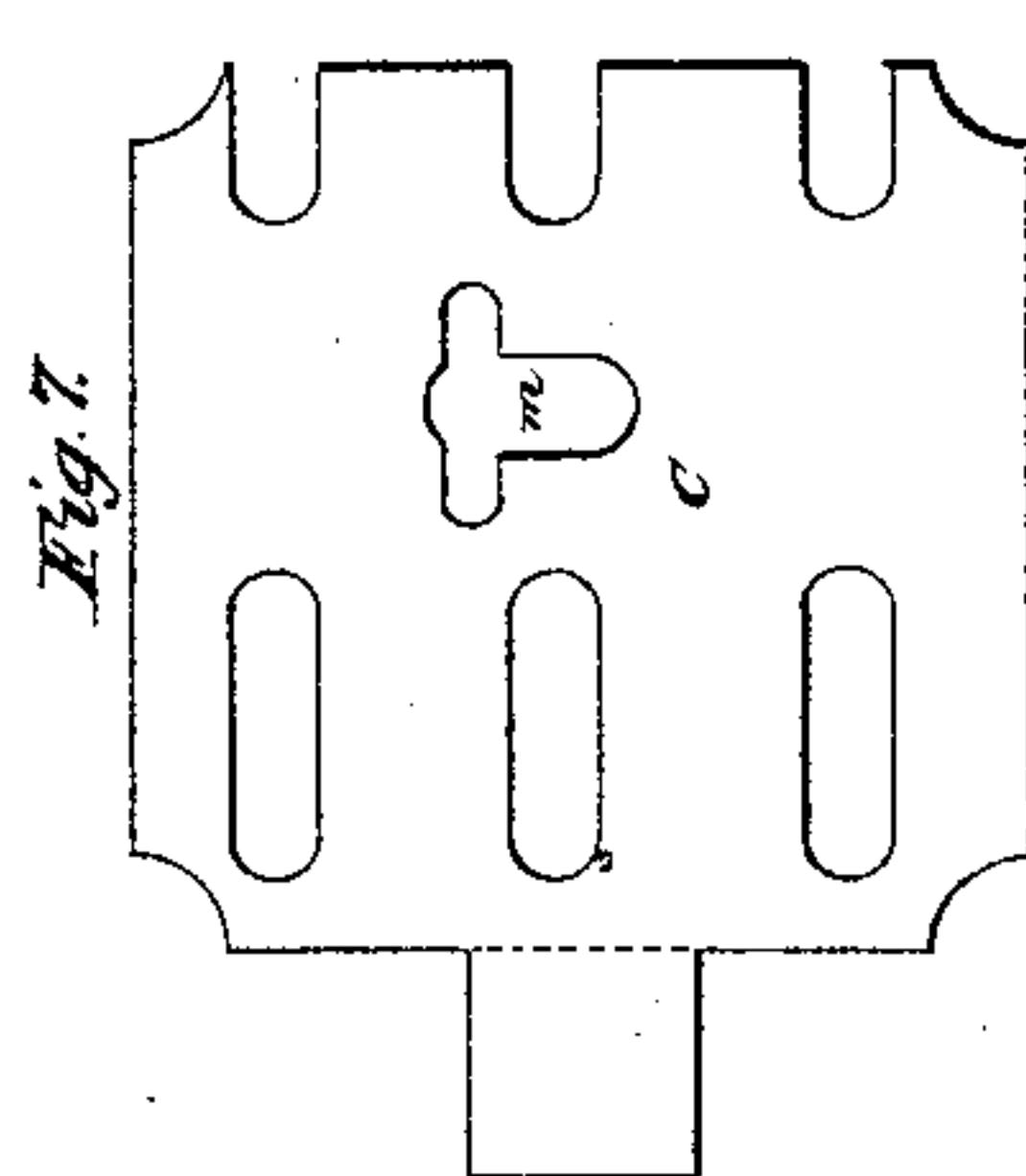
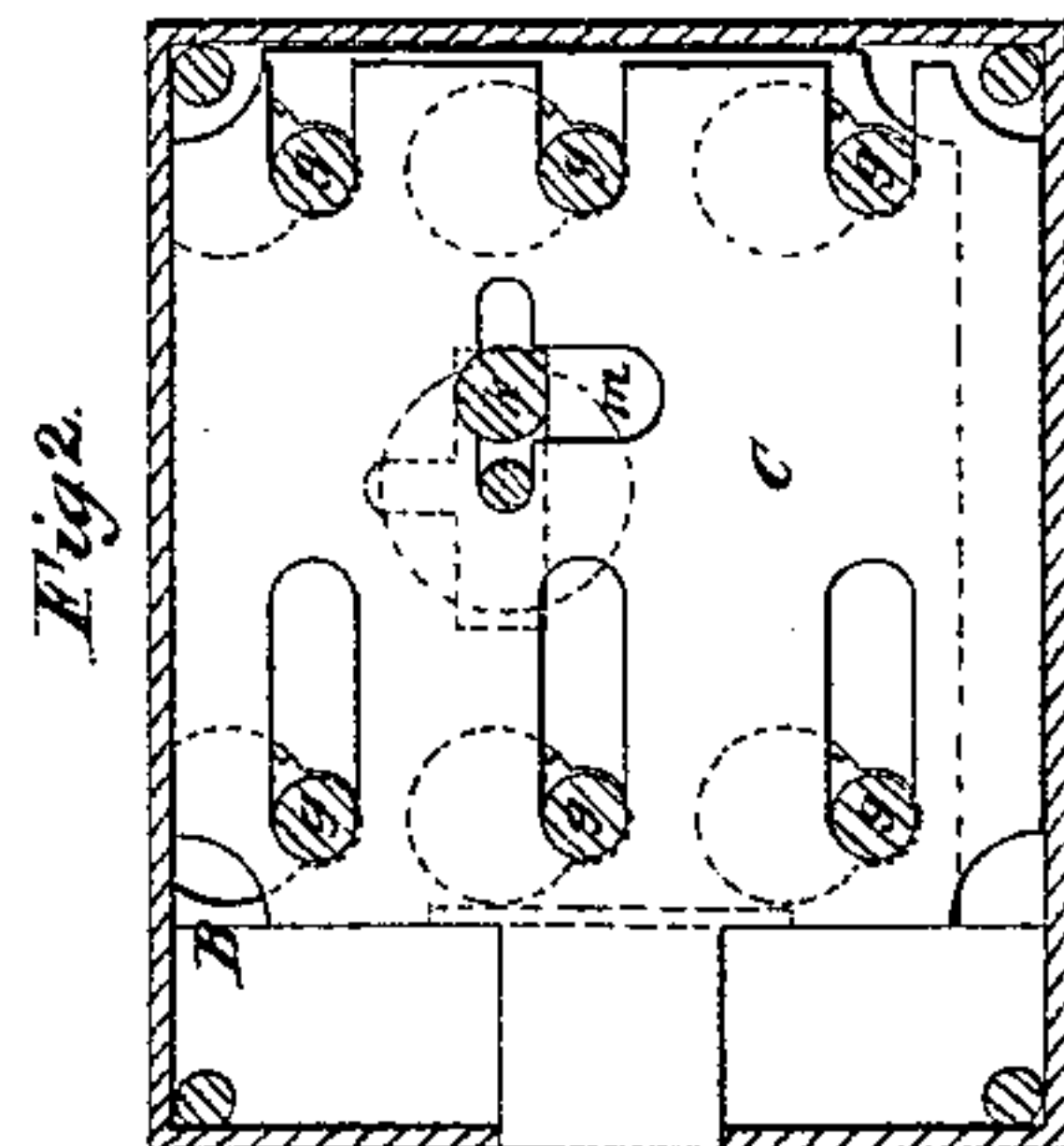
