

E. M. BENHAM.
 LOCK FOR SAFETY DEPOSIT BOXES.
 APPLICATION FILED MAY 11, 1912.

1,049,648.

Patented Jan. 7, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

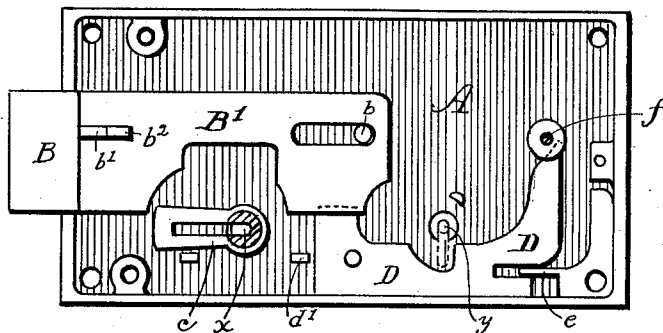


Fig. 2.

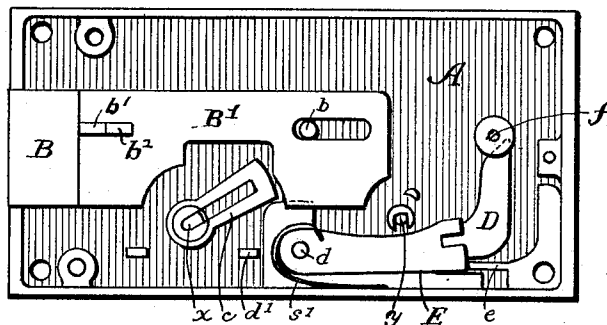
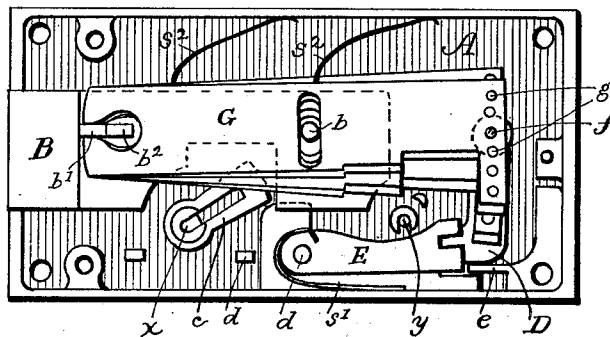


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

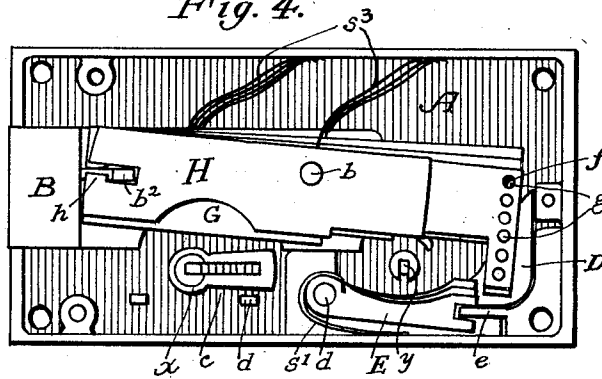


Fig. 5.

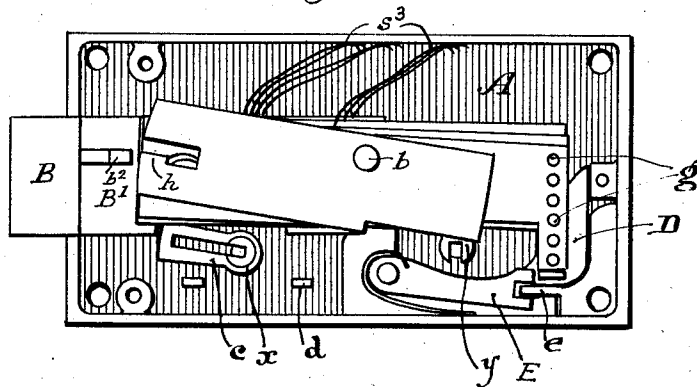


Fig. 6.

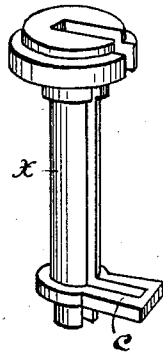


Fig. 7.

