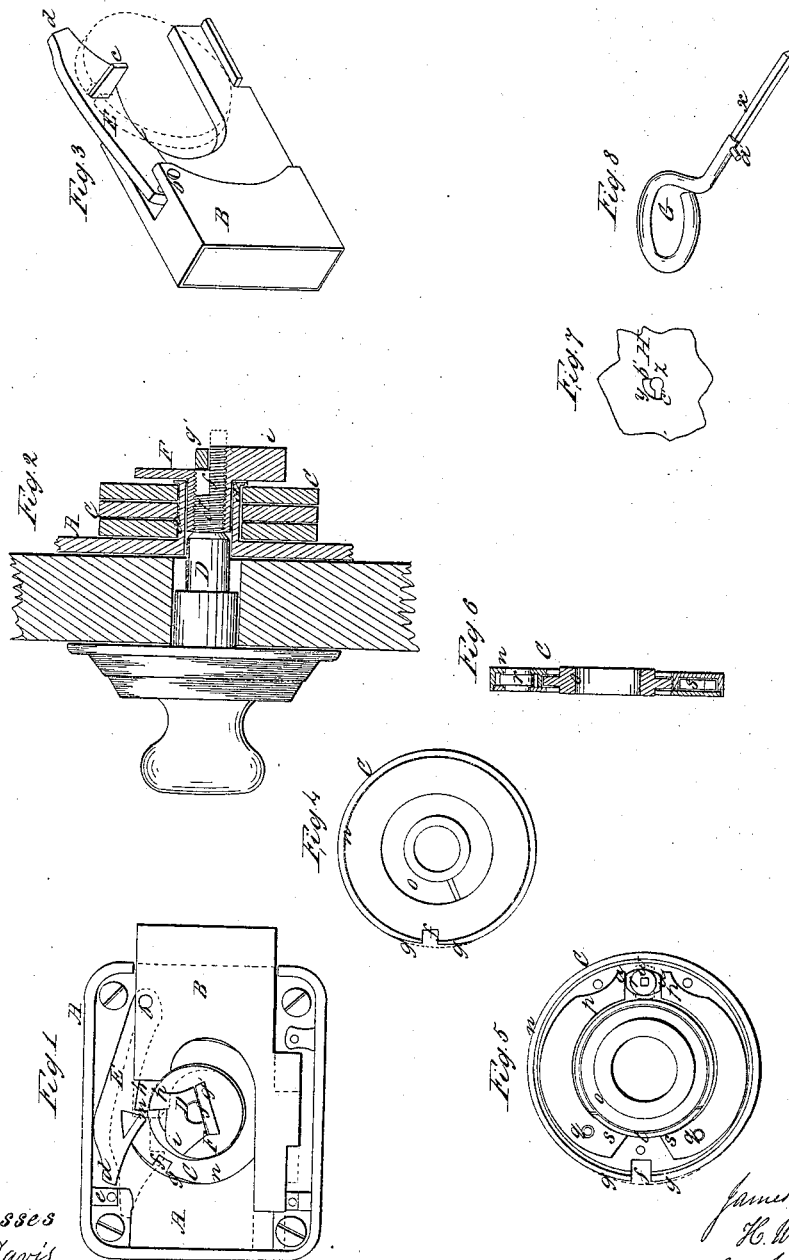


Sargent & Covert, Permutation Lock.

N^o 51,973.

Patented Jan. 9, 1866.



Witnesses
J. A. Davis
R. F. Osgood

Inventors
James Sargent
H. W. Covert
By J. Fraser & Co
Atty.

UNITED STATES PATENT OFFICE.

JAMES SARGENT AND H. W. COVERT, OF ROCHESTER, NEW YORK.

IMPROVEMENT IN LOCKS.

Specification forming part of Letters Patent No. **51,973**, dated January 9, 1866.

To all whom it may concern:

Be it known that we, JAMES SARGENT and H. W. COVERT, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Locks; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is an elevation of our improved lock with the back plate removed for the purpose of showing the interior, and with the bolt thrown out in the act of locking; Fig. 2, a diagram representing a vertical section of the cam, the permutation-wheels, the casing of the lock, and the door to which it is secured, and an elevation of the shaft and knob; Fig. 3, a perspective view of the combined bolt and tumbler; Figs. 4, 5, and 6, views of the permutation-wheels in various positions; Fig. 7, a view of the key-hole and stops in the back plate of the lock; Fig. 8, a perspective view of the key for setting the cams of the permutation-wheels.

Like letters of reference indicate corresponding parts in all the figures.

