Feb. 13, 1923.

K. HORIGUCHI.

LOCK.

FILED JULY 9, 1921.

1,445,589.

2 SHEETS—SHEET 1.

Fig. 2

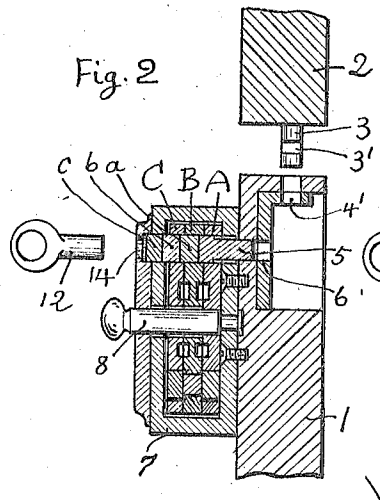
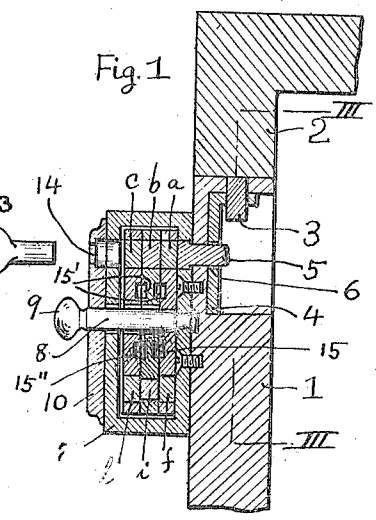


Fig. 1



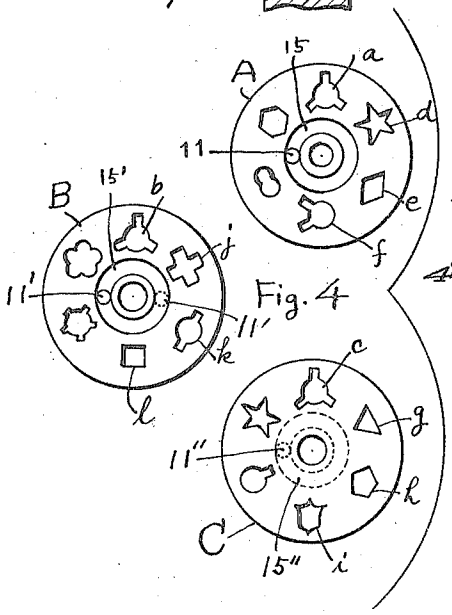


Fig. 4

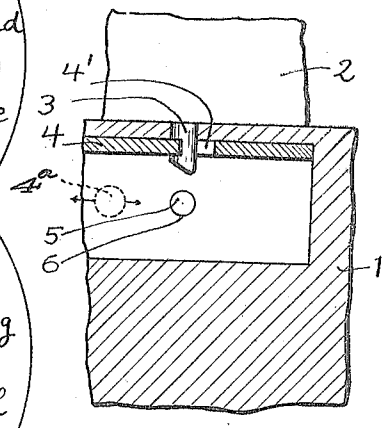


Fig. 3

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FILED JULY 9, 1921. 2 SHEETS—SHEET 2.

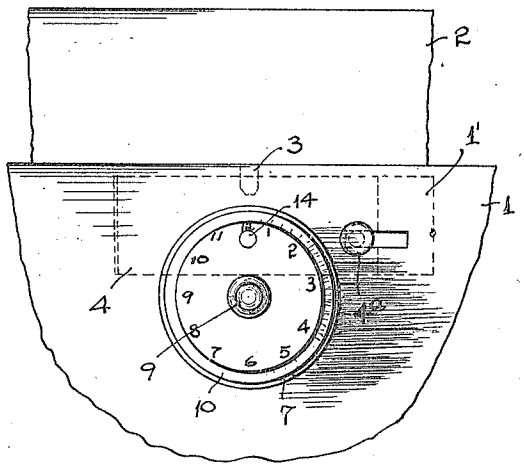


Fig. 5.

