(Model.) 3 Sheets—Sheet 1.

H. VAN HOEVENBERGH.

LOCK.

No. 387,833. Patented Aug. 14, 1888.

Fig. 1

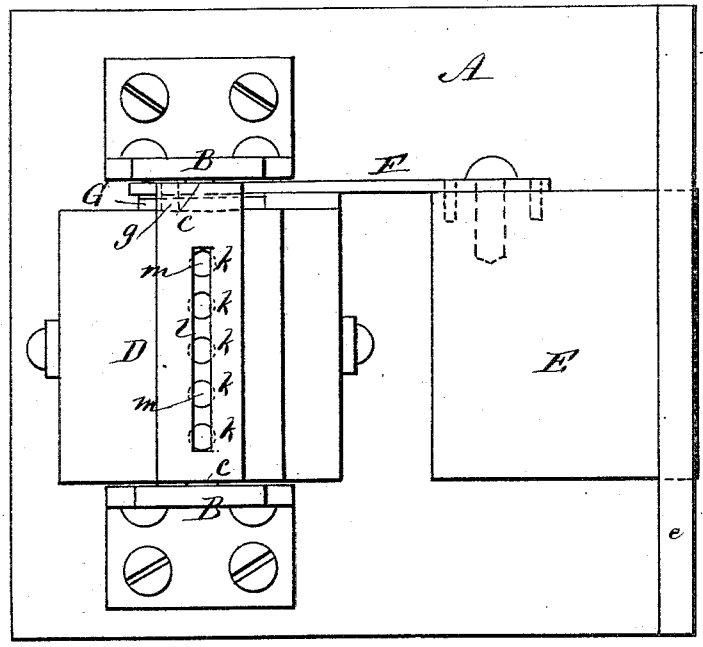
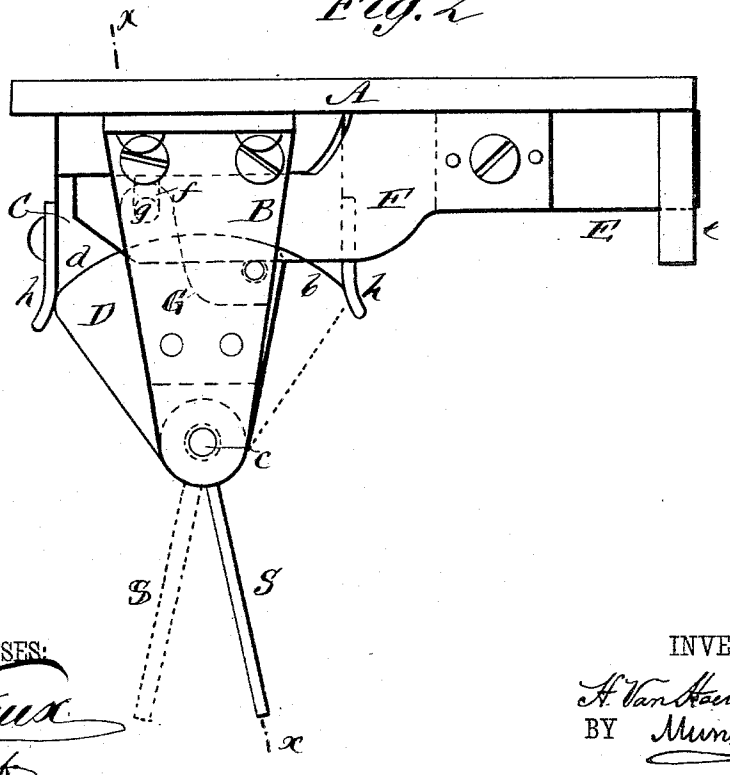


Fig. 2



WITNESSES:

C. Neveux

E. Sedgwick

INVENTOR:

H. Van Hoevenbergh

BY Munn & Co.

ATTORNEYS.

N. PETERS. Photo-Lithographer, Washington, D. C.

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H. VAN HOEVENBERGH.

LOCK.

