March 27, 1956 J. D. QUILLEN 2,739,473

CYLINDER LOCK

Filed Dec. 17, 1954 3 Sheets-Sheet 1

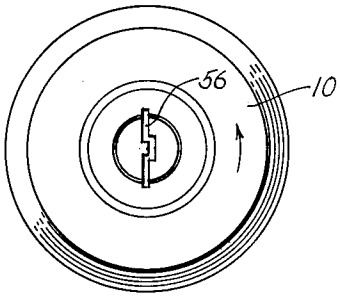


Fig. 1

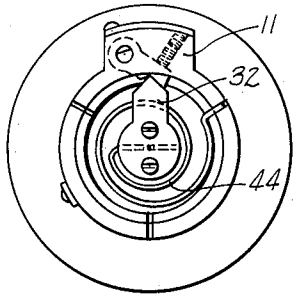


Fig. 2

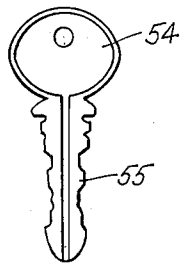


Fig. 3

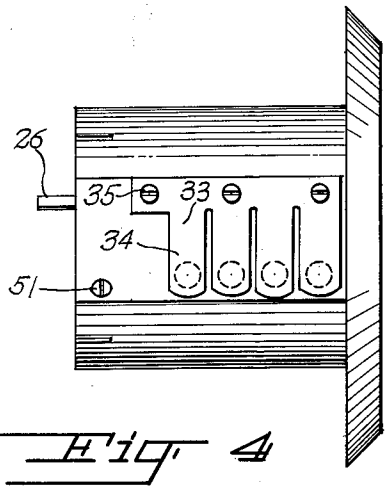


Fig. 4

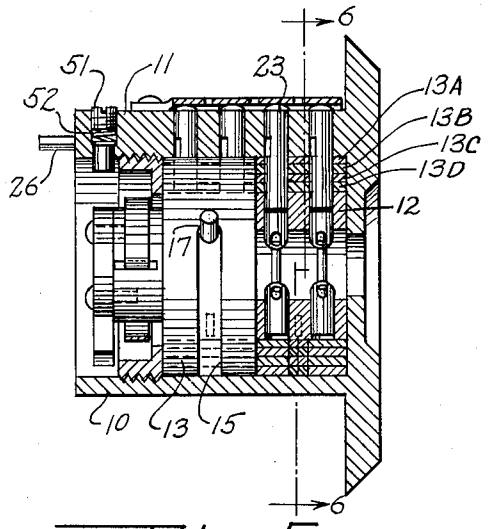


Fig. 5

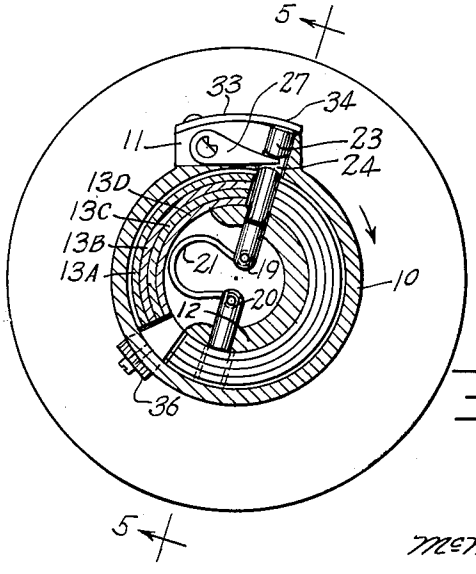


Fig. 6

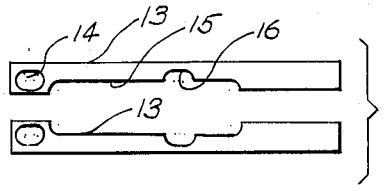


Fig. 7

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CYLINDER LOCK

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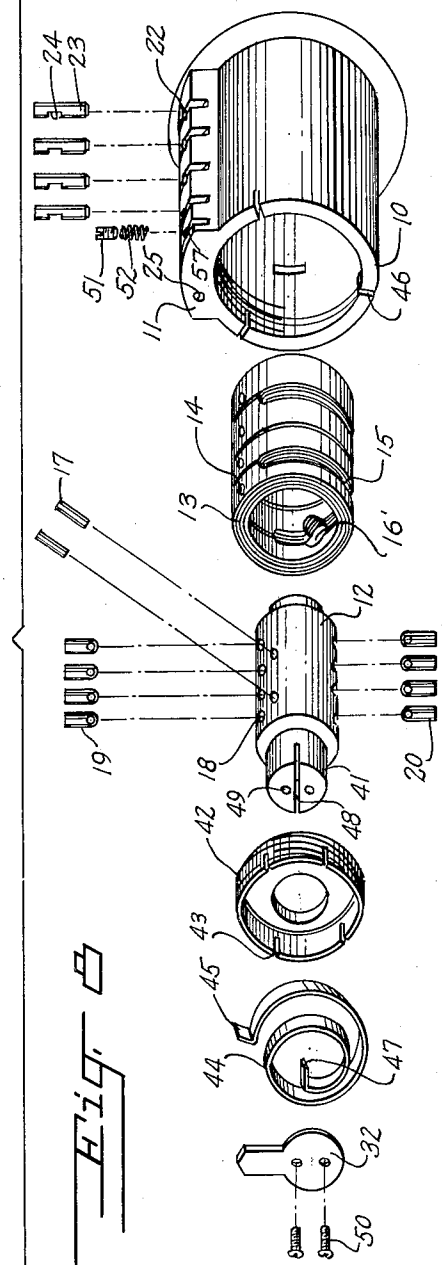


