H. Blakely,

Lock.

No. 8,964. Patented May 25, 1852.

Fig 1.

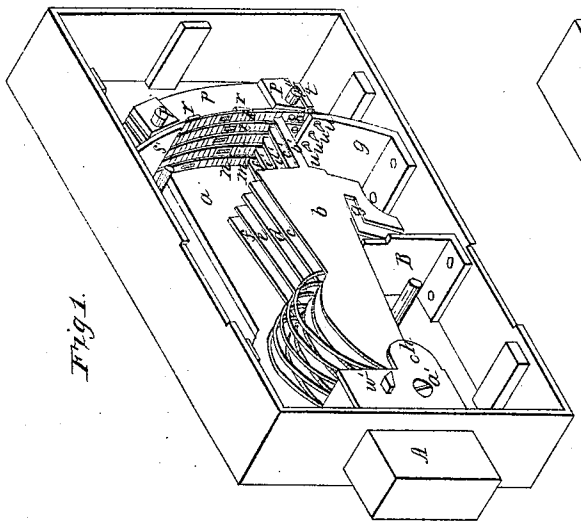


Fig 7.

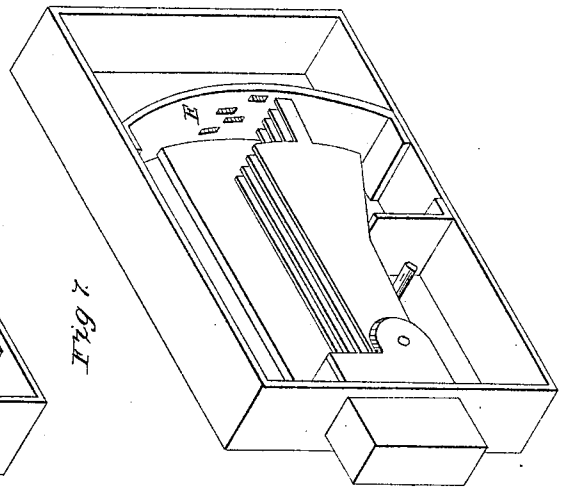


Fig 2.

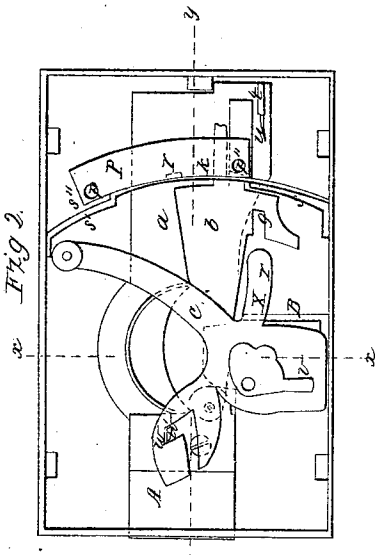


Fig 4.

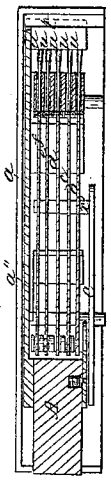


Fig 6.

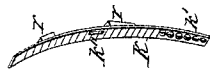


Fig 3.

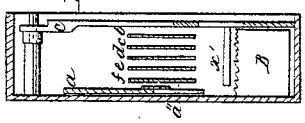
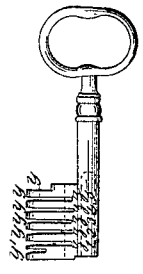


Fig 5



UNITED STATES PATENT OFFICE.

HENRY BLAKELY, OF NEW YORK, N. Y.

TUMBLER OF LOCKS.

Specification of Letters Patent No. 8,964, dated May 25, 1852.

To all whom it may concern:

Be it known that I, HENRY BLAKELY, of the city, county, and State of New York, have made certain new and useful Improvements in the Construction of Locks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being made to the annexed drawings, making a part of this specification, in which—

Figure I is a perspective view of the interior. Fig. II is an elevation. Fig. III is a section on the line *x*—*x* of Fig. II. Fig. IV is a section on the line *y*—*y* of Fig. II. Figs. V and VI are parts in detail, and Fig. VII exhibits a modification and similar letters refer to similar parts throughout.