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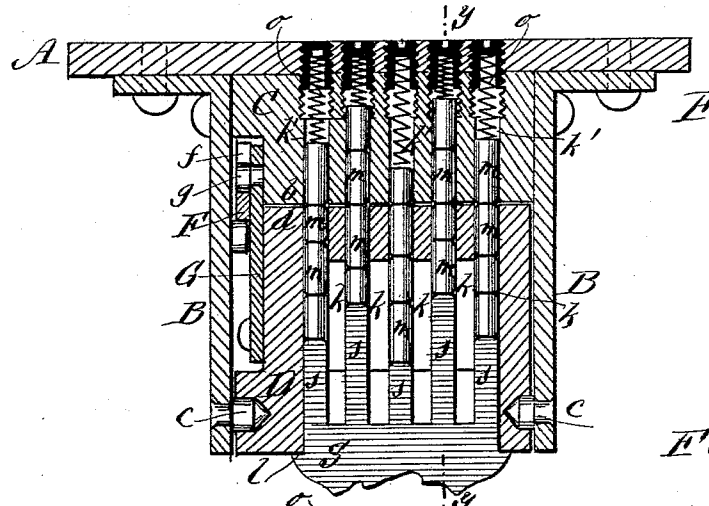


Fig. 3

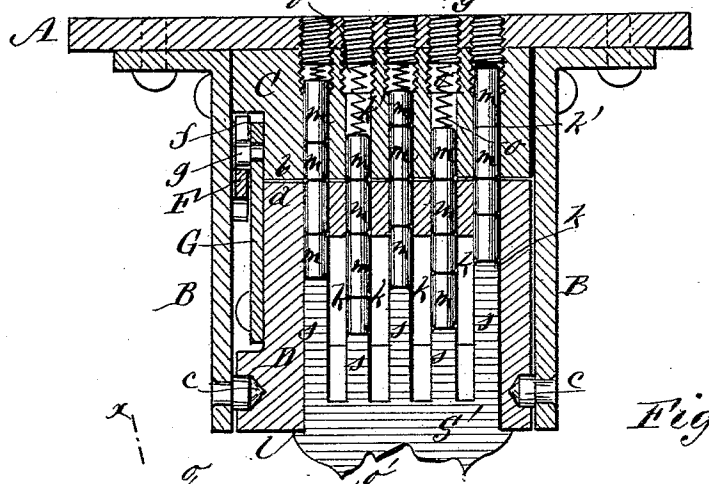


Fig. 4

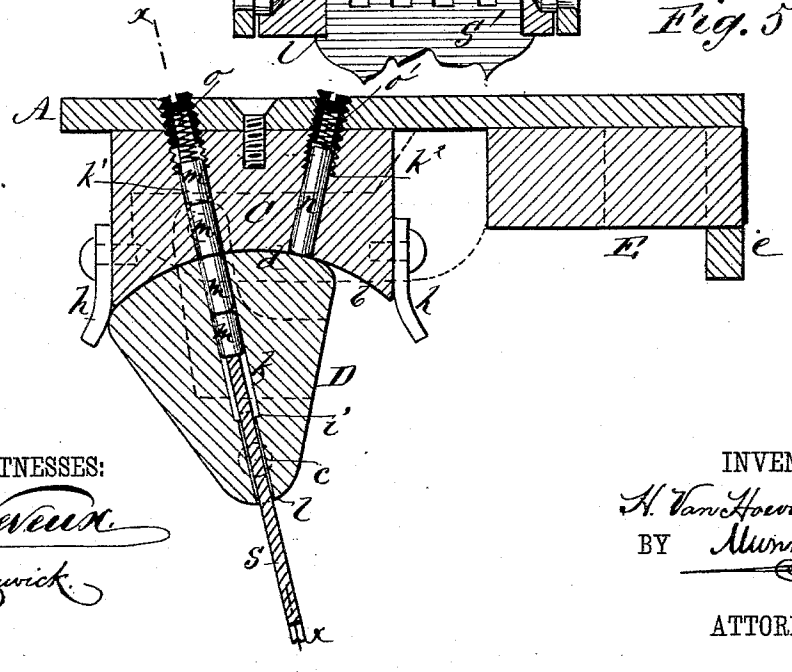


Fig. 5

WITNESSES:

C. Neveux

C. Sedgwick.

INVENTOR:

H. Van Hoevenbergh.

BY Munn & Co

ATTORNEYS.

N. PETERS. Photo-Lithographer, Washington, D. C.

(Model.) 3 Sheets—Sheet 3.

H. VAN HOEVENBERGH.

LOCK.

No. 387,833. Patented Aug. 14, 1888.

