No. 821,548. PATENTED MAY 22, 1906.

W. STREETER & E. WALLIS.

PERMUTATION LOCK.

APPLICATION FILED OCT. 1, 1904.

Fig. 1.

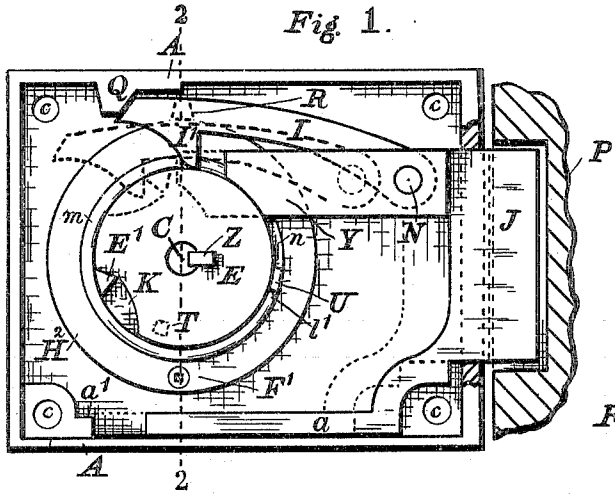

Fig. 10.

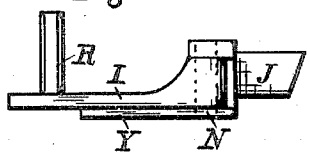

Fig. 5.

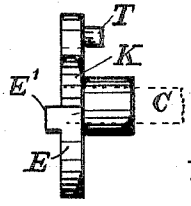

Fig. 9.

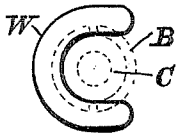

Fig. 2

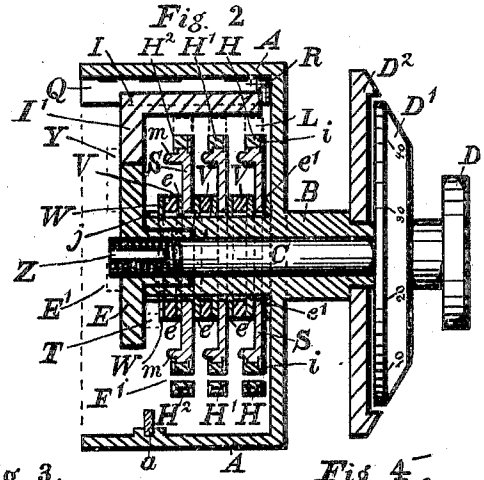

Fig. 6.

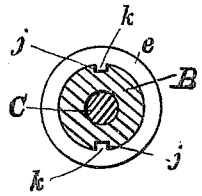

Fig. 3.

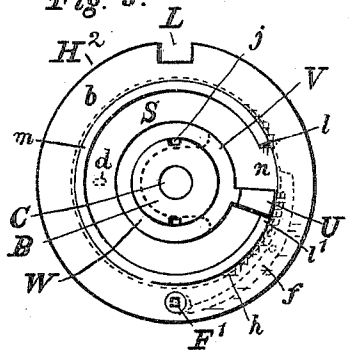

Fig. 4.

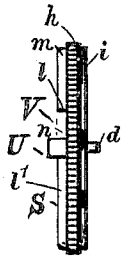

Fig. 7.

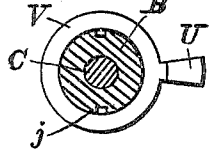

Fig. 8.

Witnesses

H. R. Selden,

E. J. Woodruff.

Inventors

Wm. Streeter and

Edward Wallis,

By Geo. B. Selden, Attorney

UNITED STATES PATENT OFFICE.

WILLIAM STREETER AND EDWARD WALLIS, OF ROCHESTER, NEW YORK.

PERMUTATION-LOCK.

No. 821,548. Specification of Letters Patent. Patented May 22, 1906.

Application filed October 1, 1904. Serial No. 226,770.

