April 21, 1925. 1,534,495

E. M. BENHAM

INTERCHANGEABLE COMBINATION KEY LOCK

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Fig. 1,

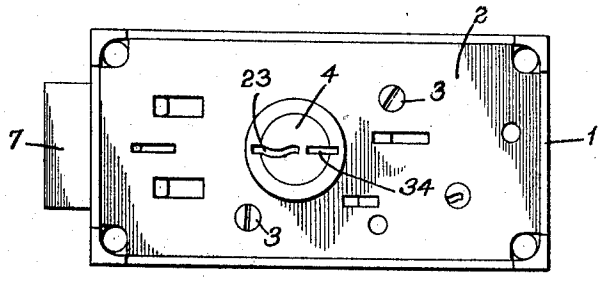


Fig. 2,

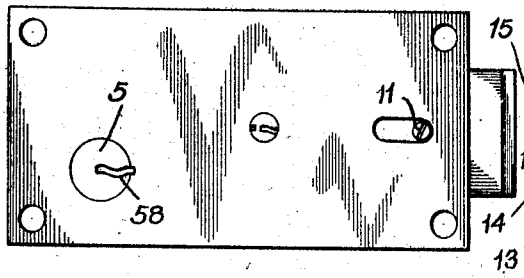


Fig. 3,

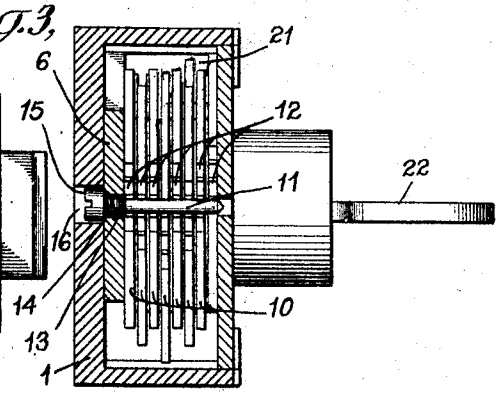


Fig. 4,

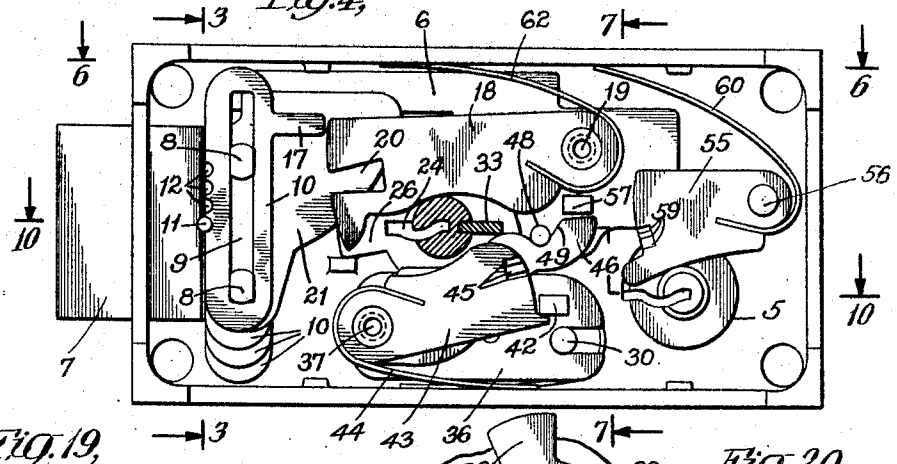


Fig. 19,

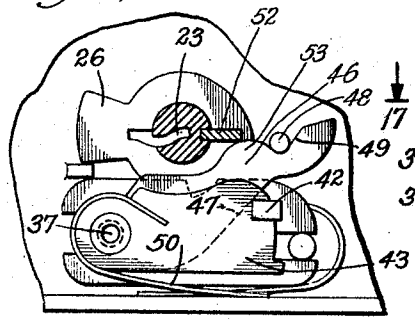
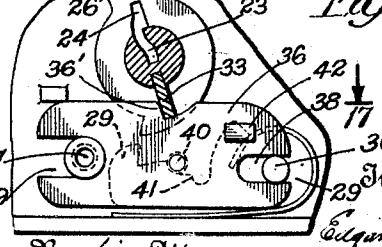