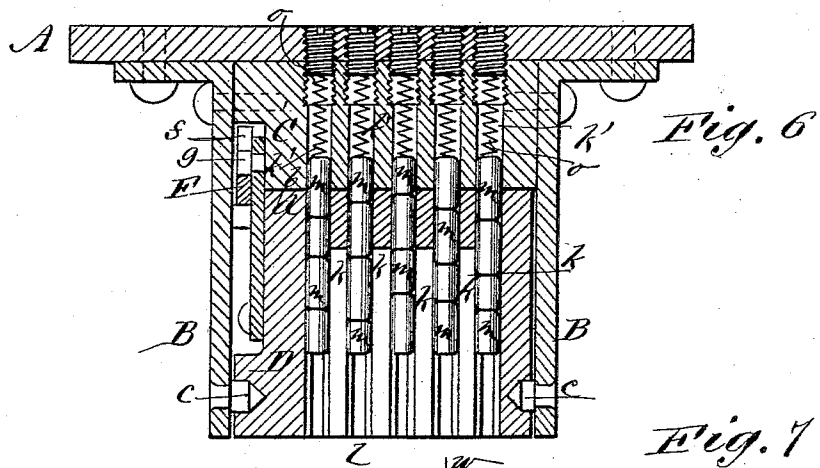


Fig. 6

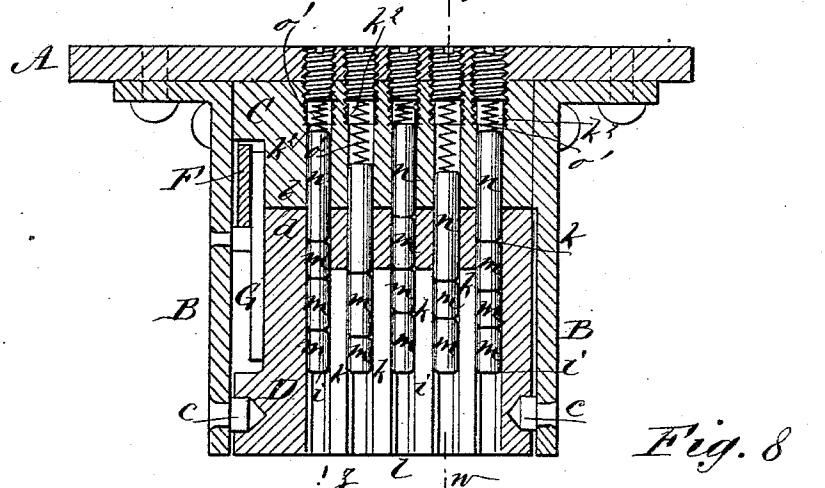


Fig. 7

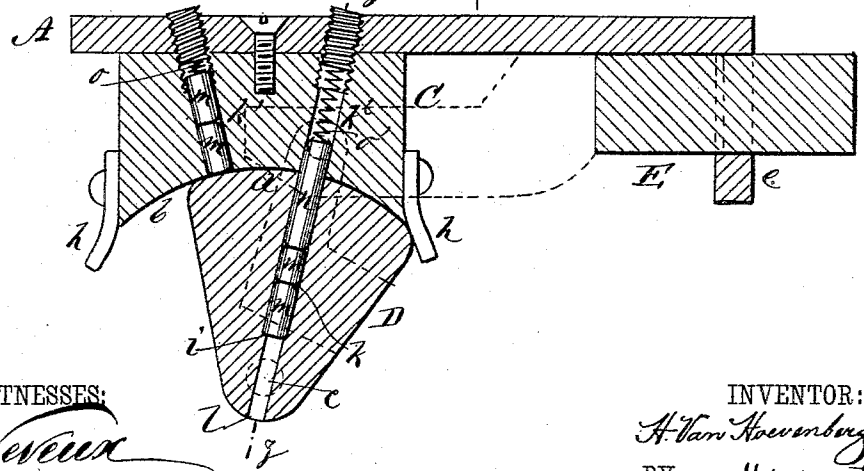


Fig. 8

WITNESSES:

C. Neveux

C. Sedgwick.

INVENTOR:

H. Van Hoevenbergh.

BY Munn & Co.

ATTORNEYS.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HENRY VAN HOEVENBERGH, OF NEW YORK, N. Y.

LOCK.

SPECIFICATION forming part of Letters Patent No. 387,833, dated August 14, 1888.

