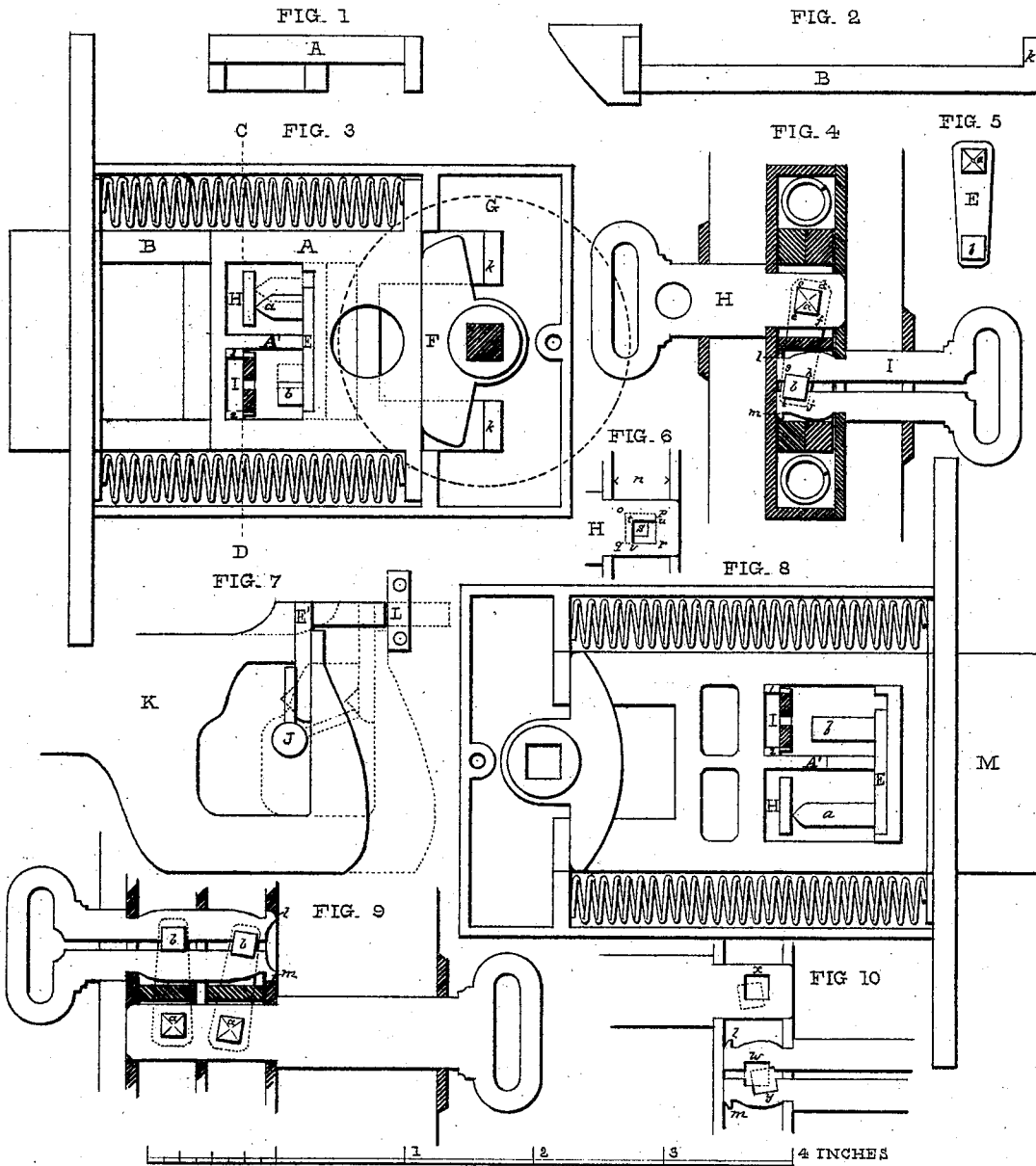


V. FRAZEE.

Improvement in Door-Locks.

No. 131,093.

Patented Sep. 3, 1872.



WITNESSES
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IMPROVEMENT IN DOOR-LOCKS.

Specification forming part of Letters Patent No. 131,093, dated September 3, 1872.

Specification describing certain Improvements in Door-Latches, invented by VITRUVIUS FRAZEE, of the city and county of San Francisco and State of California.

My invention consists of, first, a loose tumbler which is freely movable in a plane in all directions, and in various angles, within the limits of its receptacle, in combination with a key and guard; second, a key and guard so constructed and arranged that a key may take up and guide the loose tumbler in such a manner that a projection of it may enter and pass through an aperture in the guard in the process of unlocking, in combination with the tumbler-carriage; third, a hub and a tumbler-carriage whose operation in the first place is for bringing the loose tumbler in contact with the key, and so arranged that the latch remains immovable until the aperture in the guard is entered by a projection on the tumbler, after which it is withdrawn by means of the hub.

Figure 1 is an edge view of the tumbler-carriage A. Fig. 2 is an edge view of the latch B. Fig. 3 is an elevation of the front door and office lock with cover removed. Fig. 4 is a section through C D of Fig. 3. Fig. 5 is an elevation of the loose tumbler E. Fig. 6 represents the manner in which the size of the projections *a* and *b* and the limits of the movements of the loose tumbler are ascertained. Fig. 7 illustrates how the loose tumbler may be operated by a key which turns in the lock. Fig. 8 is an elevation of the safe-lock. Fig. 9 shows the manner in which several loose tumblers may be introduced in one lock. Fig. 10 represents a method by which a number of locks may be unlocked by a pass-key and also by their several respective keys.