Fig. 3

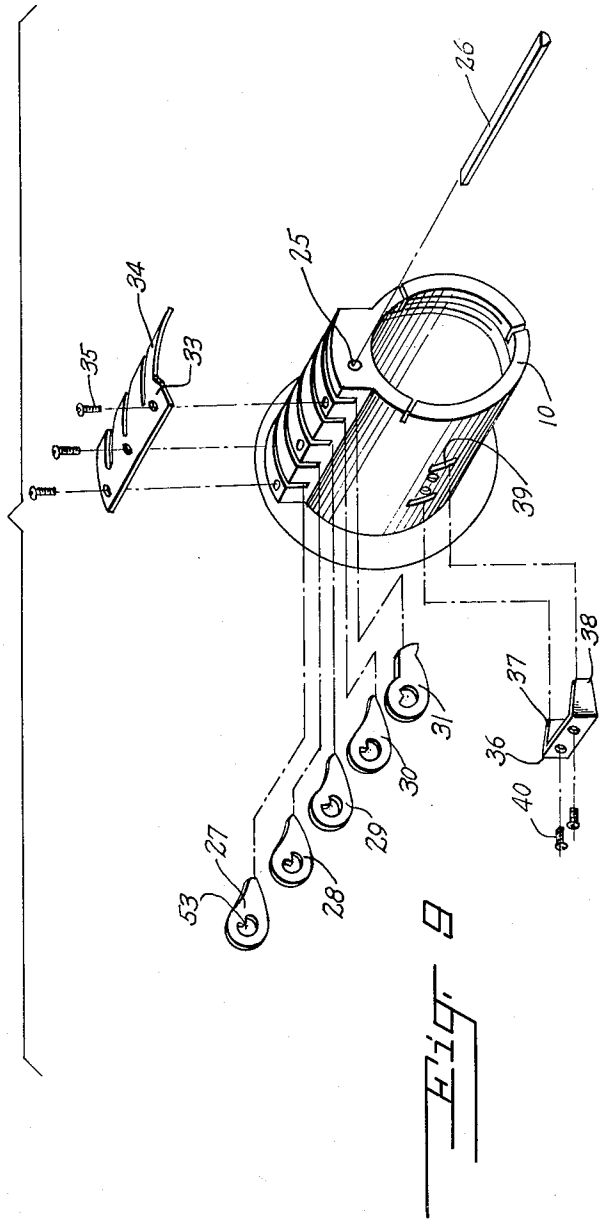


Fig. 4

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CYLINDER LOCK

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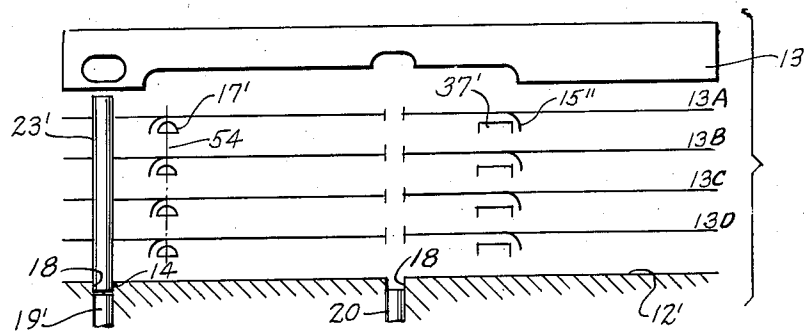


Fig. 10

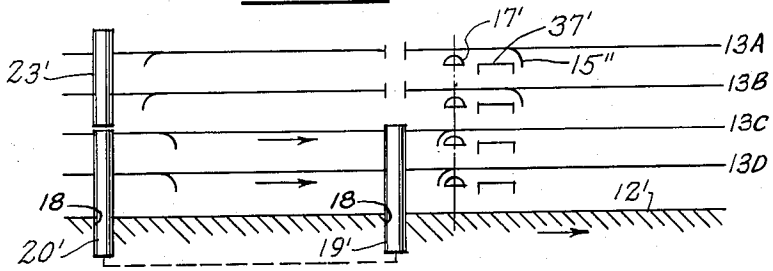


Fig. 11

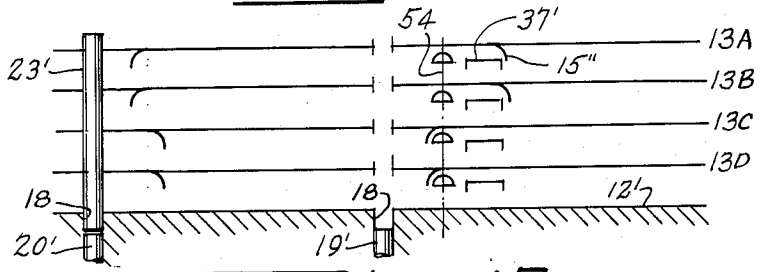


Fig. 12

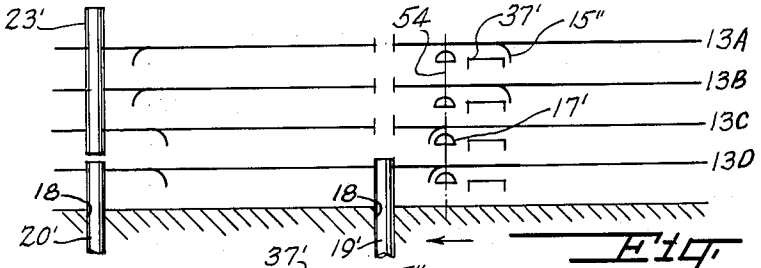


Fig. 13

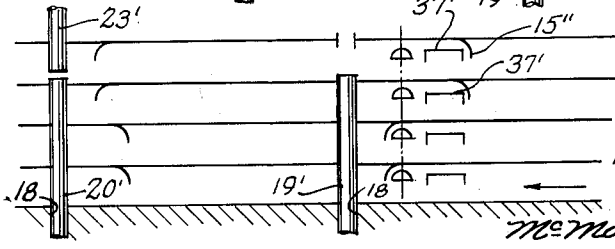


Fig. 14

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2,739,473

CYLINDER LOCK

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Application December 17, 1954, Serial No. 475,943

6 Claims. (Cl. 70—383)

The present invention relates to locks having a plug and a barrel with movable tumblers and pins connecting and disconnecting the cylinder end of the barrel.

