E. M. BENHAM.

LOCK FOR SAFETY DEPOSIT BOXES.

APPLICATION FILED JAN. 20, 1911.

1,148,282.

Patented July 27, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

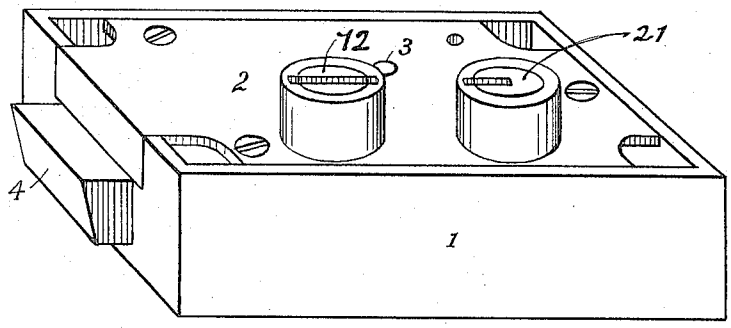
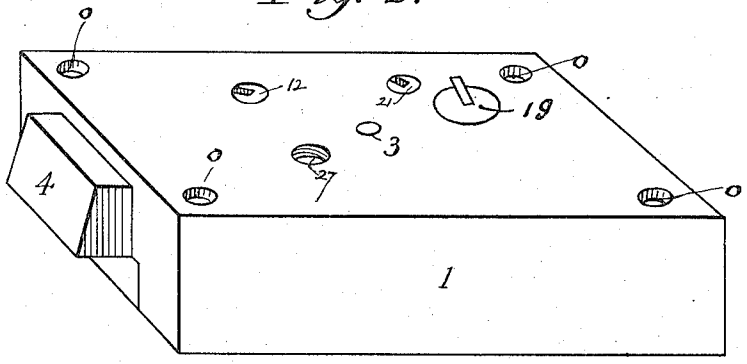


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

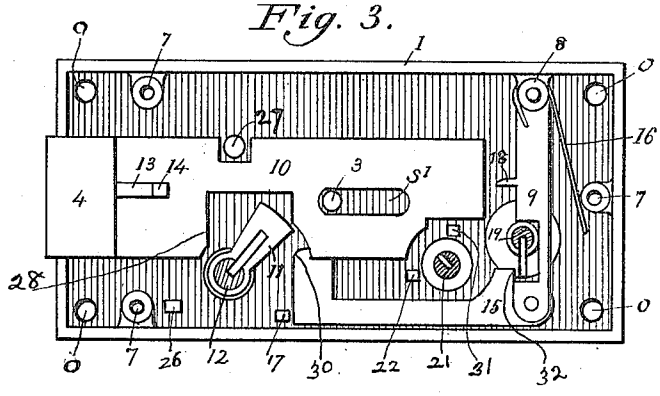


Fig. 4.

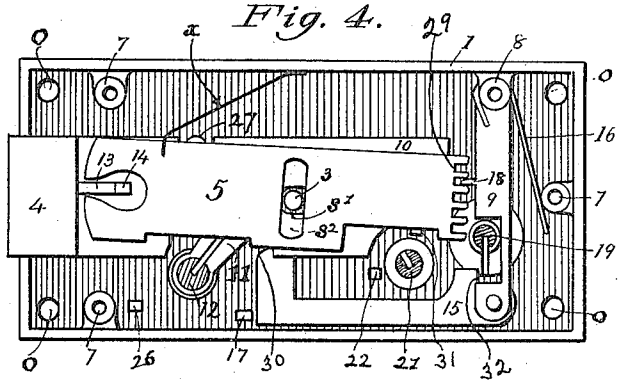
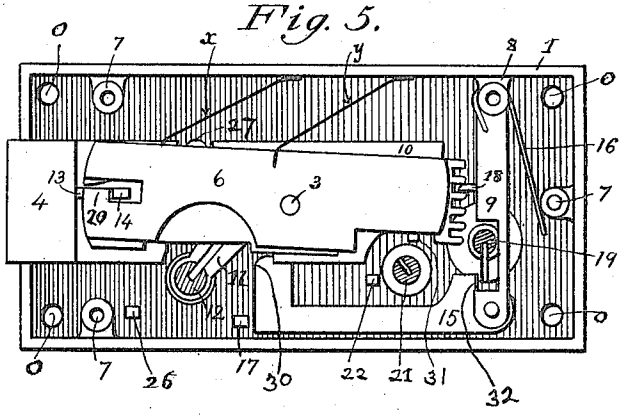