To all whom it may concern:

Be it known that we, WILLIAM STREETER and EDWARD WALLIS, residing at Rochester, in the county of Monroe, in the State of New York, citizens of the United States, have jointly invented an Improved Permutation-Lock, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to certain improvements in permutation-locks, which improvements are fully described and illustrated in the following specification and the accompanying drawings, the novel features thereof being specified in the claims annexed to the said specification.

In the accompanying drawings, Figure 1 is a rear elevation. Fig. 2 is a section on the line 2 2, Fig. 1. Fig. 3 is a side elevation of one of the permutation-wheels. Fig. 4 is an edge view of the interior portion of the same. Fig. 5 is an elevation of the disk on the end of the spindle. Fig. 6 represents one of the stationary washers, the spindle and surrounding sleeve being shown in section. Fig. 7 represents one of the flies, the central spindle and surrounding sleeve being shown in section. Fig. 8 is an edge view of one of the same. Fig. 9 is a side view of the segmental washer. Fig. 10 represents the locking-bolt and locking-dog as seen from above in Fig. 1.

Our invention relates to certain improvements in the construction of permutation-locks of that type in which the locking-bolt is operated by the rotation of a central spindle provided with a dial-plate and carrying notched permutation-wheels the positions of which are adjusted by the turning movement of the spindle first in one direction and then in the other until the notches on the several permutation-wheels are brought into alinement, thereby arranging the mechanism so that the bolt can be actuated by a further rotation of the spindle. When the notched permutation-wheels have their notches thus brought into line with each other, a movable piece or locking-dog connected to the bolt falls into the notches, and such movement allows a projecting arm on the dog to project into the path of a rotating part on the spindle, so that the rotation of the spindle can then withdraw the bolt and unlock the lock. A partial rotation of the spindle in the reverse direction locks the lock. Each permutation-wheel on the central spindle is provided with a projecting pin which actuates its neighboring permutation-wheel, and each notched permutation-wheel is adjustable with reference to its pin, so that the lock can be set on any of the numbers on the dial-plate. Thus to unlock the lock it becomes necessary to turn the spindle alternately in opposite directions until the predetermined notches in the permutation-wheels H, H′, and H^2 register with each other, when the locking-dog drops into the notches, and the further revolution of the spindle withdraws the bolt.

In the accompanying drawings, A, Fig. 1, represents the casing of our improved permutation-lock as seen from the inside; J, the sliding bolt; C, the central spindle, and I the locking-dog, pivoted to the bolt J at N. In the sectional view, Fig. 2, D is the knob on the spindle C, by which the spindle is turned. D′ is the graduated dial-plate revolving with the spindle, and D^2 the stationary dial fastened to the hub B of the casing. The central spindle C revolves freely within the hub B when the knob and dial-plate are turned, and it carries at its inner end the disk E, which controls the movement of the locking-dog I. The disk E has a notch K in its periphery, into which notch the lug I′ on the locking-dog I drops when the disk E is turned and the notches L in the permutation-wheels H H′ H^2 are in alinement, and the disk also carries the projecting pin E′, which on rotating the spindle in the proper direction engages the lug I′, withdraws the bolt J, and unlocks the lock. The bolt J engages with a suitable socket in the case P of the safe or other container, to which the lock may be applied.

The disk E is threaded on the spindle C and secured in proper position thereon by the key Z. The locking-bolt J and locking-dog I are shown detached in Fig. 10, from which it will be seen that the locking-dog is provided with a projecting arm or cross-bar R, which extends parallel to the spindle C, but is arranged to drop into the notches L, Fig. 3, in the permutation-wheels H H′ H^2 when the notches are in line with each other. The cross-bar R does not bear on the peripheries of the permutation-wheels; but the locking-dog I is held in the elevated position (indicated by the full lines in Fig. 1) by the lug I′ bearing on the edge of the disk E, which is made large enough to keep the cross-bar out of contact with the permutation-wheels, so that the notches in them cannot be felt while they are being adjusted. The depressed po-