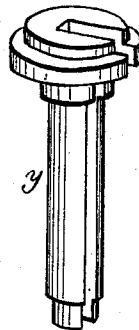
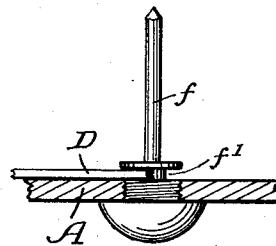


Fig. 8.



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UNITED STATES PATENT OFFICE.

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LOCK FOR SAFETY-DEPOSIT BOXES.

1,049,648.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed May 11, 1912. Serial No. 696,741.

To all whom it may concern:

Be it known that I, EDGAR M. BENHAM, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented new and useful Improvements in Locks for Safety-Deposit Boxes, of which the following is a specification.

My invention relates to the class of locks called "safety" or "multiple key" locks, intended for banks or safety deposit institutions; and its object is to combine in a lock of few parts of simple and direct action, various functions intended to promote efficiency of action; prevent tampering or "picking;" and insure against carelessness or forgetfulness on the part of the user. To this end the lock requires the positive coöperative action of two key holders,—the owner or user and the custodian,—both in locking and in unlocking; and the owner or user cannot remove his key while the bolt is withdrawn nor until it is again projected or "locked." Further, the resetting to a new combination is rendered simple and easy, requiring however the coöperation of a third key-holder—for example, the president or managing officer,—such third key being used in the same key-post used by the custodian's key. The supplemental mechanism for this purpose, although simple, being adapted to an almost unlimited change of guard-combinations, no two operating keys nor setting keys need be alike in many thousand locks. Further, the bolt and other parts are positively held in extreme positions, and cannot be disturbed or moved by a wire or other "picking" means.

The mechanism which I have devised for the accomplishment of these results is fully described in the following specification, and is illustrated in the accompanying drawings.

My invention is illustrated in the accompanying drawings, in which the figures represent the several stages of assembling the parts as in manufacturing practice. Thus—

Figure 1 represents the casing (with cover removed) with the locking bolt shown as "locked," and the sliding plate in normal position; Fig. 2 represents the same parts (bolt unlocked) with the addition of the

auxiliary guards or tumblers in normal position upon the sliding plate; Fig. 3 represents the same parts as in Fig. 2, with the addition of the main key-guards superimposed upon the bolt; Fig. 4 represents the same parts and positions as in Fig. 3, with the guard tumblers superimposed upon the main bolt guards, and holding the bolt retracted; Fig. 5 represents the same parts as in Fig. 4, but in "locked" position; Figs. 6, 7, and 8, are perspective views of key posts x and y , and of the pin f removed, respectively.

The following description is based upon the order pursued in assembling the parts, beginning with the casing and the primary moving parts first placed therein, and successively adding other parts.

In the drawings herewith, Fig. 1, A designates the casing,—a rectangular container open at one of its larger sides, and preferably cast as a single piece; and B a sliding bolt having a thin flat web B^1 extending back into the casing and guided in its reciprocatory movements by a sliding fit in the front-end wall of the casing through which it projects, and by a fixed stud b in the bottom wall of the casing projecting upwardly through a longitudinal slot in the web B^1 . The bolt is moved to and fro by a radial lug c projecting at the foot of a key post x (shown here in cross section and complete in Fig. 6), pivotally centered in an aperture in the bottom wall of the casing at the side of the web B^1 in proper relations with a suitably formed recess therein, and shown in the position reached in throwing the bolt.

Upon the web B^1 of the bolt, projecting rearwardly from the bolt head B is a fin b^1 , the rear portion, b^2 , of which is carried somewhat higher,—the functions of which will be more particularly set forth later in proper connection.

The lower edge of the web B^1 is slightly undercut at the rear end to lap over and hold in its proper plane of movement, a plate D, formed to slide upon the bottom wall of the casing A guided at the rear upon a fin e fastened to the bottom of the casing and projecting longitudinally into a corresponding slot in said plate D. The plate D

is reciprocated by a key inserted in a key-post y to be described hereafter, pivotally centered in an aperture in the bottom of the casing adjacent to the plate D as here shown. The normal function of the plate D is that of a guard or stop to prevent the removal of a pin f shown here in cross section but more fully in Fig. 8. The pin f is the pivot upon which the main bolt-guards hereinafter described, operate, and is removed upon occasion only to change the "combination" upon which the lock is set to operate for the time being. When normally in place, the sliding plate D is drawn into the relative position shown in Fig. 1 against a stop d^1 , in which position the upper-rear extremity of the plate engages as a retainer in a circumferential groove f^1 formed in the enlarged head of the pin f , as more fully shown in Fig. 8.

