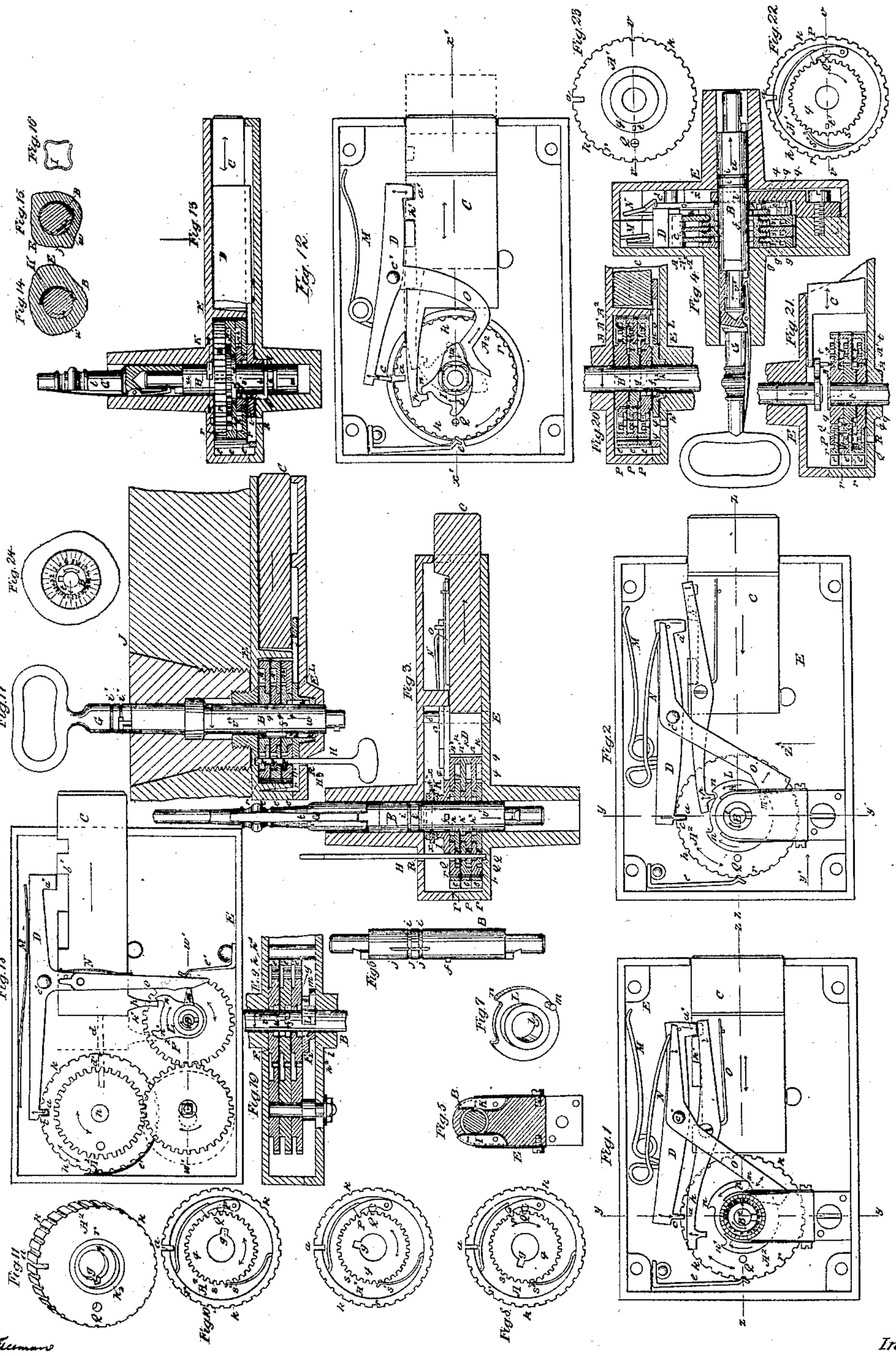
G. M. Phelps,

Permutation Lock.

No. 37,241. Patented Dec. 23, 1862.



UNITED STATES PATENT OFFICE.

GEORGE M. PHELPS, OF WILLIAMSBURG, NEW YORK.

IMPROVED COMBINATION-LOCK.

Specification forming part of Letters Patent No. **37,241**, dated December 23, 1862.