The front door and office lock, Fig. 3, contains four pieces, excluding the two spiral springs within the case, consisting of the loose tumbler E, the tumbler-carriage A, the latch B, and the hub F. The hub F is operated by the ordinary knob G. When the lock is locked it may be unlocked from the outdoor side by simply inserting the key H and turning the knob G. In the operation of unlocking, the hub F impels the tumbler-carriage A forward, the square-pointed projection *a* of the tumbler is picked up by means of the aperture *c d e f* of the key, Fig. 4, and the tumbler is thereby

given its proper position and angle for the entrance of its projection *b* into and through the aperture *g h i j* of the guard I. As the projection *b* enters the aperture in the guard an arm of the hub comes in contact with one of the projections *k l* of the latch B and withdraws it. The two spiral springs serve to impel the latch and tumbler-carriage into their relative positions when not in operation. (See Fig. 3.) The tumbler-carriage A slides on the latch B, and is there maintained by its projections on either side, which clasp the latch B, and by its projections 1 and 2, which are attached to the lock-case and lie within the latch. The side projections are acted upon by the spiral springs in bringing the tumbler-carriage to its position of rest, Fig. 3. The loose tumbler E is maintained in a plane by means of the tongue A' of the tumbler-carriage, which also serves to form separate compartments for the projections *a* and *b* of the loose tumbler and for the key H and guard I. The loose tumbler is retained in the tumbler-carriage in such a manner that it may have free movements in every direction in a plane within limits which I shall presently explain. The lock is unlocked from the indoor side by the withdrawal of the guard I, and is always locked when the key is out by the full insertion of the guard. The key and guard are to be made of steel. The guard is constructed so that it may be sprung into the lock on the indoor side and held as a fixture, the catches *l* and *m* preventing it from any greater movement without springing it than what is necessary for unlocking the lock.

The combination on which the lock is unlocked is altogether dependent on the arrangement of the apertures in the key and guard, and it is, therefore, intended to manufacture the keys and guards in pairs independently of the locks, so that the combination of any lock can at any time be changed by simply inserting a new guard and using its corresponding key.

The proper size of the projection *a* of the tumbler E and of the aperture *c d e f* of the key is ascertained in the following manner: The breadth of the key-bit may be about equal to the inside depth *n* of the lock-case, Fig. 6; a square, *o p q r*, is formed on the side of the

bit, within the limits of the key-bit and depth n of the lock. The size of this square is not an arbitrary matter, but the larger it can be made and conform to the working of the lock the greater will be the number of changes, for the reason that it circumscribes the various changes. For ordinary purposes this square may be divided into sixteen equal parts. The four central parts s represent a plane, in and about which the point of the projection a of the loose tumbler E has access—that is to say, the loose tumbler must be so limited in its movements that the square s shall always circumscribe the various positions of the point of its projection a . The nine parts contained within $t u v r$ should be the size for the aperture $c d e f$ of the key, and may be cut in the key-bit where shown, or in any other part within the large square $o p q r$. If placed at an angle it must conform to the depth of the lock-case. (See Fig. 4.) The square $t u v r$, Fig. 6, should be the size for the projection a of the tumbler, and it may also be the size for the projection b . In well-finished locks the changes may be considerably increased by dividing the square $o p q r$ into forty-nine equal parts, nine of which would form a square in the place of the square s , and twenty-five thereof the size for the square aperture $c d e f$ of the key-bit. The object sought is to have the greatest number of changes compatible with a perfect action of the several parts. The aperture in the key-bit must, in any of its various changes, take up the point of projection a of the tumbler in whatever position it may chance to be, and always remove it in some degree from that position, so that none of its chance positions on the limits of its movements may form any of the changes on which the lock may be unlocked. The changes of the tumbler must therefore always exceed those of the aperture $c d e f$ of the key in some degree, more or less, as the works are coarse or fine, respectively.

In Fig. 7 is shown a method by which the loose tumbler E' may be actuated by a turn-key, J , where K represents the bolt, and L the guard. The whole may be arranged in combi-

nation with the ordinary pawl for withholding the bolt when withdrawn. The guard L in this case is a fixture within the lock.

The bank and safe lock, Fig. 8, contains three pieces, excluding the two spiral springs, within the case. The operation of this lock is substantially the same as in Fig. 3, with the difference that the bolt M acts as a carriage for the loose tumbler, and is not beveled.

There are various methods by which a number of loose tumblers may be introduced in one lock, either side by side or under and above one another, as may be most expedient for the purpose intended. In Fig. 9 are shown two loose tumblers, side by side, in the act of entering the key and guard. In hotels and other places, where it is desirable to have a pass-key capable of unlocking a number of locks, the guards of all of them may have an aperture, w , corresponding to the aperture x of the pass-key, Fig. 10. The guard of each lock may also have an independent aperture, y , corresponding only to its proper key in each case, so that, excepting the pass-key, no two locks may be unlocked by any one key. The keys and guards should be ornamented or stamped in some manner on the side nearest the knob, so that they may always be inserted properly. It is intended to have the proper sides stamped with the words "This side to the knob."

I claim as my invention—

1. The loose tumbler E , in combination with the key H , guard I , and tumbler-carriage A , substantially as and for the purpose hereinbefore set forth.

2. The key H and guard I , in combination with the loose tumbler E , substantially as and for the purpose hereinbefore set forth.

3. The loose tumbler-carriage A and hub F , in combination with the loose tumbler E , the latch B , the key H , and guard I , substantially as and for the purpose hereinbefore set forth.

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