sition of the locking-dog is represented by the dotted lines, Fig. 1, in which position the locking-bolt J has been withdrawn by the rotation of the spindle and the disk E. The free end of the locking-dog when in the elevated position engages with the stop Q, Fig. 1, on the case A, so as to prevent the withdrawal of the locking-bolt. *a* is a guide attached to the locking-bolt, which slides on the inside of the case and to arrest the unlocking movement of the bolt at the end of its movement abuts against a stop *a'*. When it is desired to lock the door to which our invention is attached, the notches in the permutation-wheels being in line and the locking-dog in the depressed position, (represented by the dotted lines in Fig. 1,) the knob D is turned in the reverse direction from that required to unlock the lock, and the lug or pin E' on the disk E strikes against the projection Y on the locking-bolt J and forces it outward into engagement with the recess in the casing P. As the disk E revolves the side of the notch K raises the locking-dog I by coming in contact with the lug I', thus disengaging the cross-bar R from the notches in the permutation-wheels.

It will be understood that the lock may be arranged with its locking-bolt in any suitable relation with the bolt mechanism of a safe or vault, so that the mechanism cannot be operated when the bolt projects from its case. *c*, Fig. 1, represents holes for bolts by which the case is secured in place.

Proceeding now to a description of the permutation-wheels, it will be understood that the wheels H H' H^2 are set successively in the proper positions by the rotation of the spindle C and disk E in opposite directions and that provision should be made to prevent the accidental shifting of any of the permutation-wheels while the others are being set. For this purpose we mount the washers or "flies" V directly on the hub B, and we interpose the intermediate stationary washers *e* between the permutation-wheels and the flies. Either key-changing or hand-changing permutation-wheels may be employed. In the accompanying drawings we have represented key-changing permutation-wheels, the outside rim *b*, Fig. 3, of each wheel being adjustable relatively to the center S by a key inserted in the collar F'. The disk E on the central spindle is provided with a pin T, Figs. 2 and 5, by which the permutation-wheel H^2 is operated, the pin T striking against a lug U on the fly V. (See Fig. 8.) The center S of the wheel H^2 has a projecting pin *d*, Fig. 4, which operates the fly of the permutation-wheel H', and the center of this wheel has a similar projecting pin which operates the fly of the permutation-wheel H. The permutation-wheels are all of a similar construction, whatever their number, except that of course the last or outermost wheel H has no pin *d*, because there is no other permutation-wheel to be operated by it. Each of the permutation-wheels is provided with the rim *b*, Fig. 3, bearing the notch L and the center S. (Shown in Figs. 3 and 4.) The center is rotatably adjustable relative to the rim by means of a ring of teeth *h*, Fig. 4, on its periphery, adapted to engage with a suitable lever or cam operated by a key inserted at F', Fig. 3, for the purpose of changing the combination. In this way the rim *b*, with its notch L, is set in any desired position of adjustment relative to the center S with its pin *d*. The centers S are fitted to rotate freely on the hub B, which projects inward from the case. Between the flies V and the centers S are interposed on each side the stationary or non-rotatable washers *e*. The hub B has one or more longitudinal slots *j*, Fig. 6, in its outer surface, and the washers *e* have one or more corresponding lugs *k* projecting inward from their interior, adapted to engage with the slots *j*. (See Fig. 6.) Thus the washers are prevented from rotating, and, as shown in Fig. 2, the washers *e* are interposed on each side of the centers S and between them and the flies V. As the washers are stationary, no movement of any of the permutation-wheels or their centers can affect the position of any adjacent wheel or the centers. The washers *e* are conveniently made from sheet metal, having the internally-projecting lug or lugs *k*, adapted to fit the longitudinal slots *j* in the hub B. By the mounting of the flies V directly on the hub B and by the interposition of the stationary washers *e* on each side of the flies V it is rendered absolutely impossible that any movement of any one of the permutation-wheels should turn its adjacent wheel in any way whatever.

To secure the permutation-wheels on the hub B, we employ a half-washer W of horseshoe shape, adapted to fit a groove cut around the hub B in suitable relation with the other parts. Such washer is shown in outline in Fig. 9, being made of sheet metal adapted to fit the groove made for it in the hub with sufficient friction to hold it in place, and thereby to retain the permutation-wheels in their proper relative positions.

Between the front of the casing A and the permutation-wheel H a washer *e'*, Fig. 2, holds all the parts in suitable mutual contact.

