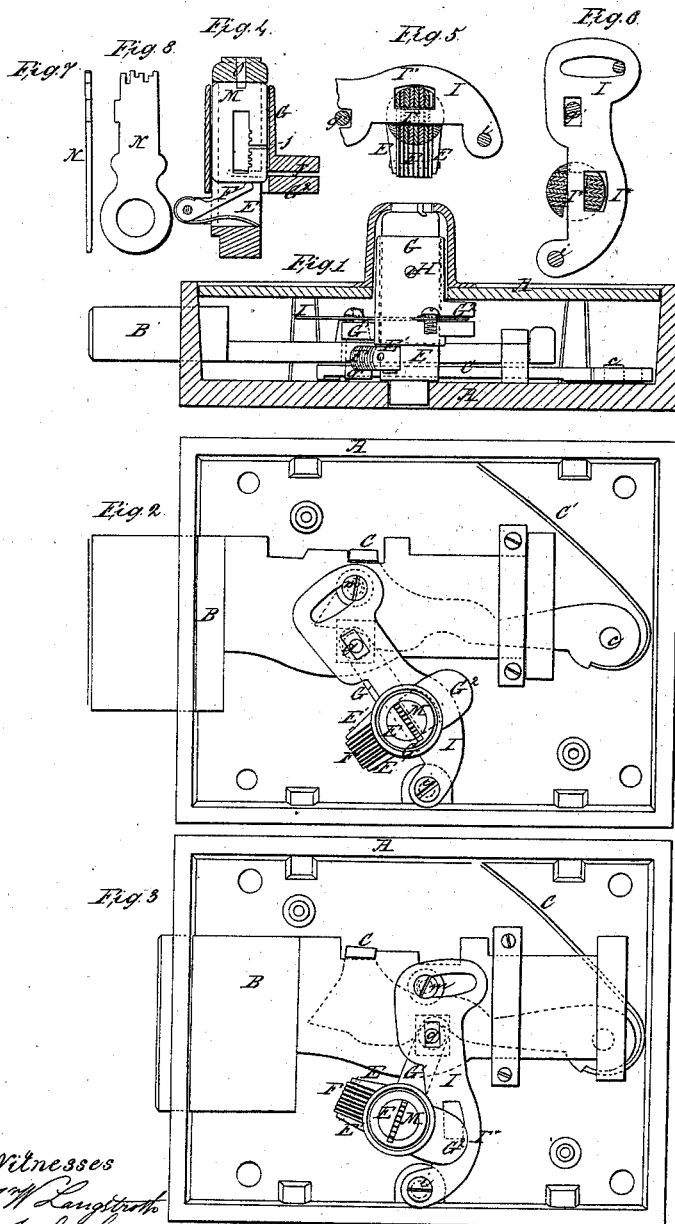


E. W. Brettell,

Bank Lock.

N^o 49,223.

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Witnesses
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IMPROVEMENT IN LOCKS.

Specification forming part of Letters Patent No. 49,223, dated August 8, 1865.

To all whom it may concern:

Be it known that I, EDWARD W. BRETTELL, of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Locks for Banks, Safes, Vaults, &c.; and I do hereby declare that the following is a full and exact description thereof.

The accompanying drawings form a part of this specification.

Figure 1 is a horizontal section through the works and the casing, with the bolt thrown out or locked. Fig. 2 is a corresponding front view, with the front plate removed to exhibit the interior. Fig. 3 is a front view of the same parts, with the bolt thrown in or unlocked. Fig. 4 is a horizontal section through the cylinder, showing one of the tumblers and its spring. Fig. 5 is a section in a plane at right angles to the last, showing a cross-section of all the tumblers and the relations of the vibrating knife thereto, while the parts remain quietly in the locked condition. Fig. 6 is a corresponding section, showing the side strain or oblique pressure on the tumblers, induced by the peculiar motion of the vibrating knife when an attempt is made to pick the lock. Fig. 7 is an edge view, and Fig. 8 a side view, of the key, which is similar in its general form to those employed in several varieties of locks.

Similar letters of reference indicate like parts in all the figures.

My invention is intended to make a lock more secure against burglars and little objectionable on account of cost.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings and of the letters of reference marked thereon.

A is the casing; A', the front plate; B, the bolt; C, a stout dog, and C' a spring, which tends to turn the dog C around on the pivot *e*, as will be obvious.

E is a small piece, cast or otherwise, formed with a rectangular space in its interior for the tumblers M, which are adapted to slide endwise therein in directions parallel to the axis of E. Springs F, mounted between arms E' E', carried on the casting E, force the tumblers M continually forward, except as they are pressed back by the key or other device.

G is a stout tube or exterior casting inclosing the casting E and its contents, and carry-

ing two stout arms, G' and G². The parts G and E are firmly secured together by the screws H, so that both turn together when the lock is operated. The arm G' carries a stout pin, *g'*, standing parallel to the axis of E. The rear end of this pin *g'* extends back through an opening in the bolt B and presses against a cam-like edge of the dog C, while the front end of the same pin extends forward through a slot in a peculiary-mounted knife, now to be described.