Fig. 20,



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Fig. 5,

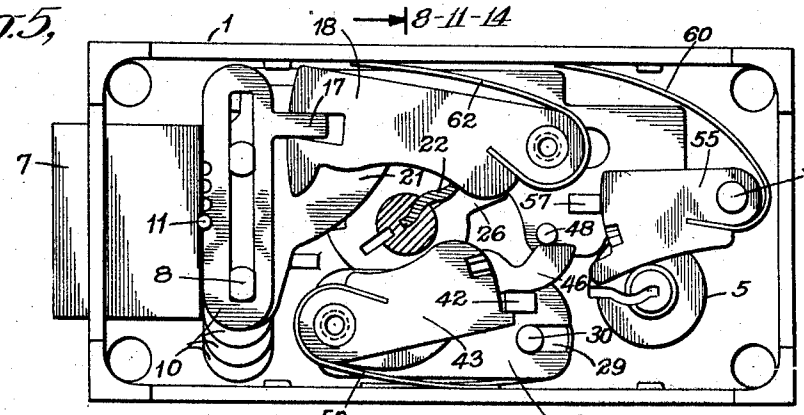


Fig. 6,

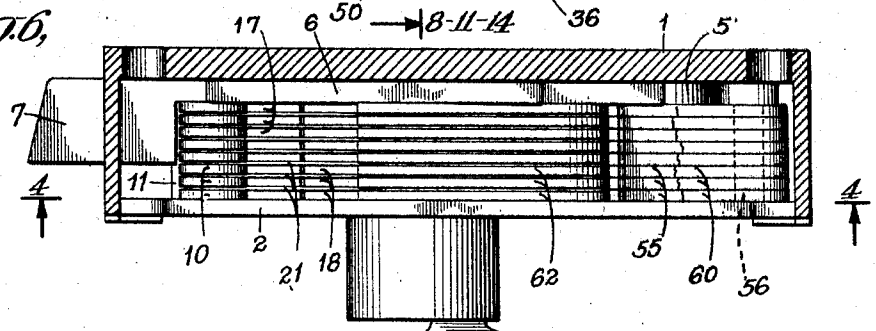


Fig. 7,

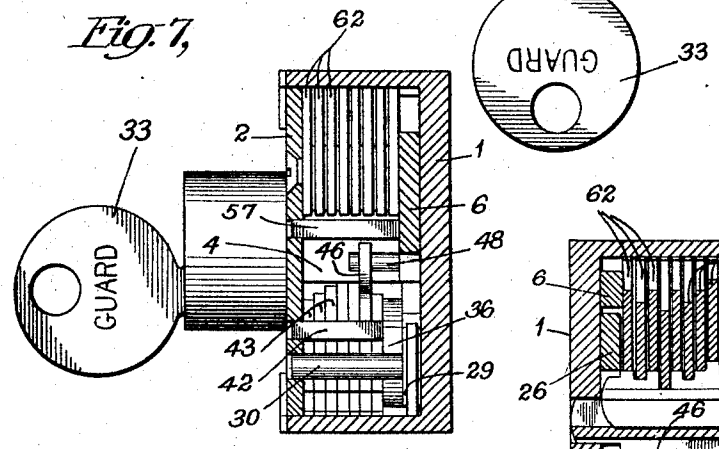


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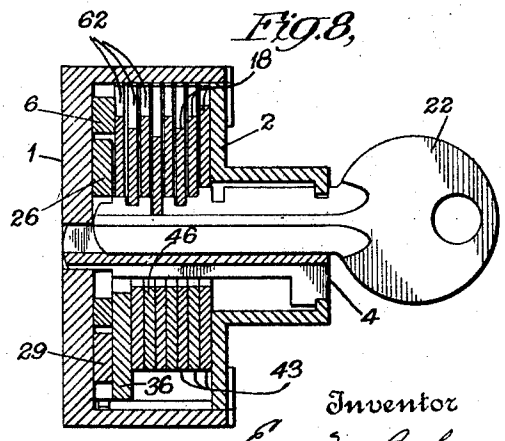
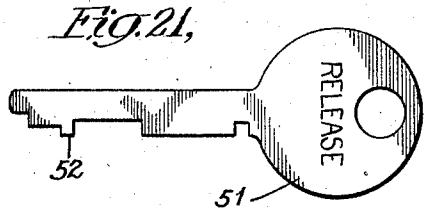


