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Gartner et al.

[11] **3,837,196**

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[54] **KEY CHANGING LOCK FOR SAFE DEPOSIT BOXES**

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[52] **U.S. Cl.** **70/339,** 70/355, 70/383

[51] **Int. Cl.** **E05b 35/12**

[58] **Field of Search** 70/337, 338, 339, 340, 70/341, 342, 343, 355, 382, 383, 384

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Attorney, Agent, or Firm—Mason, Fenwich & Lawrence

[57] **ABSTRACT**

A changeable combination key lock for safe deposit boxes and the like, wherein a guard key is insertable into a rotatable guard key plug to set guard key tumblers to permit retracting movement of a bolt, and a renter's key is insertable into a rotatable renter's key plug for engagement with normally coupled segmented tumblers to aline them to permit retraction of the bolt. A cam member is provided to be actuated by a change key which is inserted into the guard key plug when the guard key has been removed and the bolt is retracted, to disengage gating portions of the segmented tumblers from the remaining portions of such tumblers, whereupon a new renter's key may be inserted and the segmented tumblers set for the key configuration of the new renter's key.

11 Claims, 9 Drawing Figures

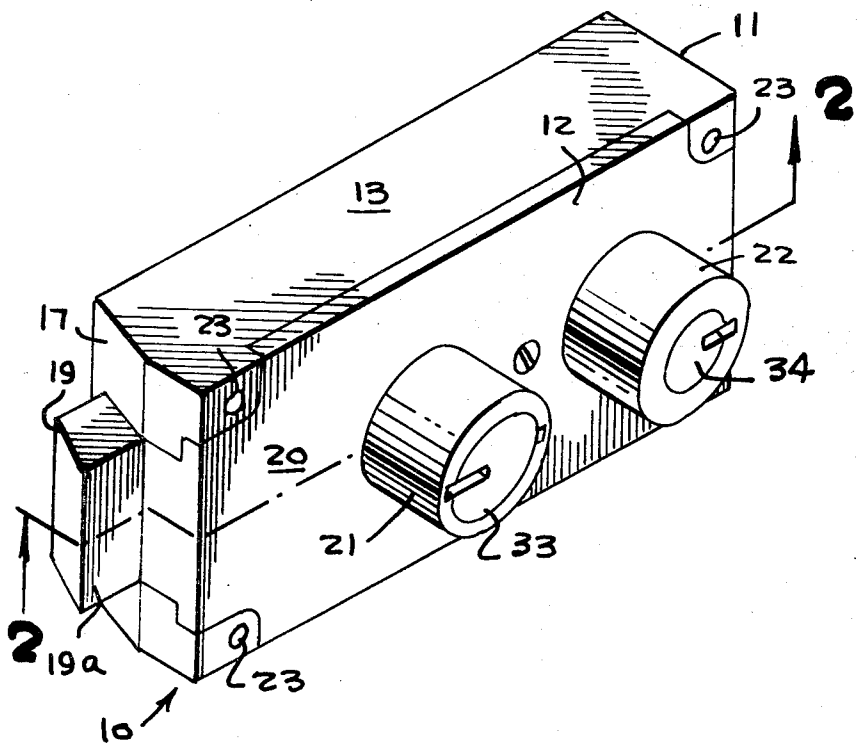


Fig-1

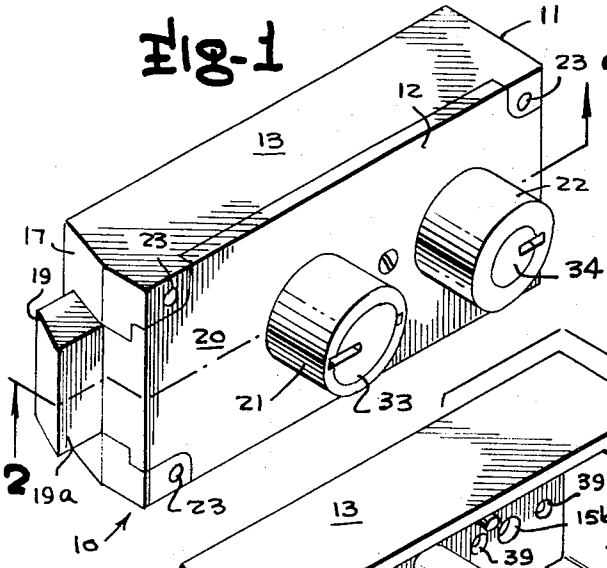


Fig-8

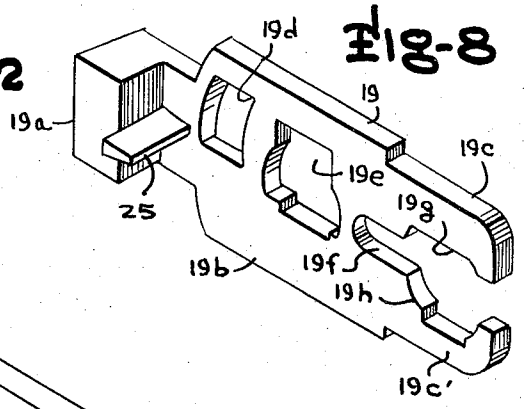


Fig-5

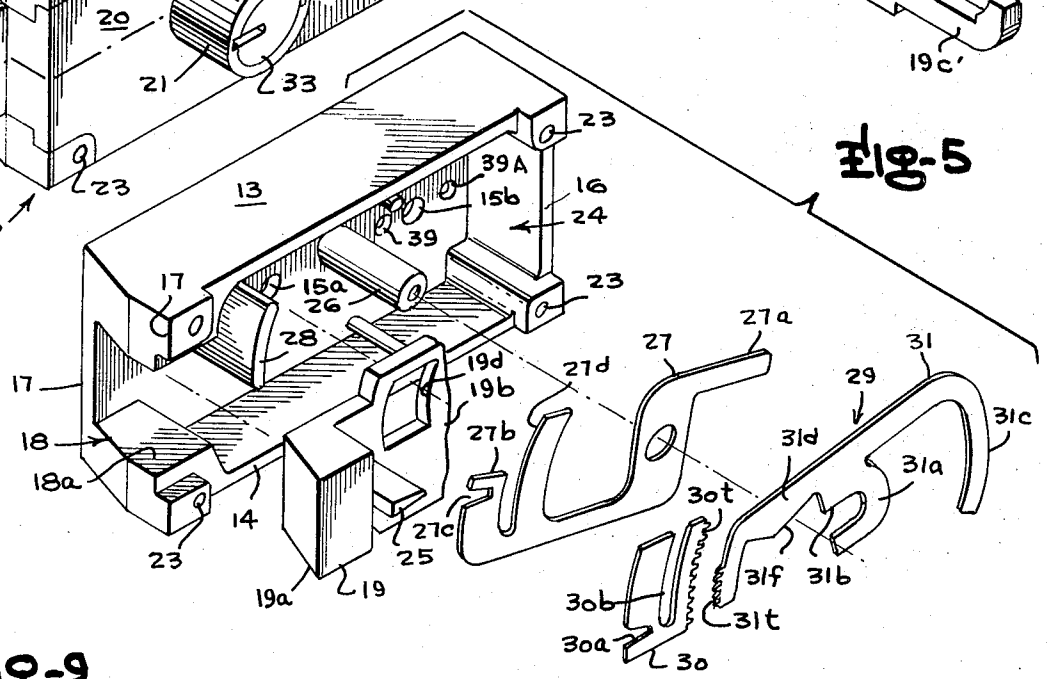


Fig-9

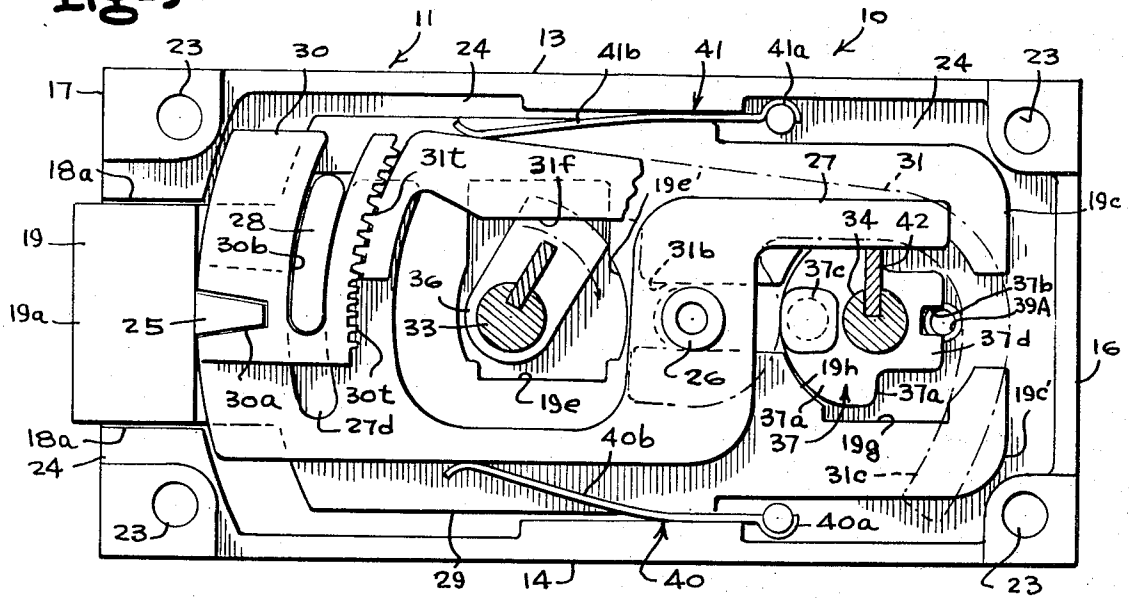


Fig-2

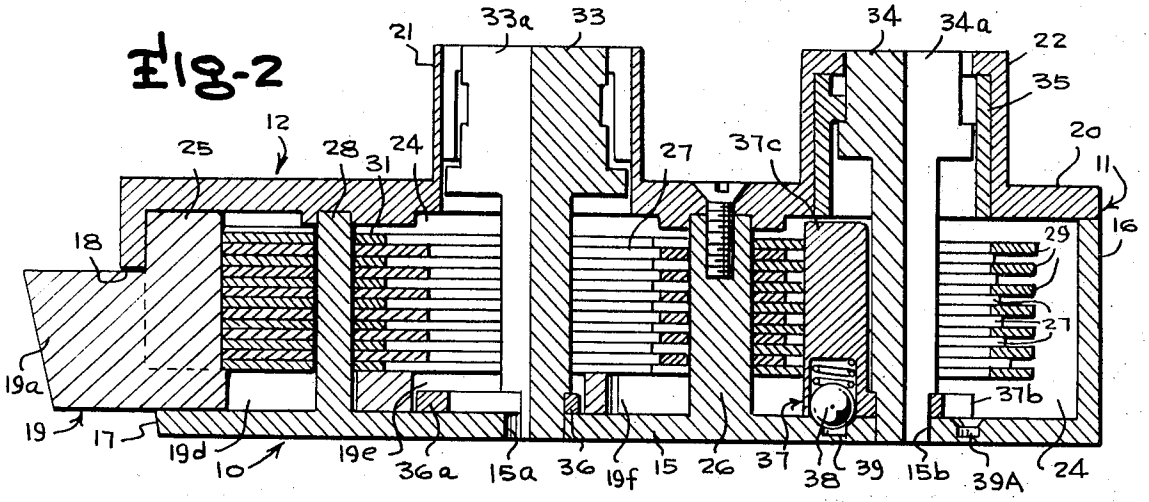


Fig-3

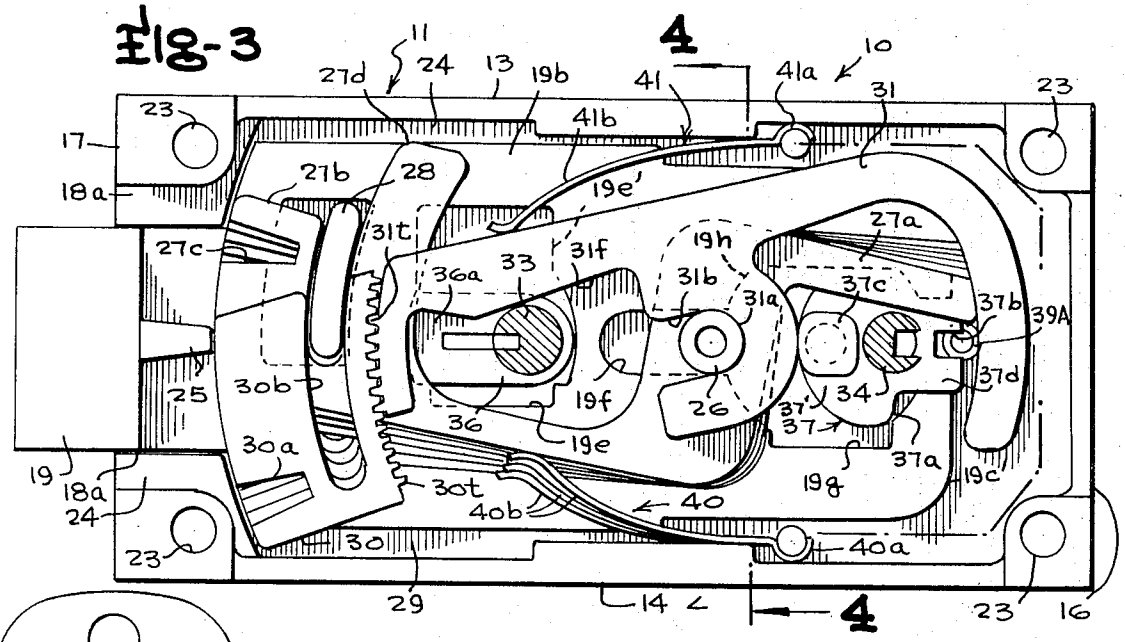


Fig-6

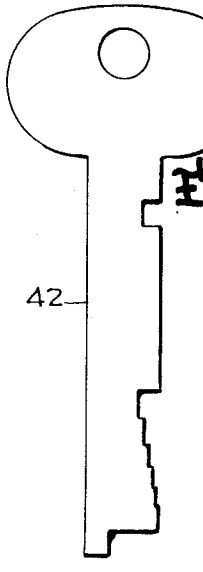


Fig-4

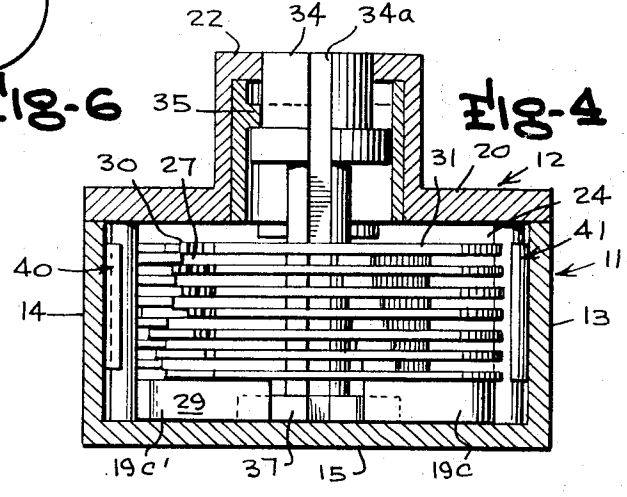
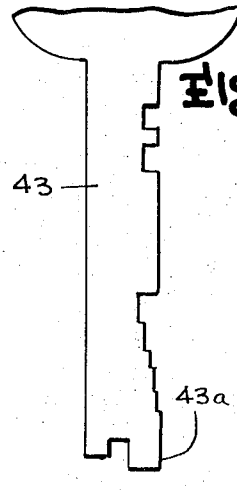


Fig-7



KEY CHANGING LOCK FOR SAFE DEPOSIT BOXES

BACKGROUND AND OBJECTS OF THE INVENTION

The present invention relates in general to key locks, and more particularly to key locks for safe deposit boxes and the like, wherein both a guard key and a renter's key having a proper configuration on the key bit must be inserted to effect retraction of the bolt.

It will be appreciated that safe deposit boxes in bank vaults and similar installations are successively leased to different parties, to whom the lessor furnishes a renter key adapted to open a given safe deposit box when the lock is partially operated or armed by a guard key in the possession of the lessor. Often, lessees fail to return the renter's key at