The primary object of the present invention is to provide a new cylinder lock which is universally operated from the unlocked position to a locked position by any one of a number of keys provided and may not be operated from the locked position to the unlocked position by any other key.

Another object of the present invention is to provide a lock which is operated in cycles, a cycle being from the unlocked position to a locked position, and from the locked position to the unlocked position, which cycle is controlled by a single one of any number of keys.

A further object of the present invention is to provide a lock and key system having universal application for use in public locker systems, parking meter systems, industrial uses, such as tool checking, time clock operation, and other applications using a plurality of locks or key operated recorders, key operated mechanisms, and the like, using individual keys.

A still further object of the present invention is to provide a lock and key system in which a single key can lock any number of locks which may be automatically reset to the unlocked position or manually reset to the unlocked position.

Yet another object of the present invention is to provide a lock which may not be operated by under-keying or over-keying. A still further object of the present invention is to provide a cylinder lock of sturdy and simple construction, having a minimum of parts and one which may be manufactured in quantities from the same number of parts and the same arrangement of those parts without setting individual locks for any particular key, the keys themselves having the differences which distinguish one from the other and each being operable in all of the locks.

These and other objects and advantages of the present invention will be fully apparent from the following description when taken in connection with the annexed drawings, in which:

Figure 1 is a front view in elevation of the face of the lock,

Figure 2 is a rear view in elevation of the rear of the lock,

Figure 3 is an elevational view of a key for use in the lock of the present invention,

Figure 4 is a top view in elevation,

Figure 5 is a side view in cross-section on line 5—5 of Figure 6,

Figure 6 is an end view in cross-section on line 6—6 of Figure 5,

Figure 7 is an undeveloped view of two of the slide elements of the present invention,

Figure 8 is an exploded view in perspective of the elements of the invention,

Figure 9 is another exploded view of other elements,

Figure 10 is a schematic view showing the condition of the elements while in unlocked condition,

Figure 11 is another schematic view showing a condition of being keyed and locked,

Figure 12 shows the condition of being locked with key removed,

Figure 13 shows the condition of being "under-keyed" and still locked, and

Figure 14 shows the condition of being "over-keyed" and still locked.

Referring in greater detail to the drawing in which like numerals indicate like parts throughout the several views, the present invention consists of a lock having a barrel **10** formed with a tumbler pin housing **11** on its upper side.

Axially positioned within the barrel **10** is a plug **12** and disposed between the plug **12** and the barrel **10** is a plurality of concentric "slides" or tumblers **13**, here shown as four in number concentrically and four in number side by side about the plug **12**.

The slides or tumblers **13** are assembled in series of pairs as seen best in Figures 7 and 8 and are formed with diametrically opposed holes **14**, half-grooves **15**, and elongated recesses **16** which, when each pair is put in side-by-side relation form another hole as indicated by the reference numeral **16'** in Figure 8.

A pair of pins **17**, secured by their one ends to the plug **12** and projecting by their other ends through each of the half-grooves **15** will be seen to engage the tumblers **13** at each end of the grooves formed by the half-grooves **15** and permit the tumblers **13** to rotate on the plug **12** for a rotational movement of 180°.

Referring to Figures 4, 8, and 9, the plug **12** is formed with diametrically opposed holes **18**, one for each of the actuating pins **19** and **20** which extend transversely for contractile and extensile movement and are connected together at their inner ends by the spring **21** by means of which they are biased toward each other. The tumbler pin housing **11** is formed with a plurality of apertures **22** in which are slidable one of each the tumbler pins **23**, each one of which is formed with a notch **24**. A bore **25** is longitudinally arranged through the housing **11** and into which extends a flat sided pin **26** about which rotate for pivotal movement the dogs **27**, **28**, **29**, and **30**, each of which bear against the upper ends of the tumbler pins **23**, also pivotally connected to the pin **26** is a latch dog **31** which engages the latch **32** at its upper end.

A plate **33** having fingers **34** is formed from resilient metal, or the like, and biases each of the dogs **27** to **31** to the downward position. Bolts **35** secure the plate **33** to the housing **11**. A U-shaped member **36** has legs **37** and **38** extending in slots **39** formed in the barrel **10** each of them extending through the grooves formed by the half-grooves **15** in the rings **13**. Bolts **40** secure the U-shaped member **36** to the side of the barrel **10**.

