April 14, 1964 H. L. DE VINES 3,128,618

KEY SHUT OUT FOR LOCKS

Filed May 25, 1959 2 Sheets-Sheet 1

FIG_1

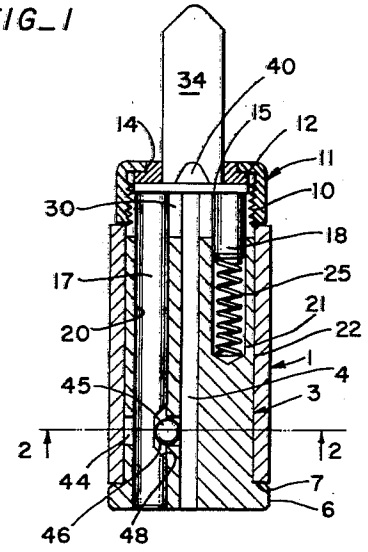


FIG_3

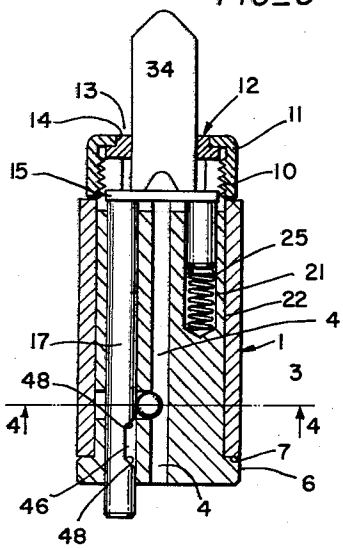


FIG_2

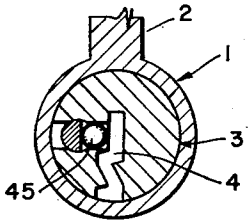


FIG_4

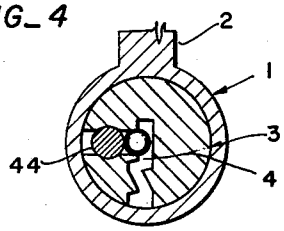


FIG_8

FIG_6

FIG_7

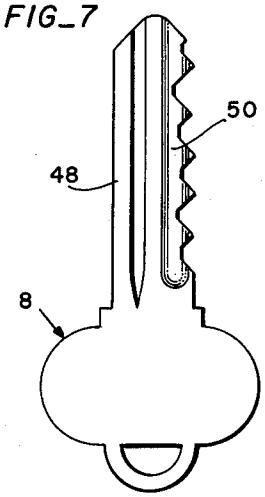
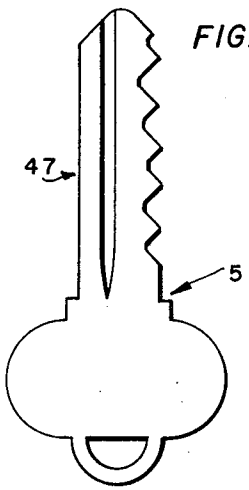


FIG_5



INVENTOR.
HOLLIS L. DEVINES
BY
Boyken Mohler + Wood.