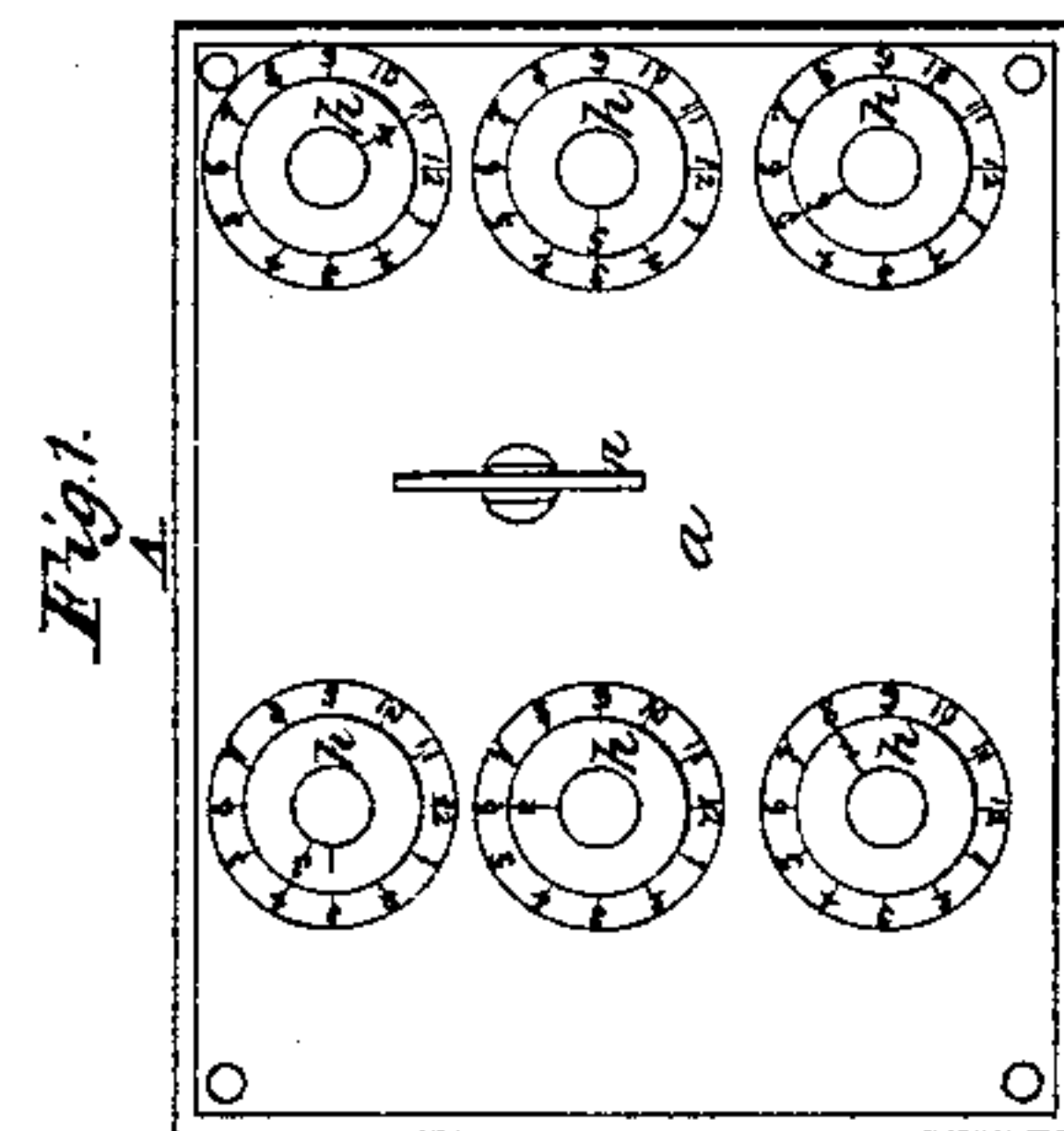