Other incidental functions of the sliding plate D will be referred to later in proper connection.

Turning to Fig. 2, we have the same parts shown in Fig. 1, and in addition, a plurality of tumblers or key guards E pivoted upon a stud d secured in the plate D, each guard having a small spring s^1 attached at the rear end, formed to impinge upon the contiguous side wall of the casing A. The tumblers or guards E are duplicates of each other in general form and size, and each is provided, as shown, with a shallow recess at its front end adapted to enter upon and engage the end of the fin e . These recesses, however, are in relatively different positions upon the several guards so that when they stand in the normal position shown, held by their several springs against the key-post y , they present a resisting surface against the end of the fin e to prevent movement of the sliding plate D to the right so as to release the setting pin f . A suitable key with graded surfaces corresponding with the inequalities of surface for the time being presented by the guards E as they may be arranged, is required to be inserted in the key post y to effect this movement—that is, to bring the recesses of the guards E into line with the fin e so as to permit the sliding plate D to be moved and the pin f released.

In Fig. 3, we have all parts thus far described, in due position and in addition thereto a plurality of adjacent bolt-tumblers or guards G. These are held at their forward ends upon the fin b^1 , secured upon the bolt web B^1 . To accommodate this engagement, each guard is correspondingly recessed at its forward end as shown. The guards G are held against a fore-and-aft movement by the stud b which projects upward through corresponding cross-wise slots in the guards, thus permitting the guards a rocking movement upon the fin b^1 , which allows an inter-adjustment of the guards in

relation to the key-post y . To attain this adjustment the guards G have a corresponding series of equidistant punctures g , arranged cross-wise at the rear end, and the relative adjustment of the guards is accomplished by bringing them to the desired staggered relations one with another at the rear, and passing the pin f upward through the entire set of apertures standing in its path which register in such position of adjustment. The guards G are provided with leaf springs s^2 bearing against the contiguous side-wall of the casing and are thereby normally under downward pressure at their forward ends, pivoting upon the pin f . When the bolt is projected in locking position, the guards G all drop down behind the fin b^1 of the bolt B, and oppose their front transverse edges as a solid barrier to its withdrawal into unlocked position. To permit the bolt to be withdrawn it is therefore necessary to raise the guards severally to a position where their forward recesses will register with each other and permit the fin b^1 to enter said recesses. This is accomplished by the bolt-throwing key in the key post x , provided with a graded or "stepped" edge corresponding with the relative distances of the edges of the guards G in relation to the center of the key aperture y as adjusted by means of the pin or stud f in relation to the transverse holes at the rear ends of the guards G.

In Figs. 4 and 5 we have in position all the parts thus far described, and in addition thereto a series of guard tumblers H superimposed upon the bolt-tumblers or guards G, but pivoted upon the stud b , and normally held upward at their front ends by springs s^3 impinging upon the adjacent side wall of the casing. The guard tumblers are also recessed at their forward ends to admit the fin b^1 , but the recess is deepened cross-wise just inside of the entering passage, thus leaving an upward projection or hook h , which, when the lock is drawn back within the casing moves upwardly behind the corresponding projection b^2 of the fin b^1 and thus holds the bolt in such withdrawn position. The release of the bolt from such detention is effected by movement of the guard tumblers by a key in key post y , and having a lifting action upon the rear ends of the said guard tumblers H. When the bolt is in the opposite or closed position the guard tumblers H are free to rise upward in front by force of their springs, and present their front edge surfaces as abutments against the rear edge of the fin b^2 to prevent its withdrawal.