My invention consists in an improved construction of tumbler locks and in the manner of operating them. In the finer sort, those intended for affording the greatest possible security, very skilful workmanship is required to obtain that extreme accuracy in the construction of the various parts, which is essential to their successful operation. This feature involves so large an expense as to place such locks beyond the reach of ordinary consumers, and those require also much care, and expense in maintaining them in order.

My invention is intended to obviate entirely the necessity of this extremely nice and accurate construction of all parts of the lock, and it has this peculiarity among others, that its very looseness of construction affords an element of additional security, as will more plainly appear when I come to describe its operation. It is also free from all danger of derangement by dirt and dust, requires no oil, may be cleaned at any time by any person capable of taking it from the door, and this cleaning involves only the blowing out of the dust without taking the lock to pieces. In addition to the difficulty of opening said locks, by picking, it may have all the usual safeguards against cutting and blasting by gun powder—while in regard to expense of construction it is so cheap as to be within the means of any party able to purchase a good common door lock.

The construction and operation is as follows: At A is represented that part of the bolt which is projected out of the case, and (*a*) is the thin piece forming the interior extension. The tumblers are arranged as seen at (*b*, *c*, *d*, *e*, *f*,), and may be stamped or cut out of sheet metal. They are shaped as seen at (*b*) Fig. II, the back ends terminating in slender bars as (*b′*, *c′*, *d′*, *e′*, *f′*,), and at (*g*) they are spread out sufficiently wide to cut the notches shown. The tumblers are secured to the bolt, by a pin (*h*) which is firmly fastened to (*a*) at the back, and to A by a plate (*a′*,) screwed on the front of A. The holes in the ends of the tumblers which go on the pin (*h*) are not so small as to form a very close fit, but they are permitted to have lateral play as well as vertical, and this is a point to be especially noted, for this loose and free movement in every direction is one of the elements of security. The tumblers are kept accurately spaced apart by small washers interposed between each upon the pin (*h*) as seen at (*i*) Fig. IV. When the bolt A is thrown out or locked, as in Fig. I, the tumblers all rest upon the top of a division plate B—this plate protects the after part of the lock from being acted upon by picks from the keyhole. At the back part of the lock and immediately at the extreme ends of the tumblers when they are in the position seen in Fig. I the lock is again divided from top to bottom by a second division, or partition partly composed of stationary plates, and partly of movable plates. These latter form both guides and checks to the movement of the bolts and tumblers—guides, when the bolts and tumblers, are operated upon by the proper key, and checks, whenever attempts are made to pick the lock. These checks are thin narrow pieces in the form of arcs, as seen in Fig. VI, and also at (*k*, *l*, *m*, *n*, *o*,). The radius upon which these arcs are formed is (*h k*,) or the distance between the pin (*h*) and the face of the check (*k*). The description of one of these checks will serve for all, since one or more may be put into the lock as will more fully appear. After the proper curve has been given, a series of holes is made in the lower end as seen at (*k′*) Fig. VI at equal distances apart, and next an opening (*k″* Fig. VI) is made at about the middle. This opening is for the purpose of receiving one of the ends (*b′*, *c′*, &c.,) of the tumblers and is accordingly of a size to take that in. The checks (*k*, *l*, *m*, *n*, *o*) are arranged as shown in Figs. I and II being kept in place

