Oct. 6, 1931. E. M. BENHAM 1,826,595

INTERCHANGEABLE KEY LOCK

Filed July 30, 1930 2 Sheets-Sheet 1

Fig. 1.

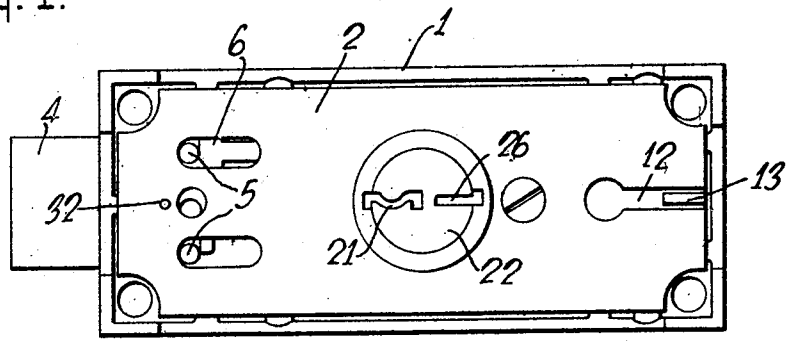


Fig. 2.

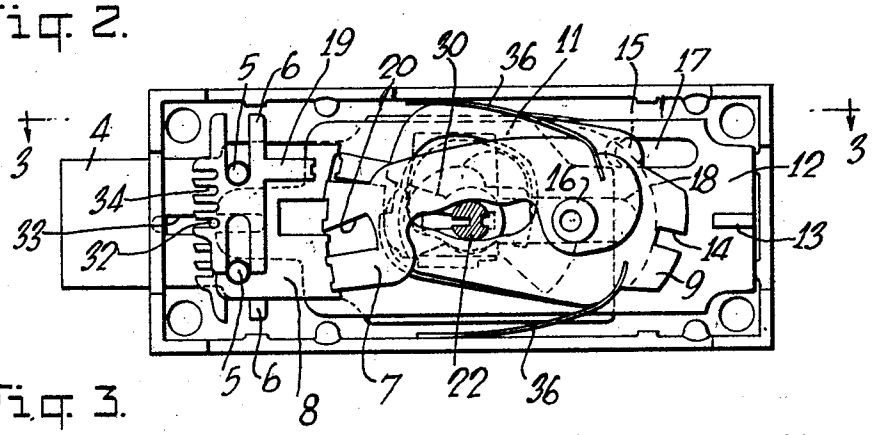


Fig. 3.

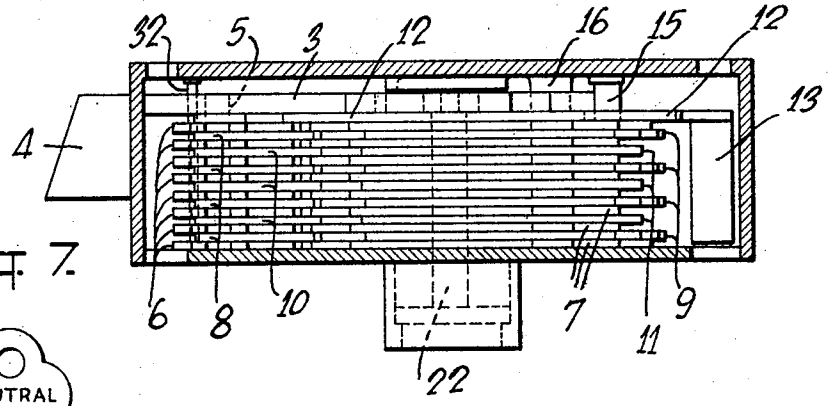
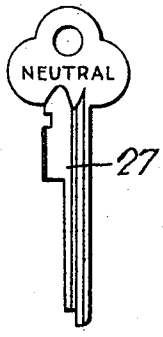


Fig. 7.



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Fig. 4.