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UNITED STATES PATENT OFFICE.

KINTARO HORIGUCHI, OF TOKYO, JAPAN.

LOCK.

Application filed July 9, 1921. Serial No. 483,565.

To all whom it may concern:

Be it known that I, KINTARO HORIGUCHI, a subject of the Emperor of Japan, residing at No. 66 Ichome, Yushima-teujincho, Hongoku, Tokyo, Japan, have invented certain new and useful Improvements in Locks, of which the following is a specification.

This invention relates to an improvement in locks and especially of the kind in which a magnetic key is used to open the lock. The invention has for its objects to obtain the greatest number of locks of different combination with simpler construction and simultaneously to prevent the unlocking with a false key.

The accompanying drawings show one example of the lock according to this invention, in which:

Fig. 1 is a sectional view of the lock when the parts are in closed position.

Fig. 2 is a similar view with the parts in unlocked condition.

Fig. 3 is a sectional view taken in line III—III of the Figure 1.

Fig. 4 shows plan view of three locking discs A, B and C, the lock being shown as a kind of registering or combination.

Fig. 5 is a front or face view of the lock.

In the drawings, 1 is a member such as a book case or pillar of a room to which the cooperating member 2 such as a cover of the case or door of the room is to be locked. 3 is a pin fitted to the member 2. 4 is a movable member to be slidable in the space 1′ provided in member 1. This member 4 has a slot 4′ into which the pin 3 of the member 2 projects. In the closed position of the lock, the side cut 3′ in the pin 3 engages with one side of the slot 4′ of the member 4 as shown in Fig. 3. When the lock is unlocked and the parts are brought to the positions shown in Fig. 2, this member 4 may be slid by means of a projecting handle 4^a. Thus the pin 3 is then disengaged with the slot 4′ of the member 4 and the two bodies 1 and 2 can be opened as usual.

6 is a hole in the member 4, into which the locking rod 5 is introduced. 7 is a lock case, 8 is a central shaft of the lock passing through the case. 9 is a head of the shaft, 10 is a rotatable disc having in its surface marks of several letters. A, B and C are locking discs such as used for ordinary registering lock and can be rotated inside the case 7. These discs are respectively provided with projections 11, 11′ and 11″ in their circular grooves 15, 15′ and 15″ as shown. The inner disc A is rigidly fitted to the shaft 8 and therefore can be rotated by rotating the shaft 8 through the head 9. The middle disc B is loosely mounted on the shaft 8 and can be rotated only when the projection 11′ engages with the projection 11 of the disc A. The outer disc C is also loosely mounted on the shaft 8 and can be rotated only when the projection 11″ engages with the projection 11′ of the disc B. Briefly, these locking discs are operated in conjunction with the letters inscribed on the surface of the rotatable disk 10, so as to bring the parts having the same configuration, shown by letters *a*, *b*, *c* of respective disks into alignment. The parts *a*, *b*, *c* are iron pieces which have the same cross pieces as the locking rod 5, and nested in the corresponding holes provided in the respective discs. Moreover, the discs have respectively several different holes *o*, *p*, *q*, *r*, *s*, *t*, *u*, *v*, etc., into which iron pieces of the corresponding shape are nested. The actions of all these holes are quite the same as those in the ordinal registering lock in common use and therefore, further explanation thereof may be omitted.

13 is a key which is made of a magnetic metal. 12 is an ordinary key of non-magnetic property.