The plug **12** is formed with a reduced portion **41** which projects through the nut **42**, having the slots **43**. A coil spring **44**, formed of flat spring steel, is provided with a leg **45** at its outer end which projects into the slots **43** and into one of the slots **46** in the barrel **10**.

The other leg **47** of the spring **44** is received into the slot **48** in the end of the reduced portion **41**. Tapped holes **49** receive the bolts **50** which secure the latch **32** to the end of the plug **12**.

A set screw **51**, together with the spring **52** bears against the end of the latch dog **31** and restrains the movement of the latch **32**. Each of the dogs **27** to **30** and the latch dog **31** has inwardly projecting bosses indicated by the reference numeral **53** which bear against the flat side of the pin **26**. As seen in Figures 4 and 5, the pin **26** projects from the rear face of the assembled lock.

Referring to Figures 5 and 6, the separate and concentric tumblers **13** are indicated by the reference numerals **13A**, **13B**, **13C** and **13D**.

In the assembly of the lock, the spring 44 is provided with sufficient tension to bias the latch and the barrel 12 to the position indicated in Figure 6. This will permit the counterclockwise movement of the plug, as seen from the front and indicated by the arrow in Figure 1.

A key, shown in Figure 3, is provided with complemental configurations indicated by the reference numeral 55.

Referring to Figures 10 to 14, inclusive, the operation of the lock is shown schematically. The first, Figure 10, shows an undeveloped view of one of the tumblers 13 in superimposed position over tumblers 13A, 13B, 13C and 13D. Straight lines indicate an edge view of each of the tumblers 13A to 13D, and the tumbler pins are indicated by the reference numeral 23'. The actuating pins are 19' and 20'. The plug is indicated by the partially shaded portion 12'.

In Figure 10 the condition in which the lock is unlocked is shown, the pins 17 being represented by the semicircular bodies 17' and are shown located at one end of the groove formed by a half-groove 15 as indicated by the reference numeral 15''.

The stop means, consisting of one of the legs 37 or 38 is indicated by the reference numeral 37'. In Figure 10 the tumbler pin 23' is shown traversing one of the diametrically opposed holes in the tumblers 13A to 13D, and is entered into the hole 18 in the plug 12'.

In Figure 11, a key, as indicated by the reference numeral 54, in Figure 3, having a configuration 55, has been inserted in the key slot 56 in the plug 12 and has raised the actuating pins 19' and 20', the former bearing against the lower ends of the tumbler pin 23' to eject it from two of the tumblers 13C and 13D, but still entered in the holes 14 of the tumblers 13A and 13B.

The plug 12', in this figure, has been rotated 180° counter-clockwise in the direction of the arrows shown in Figure 11, the pins being engaged in the ends of the grooves 15'' to carry each of the tumblers 13C and 13D for rotation with the plug.

Referring to Figure 12, a condition is shown in which the lock has been locked and the key withdrawn, permitting the associated spring 21 (not shown) to withdraw the actuating pins 19' and 20', permitting the tumbler pin 23 to penetrate the respective ones of the holes 14 or 16' in those tumblers which have been rotated, and also penetrating the hole 18 in the plug 12'.

Referring to Figure 13, the condition of "under-keying" is shown in which a key has raised the actuating pins 19' and 20', to where they have pushed the tumbler pin 23' out of the tumbler 13D but still engage in the holes of the tumblers 13A, 13B, and 13C. In this position the tumbler 13C is unable to move in the direction indicated by the arrow, due to its engagement by the tumbler pin 23', the pin 17' being at the end of the groove and being prevented from moving the tumbler 13C because of its abutment or engagement by the tumbler pin 23'.