Fig. 21,



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Fig. 9,

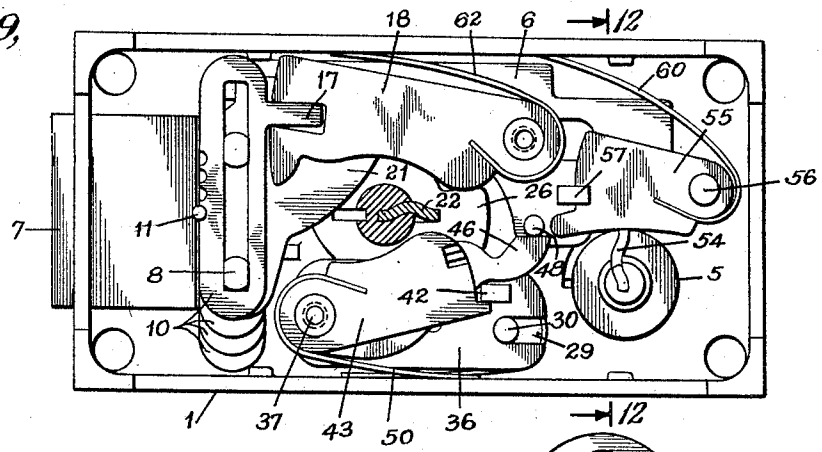


Fig. 10,

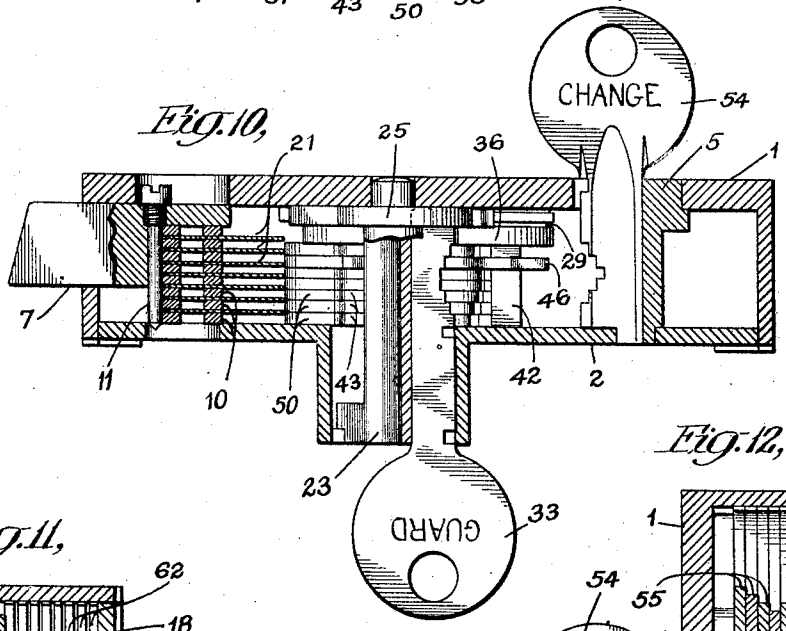


Fig. 11,

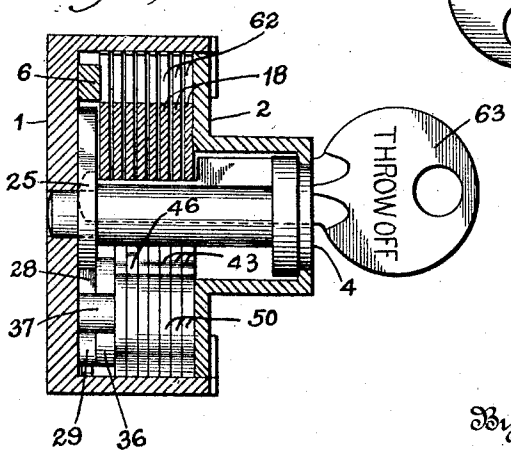
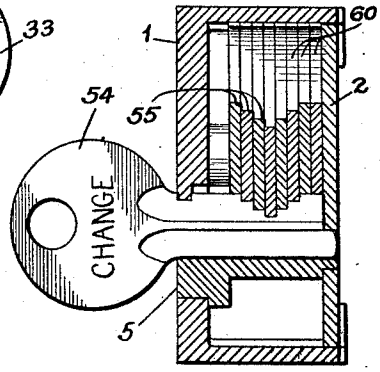


Fig. 12,



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INTERCHANGEABLE COMBINATION KEY LOCK

