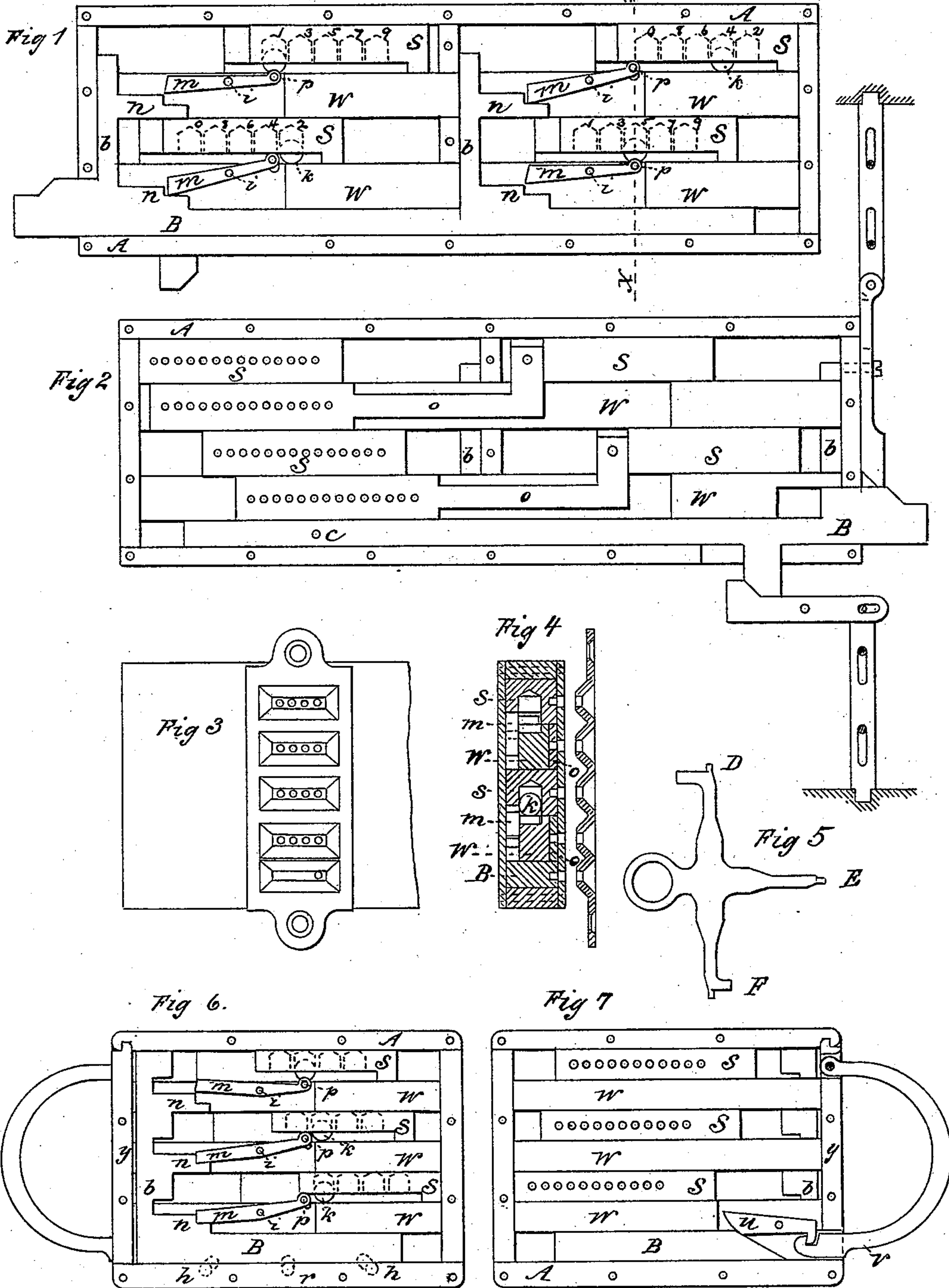


(Model.)

W. C. YOUNG.
COMBINATION LOCK.

No. 449,924.

Patented Apr. 7, 1891.



Witnesses:

John S. Hager
W. H. Hager

William C. Young, Inventor:
By H. C. Hartman atty.

UNITED STATES PATENT OFFICE.

WILLIAM C. YOUNG, OF FORT WAYNE, INDIANA.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 449,924, dated April 7, 1891.

Application filed July 14, 1890. Serial No. 358,740. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM C. YOUNG, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Combination-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in permutation-locks; and the objects are, first, to provide a perfect locking device in which the combinations may be varied, as required; second, to provide means for the proper adjustment and operation of the combinations independently and without communication with each other; third, to afford facilities to prevent others from ascertaining the combination by means of or from the operation of the slides, and, fourth, to provide means whereby the opening of the lock by force shall be made difficult. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is rear view of one form of the lock with the cover removed to show the mechanism. Fig. 2 is a front view of the same with cover likewise removed and with connecting-bolts and levers to illustrate its adaptation to safes and vault-doors. Fig. 3 is a front view of an escutcheon-gage. Fig. 4 is a cross-section of Fig. 1, taken on the line *xx*, and of Fig. 3, taken on a line through the center of the escutcheon-gage. Fig. 5 is a side view of a key provided with gages. Fig. 6 is a reverse view of the mechanism placed and adapted to a padlock with cover removed, and Fig. 7 is a front view of the same.