the expiration of their lease, or the lessee may lose the renter's key, and it becomes necessary in such cases to change the tumbler lock so that it can be operated by a renter's key bit having a different configuration. Also, even if the lessee returns the renter's key at the expiration of his lease, it is desirable to change the key bit configuration to which the lock is responsive whenever the lessee of the box is changed, to prevent the otherwise possible use of an unauthorized duplicate of the renter's key which may have been made before the renter's key was returned.

For this reason, certain safe deposit box locks have been made in such a manner that the position of the gatings in the tumblers operated by the renter's key is changeable, so that it may be adjustably set to be opened by different renter's keys. The typical practice in this regard has been to provide a change key in the form of a non-round cross-section rod which is insertable into an opening in the safe deposit lock case or rear cover wall and through shaped openings in the renter's key tumblers, when the safe deposit box has been activated by the old renter's key. The combination change key interfits into shaped openings in one of two pivoted companion tumbler sectors for each of the renter's key tumblers, all of which tumbler sectors are pivoted on a fixed tumbler post, to decouple the normally mated tumbler sectors of each of these tumbler and permit them to be recoupled in a position corresponding to the configuration of the bit of a new renter's key.

An object of the present invention is the provision of a novel construction of a tumbler lock for safe deposit boxes and the like, having a first group of tumblers to be set by a guard key, and a second group of tumblers to be set by the renter's key, and wherein a change key may be inserted in the key bushing for the guard key to decouple the gated portions of the renter's key tumblers from the remaining portions thereof for resetting the renter's key tumblers to appropriate angular positions by a new renter's key upon insertion of the latter and operation of the same in a selected manner.

Another object of the present invention is the provision of a novel key lock of the tumbler type for safe deposit boxes and the like, having a plurality of renter's key operated tumblers each having a gating section and a body section which may be selectively decoupled upon operation of a special cam by a combination change key inserted in the lock and operated in a special manner.