by a rack P which is a piece formed of plates arranged on two pins (p' and p'') having washers (p) Fig. I of proper thickness between, to keep said plates sufficiently apart to allow the ends of the tumblers (b'), &c., to go through, thus forming long narrow slits, allowing a free play between (p') and (p''). The checks are placed immediately in front of this rack so that a check shall be against every slit of the rack. They are still further kept in place from shifting from side to side by small studs (r) fixed at the back and playing in one of the slots of the rack. To keep them up to the face of the rack the latter is set back from the two permanent plates of the partition (s, s') sufficiently to allow of the ends of the checks (k, &c.) to play between them, as seen at (s'') Fig. II. These two arrangements keep the checks in place in all positions. Attached to that part of the bolt (a) which is behind the partition plates (s, s',) is an arrangement which acts in connection with the key to effect the set, or position, of the checks for receiving the ends of the tumblers in the holes (k, l, m, &c.). This is a series of sharp points or pins attached to a plate, the pins being horizontal and parallel to each other and also to the bolt (a) as represented in the Figs. I, II, IV, where (t) is the plate fixed to the side of the bolt (a) and (u) are the pins. As the bolt is carried forward by the key these pins move with it, and it will be seen that there are as many pins as there are checks (k, l, m, &c.), and also that the spaces between the points of these pins are the same from the center of one of the rows of holes (k') to the center of any hole in the row of the next check &c. It will also be observed that the points of the pins (u) are bent slightly downward, to facilitate their proper entrance into the holes. Outside of all and immediately against the front plate of the lock in which the key hole is situated, there is fixed an independent tumbler C. This is suspended from a pin near the top of the frame and extends downward terminating in three branches; one branch (v) has a hole shaped to allow the key to pass through it and so that when the key is moved it swings forward in order to bring (v) to cover all that part of the key hole not taken up by the stem of the key. The branch (w) extends toward the bolt A, and has a right angled notch cut in it so as to allow of the entrance of a pin (w') within it, certain movements being performed by the key. The third branch X extends backward beyond the division plate B, and in front of the set of tumblers (b, c, &c.). From this end a pin x' Figs. II, III, and IV, projects at right angles to the branch and across the lock. This pin is intended to be received within the opening (g) of the tumblers when the bolt has been thrown forward and locked, and accordingly it effects the fastening down of the whole set of tumblers, so that they cannot be lifted by the introduction of any picking tool. I now come to describe the construction and operation of the key. This instrument is designed to perform three operations upon the lock—viz., throwing the bolt, raising the tumblers, and also guiding and arranging them as respects their lateral movements. The key is seen at Fig. V. The blank is first cut into several slits to form the guides as at (y); on the bottom of these slits are placed the "bits" (z) which are movable and may be changed from slit to slit and when thus changed they effect also a change in the positions of the checks (k, l, m, &c.) when the bolt is thrown forward, and it is in effect then a new key.

It has been stated that the manner of attaching the tumblers (b, c, &c.) so as to have free play in all directions was an additional element of security. This will now be made apparent. Suppose it were attempted to pick the lock by any method of picks or skeleton keys &c. It will be seen that before the bolt can be withdrawn, the points (b', c', d', e', f',) must all be entered respectively in the holes in (k, l, m, n, o). Now since the tumblers are all out of sight no method is left but to feel for their places and in raising them either all together or *seriatim* a great variety of positions may be taken by them, the points (b' &c) may be too high, or too low, or be to the right, or the left of the proper holes. It is thus evident that a very complicated set of changes occur from this circumstance alone; consequent upon this feature arise other advantages—viz., that the extreme accuracy of construction requisite in other tumbler locks (at least in those of such character for workmanship as would be at all comparable with mine for security) is not in this required, and hence its advantage as respects costs; while it is because the parts are all so free, that oiling is not necessary,—that dust will not interfere with its performance—and that it may be cleaned without requiring to be taken to pieces.

To operate the lock with its proper key the key is inserted as usual, being pushed in as far as it can go, then turning it around it becomes engaged upon the tumblers and also upon the bottom of the thin part of the bolt (a). At this place a notch is cut out (as shown by the dotted lines Fig. II) and over this notch there is a thin plate secured, (a'') Figs. III, and IV. The slit (y') of the key receives the edge of this plate and thus it forms a set by which the key can adjust the tumblers so that in turning it around, when said tumblers are all elevated to their proper heights to enter the holes in (k, l, m, &c.) they will also be right