The frame A of the lock is divided by solid partitions or walls W into parallel spaces or guideways for the slides S and the bolt B to move in, and these are so adjusted to each other that the slides and bolt will move freely in their guideways when the cover is fastened on the lock. The bolt is constructed with arms *b*, to which are attached the lugs *n*, adapted in form to engage the dogs *m*. The dogs *m* are placed movably on pivots *i*, attached to the walls W. One end of each dog

is provided with an arm or pin *p*, projected at right angles underneath and across the chambers in the slides S. The other end of the dog is made of sufficient weight to fall by gravity into engagement with the lugs *n* when the bolt is projected, for which purpose it is also adapted in length and form.

The slides S are constructed to move steadily and easily in their respective guideways. On their lower or under sides a series of two or more equidistant chambers are constructed, as shown by the dotted lines in Figs. 1 and 6. The lower side of the slide is rabbeted out under the chambers a sufficient width to permit the slide to pass freely over the arm or pin *p* of the dog *m* without friction or depressing the dog out of engagement with the lug *n*. The depth of these chambers in the slides S is made sufficient to receive the weights *k* within them entirely above the upper line of the rabbet, so that should the dogs *m* be tightened by any tampering with the lock the weights *k* will be raised and pass over the arms *p*, when the slide is moved, without operating the dog. For convenience of permutations these chambers are suitably marked, preferably by numerals, as shown. For operating these slides a preferable method is shown in the drawings, which consists in making a series of small holes on the front side of the slides, where the chambers are numbered, as shown in Fig. 1. These small holes are made double the number of the chambers and placed a distance apart exactly one-half that of and corresponding to their respective chambers and preferably vertically over each other. Narrow apertures exposing two or more of these holes are made in the front cover of the lock, through which the slides S are operated by a pin or key. The bolt B is preferably operated in like manner, excepting that only one hole is necessary.

Where slides are used in series, as shown in Figs. 1 and 2, a preferable method is to attach extension-arms *o* to the forward slides to extend to the rear of the lock and put the operating-holes for the forward slides in front part of the extensions *o* and vertically in position with those of the rear slides, as shown in Fig. 2. The apertures for operating the slides and the bolt will then be vertically

over each other, as shown in Fig. 3, which exposes four holes for each side and the one in the bolt; but I do not confine myself to this method of operating the slides and the bolt, as it is obvious that various other means for such purpose may be used and are well known to those skilled in the art.

For convenience and to permit the dogs *m*, the arms *b*, and the lugs *n* to lie and move flush with the frame, but also easily when the cover of the lock is secured, I cut recesses in part of the walls for that purpose. Weights *k*, preferably spherical in form, of sufficient gravity to press down the arms *p*, and thereby raise the other end of the dogs out of engagement with the lugs *n*, are used for that purpose and provide, in combination with the chambers in the slides *S*, means for varying the combinations on which the lock may be set. One weight is used in each slide for such purposes, and is placed in one of the chambers loosely, so it will fall with the full force of its own gravity when the lock is in vertical position.

The operation is as follows: When the slide *S* is moved in its guideway, the weight is carried along with it in its chamber until it reaches the arm *p* of the dog *m*. Its gravity as it passes on to the arm forces it down, and thereby raises the dog out of engagement with the lug *n*, and when all of the dogs are thus severally lifted out of engagement by such movements of the slides the bolt can then be moved back. The distances the slides require to be so moved are determined by the location of the weights in the chambers, respectively, and the numerals of such chambers indicate the combination on which the lock is set. To change the combination, the weights are changed to different chambers, respectively. The apertures in the cover of the lock furnish access to the operating-holes when the cover is exposed. Where the lock is placed on the inside of a door or in a prepared recess in a door, corresponding apertures are made in the doors. Where the lock is placed on a wooden door, an escutcheon-
 55 The key, Fig. 5, means to operate the lock without visual inspection of the operating-holes. The key, Fig. 5, is a preferable tool for operating the slides and the bolt. The arms are provided with feet, from which pins adapted to engage the operating-holes project. The foot *E* is of such size as to permit its pin to move an operating-hole from one end of the aperture to the other. Taking Fig. 3 for illustration, this would be three spaces or holes.
 65 Another foot *F* is of such length and its pin so placed that by moving the foot from one end of the aperture, Fig. 3, to the other the

slide would be moved two spaces. The other foot *D* is so constructed that used in like manner the slide would be moved one space or hole. By such construction a person can with his key readily move the slides any given number of spaces, respectively, without visual inspection of the holes, and even do so without light. It will be seen that, as the dogs and weights operate by gravity, the lock must be placed in a vertical position to secure proper action of the parts; but it is often desirable to place a lock on movable articles, such as trunks, desks, mail-bags, &c.