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE FIGURES

FIG. **1** is a front perspective view of a changeable lock for safe deposit boxes, embodying the present invention;

FIG. **2** is a horizontal longitudinal section view taken along the line **2—2** of FIG. **1**;

FIG. **3** is a front elevation view of the safe deposit box lock, with the cover removed;

FIG. **4** is a vertical transverse section view taken along the line **4—4** of FIG. **3**;

FIG. **5** is a fragmentary, exploded perspective view of a portion of the locking bolt and portions of two adjacent tumbler levers employed in the safe deposit box lock;

FIGS. **6** and **7** are elevation views of a typical guard key, and change key, respectively, for use in the lock of the present invention;

FIG. **8** is a perspective view of the bolt of the safe deposit box lock; and

FIG. **9** is a view similar to FIG. **3**, showing the bolt in retracted position, with portions of tumblers shown in phantom lines.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, the key operated, tumbler type, changeable lock for safe deposit boxes of the present invention is indicated generally by the reference character **10** and comprises a lock case **11** and a cover plate **12** removable therefrom. In accordance with conventional practice, the lock case is a generally rectangular housing in the form of a forwardly opening box-like configuration to be forwardly closed by the cover plate **12**, and comprises parallel top and bottom walls **13, 14**, a rear wall **15**, and end walls **16** and **17**, the latter being inclined slightly relative to the plane normal to the rear wall **15** and having an opening therethrough, indicated at **18**, through which the locking bolt **19** projects. The front cover plate **12** comprises a front panel or wall **20** having a plurality of openings by which the cover plate is fastened by screws or the like to the case **11** in forwardly closing relation to the case. The cover plate **12** has a pair of forwardly projecting horns or annular bosses **21, 22** one of which serves as the renter horn, or horn for the renter key, and the other of which serves as the horn for the guard or preparatory key, and for the combination change key when the latter is used. In the illustrated embodiment, the horn **21** is the renter horn and the horn **22** is the guard horn. These horns **21** and **22** serve as outwardly surrounding tubular bearings for the hubs or plugs, to be later described, for the keys, and extend through the customary circular openings provided therefor in the door of the conventional safe deposit box cubicle or chamber. The corners of the lock case **11** are provided with customary holes **23** extending therethrough for fastening bolts projecting into tapped openings in the conventional safe deposit chamber door to mount the assembled case and cover plate against the inner surface of the door.

The bolt **19** for the safe deposit box lock, illustrated best in FIG. **8**, includes the usual heavy bolt portion **19***a* which projects from the lock case into a conventional keeper, and is guided by sliding engagement along its upper and lower edges with guide surfaces **18***a* bounding the opening **18**, and includes a relatively thinner plate portion indicated at **19***b* extending from the thicker nose portion **19***a* rearwardly through the major portion of the mechanism chamber **24** of the lock casing and terminating in a yoke or bifurcated end portion defining vertically spaced upper and lower arms indicated at **19***c* and **19***c'*. Openings **19***d* and **19***e* are provided in intermediate portions of the locking bolt, and an integral fence **25** projects rearwardly from the thicker bolt nose formation **19***a* at substantially the vertical center or mid region of the bolt. A tumbler mounting post **26** projects integrally forwardly from the rear wall **15** of the case **11** through a slot extension **19***f* of the opening **19***g* between the arms **19***c* and **19***c'* of the bolt, permitting relative sliding movement of the bolt through its reciprocative path between projected and retracted positions. Two types of tumblers are mounted for pivotal movement on the tumbler posts **26** in interleaving or alternating relation. One type of tumbler is referred to herein as guard key tumblers or pre-set tumblers **27**, having apertures in their mid-regions which fit about the tumbler mounting post to pivot the tumblers **27** thereon. The tumblers **27** include a rearward tail portion **27***a* disposed in the zone of operation of the guard key, a front gated portion **27***b* provided with a gating recess **27***c* opening through the front edge of the tumbler, and an arcuate recess **27***d* opening through the top edge of the tumbler. The gating recesses **27***c* of the pre-set or guard key tumblers **27** are designed to be alined in registry with the fence **25** of the bolt **19** when the proper guard key is inserted in the guard horn **22** and is rotated, for example counterclockwise through 90° from the 3 o'clock position, as viewed from the front of the lock, to the 12 o'clock position to angularly position the guard key tumblers about the tumbler post **26** to aline their gates with the fence. The arcuate slots **27***d* in the guard key tumblers **27** are concentric with the axis of the tumbler posts **26** and slidably receive an arcuate lug **28** which projects forwardly from the rear wall **15** of the case.

The other type of tumbler is herein referred to as a renter tumbler or segmented tumbler and is indicated by the reference character **29**. The segmented tumblers **29** are interposed between successive pairs of the pre-set or guard key tumblers **27**, so that the two types of tumblers occur in alternation, as will be apparent from inspection of FIG. **2**, and the segmented tumblers each comprise a front gated section **30** having a gate recess **30***a* therein of substantially the same configuration as the gate recesses **27***c* in the pre-set tumblers **27**, also designed to receive the fence **25** when all of the gating recesses are alined with each other and in the retraction path of the fence **25**. The gated section of each segmented tumbler also includes an arcuate slot **30***b* similar to the slot **27***d* in tumbler **27**, which slot **30***b* opens through the top edge of the front tumbler segment **30**, and follows an arcuate path concentric with the axis of the tumbler post **26**. The segmented tumbler **29** also includes a rear body section **31** which includes a medial portion **31***a* having a forwardly opening slot **31***b* therein, and includes a rearwardly projecting, downwardly curved tail portion **31***c* and a forwardly extending arm **31***d* terminating in an arcuate set of serrations or teeth **31***t* which intermesh with rearwardly projecting teeth **30***t* on the rear edge of the front gated section **30** of the segmented tumbler. The slot **31***b* in the medial portion **31***a* of the body portion **31** of the segmented tumblers receives the tumbler mounting post **26** which defines a pivot axis for pivotal movement of the segmented tumblers **29** while also permitting rearward translational movement of the rear body section **31** of each segmented tumbler under appropriate circumstances.