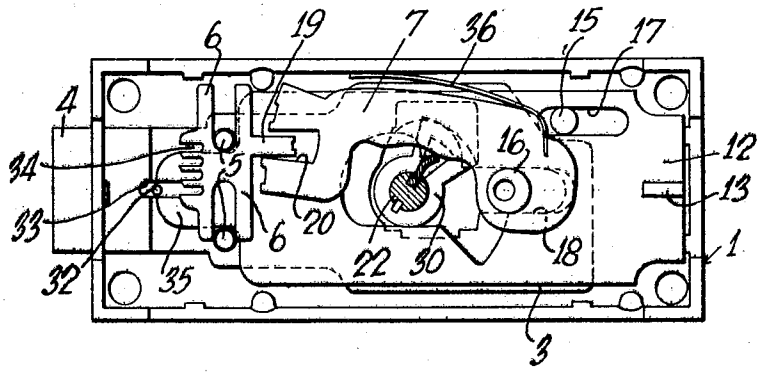


Fig. 8.

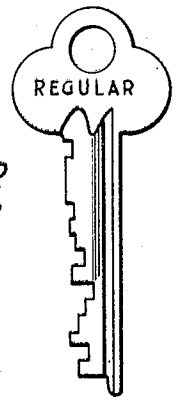


Fig. 5.

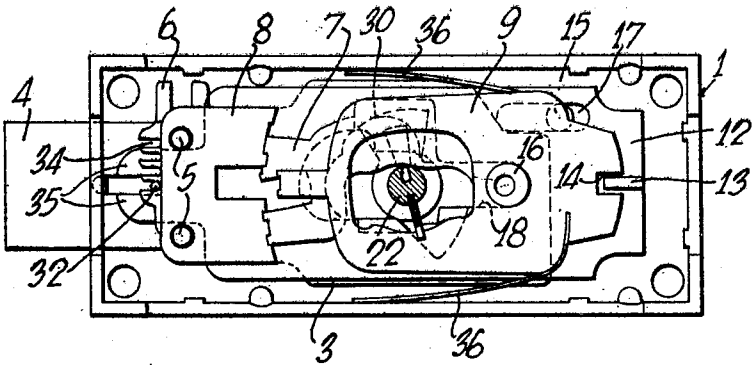


Fig. 9.

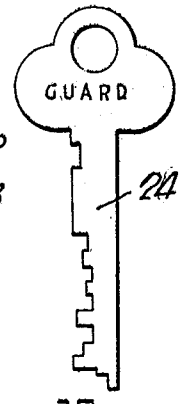


Fig. 6.

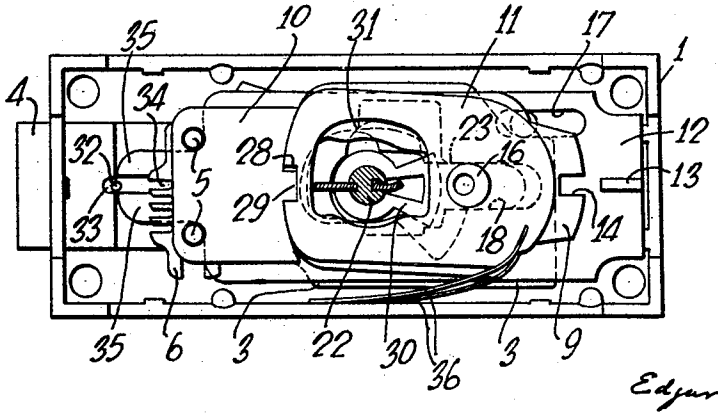
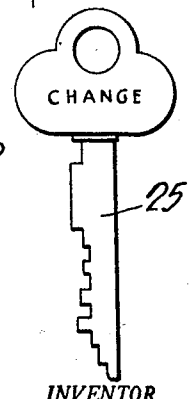


Fig. 10.