as respects their lateral positions. The distances of these holes being always the same as respects the part of the bolt (*a*), the key will be always accurately placed by this plate (*a''*). The raising of the tumblers to their proper height is effected by the "bits" and their adjustment for lateral position is effected by the guide pieces (*y*). I shall now describe the uses of the pins (*u*) and the manner of operating them; the checks (*k*, *l*, *m*, &c.) have a series of holes near their lower edges; these holes bear a certain relation to the "bits" (*z*) upon the key and pins (*u*), the "bits" (*z*) it will be seen are of different heights, these are first arranged on the key in any order, designed or accidental. The checks (*k*, *l*, *m*, &c.) must then be set so that the pins (*u*) will project through certain of these holes (*k'*) counting from the bottom of the checks. Say the bit No. 1 as seen in Fig. V, corresponds to the lowest hole in the check (*o*). For check (*o*), tumbler (*f*), and the bit (*z* No. 1) are all operated together. One of the points (*u*) is then put through. This sets the hole in the check to receive the point (*f'*) high up, for the "bit" (*z* No. 1) being the longest one, necessarily raises the tumbler (*f*) to the greatest height, and this height matches the position of the hole (*o*), so that in unlocking the end of the tumbler (*f*) may go through. The same is to be observed of the other checks, they are all to be supported by the pins (*u*) being passed through different holes to cause them to correspond to the different bits (*z*) Nos. 2 3 4 5 as those bits lift the tumblers so as to elevate their ends (*b'*, *c'*, *d'*, &c.) level with said holes (*k*, *l*, *m*, &c.) Let the key be now turned to withdraw the bolt in (Fig. I); the tumblers (*b*, *c*, *d*, *e*, *f*,) are raised by the bits (*z*), the ends (*b'*, *c'*, *d'*, *e'*, *f'*,) enter the holes (*k''* &c.) respectively in (*k*, *l*, *m*, *n*, *o*,), the bolt A begins to be moved back, the thin part (*a*) to which the pins (*u*) are attached withdraws them from the holes (*k'* &c.) in (*k*, *l*, *m*, &c.) The moment they are all clear of the checks, which happens as soon as the ends (*b'*, *c'*, &c.) are fairly entered, the checks are at liberty to slide down between the curved plates (*s*, *s'*,) and the rack (*p*) as the key passes from under the tumblers and permits those to fall. The whole row will then rest on a level, the lower ends of the checks coming to a level by resting upon the bottom of the lock as seen in Fig. II. The bits (*z*) upon the keys might now all be changed and a new set given to the checks, but this would not take place until the door was locked. This will appear as follows: In Fig. II the bolt is shown drawn within the lock. The pins (*u*) are clear of the checks (*k*, *l*, *m*, &c.) the bits have been put in the key to change the former arrangement of the holes (*k*, *l*, *m*, &c.) I will suppose that the key had been previously set to some other arrangement, and that it has been rearranged as shown in the Fig. V, (in order to make use of the same set of letters and marks of reference); the key is applied and turned half around, or until the bits are vertical. In this position the tumblers will have been all raised to their greatest height which height is various according to the different lengths of the "bits." The bolt A has also been somewhat advanced and thereby brought the points (*u*) forward so that they are just at the back of the check. The key is advanced a little farther and the pins (*u*) immediately enter the holes (*k*) &c. in the checks which are opposite to them, and thereby maintain them in the position given by the "bits" as operated on by the tumblers, the tumblers are now carried forward with the bolt, and become completely disengaged from the checks and falling down rest upon the partition B. Any attempt to move back the bolt A without the proper key would be resisted by the strong partition formed by the blank part of the checks acting against the ends (*b'*, *c'*, &c.) of the tumblers.

On the fronts of the checks a series of narrow parallel cuts or shallow grooves are made across their faces. These are for the purpose of operating as obstacles to the movement of the tumblers, in case of attempts to pick the lock; the extreme ends of the tumblers are sharpened so as to catch in the said grooves, and on pressure being applied to the bolt to throw it back the lifting of the tumblers when made to press against this roughened surface is rendered more difficult; they also act as a blind, in attempts to feel for the proper holes to receive the ends of the tumblers, for as those catch in some one of the grooves it leads to the supposition that the end of the tumbler is resting on the edge of its proper hole.

In Fig. VII is a view of a lock of very simple construction based upon this combination of the check-partition and the tumblers. The check partition is formed of one piece, with the holes to receive the ends of the tumblers permanently cut through, as seen at E. A lock may have several sets of these so that they may be changed in a few moments by taking the lock off of the door; to each check however, another key must be adapted or the changes in the "bits" made to accord. By this means, a very secure lock is obtained at the price of the commonest kind.

What I claim as of my own invention and desire to secure by Letters Patent of the United States is—

1. The employment of tumblers in such combination with the bolt of the lock that each and every tumbler independent of the others shall have freedom to move later-

ally as well as vertically, whereby a great number of positions may be assumed by their unattached ends as described.

2. I claim the guide pieces upon the key for the purpose of controlling the lateral motion of the tumblers as described, the whole being constructed and operating substantially in the manner and for the purpose herein set forth and described.

HENRY BLAKELY.

Witnesses:
S. H. MAYNARD,
L. W. BRAINARD, Jr.