The center bores in the renter horn **21** and guard horn **22**, and alined circular apertures **15***a* and **15***b* in the rear wall **15** of the case **11** form the journal openings for the rotatable key plugs or hubs **33** and **34**, each of the key plugs having a slot therein extending from substantially the axis of the plug radially through one side thereof to define the key way for the plug, indicated by the reference characters **33***a* and **34***a*. A conventional annular insert or bushing **35** may also be provided in the guard horn **22**, as can be seen in FIG. **2**.

Fixed to the rear end portion of the key plug or cylinder **33** for the renter's key, immediately inwardly of the interior surface of rear case wall **15**, is an actuator or drive cam **36** in the form of a ring surrounding and fixed to the key cylinder **33**, for example by being keyed in a slot thereof, and having a radially extending projection or tang **36***a* which normally occupies the opening **19***e*, and which, after the guard key has been inserted and rotated to the 12 o'clock position in the key cylinders **34**, is rotated clockwise from the 9 o'clock position, as viewed from the front or in FIG. **3**, by the renter's key to bring the projection **36***a* into engagement with the rear edge **19***e'* of the opening **19***e* and force the bolt to the unlocking position of FIG. **9** withdrawing the bolt from locking relation with the keeper surface (not shown). However, rotation of the tang **36***a* beyond about a 1 o'clock position is prevented, as the surfaces **19***h* of the bolt plate portion abut the change cam arcuate surface **37***a* in the normal position of the cam **37**, as shown in FIG. **9**, preventing full retraction of the bolt.

The change cam member is rotatably journaled on the rear end portion of the guard key cylinder **34** immediately adjacent the interior surface of the rear case wall **15** and has a cam body portion **37'** provided with a forwardly opening eccentric slot **37***b* in a constricted rectangular portion **37***d* thereof and having a forwardly projecting arm member **37***c* which is diametrically opposite the slot and extends forwardly through the full thickness of the entire bank of tumblers at the arcuate portion **37***a* of the cam. A spring ball detent **38** is also provided in the body portion of the cam **37** from which the arm **37***c* extends and is resiliently biased into restraining relation in either of two recesses **39** in the rear wall **15** of the case to resiliently restrain the cam **37** in the normal, inactive position shown in FIGS. **2** and **3** or in a key change position displaced 180° therefrom.

The pre-set or guard key tumblers **27** are normally biased to a misalined, somewhat fanned position, for example as illustrated in FIG. **3**, by a guard tumbler spring member **40** having a concave portion **40***a* which interfits onto a cylindrical mounting post of the case and has a plurality of spring fingers **40**b separated from each other by narrow slots, pre-set to lie along slightly different inclined axes and bearing against the lower

edges of the guard tumblers **27** to normally bias them to the position illustrated in FIG. **3** wherein their gating recesses **27***c* are out of alinement with each other and are spaced above the level of the fence **25.** Similarly, a spring member **41** for the segmented tumblers has a concave base **41***a* interfitted about another cylindrical mounting post of the case **11** and having curved spring finger portions **41***b* separated laterally from each other by narrow slots and bearing against the upper edges of the body portions **31** to urge the segmented tumblers **29** to positions misaligning the gating recesses **30***a* relative to each other and spacing them out of alinement with the fence **25.**