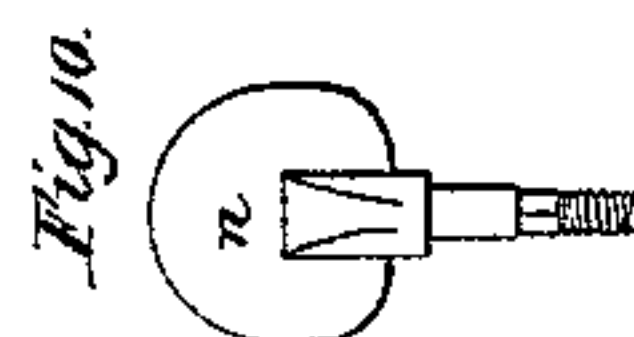
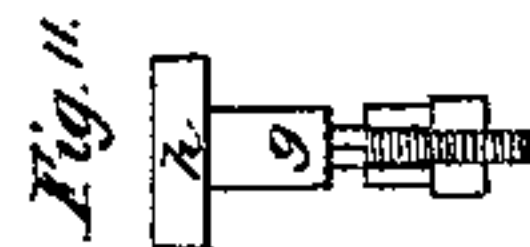
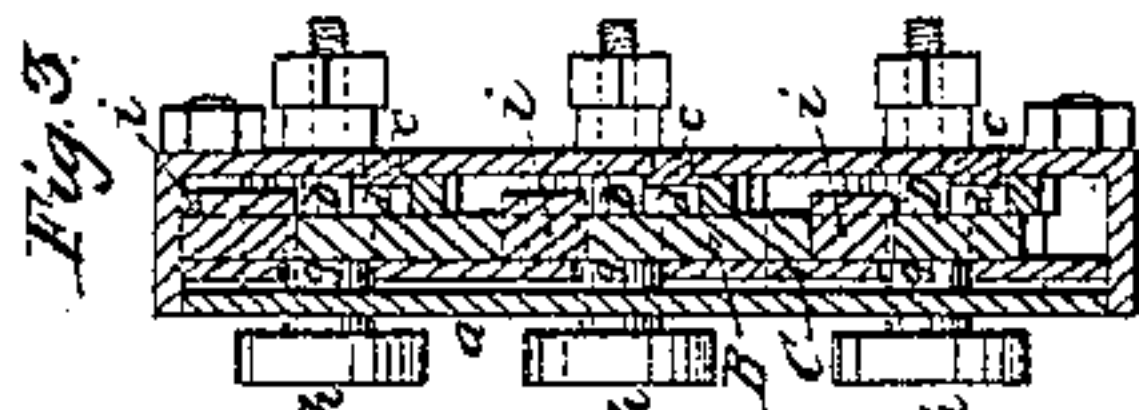
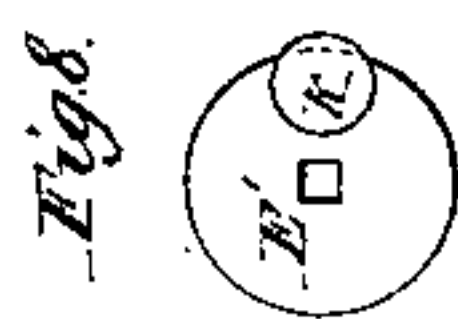