To all whom it may concern:

Be it known that I, GEORGE M. PHELPS, of Williamsburg, in the county of Kings and State of New York, have invented a certain new and Improved Combination-Lock; and I do hereby declare that the following is a full and exact description of my said improved lock and invention, reference being had to the annexed drawings, in which—

Figure 1 is a side elevation of one of my improved locks, the back plate of the case being removed and the bolt drawn back into the lock-case, but just about being released preparatory to being shot out. Fig. 2 is a side view of the same lock, with the back plate removed, and the bolt projected, but released, and on the point of being retracted. Fig. 3 is a section of the lock shown in Figs. 1 and 2, taken at the line *z z*, and viewed in the direction pointed by the arrow *z'* in Fig. 2. Fig. 4 is a section of the lock represented by Figs. 1, 2, and 3, taken at the line *y y*, and viewed in the direction indicated by the arrow *y'* in Fig. 2. Fig. 5 is a section of a part of the lock shown in Figs. 1, 2, 3, and 4, taken at the line *x x* in Figs. 3 and 4; and Figs. 6, 7, 8, 9, 10, and 11 are views of detached parts of the lock shown by Figs. 1, 2, 3, 4, and 5.

The other figures of the annexed drawings represent locks having some one or more of the features hereinafter specified as new and shown embodied in my improved lock exhibited by the aforesaid Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11.

The same letters refer to like parts in all the figures, and the arrows therein indicate the directions in which the parts are moved in use.

In Figs. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11 of the annexed drawings, A A' A² are three separable circular, disk-like tumblers, each having a slot, *a*, in its periphery, and all arranged and secured loosely together, side by side, on a spindle, B, Figs. 3 and 4. D is a lever-tumbler by which the bolt C is prevented from being retracted, except when the disk-tumblers A A' A² are all so adjusted and the bolt-tumbler D so operated that a tongue, *c*, of the bolt-tumbler can be and is engaged with the slots *a* of all the disk-tumblers indicated by Figs. 2 and 4.

In order to directly turn and separately adjust the disk-tumblers A A' A² with their slots *a* in any required position in respect to each other and to the tongue *c* of the bolt-tumbler D by means of the same spindle, B, on which the disk-tumblers are mounted, but without using any of the disk-tumblers to turn the others, I so make and arrange the spindle B that it can be freely slid endwise back and forth, and turned on its axis in either direction within the said disk-tumblers and the lock-case E, and have one or both of its ends exposed or extended through the case, and provided with or formed to receive a hand-key, G, Figs. 3 and 4, by means of which a person can easily slide and turn the key-spindle B in operating the lock, and make each of the said disk-tumblers with an internal slot, *g*, Figs. 8, 9, 10, and the spindle B with a stud or feather, *f*, Figs. 3 and 6, which can be freely slid into and withdrawn from the slot *g* of each disk-tumbler, and also provide each disk-tumbler with a friction holder or spring, *e*, Figs. 1, 2, and 3, which will hold the disk-tumbler from turning, except when the spindle B is turned with its feather *f* in the slot *g* of the disk-tumbler, the whole substantially as shown and indicated by the aforesaid Figs. 1, 2, 3, 4, 6, 8, 9, 10, and 11. Instead of having three such disk-tumblers, two or any other greater number may be employed.

In order that a person may readily set the disk-tumblers A A' A² so that their slots *a* (shown in Figs. 8, 9, 10 in different positions in respect to the slots *g*) will all be opposite to and admit the tongue *c* of the bolt-tumbler D, as indicated in Figs. 2 and 4, by the use of any suitable key or handle on the spindle B, which supports the disk-tumblers, and without either seeing or feeling the bolt-tumbler and disk-tumblers, or any part of either, and without the aid of any index, graduations, mark, or guide whatsoever on the outside of the lock, I make the spindle B with a longitudinal ratchet notch or notches, *j*, Figs. 6 and 5, and apply thereto a pawl, K, Fig. 5, so arranged that when the feather *f* of the spindle is engaged with the notch *g* of any one of the disk-tumblers A, A', or A², the spindle B can then be freely turned around in one direction with the disk-tumbler, as indicated by the arrow *u'*, Fig. 5, but in the opposite direction, only until the notch *j* meets the dog or pawl K, as shown in Fig. 5, and also make the peripher-