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UNITED STATES PATENT OFFICE

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INTERCHANGEABLE KEY LOCK

Application filed July 30, 1930. Serial No. 471,673.

This invention relates to locks, and more particularly to a lock for safety deposit boxes in banks, the boxes being for rent to customers for the storage of papers and valuables.

Safety deposit boxes are customarily provided with locks so constructed that after they are rented they cannot be unlocked or opened except by means of two keys. One of these keys is the guard key which is kept by the custodian of the bank, and the other is the customer's key which the customer keeps in his possession.

For the sake of safety and security, it is desirable that no one have access to the customer's key except the customer who rents the box. It is also desirable that the boxes may be shipped from the factory in locked condition, but that the custodian of the bank may unlock and relock any of the boxes prior to rental in order to exhibit them to the prospective customer without calling into use any customer's key.

It is also of great advantage to provide a lock which does not require the custodian's guard key to be left in the lock until the customer has opened the box by means of the customer's key, since if the custodian walks away and leaves his key unwatched, there is some danger of his guard key being taken out surreptitiously and an impression made thereof and copied, and the copy being put to an unauthorized use. Thus with locks which require the guard key to be left in the lock until the box has been opened the custodian is very much handicapped in giving attention to other customers promptly, and the customers object to the delay.

It has been proposed heretofore to provide locks which do permit the removal of the guard key before the box has been unlocked by the customer, but these are objectionable since they must be set at the factory to respond to a particular regular key, and do not permit interchanging of customer's keys. With these there is danger of unauthorized access and copying of the only regular key for the lock prior to its being turned over to the customer. Moreover, when such box is surrendered after rental, or a customer, after delivery and use of the only regular key for the box, decides not to rent that box, it has been necessary to send the lock back to the factory to have the lock set for another regular key.

The principal object of my invention is to provide a lock which does not need to be set to any particular regular key at the factory, and one which may be readily and easily adjusted on the deposit box at the bank to respond to any one of an almost infinite number of different regular keys; a lock which may be locked and unlocked repeatedly prior to rental by the custodian without the use of any regular key; a lock which does not require the guard key to be left in the lock until it has been unlocked by the customer; a lock which may be reset readily and easily for locking and unlocking without the use of a regular key, following the surrender of the box by a customer and the turning in of the customer's key to which the lock had been set; a lock which provides ample tolerance between generous key lifts; a lock which has only a single nose, and one which is of extremely simple, sturdy and durable construction. In other words, the object of this invention is to provide a greatly improved interchangeable key lock.

Other objects of this invention will be in part obvious and in part pointed out hereinafter.

In accordance with this invention, I provide master tumblers, guard tumblers and change tumblers, mutually nested and pivoted on a single post, the guard and change tumblers preferably swinging in the opposite direction from the master tumblers. Means are provided whereby when the guard tumblers are set up by means of the guard key, they become locked in this position, and will remain set up when the guard key is removed, but are automatically released and fall when the customer's key or a "throw-off" key is manipulated. The master tumblers coact with slides carried on the bolt bar, the customer's key moving the master tumblers and slides in unison. The slides are adapted to be released for the setting of the lock to a customer's key or an interchange of customer's keys by means of a change key. The lock

may be set to be responsive to a special key prior to rental, to permit locking and unlocking of the box for inspection.

In order that a clearer understanding of this invention may be had, attention is hereby directed to the accompanying drawings forming a part of this application and illustrating certain possible embodiments of this invention.