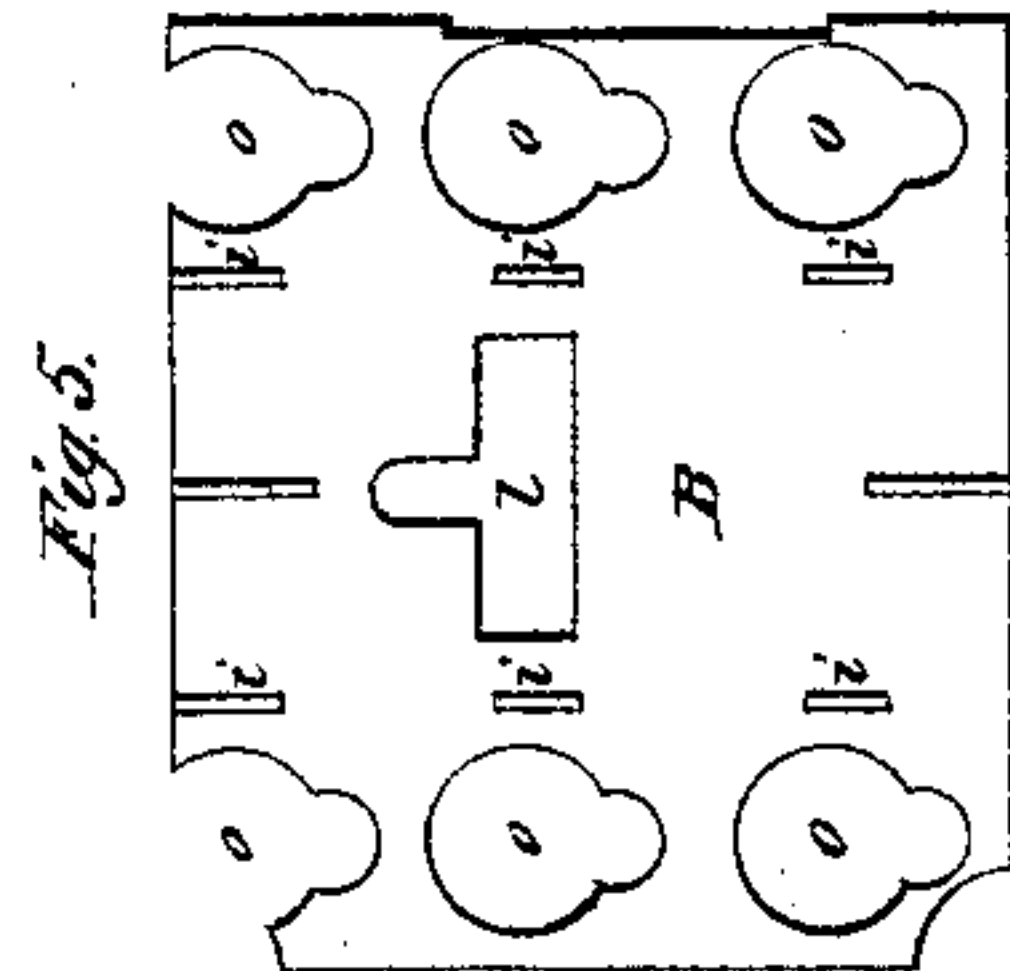