ies of the disk-tumblers with equal numbers of equidistant false slots or notches, *k*, and apply a counting-spring or yielding holder, *e*, Figs. 1, 2, and 3, to each disk-tumbler, so as to make a click or noise, or give a jumping or irregular motion to the spindle B, as each notch *k* arrives at or passes the click *e*, so that a person can thereby adjust the disk-tumblers, one by one, in the dark just as readily as in the light, by first engaging the spindle B with the disk-tumbler by means of the stud *f* and slot *g*, and next turning the spindle with the engaged disk-tumbler backward until it is stopped by the pawl K, as shown in Fig. 5, and then turning the spindle forward in the direction pointed by the arrow *w'*, Fig. 5, until the person has heard as many clicks of the spring *e*, or felt as many jumps of the spindle, as he knows, from previously-attained information, is necessary to bring the slot *a* of that disk-tumbler opposite to the tongue *c* of the bolt-tumbler, all substantially as shown and indicated by Figs. 1, 2, 3, 4, 5, 6, 8, 9, and 10 of the annexed drawings.

In order to disengage the bolt tumbler D from the bolt C, and also shoot out and draw in the bolt by means of the same sliding and turning key-spindle, B, by which the disk-tumblers A A' A^2 are supported and turned, and separately adjusted in respect to the tongue *c* of the bolt-tumbler, I arrange a collar, L, Figs. 7, 1, 2, 3, and 4, loosely on the spindle B, at one side of the disk-tumblers, which collar I make with an internal notch, *l*, Fig. 7, or its equivalent, by which the stud or feather *f* of the spindle B, when disengaged from the disk-tumblers, can, by properly sliding and turning the spindle, be easily engaged with so as to turn and disengage from the collar L, and also make the collar L with cams or projections *m n n'*, Figs. 1, 2, and 7, so that one of them, *m*, will, as the collar is turned by the spindle, then press against an arm, *o*, Figs. 1 and 2, of the bolt-tumbler D, and thereby overcome a spring, M, which spring ordinarily keeps the bolt-tumbler D engaged with the bolt so as to prevent the retraction of the latter, and thus disengage the bolt-tumbler from the bolt, as shown in Fig. 2. If the disk-tumblers A A' A^2 are all set with their slots *a* so that the tongue *c* of the bolt-tumbler can enter them, and so that as the collar L is further turned, while the bolt-tumbler is kept disengaged from the bolt by the cam *m*, the part *n* or *n'* will press against an arm, *p*, of the bolt C, and thereby either project or retract the latter, according to the direction in which the key-spindle B is then turned, all essentially as shown and indicated by the Figs. 1, 2, 3, 4, 6, and 7, aforesaid. The annular space or recess *h*^{2}, Figs. 11, 3, and 4, between the collar L and the adjacent disk-tumber A^2, is to allow the feather *f* to be disengaged from the disk-tumbler and engaged with the collar L, or released from that collar and engaged with the disk-tumbler, without turning either the disk-tumbler or the collar, whatever angular positions the internal notches, *l* and *g*, of the collar and disk-tumbler may happen to occupy in respect to each other around the spindle; and the annular spaces *h* and *h'* around the spindle between the disk-tumblers, Figs. 4 and 3, are to allow the feather *f* to be disengaged from one disk-tumbler and engaged with the next one, without turning either disk-tumbler, whatever positions the slots *g* of the disk-tumblers may be in. Grooves *i i*, Figs. 3, 4, 6, may be made in the spindle B, and a yielding holder, I, Fig. 5, arranged therewith, so as to indicate when the spindle is engaged with a disk-tumbler, and then somewhat hold the spindle from sliding endwise. The arm *o*, Figs. 1 and 2, of the bolt-tumbler D, may be fast thereon, or it may be pivoted and connected therewith by a spring, N, Figs. 1, 2, and 4, stiffer than the spring M, so that it shall be impossible to break, bend, or get any injurious strain upon the bolt-tumbler from or through the key-spindle; and the arm *p*, Figs. 1 and 2, of the bolt C, may be rigid thereon, or pivoted thereto and furnished with a spring, O, of less strength than the effective strength of the spring M, and so formed and arranged in respect to the bolt-tumbler and the projections *n n'* on the collar L that the latter cannot press against the arm *p*, except while the bolt-tumbler D is disengaged from the bolt, as shown in Fig. 2, and consequently when the bolt is free to be moved, so that no injurious strain can be got on the bolt from or through the spindle B and collar L.