Referring to the drawings:

Fig. 1 is a top view of a lock embodying this invention;

Fig. 2 is a top view thereof with the cover removed;

Fig. 3 is a side view of the lock mechanism within the case and is taken on the line 3—3 of Fig. 2;

Fig. 4 is a diagrammatical view, showing the position of a main tumbler, the slide and bolt when the lock is unlocked in the regular way;

Fig. 5 is a diagrammatical view, showing the position of certain tumblers and guard plates when the guard tumblers have been set up by means of the guard key;

Fig. 6 is a diagrammatical view, showing the positions of certain of the tumblers, a change plate and other parts, when the lock is adjusted by means of the change key in condition to be set to respond to any particular customer's key to be selected;

Fig. 7 is a plan view of a neutral key adapted to be used in opening the lock before the lock has been adjusted to a regular key;

Fig. 8 is a plan view of a regular key, also called a customer's key;

Fig. 9 is a plan view of a guard key; and

Fig. 10 is a plan view of a change key.

Similar reference characters refer to similar parts throughout several views of the drawings.

Referring to the drawings, the lock mechanism is housed in a suitable casing comprising a box 1 having a cover 2. The lock mechanism includes a suitable bolt bar 3 having a bolt portion 4 projecting through a suitable aperture in the case 1. The bolt bar is provided with two pins 5, on which are slidably nested or stacked the notched slides 6 for the main tumblers 7, the plates 8 for the guard tumblers 9, and the plates 10 for the change tumblers 11. There is an individual slide 6 for each main tumbler and a separate guard plate 8 for each guard tumbler, and a separate change plate 10 for each change tumbler.

Preferably, between each two adjacent main tumblers there is either a guard tumbler or a change tumbler. In this way increased tolerance for the key lifts or bits is provided, and the lifts may be made correspondingly wide.

Between the bolt bar 3 and the tumblers is disposed a guard plate 12 having a stump 13 at its rear end adapted to be engaged and moved forwardly by the guard key to engage the stump 13 in notches 14 provided therefor at the rear ends of the guard tumblers, the guard key, on rotation, aligning these notches with the stump. Stump 13 holds the guard tumblers set up, permitting removal of the guard key prior to the use of any bolt retracting key.

Guard plate 12 may be guided on two pins 15 and 16, which are secured to the bottom of the lock case and extend through suitable slots, such as 17 and 18, formed in the guard plate, and may be further guided by having a slotted nose 35 adapted to straddle the slide engaging pin 32. Each time the bolt bar 3 is retracted, the rear of the bolt portion 4 engages the nose 35 of the guard plate 12 and moves this plate rearwardly, taking the stump 13 out of the notches 14 of the guard tumblers.

All the tumblers are preferably commonly nested to pivot on pin 16, and the usual springs 36 are provided for restoring the tumblers to let down position.

When deposit boxes equipped with these locks are sent from the factory and are installed, and preferably at all times prior to rental, the slide plates 6 are all in let-down position, (Fig. 6), so that the fingers 19 thereof are in alignment with the notches 20 at the front ends of the main tumblers, permitting the lock to be unlocked without requiring any disturbance or relative adjustment of the main tumblers or slides. A neutral key is provided which is adapted to be inserted in the slot 21 of the key tube 22, and when so inserted and turned, will merely engage the bolt bar 3 and retract the bolt, provided the guard tumblers are set up, without displacing any of the regular tumblers. Thus the bank official may unlock the box by means of the guard key and the neutral key to exhibit the box to a prospective customer, and thereafter may relock the box by means of the neutral key.

When a customer desires to rent the box, the guard tumblers are first set up by means of the guard key 24 which is then removed. The change key 25 is then inserted in the key way 26, from which the guard key has been removed, and the neutral key 27 is inserted into the key way 21. Then the key tube 22, with both keys in place, is turned a full half turn, 180°. This amount of turn is possible because the change key has aligned the notches 28 at the front ends of the change tumblers with the fingers 29 on the change plates, permitting sufficient rearward movement of the bolt bar to allow the tongue 30 on the key tube 22 to move past the shoulder 23 of the bolt bar.