Application filed January 17, 1888. Serial No. 261,049. (Model.)

To all whom it may concern:

Be it known that I, HENRY VAN HOEVENBERGH, of the city, county, and State of New York, have invented a new and useful Improvement in Locks, of which the following is a full, clear, and exact description.

This invention relates to what are known as "pin-tumbler locks," and is applicable to all or any purposes, structures, or places using such or other locks; but it will be found especially adapted to places or structures in which the control of the lock is limited to a given time or particular person or persons—as, for instance, the safes of safety-deposit companies' vaults, postoffice-boxes, money-drawers, &c.—and in which when a change of ownership or control is made it is customary to change the lock for another requiring a different key. This necessity my invention avoids; and it consists in a pin-tumbler lock and in certain details, constructions, and combinations of parts thereof, substantially as hereinafter described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents an exterior face view of a lock embodying my invention with the bolt drawn back. Fig. 2 is a side view of the same with the bolt and other parts in the same position as in Fig. 1, and showing the key inserted by full lines when the bolt is drawn back, and by dotted lines the position of the key and that of the swinging or oscillating tumbler-carrier when the bolt is shot forward. Fig. 3 is a section upon the lines *x x* in Figs. 2 and 5 when the parts are in position for drawing the bolt back, or when the bolt is fully drawn back but not locked or held in such position, and with a key inserted. Fig. 4 is a similar view to Fig. 3 with a differently-constructed key inserted and with the parts in position when the bolt is drawn back or ready to be drawn back, but not locked or held. Fig. 5 is a section upon the line *y y* in Fig. 3 with the working parts of the lock in corresponding position, the key inserted, and the bolt drawn back, but not secured back. Fig. 6 is a section similar to Figs. 3 and 4 after the key has been removed. Fig. 7 is a section upon the line *z z* in Fig. 8 with the parts in position after the bolt has been shot and for locking the bolt in such position, and Fig. 8 is a section upon the line *w w* in Fig. 7 with the parts in corresponding position and under similar conditions.

A is the back plate, and B the frame, of the lock, both of which may be of any suitable construction, according to the purpose, place, or structure for which the lock is designed.

C is a stationary tumbler-receiver made concave on its face *b* from a center which is the center of motion of the movable tumbler-carrier D of the lock, said movable tumbler-carrier here being shown in the form of a sector-shaped block hung to rock, swing, or oscillate on side centers or pins, *c c*, and made convex on its face *d* to form a close fit or contact with the concave surface *b* of the fixed tumbler-receiver C; but this movable tumbler-carrier may be other than sector-shaped, if desired, and the extent of its circular motion be varied.

E is the bolt of the lock, fitted to slide in and out through a front guide, *e*, and connected, as by a rod or plate, F, having a slot, *f*, with a wrist-pin, *g*, on a crank or arm, G, secured to one side of the movable tumbler-carrier D; or any other suitable connections may be made between the bolt E and the oscillating tumbler-carrier D for shooting or drawing back the bolt by the motion of said carrier—as, for instance, first in the one direction and then in the other between stops *h h*.

The movable carrier D is constructed with a row or series of radial ducts or perforations, *k k*, that is in transverse relation with the axial center of motion of said carrier, each formed with a shoulder, *i*, and extending from the shoulder outward to or through the axial center of the carrier, where said ducts terminate in a front slot or key-hole, *l*, in said carrier. Each duct *k*, back of its shoulder *i*, is adapted to contain or has arranged within it a sectionally-constructed pin-tumbler, each of which is composed of independent pins or tumblers *m m*, arranged one in front of the other and of varied lengths. There may be three or more of these independent tumblers for each duct *k*, four being shown in the drawings. The greater the number the more enlarged the permutation character of the lock or greater the number of combinations possible.

The fixed tumbler-receiver C is constructed with two independent rows or series of radial ducts or perforations, k' k^2, both of which are arranged to register—that is, either one at a time—with the ducts k of the movable carrier D, accordingly as said carrier in shooting or drawing back the bolt is brought up against either stop h. The one set or row of ducts k' serves in the operation of the lock to receive from the ducts k of the movable carrier D certain of the pin-tumblers or pin-tumbler sections m m against the action of springs o o in the backs of the ducts k', as shown in Figs. 3, 4, 5, 6, and 8 of the drawings, the number of pin-sections m thus entering the ducts k' being determined by the key S or S', and the same or those thereof on which the springs o o act being what may be termed "spring-followers," as well as tumblers. The other row or series of ducts, k^2, have arranged within them a series of pin-tumblers, n n, which also act as followers, and are acted upon by springs o' o' at their backs. These combined tumblers and followers n n need not be of sectional construction, but each be made of a single piece, as shown.