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Fig. 13,

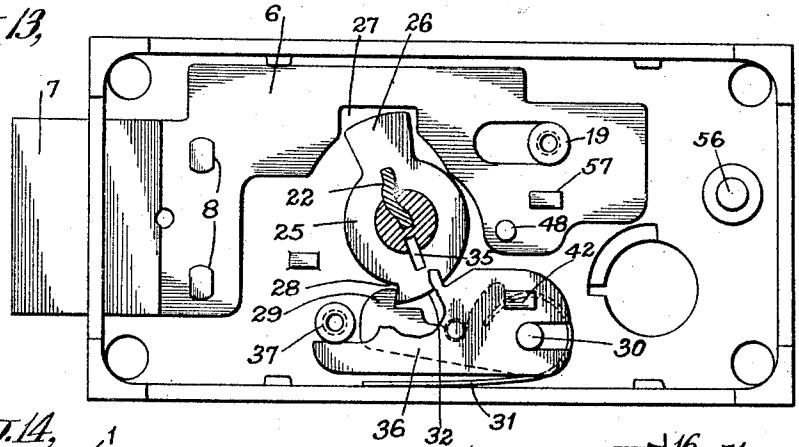


Fig. 14,

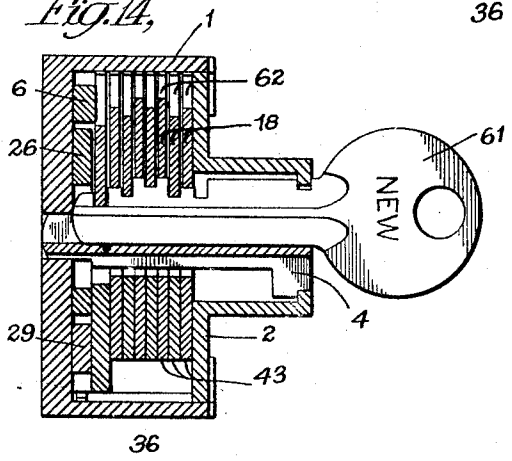


Fig. 15,

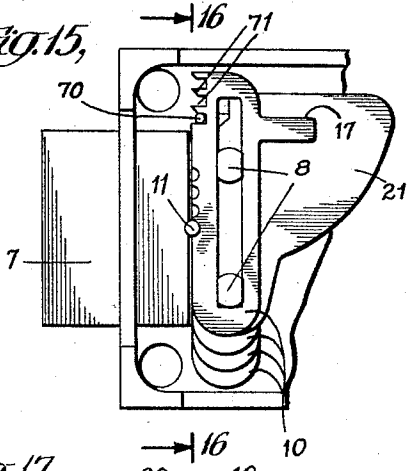


Fig. 16,

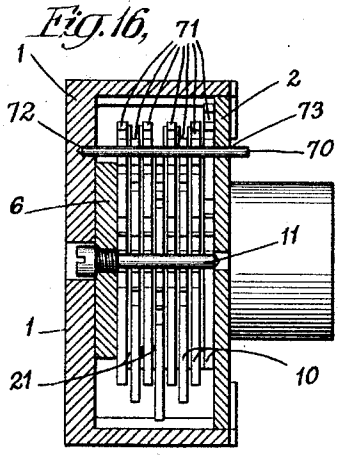


Fig. 17,

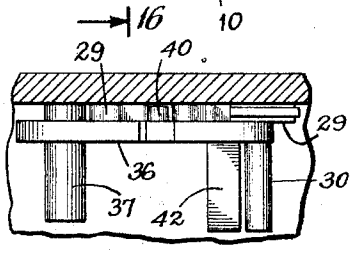
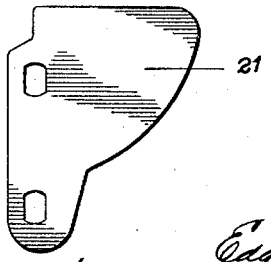


Fig. 18,



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UNITED STATES PATENT OFFICE.

EDGAR M. BENHAM, OF NORWOOD, OHIO, ASSIGNOR TO THE MOSLER LOCK COMPANY, OF COVINGTON, KENTUCKY, A CORPORATION OF OHIO.

INTERCHANGEABLE COMBINATION KEY LOCK.

Application filed April 26, 1922. Serial No. 556,708.

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 certain new and useful Improvements in Interchangeable Combination Key Locks, of which the following is a specification.

My invention relates to interchangeable combination key locks and more particularly to key locks of the cylinder type, and which are especially suitable for use on safe deposit boxes and like structures.

Heretofore in interchangeable combination key locks for safe deposit boxes it has been usual to arrange mechanism to be responsive to three keys, commonly referred to as the main or depositor's key, the guard key and the change key. In the normal operation of such a lock it is necessary for the bank custodian to operate on the lock with the guard key before the depositor may open the lock by means of the main key. The custodian is also provided with a change key which is adapted to be inserted into another key hole on the back of the lock casing, to release a dogging mechanism which normally prevents the depositor from turning his key to such an extent that it may be withdrawn from the lock while the lock is in unlocked condition. Such locks have heretofore been constructed to include a plurality of vertically adjustable comb members carried on the bolt bar for movement therewith, the comb members being held in proper vertical adjustment by a spline fixed to the lock casing and adapted when the bolt is in locked position, to interlock with recesses provided between teeth on the comb members. When the comb members are withdrawn from the stationary spline in the unlocking movement of the bolt bar, the combs are supposed to be held in proper vertical adjustment by the tumbler members which are operated by the main key. The relative movement between the stationary spline and the moveable comb members causes wear of the parts and, on account of the separation of the spline and the comb members whenever the bolt is unlocked, the spline often fails to reenter into the proper recesses of the comb members, with the result that the lock cannot be unlocked by the main key. When this happens it is usually necessary to demount the lock from the door and to disassemble it entirely and then to reassemble the lock parts into proper relative adjustment. Furthermore, the arrangement of the various parts of locks of this type, as heretofore constructed, has prevented the conditioning of the lock for operation by the key without disassembling the mechanism when the proper vertical adjustment of the comb members has not been obtained during adjustment of the lock for use with a different key.

It is one of the aims of my invention to provide a lock of the above type, and one which is free of the above mentioned objectionable features and disadvantages. Another object of my invention is to provide a lock of the above character which is very efficient and sure in operation and at the same time strong and very durable, and one which affords secure protection against being picked, and one wherein the dogging mechanism for preventing the removal of the main key when the bolt is in unlocked position comprises a minimum number of parts. Other objects will be in part obvious and in part pointed out hereinafter.