In Figure 14 the condition of "over-keying" is shown in which a key has raised the actuating pins 19' and 20' to a position where the tumbler pin 23' has been ejected from the tumblers 13B, 13C and 13D, while still in engagement with the tumbler 13A. In this position, movement in the direction of the arrow is prevented by the abutment of the end of the groove 15'' with the leg 37' which forms the stop means. The dotted line indicated by the reference numeral 54' indicates that each of the pins 17' are connected with the plug 12'.

In operation, the locks of the present invention are all manufactured identically, and have no set combinations. The keys have different configurations and operate to set up different combinations of conditions in which the actuating pins have engaged with one or more of the tumblers 13. After a key has been inserted and the actuating pins have pushed the tumbler pins outwardly, the plug and those tumblers 13 which are now engaged by the actuating pins may be rotated 180° counter-clockwise to a position at which the key is removed. At this lock combination set position, the tumbler pins 23 drop into the other of the diametrically arranged holes 14 or 16' and into the opposite ends of the holes 18 in the plug 12. This locks the plug against movement with respect to the barrel 10. Any other key which enters the lock, if it has not the right combination or configuration will fail to raise the tumbler pins 23 to the proper height to release the right ones of the tumblers 13 for rotative movement to the original or lock combination unset position. The stop means formed by the legs 37 or 38 engage the pins 17 at one end of the movement of the plug 12 and engage the ends of the grooves formed by the half-grooves 15 in each of the rings 13 at the other end.

It will be seen, therefore, that all of the objects of the present invention may be accomplished by the structure and assembly of the present invention as heretofore described.

The pin 26 may be rotated so that the shoulders 53 of each of the dogs 27 to 31 will engage with the flat side of the pin 26 to lift each of the dogs at which point the spring 44 will rotate the plug 12 and any of the displaced tumblers 13 back to the original lock combination inset position. This automatic resetting feature of the present invention permits the lock to be used for timing devices, such as parking meters, it being understood that other spring means would be provided controlled by a timing element to rotate the shaft 26 to the resetting position.

Other uses for the invention will be obvious, such as an industrial use where special tools are kept under lock and key, possibly within small compartments or lockers, and all of the tools being made available to a number of individuals each provided with a different key by means of which any one compartment could be opened by the operation of the lock of the present invention.

Other uses for the invention will be obvious. Clubs and organizations may provide themselves with rooms or lockers for many purposes and provide each of the accredited members with a key. A member would use the room or locker, locking it with one of the locks of the present invention and no other use could be made of it until such time as the same key was inserted within the lock to move it to the unlocking position.

While a single embodiment of the present invention has been here illustrated and described, it is believed that other embodiments may be made and practiced within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. A lock comprising a barrel, a plug provided with a slot for receiving a configurated key supported in said barrel for rotative movement, a group of tumblers supported in said barrel for individual rotative movement, means carried by said plug operable by any one of the configurations of a key when inserted in the key slot in said plug to selectively connect one or more of said tumblers to said plug for rotative movement with said plug to thereby cause the connected tumblers to be shifted from a lock combination unset position to a lock combination set position, and cooperating lock means on said barrel, said plug and said tumblers when in the aforesaid lock combination set position operable to resist release upon the insertion in the key slot of said plug of a different configurated key than the key employed for effecting the movement to the lock combination set position and being releasable from the latter named set position only upon employment of the last mentioned key.

2. A lock comprising a barrel, a plug provided with a slot for receiving a configurated key supported in said barrel for rotative movement, a group of tumblers supported in said barrel for individual rotative movement, means carried by said plug operable by any one of the configurations of a key when inserted in the key slot in said plug to selectively connect one or more of said tumblers to said plug for rotative movement with said plug

to thereby cause the connected tumblers to be shifted from a lock combination unset position to a lock combination set position, cooperating lock means on said barrel, said plug and said tumblers when in the aforesaid lock combination set position operable to resist release upon the insertion in the key slot of said plug of a different configurated key than the key employed for effecting the movement to the lock combination set position and being releasable from the latter named set position only upon employment of the last mentioned key, and said cooperating lock means including means carried by said barrel operable to lock said plug in either the lock combination inset position or in the lock combination set position, the last named means being releasable by said tumbler connecting means when the latter is engaged by a key inserted in the key slot in said plug.