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KEY SHUT OUT FOR LOCKS

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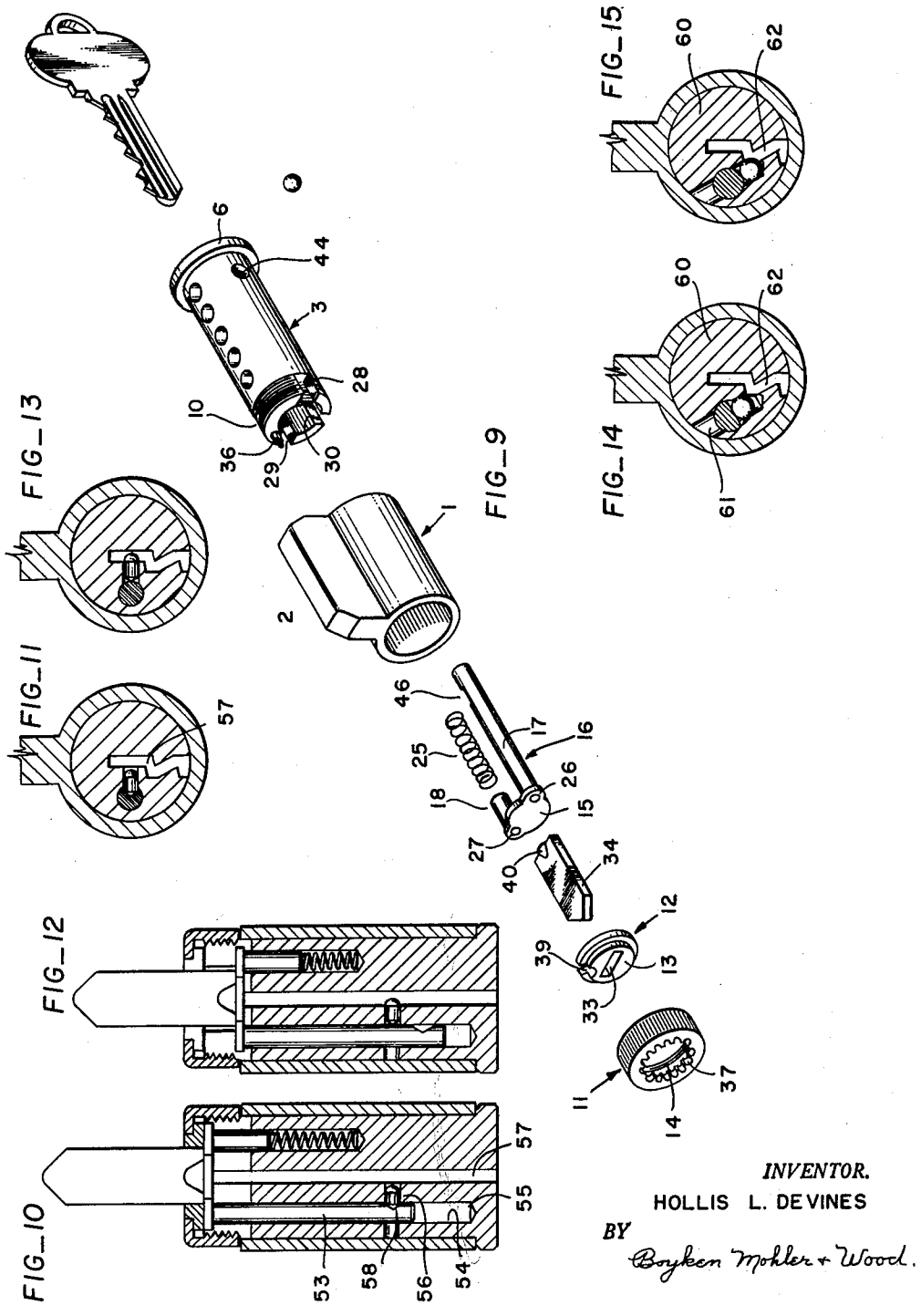

INVENTOR.
HOLLIS L. DEVINES
BY
Boyken Mohler & Wood.

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KEY SHUT OUT FOR LOCKS

Hollis L. De Vines, San Mateo, Calif., assignor to Schlage Lock Company, a corporation

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This invention relates to locks and more particularly to a means for shutting out a key from the lock cylinder in which it is adapted to operate.

In some locks it is desirable to be able to lock the door so that it cannot be opened by means of the usual master key. For example, in hotels it is customary for the maid to be provided with a master key which will operate any lock on a particular floor. In such cases each guest is, of course, provided with a change key which operates his particular lock and no other. Although most locksets may be locked from inside a room to prevent entrance without a key, such locking means does not prevent operation by means of a change key or master key. It is therefore desirable for the guest to be able to lock out a master key while the guest is in the room.

Heretofore key shut out mechanisms have been provided which engage the end of the key as the latter is inserted in the keyway. However, such mechanisms have not been entirely satisfactory because the lockset structure has not permitted sufficient resistance to be developed against entrance of the key. In other words, in those mechanisms wherein the leading end of the key is engaged by an obstruction to prevent complete entrance of the key into the keyway, such obstruction has not been sufficiently strong to prevent forcible insertion of the key and it has been possible to effect an unauthorized operation of the lock by kicking or otherwise forcing the key into the keyway against the resistance of the obstruction.