In accordance with my invention I provide a set of main tumblers operable by means of a main key and cooperating with vertically adjustable comb members mounted on the bolt bar. I provide a guard mechanism operable by means of another key and cooperating with a dogging mechanism which normally prevents the unlocking of the lock by means of the main key. In addition to the above, I provide a third set of tumblers, operable by means of a third key in a keyhole which is accessible from the rear of the lock casing, and which normally dog the bolt bar directly to prevent the main key from being turned a complete half revolution, and to thus prevent its removal from the lock while the bolt bar is in unlocked position. This third set of tumblers is adapted to be moved by means of this third key out of dogging position so that the main key may be turned for a complete half revolution, and may be withdrawn from the lock when the bolt bar is in unlocked position. This permits of the insertion of a new key to change the adjustment of the lock mechanism for this key in the usual manner. I provide the usual comb pieces for cooperation with the main set of tumblers, but instead of having these comb pieces cooperate

with a spline which is stationary, as formerly, I hold these comb members in adjusted vertical position by means of a screw which is removably carried by the bolt bar and has a shank constantly in recesses of the comb members, so that during the normal operation of the lock the splines are continually held in their vertical adjusted position. This adjustment cannot be changed until the screw is removed. The screw is exposed at the rear of the lock casing and therefore may be readily and easily removed when adjustment of the lock mechanism is required. In connection with this method of adjustably mounting the comb pieces, reference is hereby made to my application Serial Number 556,709, Changeable combination key-locks, filed April 26, 1922. If desired, in combination with the screw means for holding the comb members in proper vertical adjustment, I may provide a stationary, but removable, spline or pin, which is adapted to be engaged by the comb members whenever the bolt is in locked position. This pin acts in the manner of the stationary splines of the former constructions, except that by being removable from the casing, preferably accessible from the front of the lock which is against the door, it may be removed to release the combs when the lock is removed from the door in locked condition. By this means the unauthorized removal of the aforementioned screw will not result in the destruction of the vertical adjustment of the spline members when the lock is locked, and, nevertheless, by merely dismounting the lock from the door and removing the aforementioned pin, the comb members may be released and the lock adjusted for operation by means of any desired main key. Thus the necessity of disassembling and reassembling the entire lock mechanism is avoided in cases when it is required in other locks. Other and important advantages obtained by my improvements in design and construction, and the advantageous results flowing from such improvements, will be more particularly brought out hereinafter.

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

Referring to the drawings, Fig. 1 is a top plan view of a lock embodying my invention; Fig. 2 is a rear plan view of the same; Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 4; Fig. 4 is a top elevation, with the face plate of the casing removed and the bolt in its locked position; Fig. 5 is a similar view, showing the bolt in retracted position and with the bolt bar dogged to prevent further turning of the main key; Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 4 looking in the direction of the arrows; Fig. 7 is a vertical section taken on the line 7—7 of Fig. 4, showing the guard key in releasing position; Fig. 8 is a vertical sectional view taken on the line 8—8 of Fig. 5, showing the main key in tumbler adjusting position; Fig. 9 is a view similar to Figs. 4 and 5, but shows the change key tumblers positioned by the change key out of dogging position, and the main key turned into position for withdrawal from the lock; Fig. 10 is a horizontal section taken on the line 10—10 of Fig. 4; Fig. 11 is a vertical section taken on the line 11—11 of Fig. 5, showing the throw-off key in operative position; Fig. 12 is a vertical sectional view taken on the line 12—12 of Fig. 9, showing the change key in tumbler setting position; Fig. 13 is a top elevation of the main bolt bar, the guard key latch bar, and the throw-off mechanism, illustrating particularly the arrangement of the guard key mechanism which prevents this part of the lock from being picked; Fig. 14 is a vertical section taken on the line 14—14 of Fig. 5, showing the new main key in place; Fig. 15 is a plan view of the front portion of the lock mechanism, showing the comb members and the means for holding them in adjusted position; Fig 16 is a vertical sectional view taken on the line 16—16 of Fig. 15; Fig. 17 is a sectional view taken on the line 17—17 of Fig. 20, showing a detail of the guard key mechanism; Fig. 18 is a plan view of a spacing plate adapted to be interposed between adjacent comb members and between the ends of adjacent tumblers; Fig. 19 is a plan view of a detail of the guard key mechanism, showing the mechanism in unlocked condition; Fig. 20 is a plan view of a detail of the guard key mechanism, showing the bolt bar thereof in retracted position and Fig. 21 is a plan view of the release key. Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring to the drawings, 1 represents a casing having a removable cover 2 secured in place by screws 3. This casing houses the lock mechanism and is adapted to be secured to the inside of the door of a safety deposit box, with the key tube 4 accessible from the outside thereof, and the key tube 5 accessible only when the door is open. Bolt bar 6 is slidably mounted within the casing 1, and projects a bolt portion 7 through a suitable perforation in one end thereof. On the bolt bar 6 are two posts 8 which extend through slots 9 of a plurality of comb members 10, whereby said members 10 are carried with the bolt bar; members 10 are vertically adjustable on posts 8, and are adapted to be locked in adjusted position by means of a screw 11 which interlocks in recesses 12