The *modus operandi* is as follows: The bolt-throwing key kept by the owner or customer is adapted to operate in key post x , its action being limited to the guards or tumblers G. When the bolt B stands pro-

jected, the foot *c* of the post stands in the radial position shown in Fig. 1, in which position only can this key be inserted or removed. Being provided with a graded front edge adapted to the setting (for the time being) of the guards *G*, the first part of its rotation lifts the several guards *G* from the position dogging the bolt from behind, as indicated in Fig. 5, to that indicated in Fig. 3, where they all present their front apertures in line to receive the fin *b*¹ as the bolt is drawn back. The rotation of the key drawing back the bolt, continues to the position indicated in Figs. 2 and 3 where the foot *c* contacts with the rear end of the sliding plate *D* as a stop leaving the foot *c* still beneath the guards whence the key cannot be withdrawn. The owner, therefore, cannot remove his key from the lock while the bolt thus stands withdrawn, because the bolt itself is held against a return movement, as will now be shown. A guard key, to be held by the custodian, is employed to coöperate with the owner's key in throwing the bolt as above described. It is used in key post *y* and acts upon the guard tumblers *H* by lifting them at the rear of their pivot *b*, thereby depressing their front ends from the position shown in Fig. 4, far enough to allow the high portion *b*² of the fin *b*¹ to pass beyond the hook portion *h* of the guard tumblers from the position indicated in Fig. 5 to that shown in Fig. 4, or vice versa.

To change the combination of the working tumblers or guards *G* requires an additional key, which may be kept by the president of the bank, or other third party, said key operating in key post *y* with suitably formed edge to depress the front ends of the guards *E* so that their front recesses shall be in line to receive the fin *e* and allow the sliding plate *D* to be moved to the right with a twofold result, namely: (1) the foot *c* of key post *x*, being no longer stopped by the sliding plate *D*, may now drop down to the stop *d*¹, and the key may now be withdrawn and a new key substituted; (2) the rear upper end of plate *D* is now removed as a stop from the pin *f*, and the pin may be withdrawn through the bottom wall of the casing *A*. This being done while in the "unlocked" position shown in Fig. 3, the guards *G* all drop down on the pivot *b* to the limit of their slots, being held at a uniform level in front by the fin *b*¹ of the bolt *B* as shown. The new key adapted to a new combination of guard operating surfaces, is now turned back a quarter of a turn which lifts the guards to their new positions and the pin *f* is now restored, passing through the holes at the rear of the guards, which register with the key-combination. This being done, the setting key moves the sliding plate *D* to the left as in Fig. 2, locking the pin *f* and

replacing the stop for the new key, which thenceforward governs the lock until still another, and another combination, to an almost limitless extent, may be substituted.

The tumblers or guards *E* on the sliding plate, also admit of an almost limitless variety of combinations. Changes in this respect are accomplished by removing the tumblers *E* from their pivot *d* and replacing them in a different order as desired to accommodate a new key.

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

1. In a safety lock of the character indicated, a longitudinally movable bolt, a plurality of adjacent guards, each provided with a corresponding series of apertures arranged cross wise at the rear; and a removable pivot stud seated in a contiguous wall of the casing adapted to pass through and pivotally engage said guards each independently through any given hole in the series according to a prearranged relation each with the others.

2. In a safety lock of the character described, the combination of the sliding bolt and its plurality of guards, a removable pivot fixed in the casing, and upon which the guards are changeably held, and of means for locking the pivot against removal, said means being operable by an independent key.

3. In a safety lock of the character indicated, in combination with a sliding bolt, a plurality of guards and a removable stud pivotally engaging said guards, an independently operated sliding plate adapted to engage and hold said stud against removal, and a series of guards carried by said plate adapted to be set in any given series relation and prevent actuation of the plate by any key other than the one adapted to the relative positions of said guards.

4. In a changeable combination key lock, a bolt having a web extended rearward; a plurality of working guards superimposed upon the web and governing the action of the bolt-throwing key; a plurality of independent key-operated guard tumblers superimposed upon said working guards, key-operated re-setting mechanism for the working guards, located contiguously to said guard tumblers in the casing; and a key-post located between the guard tumblers and the re-setting mechanism, adapted to receive the guard key for actuating the guard tumblers, and, after its removal to receive the re-setting key to actuate the re-setting mechanism.

5. In a changeable combination key lock, the combination of a sliding bolt, a plurality of working guards in controlling co-operation therewith; a removable pin or pivotal stud engaging the series of guards

in common, in adjusted position as to each;
a key-operated sliding plate adapted to lock
said pin in position in the lock-casing;
and a series of key guards upon said sliding
5 plate adapted to hold the plate in advanced
position locking said pin, until released and
retracted by its operating key.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

EDGAR M. BENHAM.

Witnesses:

ALICE L. TILDESLEY,
WALTER A. KNIGHT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