The centers S of the permutation-wheels are provided with lugs or projections *l l'*, Figs. 3 and 4, which engage against the sides of the projecting arms on the flies V, so that each fly drives its corresponding center and disk, but with sufficient freedom of movement in the arc of a circle to permit a small amount of lost motion. The lug U projects laterally from the radial arm on the fly into the path of the pin *d* on the center of the adjacent permutation-wheel. In the construc-

tion shown the centers are provided with a lateral flange *m*, a portion of which is cut away, as indicated at *n*, the ends of the cut-away portion forming the lugs *l l'*. Any other desirable construction may be adopted.

The center S of each of the permutation-wheels is provided around its periphery with a ring of fine teeth *h*, Fig. 4, with which the toothed end of a pivoted lever *f*, Fig. 3, engages, to secure the center in any desired position relative to the rim *b* and the notch L. The rim is recessed to contain the lever *f*, being closed on one side by the plate *i*, Figs. 2 and 4, riveted or screwed in place on the rim. The collar F' is operated by a key inserted therein, and it is provided with a cam which swings the lever *f* on its pivot, so as to engage its toothed end with the milled ring *h* to fasten the center firmly to the rim. A spring (not shown) may be used to disengage the lever from the ring when the collar is turned, so that then the center can be adjusted relatively to the rim.

We claim—

1. In a permutation-lock, the combination with a series of revolving permutation-wheels mounted on a central stationary hub, of suitable driving-flies mounted directly on said hub, stationary washers located on each side of said flies, and mechanism adapted to rotate said flies, substantially as described.

2. In a permutation-lock, the combination with a series of revolving permutation-wheels mounted on a central stationary hub, of suitable driving-flies mounted directly on said hub, stationary washers located on each side of said flies, and pins mounted on said permutation-wheels adapted to rotate said flies, substantially as described.

3. In a permutation-lock, the combination of a stationary central hub, permutation-wheels mounted thereon, each provided with an adjustable center, a corresponding series of rotatable flies mounted directly on said hub, and non-rotatable washers interposed between said flies and said permutation-wheels, substantially as described.

4. The combination with a permutation-lock, of the notched permutation-wheel having the adjustable center provided on one side with a projecting flange having a segment cut away, the rotatable fly adapted to engage in the cut-away portion of the flange, and the non-rotating washer interposed between the fly and the wheel, as and for the purposes set forth.

5. The combination with the central rotatable spindle, the stationary hub, and bolt-operating mechanism of a permutation-lock, of the permutation-wheels each provided with a flange having a segment cut away and mounted on said stationary hub, a rotatable fly mounted on said hub and adapted to engage in the cut-away portion of the flange and the non-rotatable washers interposed between each fly and its wheel, substantially as described.

6. The combination with the central rotatable spindle, of the stationary hub and bolt-operating mechanism of a permutation-lock, of the permutation-wheel each provided on one side with a flange having a segment cut away and mounted on said stationary hub, a rotatable fly mounted on said stationary hub and adapted to engage in the cut-away portion of the flange and a non-rotating washer interposed between each fly and its wheel and between each fly and the adjacent wheel, substantially as described.

7. In a permutation-lock, the combination with a casing, a locking-bolt, and an abutment fixed to said casing to limit the backward movement of said bolt, a pivoted dog mounted on said locking-bolt, of a series of revolving permutation-wheels mounted on a central stationary hub, suitable driving-flies mounted directly on said hub, stationary washers located on each side of said flies and mechanism adapted to rotate said flies, substantially as described.

8. In a permutation-lock, the combination with a casing, a locking-bolt, and an abutment fixed to said casing to limit the backward movement of said locking-bolt, a pivoted dog mounted on said locking-bolt, of a stationary central hub, permutation-wheels mounted thereon each provided with an adjustable center, a corresponding series of rotatable flies mounted directly on said hub, non-rotatable washers interposed between said flies and said wheels and mechanism adapted to rotate said flies, substantially as described.

WILLIAM STREETER.
EDWARD WALLIS.

Witnesses:
HENRY R. SELDEN,
GEORGE B. SELDEN.