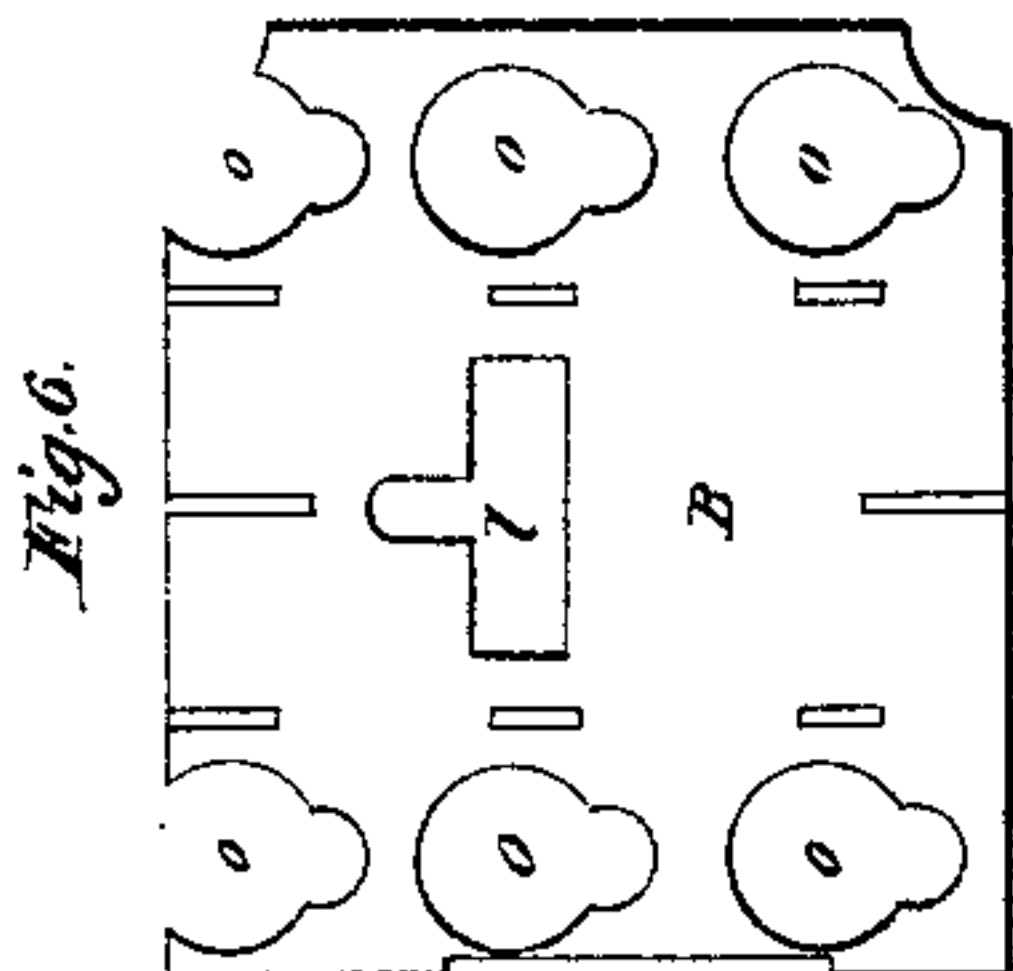
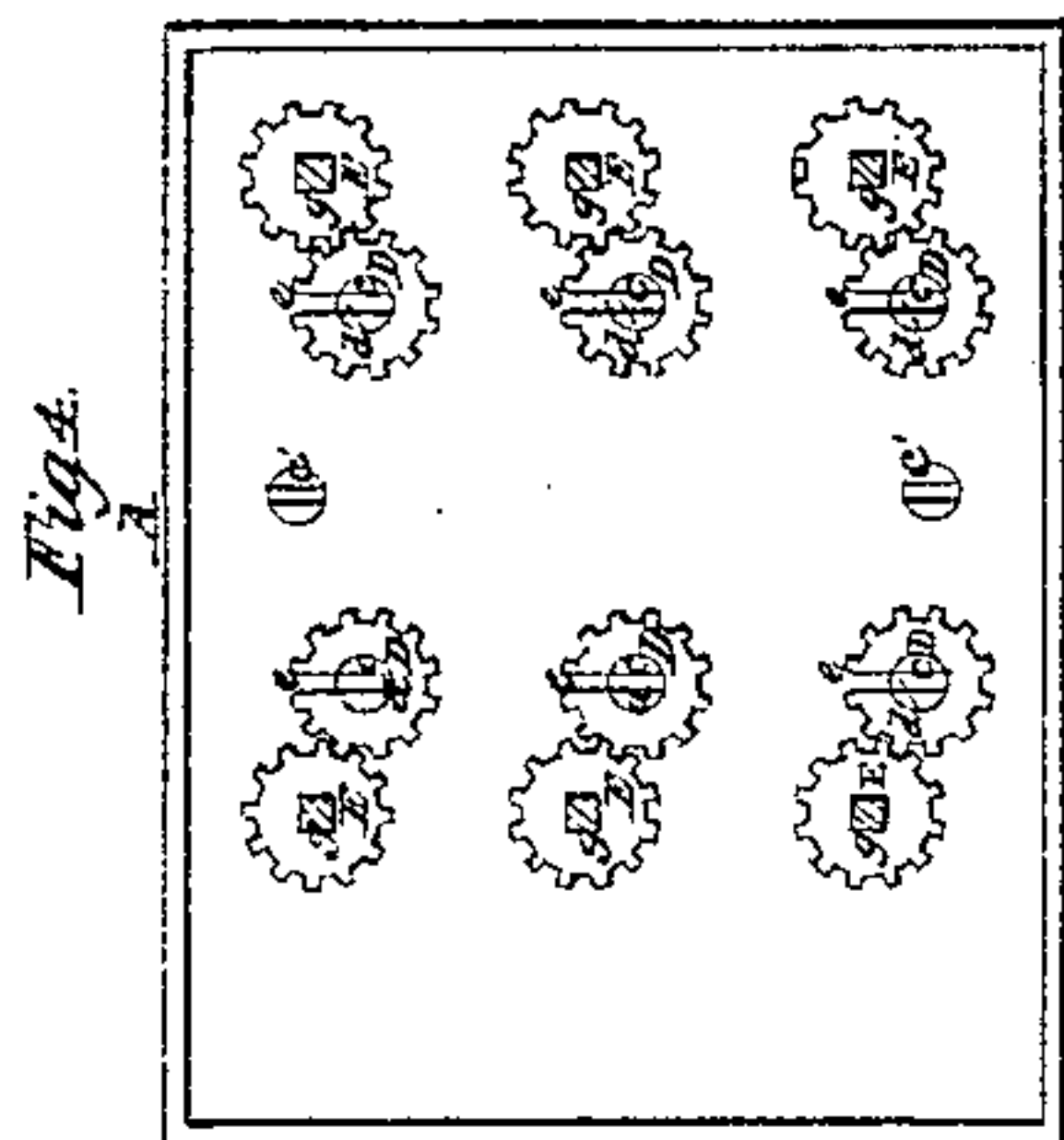