Both of these keys may now be removed. The customer having been given his key, preferably in a sealed envelope, and selected at random from a plurality of different

sealed keys, inserts it into the key way 21, which is now in the position usually occupied by the key way 26. The customer then turns this key in locking direction. During this movement, the lifts of the key engage the main tumblers and move them, together with the slides engaged thereby, into a relative alignment corresponding to the arrangement of the key lifts of this particular key. By reason of the engagement of the tongue 30 with the shoulder 31 of bolt bar 3, the bolt bar is taken forwardly and the slides 6 become engaged with the pin 32, in the relative alignment to which the key has set them. This pin is fixed to the bottom of the lock case and extends through a slot 33 therefor formed in the bolt plate. Each slide plate is provided along its front edge with a series of notches 34. The pin 32 becomes seated in the respective notches in accordance with the relative positions to which the slides have been adjusted by means of the customer's key. As the slides are seated home on the pin 32 the fingers of the slides draw out of the notches in the main tumblers and these fall, dogging the slides and the bolt bar until set up into alignment with the fingers by the key which was used to lock the lock.

Thereafter, and until the change key has again been applied in the proper way, the lock cannot be unlocked by means of any other unlocking key except the particular customer's key which has been used, as above described. When the box is surrendered it can easily be reset for the neutral key.

Whenever the customer desires the box to be unlocked, the custodian of the guard key sets up the guard tumblers, and if desired, removes the guard key and need not wait for the customer to manipulate his key. Thus the custodian of the guard key is free to attend to other customers promptly. If the guard key had to remain in place until the customer had opened the box, the custodian could only leave to attend to other customers at the risk of leaving the guard key accessible to other persons and subjected to unauthorized copying or handling, at the risk of safety and protection, not only to the bank, but also to the lessee of the boxes.

Preferably, there is either a guard tumbler or a change tumbler between each two main tumblers. This permits the key lifts of all the keys to be large and provides more tolerance in the seating of the keys in their key ways.

The construction permits the inclusion of a large number of tumblers, thus providing additional security against unauthorized entry and increases the number of different keys to which the lock can be set.

The lock has only a single nose, which is an advantage.

Obviously, the lock attains the objects and has the advantages referred to hereinbefore, as well as others which will be apparent to those skilled in the art.

As many changes could be made in the above construction and as many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is to be understood that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim is:

1. In a lock of the character described, in combination, a single key tube having two key ways, a bolt bar, means for dogging said bolt bar, including three sets of tumblers adjustable separately into non-dogging position by means of appropriate keys operated in said key ways, and means for holding one of said sets of tumblers in non-dogging position after being set up by means of their key, permitting removal of said key without disturbing the set-up position of said set of tumblers.

2. In a lock of the character described, in combination, a single key tube having two key ways, a bolt bar, means for dogging said bolt bar, including three sets of tumblers adjustable separately into non-dogging position by means of appropriate keys operated in said key ways, and means adjustable by operation of the key for one of said sets of tumblers, for holding said set in non-dogging position after being set up by said key, permitting removal of said key without disturbing the set-up position of said set of tumblers.

3. In a lock of the character described, in combination, a single key tube having two key ways, a bolt bar, means for dogging said bolt bar, including three sets of tumblers adjustable separately into non-dogging position by means of appropriate keys operated in said key ways, means for holding one of said sets of tumblers in non-dogging position after being set up by means of their key, permitting removal of said key without disturbing the set-up position of said set of tumblers, said means being adjustable by means of a key operated in one of said key ways to release said set of tumblers from set-up position.

4. In a lock of the character described, in combination, a case, a slide pin fixed to the case, a tumbler pivoted in the case, a bolt bar slidably mounted in the case, a slide plate mounted on the bolt bar for movement therewith and having notches engageable with the slide pin on movement of the bolt bar into locking position and movable out of engagement with the slide pin and into engagement with a tumbler upon movement of the bolt bar into unlocking position, said slide plate, when in engagement with the tumbler, being movable thereby transversely of the bolt bar, a guard tumbler pivoted within the case, and a guard plate carried on the bolt bar for movement therewith, said guard tumbler and

plate normally cooperating to prevent retraction of the bolt bar, and said guard tumbler being adjustable to permit retraction of the bolt bar, and means for locking said guard tumbler in non-dogging position after adjustment into said position.