provided along the edges of comb members 10. Screw 11 has a threaded portion 13 engaging within a threaded perforation 14 in the bolt bar 6, and the head 15 of screw 11 is accessible through a slot 16 in the rear wall of casing 1 to permit removal of the screw and thereby release comb members 10 for vertical adjustment on posts 8. Each comb piece 10 has a projection or finger 17 extending toward a separate tumbler 18, these tumblers 18 being pivoted on shaft or pin 19 secured to casing 1, and each tumbler presenting a nose in the path of movement of one of said fingers 17, normally dogging the same to prevent unlocking movement of the bolt bar 6, but all having a recess 20 which, by manipulating the tumblers by means of the proper main key, may be moved simultaneously in line behind finger portions 17 to allow those finger portions to move into these recesses and thus permit unlocking movement of the bolt bar 6 and the opening of the box. Preferably, spacing and guiding plates 21 are disposed on posts 8 between adjacent comb members 10 and are shaped so as to extend also between adjacent tumblers 18.

The main key 22 operates in key tube 4 through key hole 23, and its lower end enters a slot 24 of a cam member 25 which is pivotally mounted about the lower end of key post 4 and has a cam portion 26 which engages the sides of a slot 27 in bolt bar 6, whereby the turning of key 22 slides bolt bar 6 in one direction or the other.

Cam member 25 has also a projection 28 which is normally dogged by a guard key mechanism to prevent the turning of main key 22, thereby preventing movement of tumblers 18 out of dogging position and movement of bolt bar 6 in unlocking direction. The guard key mechanism comprises a stop lever 29 pivotally mounted about a pin 30 which is secured to casing 1. Stop lever 29 is pressed by spring 31 into the path of movement of projection 28 of cam 25 to prevent movement thereof in unlocking direction. Beyond projection 28 the edge of cam 25 is gradually curved as at 32 to permit reverse movement of cam 25 after projection 28 has passed stop 29. The guard key mechanism is adapted to be latched in inoperative position by means of a guard key 33 operating in key post 4 through key hole 34, and steadied by having its end enter a slot 35 in cam member 25. The guard key mechanism includes a slidable latching bar 36 guided by pins 30 and 37 which are carried by the casing and are seated, respectively, in suitable recesses 38 and 39, in bar 36.

When bar 36 moves to the left (Fig. 20) a pin 40 thereon rides over cam surface 41 on stop member 29, camming and holding this member downward and out of the path of projection 28 of cam member 25. However, bar 36 has a lug 42 in the path of movement of which are a plurality of tumblers 43 which normally dog lug 42 to prevent movement of bar 36 to the left. Tumblers 43 are pivotally mounted on pin 37 and are normally held in dogging position by springs 44, but each tumbler 43 contains a recess 45 adapted, as a result of movement and adjustment of these tumblers by the bits of the proper guard key 33, to be simultaneously aligned with lug 42 and to be out of dogging position, so that bar 36 may be moved to the left forcing cam stop lever 29 away from projection 28 of cam 23. When certain key bits of key 33 have adjusted tumblers 43 in this manner, a lower bit of key 33 engages a rabbet 36′ on the upper edge of bar 36 so that further turning of key 33 moves this bar to the left and latches the lug 42 within the recesses 45 of the tumblers. Lug 42 will remain latched in these recesses, and consequently stop lever 29 will remain in inoperative position, permitting unlocking of the lock by means of main key 22, after the guard key has been turned in reverse direction and removed, and until bar 36 has been moved to the right by means of a trip lever 46 provided for this purpose. Lever 46 is pivoted on pin 37 and has one cam surface 47 which rides against lug 42 to move bar 36 to the right, with the result that stop lever 29 becomes positioned in the path of projection 28 of cam 25, and lug 42 is cammed out of recesses 45 and is dogged by tumblers 43, the guard key mechanism being thus restored to locking or operative condition to prevent the opening of the lock by means of the main key until the guard mechanism is again placed in operative position by means of the guard key. I provide two means for actuating trip lever 46. One of these means comprises a pin 48 secured to bolt bar 6 and arranged to ride against a cam surface 49 on lever 46 whenever bolt bar 6 moves in unlocking direction to press lever 46 downward and thereby throw bar 36 to the right. A spring 50 continually presses trip lever 46 upwardly. Thus, whenever bolt bar 6 is moved in unlocking direction, the guard key mechanism is restored to operative position. My other means for actuating trip lever 46 to restore the guard key mechanism into protecting position comprises a release key 51 adapted to operate in key tube 4 through key hole 34. This key has only one engaging bit 52 which engages against a shoulder 53 on lever 46 when the key is turned and moves lever 46 downward to throw the guard key mechanism into dogging position. This release key is useful in case the guard key mechanism has been adjusted by means of the guard key into non-interfering position and then the depositor

has failed to unlock the box, and the main key is not available to the bank custodian to move the bolt bar 6 to actuate trip lever 46.