It should be noted in this connection that the type of key shut out contemplated by the present invention not only provides for privacy of the guest but may also be used to shut out one who is in possession of a change key against forcible entrance with the aid of such change key. It is therefore necessary that the shut out structure be sufficiently strong to withstand heavy loads tending to insert the key in the keyway.

The main object of the present invention is therefore the provision of an improved key shut out device which is more rugged than those heretofore developed for the same purpose.

Another object of the invention is the provision of a key shut out which incorporates a wedging action between the key and the key obstruction to prevent entrance of the key in the keyway; such wedging action developing considerably more resistance than has been developed heretofore.

Still another object of the invention is the provision of a key shut out incorporating a lock indicator which indicates to one on the outside of a door that the lockset is in locked position.

Yet another object of the invention is the provision of a key shut out mechanism which lends itself to operation in a lock so that a special key may be readily formed to operate the lock even when the key shut out means is in locked position. In this connection it should be noted that prior art devices of like nature which have provided an obstruction to engage the leading end of the key have contemplated the use of a short key shank for operating the lockset even when the shut out is actuated. However, in such a case it is a simple matter for one to shorten a pass key either by cutting off the leading end or by abrading it off, and thus operate the lock. By the present invention the special key must be provided with a longitudinally extending groove which is not readily formed except by special equipment.

Other objects and advantages will be seen from the following specification and from the attached drawings:

FIG. 1 is a longitudinal section through a lock cylinder showing the invention provided in the cylinder plug and in an unlocked position.

FIG. 2 is a cross section through the cylinder of FIG. 1 as taken along lines 2—2 of FIG. 1.

FIG. 3 is a view similar to FIG. 1 but with the cylinder in locked position.

FIG. 4 is a cross section through the cylinder of FIG. 3 as taken along lines 4—4 of FIG. 3.

FIG. 5 is a side elevation of a conventional change key for operation of the cylinder of FIGS. 1–4.

FIG. 6 is a cross section of the shank of the change key of FIG. 5.

FIG. 7 is a side elevation of a special key adapted to operate the cylinder in the locked position of FIGS. 3, 4.

FIG. 8 is a cross section of the shank of the special key of FIG. 7.

FIG. 9 is an exploded perspective view of the elements of the cylinder of FIGS. 1–4.

FIGS. 10–13 are views similar to FIGS. 1–4 respectively showing a modified form of the invention.

FIG. 14 is a cross section of a cylinder showing another modified form of the invention in unlocked position.

FIG. 15 is a cross section similar to FIG. 14 showing the cylinder in locked position.

In detail, and with reference to FIGS. 1–4 and 9 the invention is shown incorporated in a conventional pin tumbler locking mechanism, having an outer cylinder 1 which includes an integral tongue 2 (FIG. 2) for containing the pin tumblers (not shown).

Rotatable within cylinder 1 is a plug 3 which is provided with a central longitudinally extending keyway 4 broached or otherwise formed to a section complementary to that of the key 5 (FIG. 5) adapted to operate therein.

The outer end of plug 3 is provided with a circumferentially extending flange 6 rotatable on the outer end 7 of the cylinder 1. Plug 3 is also provided at its inner end with screw threads 10 which are adapted to threadedly receive an internally threaded cap 11. Interposed between cap 11 and the inner end of plug 3 is a disk 12 which is formed with a central boss 13 received within a central aperture 14 in cap 11.

Disk 12 is in engagement with the end plate 15 of the shut out mechanism generally designated 16. Said mechanism includes a relatively long pin 17 rigidly secured at one end to plate 15 and a short pin 18 similarly secured to plate 15.

Pin 17 is slidably received in a bore 20 extending longitudinally through plug 3 and offset from the central axis of said plug. Pin 18 is similarly received in a bore 21 on the opposite side of said axis and extending inwardly from the inner end of plug 3 and terminating in a bottom 22 within said plug. Interposed between said bottom 22 and the free end of pin 18 is a compression spring 25 which urges the shut out mechanism outwardly of the inner end of plug 3 at all times.