Our invention belongs to that class known as "permutation or combination locks," for use on banks, safes, &c.; and our object is to produce a cheap and simple device to take the place of the cumbersome and complicated locks in common use.

As represented in the drawings, A is a casing of ordinary form to receive the working parts, and B is the bolt.

The casing is provided, preferably, with a hollow stud or bearing, *a*, Fig. 2, at a suitable position, which supports the permutation-wheels C C C, and through which passes the knob-shaft D.

The bolt is provided with a tumbler, E, jointed to it at one end, as shown at *b*. At a suitable position this tumbler is provided with a dog, *c*, which projects over and rests upon the edges of the permutation-wheels, as indicated most clearly in Fig. 3. When the tumbler is thus elevated by its dog resting on the edges of the wheels, the end *d* of the tumbler will strike against a stop, *e*, of the casing, and prevent the bolt from being retracted or drawn in, and therefore hold the door locked, as shown by the black lines in Fig. 1; but when the

notches *f f* of the permutation-wheels are all brought in coincidence, and the dog *c* falls into them, the end *d* of the tumbler will fall below the stop *e*, and the bolt can be thrown back, as indicated by red lines.

In order to prevent the clicking against the dog when the notches of the wheels come in coincidence, we flatten the portion *g* of each wheel next the notch, so that the dog will ride on the wheel or wheels beyond, and therefore not touch the edges of the notch. This is shown most clearly in Figs. 1 and 2, in which the red line indicates the outline of the wheel beyond. By this means the lock-pick is unable to detect the position of the notches, as would be the case if they touched the dog.

Outside the permutation-wheels a disk, F, is secured to the shaft, having a bit, *h*, and a cam, *i*, substantially of the form shown in Fig. 1. The bit is for the purpose of throwing the bolt out and in, which it does by fitting in a space, *k*, formed between shoulders *l* and *m* of the tumbler. The cam is for the purpose of elevating the tumbler again after the bolt has been thrown out, which it does by striking a projection, *j*, of the tumbler.

A device is already in use in which the tumbler is pivoted directly to the bolt, and the latter is thrown by the dog resting in the notches of the wheels, and giving the latter a positive rotary motion. The difficulty in this case is that if the throw of the bolt is considerable, causing considerable turning motion of the wheels, the dog will bind in the notches, unless the latter are made of considerable width, in which case, when the action is reversed to throw the bolt out again, there will be a looseness and rattling of the parts that is disagreeable. In such device there is also considerable uncertainty of action, since the notches are necessarily made shallow, and therefore in a long throw the dog and notches are liable to become disengaged. Besides these difficulties, the dog is liable to become broken in the notches by violent action, which would not be the case if there was no strain in it in the throw of the bolt.

The especial feature of our invention in this connection consists in the arrangement of parts whereby, while the tumbler is pivoted directly to the bolt, the latter is thrown out and in by a means entirely independent of the dog and

notches, thereby easing the strain upon them, and producing a more perfect and unfailing action. At the moment the dog falls into the notches the bit *h* engages with the shoulders *l m* and throws the bolt either out or in by its contact, and, of course, transfers all action from the dog. In this manner the throw of the bit may be made to much exceed the effective throw of the contact of the dog and notches, while still the latter may be so engaged as to preserve their coincidence at all positions.

Each permutation-wheel is composed of a rim, *n*, and a center, *o*, as in ordinary locks, the center being for the purpose of sitting in different positions for producing new combinations. A device is in use for fixing the center in any position by the employment of a flat spring on one side, compressed against the wheel by means of two short brakes, a joint-piece resting against their ends, and a cam or eccentric acting against the joint-piece. Our arrangement for securing the center is on this principle; but we have an improved construction that renders the wheel much more effective. We dispense with the joint-piece, and instead of short brakes we employ brakes, Fig. 5, of considerable length, in the form of segments of a circle, surrounding the center *o* and pivoted at *g*. Between the ends of the long arms *p p* of these brakes fits a double-faced cam, *r*, on turning which into the position indicated in black lines, so as to expand the said arms, the opposite short arms or bearings *s s* will be made to press firmly against the spring *t* and hold the center in place. Each end of the double-faced cam is clipped or squared, as shown at *u*, Fig. 5, so as to prevent displacement or accidental turning of the cam at any time.