In the following description of operation of the lock, the key positions are indicated as viewed from the front of the lock or as viewed in FIG. **3.** In the operation of the safe deposit box lock, the guard key, such for example as the key illustrated in FIG. **6** and indicated by the reference character **42,** is inserted into the key cylinder or plug **34** in the guard horn **22** and is rotated from the 3 o'clock position to the 12 o'clock position disposing the bit of the key in a vertical plane with the shaped edge of the bit extending upwardly and bearing against the tail portions **27***a* of the guard tumblers **27.** This insertion and movement of the guard key **42** rocks the guard tumblers **27** about the tumbler post **26** to a position alining each of the gating recesses **27***c* therein with each other and with the fence **25** to accommodate retracting movement of the fence and bolt. The proper renter's key is then inserted in the key cylinder **33** of the renter's horn **21** and is rotated from a horizontal 9 o'clock position clockwise to the 12 o'clock position to bring the key bit into engagement with the inclined lower edges **31***f* of the body portions **31** of the segmented tumblers to rock the segmented tumblers **29** about the tumbler post **26** to a position disposing their gating recesses **30***a* in registry with each other and in alinement with the fence **25.** Additional rotation of the renter's key clockwise from the upwardly extending 12 o'clock position rotates the tang **36***a* of drive cam **16** into engagement with the vertical bounding surface **19***e'* in the bolt plate, forcing the bolt plate to the right, as viewed in FIG. **3,** to retract the bolt to normal unlocking position, which is the point where movement is stopped by the change cam **37** by abutment of bolt surfaces **19***h* with cam surface **37***a.* The drive cam **36** is therefore stopped by the bolt at about the 1 o'clock position, preventing the renter key from reaching the 3 o'clock key exit position. The end portions **19***c* and **19***c'* of the bolt have been moved out of their holding relation with the constructed rectangular portion **37***d* of change cam **37** at this unlocking position of the bolt. The spring ball detent **38** in the body portion of the change cam **37** in recess **29** prevents unintentional change cam movement.

When a renter key combination change is desired, the lock will have to be brought to the normal unlocking condition shown in FIG. **9.** The guard key **42** will be rotated clockwise to the 3 o'clock key exit position and removed without returning the renter's key to exit position, the guard tumblers **27** being held in alined, unlocking position by the fence **25** interfitting in the gates. A guard change key **43** is then inserted into horn **22,** fitting key tongue **43***a* into slot **37***b* of the change cam **37.** Rotation of the change key **43** counterclockwise from 3 o'clock to 9 o'clock position will effect rotation of the change cam **37,** pushing spring ball detent **38** out of recess **39.** A complete rotation of 180° will bring change cam arm **37***c* into contact with cam follower surface **31***c* separating segmented lever body **29** from segmented gated portion **30.** The spring ball detent **38** will go into recess **39**A. When the segmented lever portions **29** and **30** are decoupled and the change cam **37** is out of the holding relation with the bolt **19,** (because the midregion of its constricted portion **37***d* is radially shorter than portion **37***a*) the drive cam **36** can move the bolt a sufficient distance to reach the 180° key exit position in renter horn **21.** The old renter key can then be removed from the lock since it can reach the 3 o'clock position, letting segmented lever body portion **29** with spring pressure applied by spring **41** fall and rest on renter plug **33.** The segmented lever portion **30** remains in unlocking position with its gating recess **30***a* receiving the fence **25.**

A new renter key is inserted into the renter horn **21** at the 3 o'clock position and rotated counterclockwise to the 12 o'clock position bringing the curved end portions **19***c* and **19***c'* of the bolt into contact with the change cam **37.** The new renter's key combination provides lift on segmented lever body portions **29.** The guard change key **43** can now rotate change cam **37** clockwise out of the spring ball detent recess **39**A, bringing change cam arm **37***c* into contact with the cam follower surfaces of segmeted lever body portions **29** to the left of the guard plug **34,** coupling segmented lever portion **29** with segmented lever portion **30** at the new key combination and coming to rest in the spring ball detent recess **39.** The renter key combination change is thus completed.

It will also be appreciated that in accordance with standard practice, a set up key is provided by the manufacturer which is a neutral key to which all changeable locks are set when shipped from the factory and when not in use by the customer or renter, so that the purchaser can initially set the safe deposit box locks to the proper setting for the initial renter's keys. The insert **35** in the guard key horn has a 90° relieved sector in its inwardly projecting rib to accommodate 90° rotation of the guard key. However, full rotation of the change key is permitted due to its second notch in its shank as shown in FIG. **7.**

What is claimed is:

1. A changeable combination key lock for safe deposit boxes and the like, comprising a lock case, a locking bolt movable between projected and retracted bolt positions, a plurality of pivoted guard key tumblers having gating recesses for accommodating retraction of said bolt, a plurality of pivoted segmented tumblers having body segments and gated segments releasibly coupled therewith at variable positions, said tumblers normally occupying positions barring retraction of the bolt from projected position, a first rotatable key plug for insertion of a guard key therein to aline the guard key tumblers for retraction of the bolt, a second rotatable key plug for insertion of a renter's key therein engaging said segmented tumblers and adjusting them to aline their gating recesses for retraction of the bolt and including means for moving the bolt between said positions upon rotation thereof, said tumbler body segments having cam follower surfaces, and a cam rotatably supported in the lock case adjacent said cam follower surfaces to be rotated between couple and release positions by a combination change key inserted in said first key plug, the cam having cam surfaces en-

gageable with said cam follower surfaces upon rotation of the cam for decoupling the body segments from their companion gated segments to free the body segments to assume new positions corresponding to a new renter's key selectively positioned in said second key plug.