5. In a lock of the character described, in combination, a case, a slide pin fixed to the case, a tumbler pivoted in the case, a bolt bar slidably mounted in the case, a slide plate mounted on the bolt bar for movement therewith and having notches engageable with the slide pin on movement of the bolt bar into locking position and movable out of engagement with the slide pin and into engagement with a tumbler upon movement of the bolt bar into unlocking position, said slide plate, when in engagement with the tumbler, being movable thereby transversely of the bolt bar, a change tumbler pivoted in the case, and a change plate mounted on the bolt bar for movement therewith, a key tube having a tongue engageable with a shoulder of the bolt bar, said change tumbler and change plate normally coacting to prevent sufficient retraction of the bolt bar to allow the key tube tongue to pass by said shoulder of the bolt bar, said change tumbler being adapted to be adjusted by means of a key out of dogging position to permit sufficient retraction of the bolt bar to permit the tongue of the key tube to pass by said shoulder of the bolt bar.

6. In a lock of the character described, in combination, a case, a slide pin fixed to the case, a tumbler pin fixed to the case, guard tumblers having fingers at one end and notches at the other, regular tumblers having notches and change tumblers having notches, all commonly pivoted on said pin, a single key tube having a key way for regular keys and for a neutral key, and having a key way for a guard key and for a change key, a bolt bar slidably mounted in the case, a tongue on the key tube engageable with the bolt bar to move it back and forth, a guard plate slidable in the case and having a stump engageable in the notches of the guard tumblers when aligned therewith, pins fixed to the bolt bar, slide plates adjustably mounted on said pins and having notches for the slide pin and fingers for the notches of the regular tumblers, guard plates, having notches, mounted on said pins and change plates, having fingers, mounted on said pins, said slide plates being movable forwardly with the bolt bar to engage said pin in their notches and to disengage their fingers from the notches of the regular tumblers and being movable rearwardly with the bolt bar to disengage said slide pin and to engage their fingers in the notches of the regular tumblers, said guard tumblers normally dogging the guard plates to prevent retraction of the bolt bar sufficiently to release the slide plates from the slide pin, said change tumblers normally dogging the bolt bar beyond unlocking retraction to prevent retraction of the bolt bar sufficiently to permit rotation of the key tube for full transposition of the key ways therein, said guard tumblers being adapted to be set up and the stump of the guard plate engaged in their notches by means of a guard key, said bolt bar being adapted to be retracted, when the guard tumblers are set up, by means of a neutral key, without disturbing the regular or change tumblers, said regular tumblers being adapted to be set up by means of a regular key, and, when the guard tumblers are set up, the bolt bar to be retracted by said key, and said change tumblers being adapted to be set up by means of a change key, and resilient means for restoring the tumblers to normal position when released.

7. In a lock of the character described, in combination, a case, a bolt bar slidably mounted in the case, a guard tumbler pivoted within the case, and a guard plate carried on the bolt bar for movement therewith, said guard tumbler and plate normally cooperating to prevent retraction of the bolt bar, and said guard tumbler being adjustable to permit retraction of the bolt bar, and means for locking said guard tumbler in non-dogging position after adjustment into said position.

8. In a single nose interchangeable key lock of the character described, in combination, a key tube provided with two separate key ways, main tumblers positioned to be set up by a proper key disposed and operated in one of said key ways, guard tumblers and change tumblers positioned to be set up selectively by proper keys disposed and operated in the other of said key ways, and means, adjustable by the key adapted to set up the guard tumblers and upon the guard tumblers being set up thereby, adapted to retain the guard tumblers set up independently of said key.

This specification signed this 23d day of July, 1930.

EDGAR M. BENHAM.