To prevent the bolt from being moved when at any time the position of the lock is so changed that the dogs will fall by gravity out of their engagement with the lugs *n*, I have devised a method of locking the bolt. It consists in making chambers *h*, Fig. 6, obliquely in the lower wall of the guideway of the bolt *B* of sufficient depth to receive weights, preferably spherical in form, entirely within them, so that the bolt will not impinge against the weights when the lock is in vertical position. Corresponding chambers are made in the bolt, but only of sufficient depth to receive part of the weight, so that when the weight falls therein a part will project into the corresponding chamber in the wall, and thus lock the bolt while the lock remains in that position. This occurs when the lock is turned endwise in either direction. Another chamber *r*, with its corresponding chamber, is made at right angles to the bolt by which it is locked when the lock is turned upside down. Other like chambers of different obliquity may be added, if desired, and, if preferred, they may be placed on the upper side of the bolt and in the upper wall of its guideway; but in that case the full-length chambers must be made in the bolt and the shallower chambers in the said upper wall. By this construction when the lock is in vertical position the bolt will move freely in its guideway; but any material change in the position of the lock will cause one or more weights to fall into engagement and lock the bolt.

When my devices are placed in a padlock, as shown in Figs. 6 and 7, a hook *u* is pivoted on one of the walls, so it will fall out of engagement with a corresponding hook *v* of the ring when the bolt is thrown back to permit it to do so. One end of the hook *u* and one end of the bolt *B*, Fig. 7, are made V-shaped and are adapted to engage each other, as shown.

Instead of removing the cover to change the combinations, the end *y* is constructed in the form shown, and so as to be removably placed between the sides of the frame and rest on the top of the walls *W*, one end projecting under a recess in one of the walls, as shown in Fig. 7, and the other held in place by a shoulder on the ring when locked. This end is also held in place by screws from the outside, so it will not be displaced by simply opening the lock. When this end is removed,

the slides S drop out. The weights can then be changed to different chambers and the slides replaced and the end secured as before.

The operation is as follows: Referring to Fig. 1, the lock is shown as set on 2514, commencing with the lowest slide, because the weights *k* are in the respective chambers marked by these numerals. The corresponding operating-holes are shown in Fig. 2, and their exposure in Fig. 3. The lock being placed in a vertical position, we first move the slides in the manner described as far as they will go to the right or left in accordance with the decrease of the numerals. To illustrate: In Fig. 1 the odd numbers increase from right to left, viewing from the front of the lock. Therefore the slides on which the odd numbers are placed are to be moved to the right. The even numbers increase in the opposite direction, and the slides marked with the even numbers are to be moved to the left. Having thus placed the slides into position, the lowest one is moved two spaces (represented by the distances between the operating-holes) to the right. The next slide above is moved five spaces to the left. The third slide above is moved one space to the right, and the fourth or top slide is moved four spaces to the left, viewing from the front part of the lock, as shown in Fig. 2. These movements bring the weights *k* exactly over the pins *p*, respectively, so that all of the pins *p* are thereby depressed, and the dogs have their other ends lifted out of engagement with the lugs *n*, respectively. The bolt is then easily moved back. When desired to lock the door, the bolt is projected and the slides moved slightly, which puts them out of combination.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A combination-lock consisting of a frame divided into separate guideways by suitable partitions or walls, in combination with slides and a bolt adapted to move in the guideways, chambers in the slides adapted to receive weights and their location suitably indicated, dogs movably mounted on pins in the walls

provided with arms placed at right angles at one end and having the other end adapted to fall by gravity and engage attachments to the bolt, attachments to the bolt adapted to engage the dogs, weights adapted to move easily in the chambers in the slides and by their gravity to depress the arms of the dogs, and means to operate the slides and the bolt, substantially as described.

2. In a combination-lock, the combination of guideways with slides adapted to move therein, chambers in the slides adapted to receive weights and suitably indicated, and dogs or levers adapted to be operated upon by the weights and to engage attachments to the bolt and weights, substantially as described.

3. In a combination-lock, the combination of the frame A with the slides S, the weights *k*, the dogs *m*, the bolt B, the arm *b*, the lugs *n*, the alternate numerals on the slides indicating the location of the chambers in the slides, and the small holes on the front of the slides S, substantially as described.

4. In a combination-lock, the combination of the frame A, the slides S, the dogs *m*, the lugs *n*, the arm *b*, a bolt provided with an inclined end adapted to engage a corresponding incline on the hook *u*, the hook *u*, the hook *v*, and the removable end *y*, with the weight *k*, substantially as described.

5. The combination of a lock of the class described with an escutcheon-gage exposing an equal number of holes in each slide and adapted to confine the movement of a key engaging said holes to distances corresponding with the combinations, and a key provided with feet of different lengths, having pins projecting from each foot, the position of the pins and the lengths of the feet being adapted to limit the movement of the key in the said escutcheon to different distances corresponding to the combinations.

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM C. YOUNG.

Witnesses:

H. C. HARTMAN,
E. J. LONGFIELD.