While only two keys, S S', of different construction as regards the length of their bits or pins s s, are here shown, there may be a large number of such keys, each of different construction to the other as regards the length of their bits or certain of them, and each key will operate the lock; but, whichever of the keys be used, the same key that is used at any one time to shoot the bolt is the only one, or another key of the same construction, that will unlock or draw back the bolt.

Supposing the bolt E to be drawn back, as shown in Figs. 1, 2, and 5, then the position of the movable carrier D relatively to the fixed tumbler-receiver C will be as represented in Figs. 2 and 5, which brings the ducts k in said carrier in line and register with the ducts k' in the fixed receiver C, as shown in Figs. 3, 4, 5, and 6. The pin-tumblers or tumbler-sections m farthest removed from the key-hole l will then project from their ducts k in the carrier D partly into the ducts k' of the fixed tumbler-receiver C, and by crossing the surfaces of junction d b of the tumbler-carrier and tumbler-receiver, as shown in Fig. 6, the bolt E will be locked or held in its back position, so that it cannot be shot without the aid of a proper key. The combined tumblers and followers n in the fixed tumbler-receiver C will then simply rest on or be forced by their springs o' against the convex face d of the tumbler-carrier D.

To shoot the bolt, the key S or S' or other suitable key is then inserted through the key-hole l and pressed inward as far as it will go. This will cause the bits of the key to force one or more of the back tumblers out of each duct k in the movable carrier D wholly into the ducts k' of the fixed tumbler-receiver C, as shown in Figs. 3, 4, and 5, the number of tumblers or tumbler-sections m thus displaced being dependent upon their length, but more particularly upon the varied lengths of the bits s of the key, and the number of tumblers m used in each duct k will be determined by the key. When the tumblers m, however, have been displaced by the key, as described, then, as shown in Figs. 3, 4, and 5, none of the tumblers m will close the junction between the faces b and d of the fixed tumbler-receiver C and the movable tumbler-carrier D, so that on laterally oscillating the key as a lever throughout its whole length from the position shown by full lines in Fig. 2 to the position shown by dotted lines in the same figure, in contradistinction to the whole or partial rotation of the key upon its axis or center, the movable tumbler-carrier will be moved from the position shown in Fig. 5 to the position shown in Fig. 8, leaving certain of the tumblers m within the ducts k' of the tumbler-receiver C, as shown in Figs. 3, 4, 5, and 8, and the bolt E will be shot, as shown in Fig. 8, and the duct k of the movable carrier D will be brought into line or register with the duct k^2 of the fixed tumbler-receiver C, as shown in Fig. 8, when upon removing the key the combined tumblers and followers n in said tumbler-receiver will be partly forced by the springs o' into the ducts k of the movable tumbler-carrier D, crossing the movable tumbler-carrier and fixed tumbler-receiver, as shown in Figs. 7 and 8, and thus locking the bolt E in its closed position.

It will thus be seen that independent sets of tumblers are used to lock the bolt in its open and closed positions.

To draw back the bolt E the same key is again inserted, forcing the followers n back to their normal unlocking position of the bolt, and is oscillated or vibrated throughout its whole length in a reverse direction—that is, from the position shown by dotted lines in Fig. 2 to the position shown by full lines in the same figure—when the tumblers m left in the ducts k' of the tumbler-receiver C will be forced outward by their springs o into their normal position (shown in Fig. 6,) thus locking the bolt again in its drawn-back position.

From this description it will be seen that only a slight movement of the key as a lever throughout its whole length from one side to the other is necessary to shoot or draw back the bolt, and that the bolt is locked when shot and thrown back by different pin-tumblers, and that by the sectional construction of the tumblers m of varying length a very large variety of combinations may be made, thereby making the lock of an extended permutation character, the sectional construction of the tumblers m and their varying lengths and their changed position, if desired, in the ducts k of the movable tumbler-carrier, and the use of keys having their bits or certain of them of different lengths—that is, the one key as compared with another—providing for this, it only being necessary that when the key is inserted to shoot the bolt, its bits force certain of the tumblers m, the same varying with

the lengths of the key-bits, out of locking position between the fixed tumbler-receiver C and the movable tumbler-carrier D. The same key, however, or one of like construction used to shoot the bolt will be necessary to draw it back, notwithstanding that several keys of different construction may be used to work the same lock, which only renders a change of keys necessary instead of a change of lock when a key has been lost or the control of the lock is required to be changed.