2. A changeable combination key lock for safe deposit boxes and the like, comprising a lock case, a locking bolt movable between projected and retracted bolt positions, a plurality of pivoted guard key tumblers having gating recesses for accommodating retraction of said bolt, a plurality of pivoted segmented tumblers having body segments and gated segments releasibly coupled therewith at variable positions, said tumblers normally occupying positions barring retraction of the bolt from projected position, a first rotatable key plug for insertion of a guard key therein to aline the guard key tumblers for retraction of the bolt, a second rotatable key plug for insertion of a renter's kay therein engaging said segmented tumblers and adjusting them to aline their gating recesses for retraction of the bolt and including means for moving the bolt between said positions upon rotation thereof, and a cam to be rotated between couple and release positions by a combination change key inserted in said first key plug for decoupling the body segments from their companion gated segments to free the body segments to assume new positions corresponding to a new renter's key selectively positioned in said second key plug, said gated segments having copuling teeth, said tumbler body segments including teeth on a first end thereof releasibly intermeshed with the teeth of said gated segments and including integral extensions at the opposite end thereof defining cam follower surfaces and said cam having a cam surface thereon for concurrently engaging said cam follower surfaces of said body segments upon rotation of the cam and retracting said body segments from intermeshed relation with the gated segments by movement in a direction corresponding to bolt retracting movement.

3. A changeable combination key lock as defined in claim 1, wherein said guard key tumblers and segmented tumblers are pivotally mounted on a common tumbler post, said body segments having elongated slots receiving said post and accommodating decoupling retracting movement of the body segments codirectional to retracting movement of the bolt, the body segments having curved follower surfaces remote from the gated segments forming said cam follower surfaces partially encircling the axis of rotation of said cam at diametrically opposite zones about said axis, and said cam having a surface moveable into contact with said follower surfaces to a first position for retracting said body segments to a decoupled position relative to their companion gated segments and to a second position for returning the body segments to coupled relation with the gated segments.

4. A changeable combination key lock as defined in claim 1, wherein said segmented tumblers are arranged in side-by-side stacked relation collectively defining a tumbler stack, said cam member having an arm transversely spanning the whole stack of tumblers eccentric to the axis of rotation of the cam to concurrently engage portions of said body segments upon rotation of the cam to decoupling and recoupling positions.

5. A changeable combination key lock as defined in claim 2, wherein said segmented tumblers are arranged in side-by-side stacked relation collectively defining a tumbler stack, said cam member having an arm defining said cam surface transversely spanning the whole stack of tumblers eccentric to the axis of rotation of the cam to concurrently engage the cam follow surfaces of said body segments upon rotation of the cam to decoupling and recoupling positions.

6. A changeable combination lock key as defined in claim 1, wherein said segmented tumblers are arranged in side-by-side stacked relation with said guard key tumblers interleaved in alternation between each successive pair of segmented tumblers collectively defining a tumbler stack, said cam member having an arm transversely spanning the whole stack of tumblers eccentric to the axis of rotation of the cam to concurrently engage portions of said body segments upon rotation of the cam to decoupling and recoupling positions.

7. A changeable combination key lock as defined in claim 2, wherein said segmented tumblers are arranged in side-by-side stacked relation with said guard key tumblers interleaved in alternation between each successive pair of segmented tumblers collectively defining a tumbler stack, said cam member having an arm defining said cam surface transversely spanning the whole stack of tumblers eccentric to the axis of rotation of the cam to concurrently engage the cam follow surfaces of said body segments upon rotation of the cam to decoupling and recoupling positions.

8. A changeable combination key lock as defined in claim 1, wherein said bolt and cam have confronting shoulder portions restraining said cam against movement from said couple position when said bolt occupies said projected position and freeing said cam for movement to its release position only when the bolt is retracted.

9. A changeable combination key lock as defined in claim 2, wherein said bolt and cam have confronting shoulder portions restraining said cam against movement from said couple position when said bolt occupies said projected position and freeing said cam for movement to its release position only when the bolt is retracted.

10. A changeable combination key lock as defined in claim 1, wherein said bolt includes an elongated bolt plate portion spanning the major portion of said lock case and having an opening therein accommodating said cam, said cam having peripheral interruptions defining oppositely facing shoulders, and said bolt plate portion having stop formations substantially abutting said shoulders when the bolt occupies said projected position to prevent rotation of the cam from said couple position, said stop formations being displaced from adjacent the cam when the bolt reaches retracted position to free the cam for rotation to release position.

11. A changeable combination key lock as defined in claim 2, wherein said bolt includes an elongated bolt plate portion spanning the major portion of said lock case and having an opening therein accommodating said cam, said cam having peripheral interruptions defining oppositely facing shoulders, and said bolt plate portion having stop formations substantially abutting said shoulders when the bolt occupies said projected position to prevent rotation of the cam from said couple position, said stop formations being displaced from adjacent the cam when the bolt reaches retracted position to free the cam for rotation to release position.

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