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

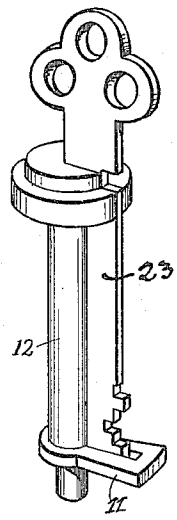


Fig. 7.

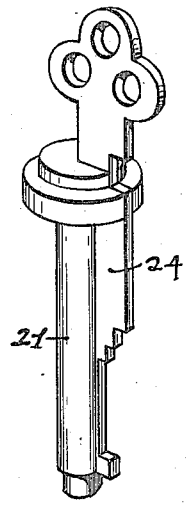


Fig. 8

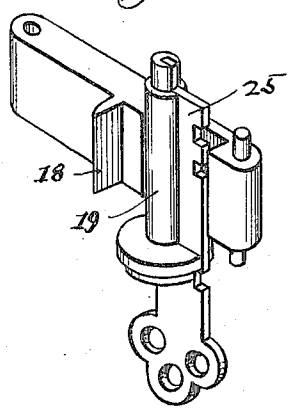
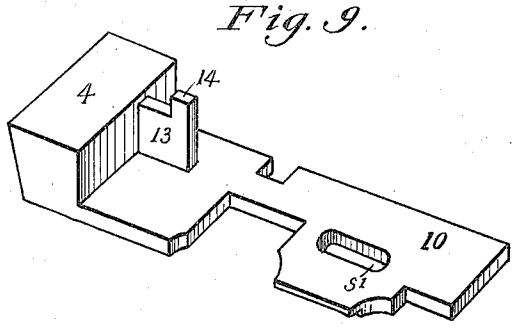


Fig. 9.



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UNITED STATES PATENT OFFICE.

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LOCK FOR SAFETY-DEPOSIT BOXES.

1,148,282. Specification of Letters Patent. Patented July 27, 1915.

Application filed January 20, 1911. Serial No. 603,654.

To all whom it may concern:

Be it known that I, EDGAR MORTON 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.

This invention relates to improvements in locks for safety deposit boxes and the like.

One of its principal points of advantage is that it is adapted to be set for use with each of a large number of keys for exactly similar locks; and when set it can be used with one particular key only. The setting key can be inserted only when the door is open; and, when the lock is set, the setting key is to be immediately removed. As the setting key may be retained by an officer of the safety deposit bank, other than the custodian of the vaults, no other key can be used upon that lock box until the tumblers have been released by this setting key. Assuming the door to be closed and the box locked, both the holder of the bolt-throwing key and the custodian having in charge the guard-key, insert these keys in their respective places in the lock, the custodian having turned the guard-key a quarter turn to the right, the box-renter turns his key nearly a half turn to the right, and the lock is open. The custodian cannot remove his key until he has turned it back to the place of starting. He then removes his key, but the bolt-throwing key cannot be removed from the lock, nor can the box be relocked until the guard-key has been again inserted and turned a quarter turn to the right. Therefore, if the box-renter goes away and leaves his box unlocked, he must also leave his key; and he cannot, therefore, blame any one but himself;—which is not the case with locks that can be locked without the presence of the attendant with his guard-key. Should the renter of a box become suspicious that some one has a duplicate of his key (as for example, it should be temporarily lost, or in possession of some other person during his absence or sickness), he can be made absolutely safe by surrendering his key and being given another and different key for the same box, and the lock re-set to the new key, without any cost whatever to the renter or the safety deposit bank, and the bank could then, with entire safety, use the old key on some other box. As any key may, in my improvement, be made available for any lock, there is no number on any key; hence the safe control of all boxes is always within the discretion of the safety deposit bank's officers and attendants; and, as no lock can be re-adapted to any other key, without the presence of the setting-key, the officers of the bank may have a complete check upon the custodian, by having the setting-key always in the possession of an officer of the bank not in constant attendance in the vault room. There is thus provided, in a single and comparatively simple device, a locking mechanism adapted to a very large number of combinations for bolt-throwing keys, and which may be changed and re-set at will; but which require for the opening and relocking of the box or drawer to which it is applied, the presence and coöperation of two different keys, which may be held by different persons, thereby conducing to absolute safety as against carelessness or inadvertence.