In a lock constructed substantially as described a matrix approximately the shape of the step-like construction of the bits of the key is formed by the united action of said key, pins, or tumblers moving in ducts and suitable springs, and which is so organized that the bolt cannot be withdrawn unless said matrix is reproduced by the action of the same key or one with precisely similar steps or bits.

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

1. In a pin-tumbler lock, an oscillating or swinging tumbler-carrier provided with a series of ducts or perforations arranged in transverse relation with the axial center of motion of said tumbler-carrier, and each containing three or more independent pins or tumblers arranged one in advance of the other, and the several pins or tumblers in each duct being of different lengths, in combination with a stationary tumbler-receiver in working or close contact with the oscillating tumbler-carrier and having a corresponding or registering series of ducts or perforations adapted to receive a portion of said independent tumblers by the pushing action of a proper key, springs for operating said tumblers, and a locking-bolt, substantially as specified.

2. A pin-tumbler lock provided with a movable tumbler-carrier having a series of ducts or perforations, each containing three or more pins or tumblers, and with a tumbler-receiver having two sets or rows of ducts or perforations, one of which rows or sets is adapted to receive and hold certain of the pins or tumblers from the movable tumbler-carrier, determined by the key of the lock, and the other row or set holding or being provided with separate locking pins or tumblers for the purpose of locking the movable tumbler-carrier when the key is removed, essentially as described.

3. A pin-tumbler lock in which a matrix approximately the shape of the steps of the key as produced by its bits is formed by the united action of the key of the lock, and pins or tumblers moving in ducts, said pins or tumblers in each duct being of different lengths, and suitable springs controlling said tumblers, the whole being organized so that the bolt of the lock cannot be withdrawn excepting said matrix is reproduced by the action of the same key or keys of similar construction as regards its steps, substantially as specified.

4. A lock having a movable pin-tumbler carrier organized to oscillate or rock, and provided with a key-hole intersecting its axis of oscillation, in combination with a bolt connected with said tumbler-carrier, whereby said bolt is shot or withdrawn by the oscillation or lever-like action of a key throughout its length in contradistinction to the whole or partial rotation of the key upon or about its longitudinal axis or center, substantially as specified.

5. In a pin-tumbler lock, the combination of a swinging or oscillating tumbler-carrier, a stationary tumbler-receiver, a key fitting said tumbler-carrier and adapted to be rocked or oscillated with it, and a bolt capable of being shot or withdrawn by such rocking or oscillating movement, essentially as described.

6. In a pin-tumbler lock provided with a swinging or oscillating tumbler-carrier having a series of ducts or perforations in transverse relation with the axial center of motion of said carrier, the combination, with such carrier, of a series of sectionally-constructed sliding pins or tumblers of varying lengths arranged within said ducts or perforations, essentially as herein set forth.

7. In a pin-tumbler lock, the combination of the swinging or oscillating tumbler-carrier having a series of ducts or perforations, sectionally-constructed sliding pins or tumblers arranged within said ducts or perforations, a bolt connected with said oscillating carrier, the stationary tumbler-receiver having two sets or rows of ducts or perforations arranged to register in the oscillation of the tumbler-carrier with the ducts in the latter, and a secondary set of pins or tumblers in the one set or row of ducts in the stationary tumbler-receiver, the whole being organized for operation substantially as specified.

8. In a pin-tumbler lock, the combination, with the swinging or oscillating tumbler-carrier having ducts or perforations in transverse relation with the axial center of motion of said carrier, of a series of sectionally-constructed tumblers arranged to move within said ducts, a stationary tumbler-receiver perforated to receive said tumblers partially within it, and a series of keys differently stepped or having bits of different lengths, each adapted to control said tumblers to open and close the lock, essentially as herein set forth.

HENRY VAN HOEVENBERGH.

Witnesses:

C. SEDGWICK,

A. GREGORY.