In order that a person may readily change the position of the internal slot, *g*, or its equivalent, in respect to the external slot, *a*, in each of the disk-tumblers A A' A^2, so as to thereby "change the combination" of the lock while all the parts of the lock are together in its case and upon a door or safe ready for use, I make each disk-tumbler with a circular hub, *q*, Figs. 8, 9, 10, 11, 3, 4, and a rim, *r*, loose on the hub and secured thereto by means of a spring-pawl, P, secured on the rim and arranged to engage with teeth *s* on the hub in different places, and so arrange each pawl P in respect to the slot *a* and a hole, Q, through each rim *r* and an aperture, R, Fig. 3, through the back plate of the lock-case E, that by inserting a semi-cylindrical or other suitably-shaped pin or key, H, Fig. 3, from the outside of the lock through the hole R in the case, and also through the holes Q in all disk-tumblers, the disk-tumblers will then all be held by the pin H with their slots *a* all opposite to, so as to admit the tongue *c* of the bolt-tumbler, and that the pawls P will or can then be pressed out of the teeth *s* of the hubs *q* by means of the pin H, so as to allow each of the hubs *q* to be turned within its then stationary rim *r* by the spindle B, and thereby set with its notch *g*, or the equivalent therefor, at any desired place in respect to the slot *a* in the rim, all essentially as shown and indicated by the Figs. 1, 2, 3, 4, 8, 9, 10, aforesaid.

Now, I do not broadly claim as new, in combination-locks, the turning and adjusting of a series of slotted disk-tumblers in respect to the bolt-tumbler by means of a spindle supporting the disk-tumblers. Nor do I claim the disengagement of a bolt-tumbler from the bolt and the projection and retraction of the latter by means of a key-spindle, arranged to turn and adjust a series of slotted disk-tumblers in respect to the bolt-tumbler; and I do not claim the arrangement of the clicks *e* with the notched disk-tumblers, nor the adjustment, within a case, of a series of slotted disk-tumblers in respect to a bolt-tumbler without the aid of any guide, index, or dial on the outside of the lock-case. Nor do I now claim the "finding of the combination" of the series of disk-tumblers by means of a pin inserted through a hole in the lock-case, and also through a perforation in each of the disk-tumblers; nor the construction of slotted disk-tumblers in two parts, connected together by a ratchet and pawl and provided with a device for changing the combination, as shown in United States Letters Patent No. 10,265, A. D. 1853.

What I claim as new and of my invention, in combination-locks having a series of circular tumblers, all arranged side by side on one spindle, and desire to secure by Letters Patent, is—

1. The key-spindle B, having both a rotary and a longitudinal movement, and provided with a feather, *f*, in combination with the series of disk-tumblers A A′ A², loosely mounted on the said key-spindle, and each having an internal slot, *g*, and a yielding holder, *e*, substantially as and for the purpose herein described.

2. In combination with the series of independent disk-tumblers A A′ A², each having an internal notch or slot, *g*, and a series of notches, *k*, around its periphery, with a click, *e*, applied thereto, and all mounted on a sliding and turning spindle, B, provided with a feather, *f*, substantially as herein described, the notch or groove *j* in the said spindle, and pawl or stop K, applied thereto substantially as and for the purpose herein set forth.

3. In combination with the bolt C, bolt-tumbler D, and series of disk-tumblers A A′ A², mounted upon and formed so as to be turned and adjusted by the sliding and turning key-spindle B, substantially as herein described, the collar L, or its equivalent, whereby the said key-spindle, when disengaged from the said disk-tumblers, can be engaged with and disengaged from the said bolt-tumbler and bolt, substantially as and for the purpose herein set forth.

4. The arrangement of the pawl P, by which the toothed hubs *q* are secured to the rims *r* of the disk-tumblers, with the perforation Q and slot *a* in each of the said rims, the hole R in the lock-case, and the tongue *c* of the bolt-tumbler, substantially as and for the purpose herein described.

G. M. PHELPS.

Witnesses:

RICHARD V. FREEMAN,
JACOB ELLWANGE.