In connection with this guard key mechanism it is to be noted that bar 36 overlaps cam 25, and that the two adjacent surfaces of these members are close together. This arrangement effectively prevents the picking of this mechanism, since it renders it impossible for a wire or other instrument inserted in key hole 34 to reach or engage stop lever 29 to move it out of dogging position. In constructions heretofore known this mechanism may be picked quite easily on account of the exposed positions of the vital parts.

In my lock I may also provide a change key mechanism which normally prevents the turning of the main key for a complete half revolution and thereby normally prevents the removal of this key from the lock when in unlocked condition. This mechanism is operable, however, by means of a change key 54 to permit the main key to be turned sufficiently to allow for its removal, as for the purpose of inserting a new key when it is desired to interchange keys. This change key mechanism comprises a series of tumblers 55, pivotally mounted on a post 56 carried on casing 1, which normally are adapted to dog a lug 57 carried on bolt bar 6 after it has been moved into unlocked position but before main key 22 has completed a full half turn. Tumblers 55 are adapted to be moved by means of the change key 54 operating in key post 5 through key hole 58 at the rear of casing 1, to bring the tumbler recesses 59 in line with lug 57, permitting lug 57 to enter these recesses. The additional movement thus permitted to the bolt bar 6 and to the main key permits the key to be removed while the lock is in opened condition. Springs 60 continually press tumblers 55 toward dogging position.

In the normal operation of this type of lock the custodian sets the guard key mechanism into inoperative condition by means of guard key 33, and then withdraws this key. The depositor then unlocks the lock with his main key, and may lock the box by the same key when ready. Meanwhile, the unlocking of the lock has tripped the guard key mechanism so that it will be automatically in operative condition when the box is again locked. In setting the lock for operation by a different main key, the same unlocking operations are consummated, and, after the box is opened, the custodian inserts his change key in key hole 58 and sets the change key mechanism to permit of the removal of the main key while the lock is unlocked. The custodian then removes screw 11, thus releasing comb pieces 10, and these are now adjusted into new positions by inserting the new main key 61 in key hole 23 and turning it one-quarter turn in locking direction. While this adjustment is so maintained screw 11 is replaced, thereby locking these comb pieces in their new adjusted positions. The new main key 61 is used thereafter in place of the old one, and until another interchange of keys is made. However, should a faulty adjustment be made in so changing keys, the screw 11 is removed, allowing all the comb pieces 10 to fall into their lowest position in which their fingers 17 align with the recesses 20 of tumblers 18, these being normally so positioned by springs 62. Then the custodian unlocks the lock by means of a throw-off key 63 which engages cam member 25 but none of the tumblers 18. The change key mechanism is operated to permit removal of the throw-off key and the adjustment with the new key may be attempted again. If the box has been locked, the door must be forced open to obtain access to screw 11, but it is not necessary to entirely disassemble and reassemble the lock parts as is required in the above case with locks heretofore known.

To give added protection I may modify the above construction by removably mounting on the casing 1 a pin 70 which is adapted to interlock in fence portions 71, provided on each comb member 10, when the lock is in locked position. Pin 70 is accessible preferably from the surface of the casing which abuts against the rear face of the door so it cannot be removed unless the lock is taken off the door. Since pin 70 locks comb members in adjusted position when the lock is locked, screw 11 may be removed without disturbing the adjustment of the tumblers for operation by the desired main key. One end of pin 70 may be frictionally held in a recess provided therefor in the casing 1, as at 72, the other end of the pin extending through a perforation in the cover 2, as at 73.

There may be any desired or convenient number of tumblers in each set, and the number of comb pieces may be varied considerably. Preferably, I do not employ the pin 70 and the fence portions 71 on the comb members 10.

As many changes could be made in the above construction and many apparently different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description and 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 movable bolt bar, a main key mechanism including a rotatable cam member for moving said bolt bar, means, including a stop lever having a cam surface

and movable into and out of dogging position with respect to said cam, controlling the operation of said main key mechanism, and means, including a movable bar covering said lever and having a pin slidably coacting with the cam surface on said lever, operable to place said stop lever out of said dogging position.