My invention is illustrated in the accompanying drawings in which—

Figure 1 is a perspective of the lock casing, showing the removable face and the "noses" of the bolt-throwing key and guard-key; Fig. 2 is a perspective showing the back of said lock with the setting key post in position; for insertion of key; Fig. 3 is a plan view of the case in position, corresponding with Fig. 1, with the back plate, working and guard tumblers and key posts removed, leaving in position only the locking bolt and setting devices, with sections of the key posts in position. Fig. 4 is a similar plan view of the open case with the working tumblers in place, superimposed upon the bolt-web, with sections of the key posts in position. Fig. 5 is a similar plan view of the open case with the guard tumblers in place superimposed upon the working tumblers, with sections of the key posts in position. Fig. 6 is a perspective elevation of the bolt-throwing key in position in its key-post complete and detached from the other mechanism; Fig. 7 is a perspective view of guard-key in position in its key-post complete and detached from the other mechanism; Fig. 8 is a perspective view of the setting-key in position in its key-post, shown in relation of

contiguity to the tumbler-holding lever (also shown) complete and detached from the other mechanism; and Fig. 9 is a perspective view of the locking-bolt detached from the other mechanism.

Referring now to the drawings, the body 1, of the lock-case consisting of the back, side and ends, I cast or otherwise form as one piece of metal constituting an integral receptacle, with a removable cover, 2, for the reception of the bolt and its governing mechanism. Fixed in the back wall of and projecting through the casing, into the cover, 2, is a post or stud, 3, which serves as a guide and limiting abutment for the locking bolt, 4, a seat and retainer for the working tumblers, 5, (of which in the present illustration six are employed), and as a pivot for one or more guard tumblers, 6, (in this illustration two). Formed integrally with the body of the case, 1, are bosses 7, being seats for the cover, 2, which are held thereto by screws, another boss, 8, is also provided as a pivot seat for a lever, 9, which is part of the lock-setting device hereinafter explained. The casing is secured to its door or box lid by screws passing through apertures, *o*, in the corners in the usual manner.

The mechanism of the lock can be best understood by considering Figs. 3, 4, and 5 in order—Fig. 3 showing only the locking-bolt and setting device in position; Fig. 4 showing the working tumblers added to these; and Fig. 5 showing the guard tumblers superimposed upon these,—all exactly as would be done in "assembling" the parts in manufacture.