The action of the present lock may be explained as follows:—

Suppose the lock is adjusted a kind of registering lock by a suitable combination of locking discs according to ordinal manner of combination in the known registering lock. Then, when one wishes to open the lock, now locked, one firstly brings the iron pieces *a*, *b*, *c*, in alignment according to the ordinal registering principle of the lock of the kind. Then one uses the key 13, inserts it in hole 14 on the disc 10, and attracts the pieces *a*, *b*, *c*, and rod 5 by the magnetic force of the key 13, and draw out the parts from the position in Fig. 1 to that in Fig. 2 as shown. Therefore the member 4 can now be freely slid to disengage the cut 4′ from the cut 3′ of the locking pin 3. When one wishes to close the lock after bringing the pin 3 and member 4 into engagement, one uses the key 12 and pushes in the pieces *a*, *b*, *c*, and rod 5. In such operation, the rod 5 will freely move in and out of the holes

for iron pieces *a*, *b*, and *c* of the discs A, B or C, since said rod is of the same cross sectional shape as said holes.

From the foregoing it will be understood that when the disks A, B, C and 10 are not in correct register, or when these parts are in register and a false key of non magnetic material, which coincides with the shape of the parts *a*, *b* and *c* is used, the unlocking of the lock is entirely prevented. Moreover, as the locking and unlocking method of the improved lock consists in a mere linear displacement of the locking pieces, the lock is of simpler construction than those locks having rotatable parts. Further, the keyhole of the improved lock is substantially filled with the locking pieces and this will prevent the insertion of a wire or the like for the purpose of picking the lock.

Briefly, the improved lock can be very easily operated by an authorized person possessing the proper keys but cannot be operated by an unauthorized person.

Moreover, by suitable choice of the number of the locking discs, shapes of the iron pieces, locking rod 11 or of the hole 14, number and shapes of the auxiliary pieces of *a*, *b*, *c*, *d*, *e*, etc., and especially the strength of magnetic force in the key 13, a practically unlimited combination of them can be obtained to constitute a great many locks of different type with comparatively simple construction. All these merits are due to the employment of a magnetic key together with the ordinary key for respectively unlocking and locking the instrument.

I claim—

1. In combination with a lock having a movable non magnetic locking bolt, of a magnetic key for withdrawing said bolt, and a non magnetic key for locking said bolt.

2. The combination with a lock having a plurality of rotatable members provided with slidably locking pieces, and a locking bolt movable with said locking pieces, of a magnetic key for moving said locking pieces and bolt.

3. In combination, a lock provided with a plurality of rotatable members, each rotatable member having a series of apertures of different shapes, locking pieces slidably mounted in the apertures in said rotatable members and adapted to move axially in said apertures when apertures of the same shape in all the rotatable members are in alignment, a locking bolt adapted to move with said locking pieces, and a magnetic key for moving said locking pieces and said bolt simultaneously.

4. In combination, a lock provided with a series of coaxially arranged rotatable disks, means for rotating said disks, each disk being provided with a series of apertures of different shapes, locking pieces arranged in said apertures and adapted to move axially when the apertures of the same shape in the disks are in alignment, a locking bolt movable with said locking pieces and adapted to move into one of said apertures when the locking pieces are in movable position, and a magnetic key for simultaneously actuating said locking pieces and said bolt.

5. In combination, a lock provided with a rotatable shaft, a disk fixed to said shaft, other disks loosely mounted on said shaft, means for causing the last mentioned disks to move with the first mentioned disk during a portion of a revolution of the first mentioned disk, a casing enclosing said disks, a series of apertures of different shapes arranged in each disk, a dial disk fixed to said shaft and arranged exteriorly of said casing, locking pieces arranged in the apertures of the disks and movable axially when the apertures of the same shape in the first mentioned disks are arranged in alignment, a locking bolt movable with said locking pieces, and a magnetic key for simultaneously moving a plurality of said locking pieces and said bolt for the purpose of withdrawing the latter.

6. A combination as claimed in claim 5 in which the locking pieces are of non magnetic material, and a non magnetic piece for moving said locking pieces in the direction opposite that in which they are moved by the magnetic key.

In testimony whereof he affixes his signature.

KINTARO HORIGUCHI. [L. S.]