after the plug ha been withdrawn from the case of the lock.

Like letters of reference indicate the same parts when in the different figures.

My invention relates particularly to a certain improved burglar-proof plug-lock invented by Alfred A. Oat, of the city of Philadelphia, and for which Letters Patent No. 56,790 were issued to him, dated the 31st day of July, 1866. In that lock the "plug" and "locking-bolts" are secured and released by successively operating a number of interlocking spring-slides, and withdrawing the locking-bolts against spring-pressure through chains and pulleys acted upon by means of a jointed removable hand-lever; but although the said lock is believed to be perfectly burglar-proof, it is very complicated and expensive of construction, and also somewhat tedious of operation.

The object of my invention is to remedy these objections without impairing the peculiar burglar-proof feature of the said lock.

It consists, substantially as hereinafter described, in providing for moving the slides which immediately secure and release the central plug or plugs of the said lock by means of a series of disks having concave recesses in their edges, and being respectively connected with cams and outside indicating-disks by means of shafts or arbors in such a manner that each shaft or arbor, with its respective cam and recessed disks, can be independently and freely rotated in either direction, right or left, by means of a small square pin applied to a shallow square cavity in its center, or by one's thumb and finger applied for the purpose to the outside surface of the indicating-disk; and my invention also consists in providing for moving and fixing the four locking-bolts of the said lock by means of a pivoted central disk connected therewith, and having concave recesses in its periphery adapted to fit the convex portions of the peripheries of the series of surrounding disks, so that each of the latter disks will reciprocate with the former, and vice versa, as occasion may require in operating the lock, as will hereinafter be explained.

In the drawings, A A A A are the slides; B, the central plug; C C C C, the cams; D D D D, the series of recessed disks; E E E E, the indicating-disks in the face-plate; F F F F, their four shafts or arbors which connect together the disks E and D and the cams C of each; G G G G, the four locking-bolts; H, the recessed central disk, and I I I I the coupling-bars of the said bolts and disk.

The central plug B is made cylindrical in form, so as to be easily turned around or rotated in its seat, has a bearing-shoulder, b^1, and an annular recess or groove, b^2, near its lower end, for the reception of the bolting ends a^1 of the slides A, and fits flush or even with the outside surface of the face-plate J of the lock in a hole or socket, K, through the sides of which latter the bolts a^1 slide into and out of the recess b^2 of the plug B, allowing the latter to be freely rotated in its seat. The plug extends a little beyond its said annular groove. (See Fig. 4.) The slides A are secured to the under side of plate k', and each slide has an opening, a^2, within it for the reception of its respective cam C, which is adjustably fixed on the shaft F. Near the rear or inner ends of the shafts F their respective recessed disks D are adjustably fixed, and on the upper ends of said shafts the respective indicating-disks

E are also adjustably fixed. The disks E are let in the face-plate so as to be flush or even with its outer surface, as represented in Fig. 1, and indicated by the dotted lines *n n*, Fig. 4, and also have a small, shallow, rectangular cavity, e^1, in their centers, for the purpose of affording thereby a hold for turning them around with their shafts, cams, and recessed disks, as will be hereinafter explained. The faces of the said disks E are each divided off at their edges into regular portions by short radial lines, which are numbered, and just outside of each disk E a small point mark, e^2, is made in the face-plate, as shown in Fig. 1. The central disk H has four uniform and equidistant concave recesses in its periphery, which are adapted to receive and fit the convex portions of the peripheries of the series of the four smaller disks D when the former is turned, so as to bring its four recesses directly and exactly opposite to the latter. The disk H has a fixed central cylindrical shaft or arbor, h^1, the lower end of which serves as one of its pivots, in a socket in the rear or bottom plate L of the lock, while its upper end, which has a diametral groove, h^2, enters the socket K, and serves as its opposite pivot, thus allowing a free rotary motion to the said disk H. The disk H is also connected to the four locking-bolts G by means of the respective bars 1, which are pivoted or jointed to both, the said bars being each of such a length between their pivots as will cause the bolts G to be moved simultaneously out and in properly for closing and opening the lock by rotating the disk H accordingly.

All the parts are to be made of steel; the moving surfaces in contact polished and fitted together accurately, and so as to be moved without causing any noise or jarring whatever. The exterior plates, or case of the lock, the disks E, and the removable plug B, are intended to be made of steel hardened thoroughly, or of any other undrillable metal.