Referring, then, to Fig. 3, the bolt 4 is extended at the bottom of the casing, rearward by a web, 10, longitudinally slotted at s^1 to engage and be guided upon and limited in its reciprocatory action, by the post or stud 3. It is further guided by the front wall of the casing, through which the bolt proper, 4, passes, and by the cover, 2, and moves upon suitably prepared surfaces of the bottom wall of the casing. The web, 10, is recessed at its lower edge for the play and action of the bit, 11, projecting radially from the rotating post, 12, shown here in section (but in full in Fig. 6). From the rear of the head or "stump" of the bolt, 4, projects rearwardly a short distance along the web, 10, a fin, 13, of a height equal to the aggregated height of the working tumblers, 5, with a head, 14, at the rear increased to the added height of the guard tumblers, 6. The rear lower corner of the web is cut away to allow place and movement to the stop actuated by the tumbler-setting key presently to be described. The setting mechanism shown in Fig. 3, consists of a lever, 9, pivoted in the boss 8, and extending across to near the opposite wall of the casing, where it pivotally engages a sliding bar or stop, 15. The lever, 9, is constantly governed by a spring, 16, which holds the sliding bar, 15, forward against the setting key post, 19. The lever, 9, is provided with an elongated catch, 18, projecting laterally to engage and retain the working tumblers as presently to be described. The lever, 9, is operated by a suitable key for which a radially slotted key post, 19, is provided (shown more fully in Fig. 8), and its action is a simple movement rearward to withdraw the catch, 18, from engagement with the working tumblers, and to draw back stop-bar, 15.

Turning now to Fig. 4, there is shown, superimposed upon the web, 10, a plurality of working tumblers, 5, all duplicates of each other (in the present case I employ six). The tumblers are plates recessed in front to engage upon the fin, 13, of the locking-bolt, and are provided with a cross-slot, s^2, near their center, whereby they are all engaged upon the fixed stud, 3. Their rear ends are finished across with a series of teeth with recesses, 29, between, those here shown having five recessed, into one of which, in each tumbler, the catch projection, 18, of the setting lever, 9, enters, and engages each tumbler. The angular relation of the tumblers to each other when thus set will depend upon the relative location in the series of recesses in each tumbler, of the engaging catch, 18; and this inter-relation of the tumblers may be changed at will and remain as so changed until again re-set to a new combination. Each tumbler, 5, is provided with a spring wire, *x*, at its back (upper edge) extending to and impinging against the nearest side of the casing, in such wise as to hold the free end of the tumbler downward.

In Fig. 5, the guard tumblers, 6, (two, in this instance) are shown superimposed upon the series of working tumblers, and pivoted upon the pin, 3. They are recessed in front to admit the upper extension, 14, of the fin 13, of the bolt head 4. The lower wall of the recess has an upward extension, 20, which normally engages behind the upper extension 14 of the fin 13, as a hook, and prevents the locking-bolt, 4, from being moved forward so long as the guard tumblers are in the position shown, in which they are normally held by springs, *y*, extending to and impinging against the contiguous wall of the casing, 1. The lower edge of the guard tumblers is recessed in the vicinity of the bolt-throwing key in post, 12, to permit the operation of said key without contact. At the rear the said guard tumblers are somewhat cut away at the lower edge to admit being raised up behind and depressed in front by a key, 24, in a key post, 21, suitably located for the purpose;

and stops 22 and 23 are arranged upon the bottom of the casing to limit the operation of said key. The object of thus elevating the guard tumblers in rear is to depress them in front and release the bolt from the hook, 20.