3. A lock comprising a barrel, a group of tumblers arranged in concentric relation disposed within said barrel, a spring biased tumbler pin carried by said barrel and normally extending slidably through said group of tumblers, a plug provided with a slot for receiving a configurated key extending loosely through the innermost one of said group of tumblers and rotatable by a key received in said slot from a lock combination unset position to a lock combination set position, actuating pin means interiorly of and connected to said plug for transverse contractile and extensile movement, said actuating pin means being operable by any one of the configurations of a key when inserted in said slot to selectively release one or more of said tumblers corresponding to the height of such one of the key configurations from said tumbler pin and attach the released tumblers for rotational movement with said plug to the lock combination set position, and cooperating lock means on said barrel, said plug and said tumblers operable when in the aforesaid lock combination set position to resist release upon insertion in the key slot of said plug of a different configurated key than the key employed for effecting the movement to the lock combination set position and being releasable from the latter named set position only upon the employment of the last-mentioned key.

4. A lock comprising a barrel, a group of tumblers arranged in concentric relation disposed within said barrel, a spring biased tumbler pin carried by said barrel and normally extending slidably through said group of tumblers, a plug provided with a slot for receiving a configurated key extending loosely through the innermost one of said group of tumblers and rotatable by a key received in said slot from a lock combination unset position to a lock combination set position, actuating pin means interiorly of and connected to said plug for transverse contractile and extensile movement, said actuating pin means being operable by any one of the configurations of a key when inserted in said slot to selectively release one or more of said tumblers corresponding to the height of such one of the key configurations from said tumbler pin and attach the released tumblers for rotational movement with said plug to the lock combination set position, and cooperating lock means on said barrel, said plug and said tumblers, said cooperating lock means embodying a pin carried by said plug and movable through an arcuate slot formed in adjacent tumblers, operable when in the aforesaid lock combination set position to resist release upon insertion in the key slot of said plug of a different configurated key than the key employed for effecting the movement to the lock combination set position and being releasable from the latter named set position only upon the employment of the last-mentioned key.

5. A lock comprising a barrel, a plurality of groups of tumblers each arranged in concentric relation disposed in side by side relation within said barrel, spring biased tumbler pins carried by said barrel and each normally extending slidably through the adjacent group of tumblers, a plug provided with a slot for receiving a configurated key extending loosely through the innermost ones of all of said groups of tumblers, and a plurality of actuating pin means interiorly of and each connected to said plug for transverse contractile and extensile movements, the respective actuating pin means being operable by one or more of the configurations of a key when inserted in said slot to selectively release one or more of the tumblers corresponding to the heights of the respective ones of the key configurations from said tumbler pins for rotational movement with said plug to the lock combination set position, and cooperating lock means on said barrel, said plug and said tumblers operable when in the aforesaid lock combination set position to resist release upon insertion in the key slot of said plug of a different configurated key than the key employed for effecting the movement to the lock combination set position and being releasable from the latter named set position only upon the employment of the last-mentioned key.

6. A lock comprising a barrel, a plurality of groups of tumblers each arranged in concentric relation disposed in side by side relation within said barrel, spring biased tumbler pins carried by said barrel and each normally extending slidably through the adjacent group of tumblers, a plug provided with a slot for receiving a configurated key extending loosely through the innermost ones of all of said groups of tumblers, and a plurality of actuating pin means interiorly of and each connected to said plug for transverse contractile and extensile movements, the respective actuating pin means being operable by one or more of the configurations of a key when inserted in said slot to selectively release one or more of the tumblers corresponding to the heights of the respective ones of the key configurations from said tumbler pins for rotational movement with said plug to the lock combination set position, and cooperating lock means on said barrel, said plug and said tumblers, said cooperating lock means embodying pins carried by said plug and each being movable through respective ones of a plurality of slots formed one each in each of said tumblers of each group operable when in the aforesaid lock combination set position to resist release upon insertion in the key slot of said plug of a different configurated key than the key employed for effecting the movement to the lock combination set position and being releasable from the latter named set position only upon the employment of the last-mentioned key.

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