C. L. Lucas,
Permutation Lock.

N^o 68,219.

Patented Aug. 27, 1867.



Witnesses.
George Andrews
Samuel N. Piper

Inventor.
Calvin L. Lucas.
by his attorney.
R. M. Edgely

United States Patent Office.

CALVIN L. LUCAS, OF PLYMOUTH, MASSACHUSETTS.

Letters Patent No. 68,219, dated August 27, 1867.

IMPROVEMENT IN PERMUTATION LOCKS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL PERSONS TO WHOM THESE PRESENTS SHALL COME:

Be it known that I, CALVIN L. LUCAS, of the town and county of Plymouth, and State of Massachusetts, have invented an improved Permutation Lock; and do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a front view,

Figure 2 a longitudinal section, and

Figure 3 a transverse section of it.

Figure 4 is a view of the interior of its case, with the gears within such case.

Figure 5 is an under side view of the tumbler-plate and its projections.

Figure 6 is a top view of such plate.

Figure 7 is a representation of the bolt.

Figure 8 is a top view, and

Figure 9 an edge view of the crank-wheel for throwing the tumbler-bolt.

Figure 10 is a side view of the key or arbor for moving the crank-wheel.

Figure 11 is a side view of one of the index-arbors.

In the said drawings, A is the lock-case, B the tumbler, and C the bolt, they being formed as represented. The cover of the case is shown at *a*. It is to be confined to the case by a screw-pin, and a nut thereto, arranged near each corner of the case and cover. A series of stationary centres, *c c c*, is arranged within the case, and so as to project from its bottom, the same being as shown in fig. 4. Each of such centres has a groove, *d*, extending across it parallel with either end of the case. On each of such centres, except the two medial ones, marked *c' c'*, is placed a gear, D, (see Figure 12, which is a top view of the gear,) having a slot, *e*, extending radially through it from its eye to its circumference, and of a width to correspond with that of the groove *d* of the centre. Each of such gears D engages with one of a series of other gears, E, (see Figure 13, which exhibits one of such gears,) corresponding in diameter and number of teeth with the gears D. Each gear E has a square hole through it for the purpose of admitting one of a series of arbors, *g*, which pass through the lock, each of such arbors having a circular head or knob, *h*, across whose circumference a gauge-mark is made.