The operation is as follows:—Supposing the device is in locked position, and the tumblers operated by the locking-key are set up so that key 23 will, when turned, bring the slots on the forward end of these tumblers into alinement with the fin, 13, on the bolt, this key is inserted in the slot of post 12, to the position shown in Fig. 6, with the notched edge of the key to the left, and the bit 11 against the stop 26. The key, 23, however, cannot throw the bolt until the slots in the forward end of the guard tumblers have been alined with the catch elevation 14 of the fin 13; and this requires the similar insertion in key post 21 of the guard key 24 whose edge surfaces are adapted to engage the guard tumblers and lower them at their forward ends sufficiently to bring the tumblers to such position. This is done by a quarter turn to the right of key 24 to stop 31. When the guard key has so alined the slots of its tumblers with the catch 14, then the key 23 is turned to the right, until the bit 11 reaches the stop 30 formed by the forward end of the bar 15. In the course of its revolution, less than a half turn, it will aline its tumblers and retract the bolt 4 by the contact of the bit 11 with contiguous projections of the web 10. Thus, as will be seen, the coöperation of the two keys is required to unlock the door or box to which the lock is applied. Now, the guard key 24 may be turned back a quarter turn to stop 22, which will cause its tumblers 6 to raise at the forward end, and catch 20 to engage the fin 14 and hold the bolt 4 against being thrown into locked position. The guard-key may now be removed. The bolt-throwing key 23 cannot be removed because the stop 15 prevents it being turned far enough to the right, and the surface 28 of the web 10 prevents it being turned far enough to the left. Re-insertion and operation of the guard-key 24 is then necessary to throw the bolt out and remove the key 23. But when the bolt is thrown outward the working tumblers are all thrown downward, and the guard tumblers upward, at their forward ends as stops behind the fin 13, and its extension 14, and the key 23 may then be removed by continuing its movement until the bit 11 is against the stop 26, when it may be withdrawn. The setting key 25 is inserted from the rear, and has only the function of throwing back the swinging lever 9, thus withdrawing the catch or dog 18, from the recesses at the rear end of the tumblers 5, whereupon under the force of their springs, x, their combination relation is destroyed and all are forced down to the limit of their cross slots s^2. The insertion of a new bolt-throwing key and turning the same to the mid-point of its arc of movement will raise the tumblers to the several positions of the new relation, whereupon the lever 9 is released and its key withdrawn and the catch or dog 18 thenceforward holds the tumblers 5 in the new relation.

Re-setting is accomplished in the following manner: Unlock with keys 23 and 24, and take out the guard-key 24, or leave it in position at insertion, as before described. Insert setting key, 25, as shown in Fig. 8, and turn it a quarter turn, when the engaging catch 18 will be out of contact with all the recesses 29 at the rear ends of tumblers 5. The stop bar 15 pivoted to setting lever 9, will then be retracted so that locking key 23 can be turned farther to the right to stop 17 and there withdrawn. Now insert any locking key in place of 23, placing the notched edge to the right and inserting at position where 23 was withdrawn. Turn the new locking key to the left a quarter turn to surface 28 on web 10, and turn the setting key back to position of insertion, remove it. On the rearward end of stop bar 15 is a stop 30 for the setting key. The lower edges of the tumblers 5 have adjusted themselves into the notches on the new locking key, and the front ends of said tumblers being held against the fin 13, one of the notches 29 on the rear end of each of said tumblers, has been caught and held by the engaging catch 18. The lock is now in position to be operated solely by the new locking key in conjunction with the guard key.

If it is desired to eliminate the feature of requiring the custodian to assist in locking the box after it has been unlocked; then the front ends of the guard tumblers 6 are made the same as the tumblers 5, without hook, and the presence of the custodian with his guard key is only required in unlocking the box, the renter being free to lock it with his locking key alone. But the guard tumblers, made as shown in the drawings, have two functions, and when that of holding the bolt in unlocked position is eliminated by removing the hook, then a screw 27 adjusted from the back is used to hold the bolt from being thrown out when setting up a new combination. (See Fig. 3). This screw is removed as soon as resetting is complete and has no other function.

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

1. In a safety lock the combination of a sliding bolt, a plurality of governing tumblers adapted to be set to relative positions to control the action of a bolt throwing key, and one or more key-controlled guard tum-

blers constructed to normally hold the bolt in its locked or unlocked position.

2. In a safety lock, the combination of a sliding bolt, a plurality of key controlled tumblers guarding the same in locked position, and one or more independent, key-controlled guard tumblers, operating to prevent the movement of the bolt in either direction until released by a key acting independently of the bolt-throwing key.

3. In a safety lock, in combination with a sliding bolt provided with a detent, a plurality of adjacent tumblers, normally engaged at one end in a common relation by said detent in the retracted position of the bolt, a key-operated detent normally and directly engaging the tumblers at the opposite end in relatively adjusted relations, and a spring holding the last mentioned detent normally in such engaged relation with the tumblers.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDGAR MORTON BENHAM.

Witnesses:
A. L. TILDESLEY,
L. M. HOSEA.

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