The advantages of this device over that before referred to consists, essentially, in the employment of the long brakes and the double-faced cam. Where short brakes are employed they are so rigid and unyielding as to make it difficult to fasten the center properly. They are also liable to become loose by the constant jar and action to which they are subject in opening and shutting a door, and in a combination-lock it is essential that the centers should be held firmly in place. In our device we make the long arms of the brakes with a certain degree of elasticity or spring, so that when expanded they will exert a constant pressure against the cam, and which, coming against the clipped or squared edges of the cam, will serve to retain the brakes in the right position at all times and sustain them against any sudden jar. This advantage is obvious. In addition to this, the employment of the double-faced cam in the manner shown obviates the necessity of a joint-piece to connect the ends of the brakes, and thus simplifies the device.

Each cam is provided with a central square socket, *w*, in which fits the square shank *x* of a key, *G*, for operating the cam. This key has

a bit, *a'*, and is inserted from the back through the sockets of all the cams, which are thus tightened or loosened all together and in the same degree. Since in tightening the cams they are liable to be turned too far around, it is necessary to produce a stop to the motion of the key in turning. To effect this we form on the inside of the back plate, *H*, of the lock, Fig. 7, a cavity, *y*, forming quarter of a circle, bounded on one side by a shoulder, *c'*, and key-hole *z*, through which passes the key and bit, and on the other a shoulder, *b'*, which serves as the stop to the motion of the key by the bit striking in turning.

When the back plate is applied to the lock the key is first inserted and turned with its bit *a'* resting against the shoulder *b'* of the cavity. In this position the shank, in resting in the sockets of the cams, will hold the latter disengaged from the brakes *p p* or turned back into the position indicated by the red lines in Fig. 5. Then, in turning forward so that the bit will strike the opposite shoulder *c'*, and be in position to be withdrawn from the key-hole, the cams will be fully turned so as to expand the brakes, as indicated by black lines, Fig. 5. The advantage of this arrangement is that all the cams can be turned at one movement of the key and to the exact degree desired. The turning motion of the key is limited by the shoulders *b' c'*, and this motion is just sufficient to tighten and loosen the cams to the proper degree. In the similar device before referred to the cams are turned in succession by gradually inserting or withdrawing the key. The greatest objection in that class lies, however, in the fact that there is no limit or stop to the turning motion of the cam. Thus too great a power may tighten them to such a degree as to break the operating parts, or too small a power may not fix the center of the wheel firmly in place. It will be seen that we obviate these difficulties, for the limit of motion of the key in either direction will unfailingly set the cams in the right position, and will allow no undue strain on the parts. In this connection the elasticity or yieldingness of the long arms of the brakes is of much importance in obviating any rigidity of the parts.

The shaft *D* is simply a single straight or tapering bolt, which is not withdrawn to operate the lock, but simply receives a rotary motion. Its inner end is cut with a screw-thread, *d'*, which screws into the disk *F*. The ordinary way of holding a screw of this kind in place, and preventing it from unscrewing, is by simply inserting a small screw longitudinally in the joint between the male and female screws. In such method of fastening it is obvious that the shaft is not adjustable to doors of different thickness, as it cannot be screwed out or in. Furthermore, in such an arrangement the small joint-screw is liable to work loose, and thus give play to the shaft, and allowing the combination to be changed by the accidental displacement of the shaft and dial.

It is necessary that the shaft should be held in a rigid and exact position, otherwise the lock cannot be opened on the combination at which it was set. In place of this arrangement, we notch or clip off one side of the screw d' , as shown at f' , Figs. 1 and 2, so as to make it plane, and over this notch we screw or otherwise secure a cap, g' , against a shoulder of the disk, as clearly represented. In this manner, by making the notch f' of considerable length, it will be seen that we can screw the shaft in or out to adapt it to doors of varying thickness, and screw the cap down to hold it at any position. By this arrangement we avoid the necessity of shafts of different lengths.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination and arrangement of the bit h and cam i with the tumbler E , pivoted directly to the bolt B in such a manner as to transfer the throwing action from the dog and notches to the bit, and thus obviate the strain on the dog and notches, substantially as herein specified.

2. Making the brakes that secure the center of the wheels with long arms p , having a proper degree of elasticity, and employing, in combination therewith, the double-faced cam r , the whole so arranged as to avoid rigidity of the parts, and holding them securely in place, substantially as described.

3. In combination with cams r , of suitable form for securing the centers of the permutation-wheels in place, and with a suitable key, G , for turning the cams, the shoulders b' c' , forming stops for limiting the motion of the key, substantially as and for the purpose herein set forth.

4. Adjusting the length of the shaft D to adapt it to doors of different thickness by means of the longitudinal notch f' and the cap g' , substantially as described, when the same are used in combination with the mechanism of a lock.

JAS. SARGENT.
H. W. COVERT.

Witnesses:

R. F. OSGOOD,
J. A. DAVIS.