Operation: The different parts being constructed and arranged together substantially as described, and shown in the drawings, and the four bolts G pushed out, and fixed in the positions represented in Fig. 4, it will be seen that the said bolts G cannot be withdrawn into the case until the central disk H is released from the four interlocking disks D, the convex portions of which latter being in the curved recesses of the former (see Fig. 2;) nor can the operating hand-lever, Fig. 5, be inserted for the purpose of turning around the said disk H until the plug B be withdrawn; and that the withdrawal of the said plug cannot be effected until it has been released from the ends a^1 of the slides A by rotating the four indicating-disks E to certain positions, and consequently with them the four cams C, which govern the said slides. But the relative positions of the cams and slides cannot be seen, nor can they be felt by the most delicate sense of touch, because each of the disks E and the plug B can be rotated freely without causing the least noise or jarring; in short, the lock is closed, and cannot be unlocked without first arranging the four indicating-disks E so that some previously selected one of the numbers or radial lines on each of the said disks is brought directly opposite to its respective fixed point e^2 in the face-plate J, and thus causing the cams C to withdraw the ends a^1 of the slides A from the annular groove b^2 of the plug B, and thus releasing the latter and permitting it to be readily withdrawn by means of the usual magnet provided for the purpose, as heretofore. The next thing to be done, after withdrawing the plug, is to introduce the hand-lever, Fig. 5, so that its tongue *m* will enter the groove h^2, for the purpose of thereby rotating the disk H, and thus withdrawing the locking-bolts G; but the relative adjustments of the cams C and disks D upon the respective shafts F are such that when the ends a^1 of the slides A are withdrawn by the cams C from the groove b^2 in the plug B, the convex parts of the perimeters of the disks D will be in the curved recesses of the central disk H, and therefore the latter cannot be rotated until the said disks D have their recessed edges again brought back directly opposite to the said recesses in the central disk H; and these required positions can only be known by a certain number, appropriate to the purpose, on each of the disks E being brought directly opposite to its respective fixed point e^2 in the face-plate J. The disks E having been rotated accordingly, the disk H can then be freely and easily rotated, and consequently the four bolts G withdrawn thereby, and thus the lock opened, the hand-lever, Fig. 5, being, of course, retained by the ends a^1 of the four slides A, which have been thus moved into the annular groove *o* thereof by rotating the disk H. In relocking or closing the lock, the bolts G are pushed out by rotating the disk H to its first position, and the hand-lever released by again withdrawing the ends a^1 of the slides A, by rotating the indicating-disks E so as to bring the respective appropriate numbers thereon to correspond radially with the points e^2 on the face-plate J, then reinserting the plug B, and finally advancing the ends a^1 of the slides A, either wholly or partially, into its groove b^2 by rotating the disks E, without any regard to the fixed points e^2.

It will be seen that it will be almost impossible for a burglar, or any one, to open this lock without first acquiring a knowledge of the two sets of selected numbers which may have been adopted for the purpose, on the disks E, in the original adjustments of the said disks or cams on their respective shafts; and as these adjustments can be readily varied so as to require a change of the two sets of numbers, a discovery of the said sets of numbers by any one will be rendered useless to him by simply changing the adjustments of either the disks E, the cams C, or disks D.

It will now be seen that the specified objectionable features of Mr. Oat's lock are remedied

by this invention without impairing its peculiar burglar-proof feature.

Having thus fully described my improvement, what I claim as new therein of my invention, and desire to secure by Letters Patent, is confined to the following, viz:

1. Making the plug B cylindrical, and with an annular groove, b^2, therein, substantially as and for the purposes described.

2. The employment of the recessed central disk H for controlling the bolts G, the said disk being constructed and arranged to operate substantially as described.

3. The employment of the surrounding recessed disks D, for the purpose of locking the central disk H, the said surrounding disks D being constructed and operated substantially as described.

4. Moving the slides A by means of the respective cams C, substantially in the manner described.

5. Operating the inclosed or invisible disks D and cams C by means of the exposed or visible indicating-disks E, or their equivalents, substantially in the manner described.

6. The employment of the combination consisting of the recessed disk H with the four recessed disks D, whereby they reciprocate with each other in the manner and for the purposes described.

GEO. B. ATWOOD.

Witnesses:
ROBERT HUTCHINSON,
W. R. SCOTT.