The tumbler B is next to be placed on the system of gears. This tumbler has a series of projections or short tongues, *i i i*, extending from its lower side, they being to enter the slots in the gears D and their centres. The tumbler thus can slide crosswise of the lock-case, at right angles with the bolt C, which is next placed on the tumbler. The tongues, by passing into the slots of the gears and their centres, enable the bolt and the tumbler to be moved by the cranked wheel, in order that the bolt may be either locked or unlocked. When the bolt is either locked or unlocked the tongues are wholly out of the gears. A cranked wheel, E', provided with a crank-pin, *k*, is arranged within the lock-case, and is employed to move the tumbler and the bolt. The crank-pin *k* works in T-slots made in the tumbler and bolt, as shown at *l* and *m*, in figs. 5, 6, and 7. A knob, *n*, is affixed to such crank-wheel for enabling it to be revolved.

Each arbor *g* is made capable not only of being revolved within the case, so as to revolve the gear E, immediately connected to it, but of being slid or moved lengthwise in the case, so as to move such gear either into or out of engagement with its slotted fellow-gear D, in the following manner: Each arbor, below the square part *s*, which engages with the hole formed in its gear, has a screw-thread cut upon its end. This end projects through a hole formed for it in the back of the case, which is of sufficient size to admit of the passage of a sleeve, *p*, which encircles a portion of the screw-stem. A nut, *r*, upon the stem holds the sleeve against the shoulder formed by the square part *s*. This construction and arrangement of parts is shown in fig. 11; and it will be seen that when the nut is screwed down upon the stem the gear-wheel will be held firmly between the shoulders formed by the sleeve and the upper and enlarged portion of the arbor. The arbor is free to revolve in its bearings, while at the same time it is capable of being drawn out until the nut *r* catches against the back of the lock and stops its further withdrawal. The nut and sleeve can be cast or otherwise formed in one piece if it be desired. There is made on the external face of the cover of the case, and concentrically with each of its arbors *g*, a circle of numbers, from one to twelve, the same being as represented in fig. 1.

When the several slots of the gears D are brought into parallelism with one end of the case, the bolt and

tumbler can be moved by the cranked wheel E'. So, when the tumbler is at one extreme of its movement, certain circular openings *o o* in it will allow of the arbors *g g* being moved longitudinally, as just explained, so as to draw their gears E into such openings and out of gear with the gears D. When so drawn out of engagement the arbors may be revolved, so as to set their indices to any of the numbers on their respective circles of numbers, after which they may be pressed back into gear and the gears be revolved so as to throw the radial slits of the gears D out of parallelism with the end of the case. This will prevent the bolt from being thrown back until the several slits of the gears D are again brought around into parallelism with the end of the case. When the indices of the knobs are set to the gauge-marks for enabling the bolt to be moved, such bolt should be just half way out. The bolt being shot either fully back or forward, the knobs should be revolved so as to throw the slitted wheel around in a manner to carry their slits out of parallelism with the end of the case. The crank or disk E' and its pin *k* are located under both the bolt and the tumbler, so that only the pin which is upon the circumference of the disk extends up into the slots *l m*. The arrangement and combination of these parts is such that the crank-pin *k* not only serves to actuate both the tumbler and the bolt, but to entirely prevent any movement of the latter unless the tumbler moves also. This will be apparent by reference to fig. 2, where it will be seen that the pin *k* abuts on both sides against the shoulders of the smaller arms of the T-shaped slot in the bolt, and effectually prevents the movement of the latter in any direction unless the tumbler moves also. The bolt-plate is guided and its movement regulated by means of the arbors *g*, which fit in slots formed in the plate parallel with each other and with the plane of motion of the bolt.

I claim the combination with the tumbler and the superposed bolt-plate, when guided by the arbors of the permutation gear as described, of the crank or locking-pin *k*, under the arrangement and for operation as herein shown and specified.

CALVIN L. ^{his} X LUCAS.
mark.

Witnesses:

CHAS. O. CHURCHILL,
ISAAC J. LUCAS.