2. In a lock of the character described, in combination, a movable bolt bar, a main key mechanism including a rotatable cam member for moving said bolt bar, means, including a stop lever having a cam surface and movable into and out of dogging position with respect to said cam, controlling the operation of said main key mechanism, means, including a movable bar covering said lever and having a pin slidably coacting with the cam surface on said lever, operable to place said stop lever out of said dogging position, means, including a plurality of tumblers movable into and out of dogging position with respect to a lug on said bar, controlling movement of said bar, means, comprising a key adapted to engage and move said tumblers and said bar, for placing said stop lever out of its dogging position, recesses in said tumblers, and means, comprising a key, for adjusting said tumblers to receive said lug in said recesses and thereby place said tumblers out of dogging position.

3. In a lock of the character described, in combination, a movable bolt bar, a main key mechanism including a rotatable cam member for moving said bolt bar, means, including a stop lever having a cam surface and movable into and out of dogging position with respect to said cam, controlling the operation of said main key mechanism, means, including a movable bar having a pin slidably coacting with the cam surface on said lever, operable to place said stop lever out of said dogging position, and means for restoring said stop lever to dogging position, said means including a spring engaging said stop lever and a pivoted trip lever having a cam surface coacting with a lug on said bar and a pin on said bolt bar coacting with another cam surface on said lever whereby movement of said bolt bar in unlocking direction actuates said trip lever to move said bar.

4. In a lock of the character described, in combination, a movable bolt bar, a main key mechanism including a rotatable cam member for moving said bolt bar, means, including a stop lever having a cam surface and movable into and out of dogging position with respect to said cam, controlling the operation of said main key mechanism, means, including a movable bar having a pin slidably coacting with the cam surface on said lever, operable to place said stop lever out of said dogging position, means, including a plurality of tumblers movable into and out of dogging position with respect to a lug on said bar, controlling movement of said bar, means, comprising a key adapted to engage and move said tumblers and said bar, for placing said stop lever out of its dogging position, recesses in said tumblers, means, comprising a key, for adjusting said tumblers to receive said lug in said recesses and thereby place said tumblers out of dogging position, and for moving said bar to place said lever out of its dogging position and to latch said lug in said recesses, and means for moving said bar to unlatch said lug from said recesses and to restore said tumblers and said stop lever to their dogging positions, said means including springs engaging said tumblers and said stop lever and a pivoted trip lever having a cam surface coacting with said lug on said bar and a key adapted to engage and to move said trip lever.

5. In a lock of the character described, in combination, a movable bolt bar, a main key mechanism for operating said bolt bar, a guard key mechanism adapted to be set to prevent or to permit operation of said main key mechanism, means for adjusting said guard key mechanism to permit operation of said main key mechanism, and means, including a pin carried by said bolt bar and adapted to engage said guard key mechanism, whereby movement of said bolt bar in unlocking direction adjusts said guard key mechanism to prevent operation of said main key mechanism.

6. In a lock of the character described, in combination, a movable bolt bar, a main key mechanism for operating said bolt bar, a guard key mechanism adapted to be set to prevent or to permit operation of said main key mechanism, means, comprising a key, for adjusting said guard key mechanism to permit operation of said main key mechanism, and means, including a second key adapted to engage said guard key mechanism, for setting said mechanism to prevent operation of said main key mechanism.

7. In a lock of the character described, in combination, a movable bolt bar, a main key mechanism, including a rotatable cam, for moving said bolt bar, a guard key mechanism normally preventing operation of said main key mechanism, and a key hole for said mechanism, said mechanism including a stop lever flush with said cam and a movable bar for operating said stop lever, said bar overlapping both said stop lever and said cam and in close proximity thereto, whereby direct access to said stop lever is prevented through said key hole.

8. In a lock of the character described, in combination, a casing, a movable bolt bar, and a main key mechanism for moving

said bolt bar, said mechanism including a plurality of pivoted tumblers coacting with a plurality of members carried by said bolt bar for adjustment thereon, means comprising a removable pin carried on said casing and interlocking in fences on said adjustable members for holding said members in adjusted position when said bolt bar is in locked position.

9. In a lock of the character described, in combination, a casing, a movable bolt bar, and a main key mechanism for moving said bolt bar, and mechanism including a plurality of pivoted tumblers coacting with a plurality of members carried by said bolt bar for adjustment thereon, means comprising a removable pin carried on said casing and interlocking in fences on said adjustable members for holding said members in adjusted position when said bolt bar is in locked position, and means comprising a screw removably carried by said bolt bar and interlocking in recesses in said adjustable members for holding said members in adjusted position in all positions of said bolt bar.

10. In a lock of the character described, in combination, a movable bolt bar, means for moving said bolt bar into locked and unlocked positions, means, comprising a change key mechanism adapted to dog a lug on said bolt bar, for limiting movement of said bolt bar in unlocking direction, said means comprising a plurality of pivoted tumblers having recesses for said lug, normally dogging said lug and movable by means of a key to align their recesses with said lug to permit further unlocking movement of said bolt bar.

This specification signed and witnessed this 21 day of April, 1922.

EDGAR M. BENHAM.