I is the knife. Like the knife or fence in other locks its function is to prevent the lock from being opened unless the several tumblers are all arranged by the key so that their notches coincide with the knife. But my knife I is not, as in some locks, fixed rigidly to the casing. Neither is it, as in others, fixed rigidly to the bolt, but it turns around a fixed center, *i*, so as to perform in a manner differently from any before known.

A narrow recess, J, (see Fig. 4,) is sawed or otherwise produced in the outer casting, G, and in its arm G², and a corresponding recess in the same plane is provided through the inner casting, E. This recess thus extends some half or two-thirds across or through the entire mass, and when the tumblers M are each depressed to their proper extent by the introduction of the proper key N through the narrow key-hole O at the front of the casting E, there is nothing to hinder the knife I from swinging freely in this recess to allow it to enter or retreat, as may be required. The forward end of the pin *g'*, by standing in a slot in the knife I, as represented, requires the knife to enter deeply into the recess J every time the bolt B is thrown out or locked, and to retreat from the recess in the part E altogether every time the bolt is drawn back or unlocked. The retreat of the knife I in this manner is prevented, and the unlocking of the lock is consequently rendered impossible, unless the tumblers M are operated by the right key, so as to depress each to a just sufficient extent to make its notch coincide with the recess or notch J in the inclosing-castings. The general character of this provision is closely analogous to that in many other tumbler-locks, each tumbler M having a large cavity in its interior, in which the inner part or edge or bar, I*, of the knife I is loosely inclosed, and each tumbler M allowed to assume its extreme forward position so soon as the lock is locked and the key is withdrawn,

the outer bar, I**, of the same knife I being only useful to steady and strengthen the parts. But one of the useful results of my peculiar device—to wit, the mounting of the knife on centers, so as to swing and partake of the motion of the bolt B while pivoted to a fixed center—is that the tumblers are pressed sidewise and bound together by friction whenever great force is applied to turn the parts and throw the bolt inward without the proper key. This is indicated in Fig. 6, by studying which it will be observed the swiveling motion of the part E and its contained tumblers is resisted by the part I* of the swiveling or vibrating knife I in such an indirect manner as to tend to twist the tumblers M powerfully around in the casting E. This twisting strain compresses them powerfully together, not on one edge alone, as would be the fact with an oblique strain on ordinary arrangements of tumblers, but on both edges. If, after a strain has been thrown on the parts by forcibly twisting the part E by some burglarious operation, the tumblers are pressed down to feel their proper position, and the proper position of one is found, so that its deep notch *j* coincides with the knife I, it still will not be relieved, and cannot be rattled or otherwise made to indicate the fact, because it is twisted and compressed at the other edge, so as to tightly hold it.

The outside tube, G, fitting over and around the inner casting, E, as indicated, and secured by the screws H, supports the tumblers M very completely, stiffens and sustains the swiveling knife I by its arm G², and allows a ready separation of the parts.

The open tumblers M, arranged as described relatively to the other parts, carried on the castings E G, and to the two bars I* I** of the swiveling knife, allows the latter to obtain such a position and act in such a manner in twisting within the tumblers as to be far more effective than outside contact.

I extend the swiveling knife I a little beyond the pin *g'*, so as to embrace a pin, *m*, on the bolt B, as indicated. It embraces it in a slot of such length and so arranged as to allow a considerable motion of the swiveling knife I and its attachments before the bolt B is required to move. The pin *m* is formed with a broad head, as represented, and is tapped into the bolt B. It is screwed in strongly after the other working parts are in place, and its head aids to steady and support the swiveling knife I and prevent it from bending and twisting.

The operation of my lock will be readily un-

derstood. Inserting the proper key, N, into the key-hole O at the front, so as to press back all the tumblers M, I twist the key and thereby twist or turn the entire castings E and G, with their contained and attached parts. The action of the back end of the pin *g'* presses back or upward the dog C, and immediately afterward, by striking the side of the slot in the bolt B, commences to press the latter in the direction required for throwing it inward, and actually does move it inward. But before even the dog C was lifted the partial revolution of the parts E and G had moved the swiveling knife I around on its fixed center *i* so far as to commence to withdraw the part I* from the interior of the tumblers M, and if the right key had not been used, some of the tumblers M, by standing wrongly depressed, would have resisted the movement of the swiveling knife I, and have prevented all further movement of any of the parts. The tumblers M being all rightly depressed, their true notches *j* coincide all with the knife I, and the unlocking proceeds as described; but if one is wrong, it stops the knife from turning and induces a twisting and side strain, which, in case great violence is applied, may break some part, but will not allow the unlocking. In case of an attempt to open by the tentative process, any twisting strain on the parts E G while the tumblers are wrong binds them all tightly and defeats the operation. The locking is performed by inserting the right key and reversing the movements, and the bolt is thrown out and all the parts come into the position shown in Fig. 2.

Having now fully described my lock, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The vibrating knife I, partaking of the motion of the bolt B, but compelled to turn around a center, *i*, substantially in the manner and for the purpose herein set forth.

2. The inclosing the tumblers M within two separately constructed castings, E and G, arranged to operate substantially as and for the purpose herein set forth.

3. The arrangement of the open tumblers M in the turning part E, and adapted to operate relatively to the swiveling or vibrating knife I* I**, substantially in the manner and for the purposes herein set forth.

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Witnesses:

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