End plate 15 of the shut out mechanism is formed with a pair of opposite ears 26, 27 (FIG. 9) to which are secured the inner ends of pins 17, 18 and said ears are slidably received in a pair of slots 28, 29 respectively in the inner end of plug 3. Plug 3 is also formed with a central recess 30 at its inner end for receiving therein the end plate 15 of the shut out mechanism 16 so that said end plate may be moved from the outer position of FIG. 1 to the inner position of FIG. 3.

Disk 12 (FIG. 9) is provided with a central slot 33

through which is received an actuator bar **34** for actuating the latchbolt locking mechanism (not shown). At assembly, retracting bar **34** is inserted through slot **33** in disk **12** and said bar and disk are placed between cap **11** and end plate **15**. When plug **3** is received within cylinder **1** pins **17**, **18** are then inserted into bores **20**, **21** with the spring **25** in the latter. Screw cap **11** is then tightened on plug **3** and a small securing pin **36** (FIG. 9) is passed through one of a plurality of notches **37** formed in cap **11** around its central aperture **14**, through a corresponding notch **39** in disk **12** and press fitted into a small bore in the end of plug **3**.

Bar **34** is upset at its inner end as indicated at **40** and said upset portion fits within a complementarily formed notch (not shown) in disk **12** to prevent withdrawal of said bar through slot **33**.

The plug **3** of FIG. 1 is provided with a transversely extending bore **44** which extends from the sidewall of said plug **3** (FIG. 9) and into the keyway **4** (FIG. 1). The outer end of said bore is of course closed by the cylinder **1** at assembly. Received within bore **44** is a ball **45** which is free for movement in said bore but the diameter of said ball is large enough so that it cannot be completely received within keyway **4**.

Pin **17** is provided with a notch **46** having slanted sides **48** so that when said pin is in its inner or normal position of FIG. 1 the ball **45** may be partially received within said notch so that the ball does not offer any interference to shank **47** of the key **5** being inserted in keyway **4**. However, when the pin **17** is moved to its projected position of FIG. 3 so that notch **46** does not register with ball **45** the latter is forced into keyway **4** and held there providing an obstruction to insertion of key shank **47** therein (FIG. 4).

Upon return of the pin **17** to its normal position of FIG. 1 the key **5** may then operate the lock because insertion of the same into the keyway **4** moves the ball along bore **44** into notch **46** in the pin **17**.

It will be apparent that considerably more resistance to insertion of the keyway is present with the structure of FIG. 4 than would exist if the end plate **15** of the shut out mechanism were relied on to prevent complete insertion of the key. By the structure of FIGS. 1–4 it would be necessary to deform the material of the key along almost its entire length in order to insert it completely in the keyway **4**. For this reason it is preferable to position ball **45** relatively close to the outer end of plug **3**.

The pin **17** in its projected position of FIG. 3 of course functions as an indicator for indicating that the mechanism is in locked condition.

As seen in FIGS. 7, 8 a special key **8** may be made to operate the cylinder despite the presence of ball **45** in keyway **4** by providing a longitudinally extending groove **50** in the key shank **48** which is adapted to receive ball **45** therein so that said shank may be inserted past said ball. Although the formation of groove **50** is a simple milling operation it cannot readily be done without a machine tool. Thus a relatively high degree of security is provided against duplication of the special key.

FIGS. 10–13 illustrate a modified form of the invention which includes the use of the shut out feature but without the indicator feature. In this case pin **53**, which is similar in function to pin **17** in FIGS. 1–4, is received in a bore **54** which does not extend through the front end of plug **55**. In lieu of a ball, a pin **56** may be provided which is formed with a hemispherical end to enter the keyway **57**. The pin **53** is provided with a notch **58** cooperating with the squared end of pin **56** for the same purpose as above described. A pin such as pin **53** may also be provided in lieu of ball **45** in the structure of FIG. 1.

It may be desirable in some instances to position the blocking element so as to engage the key at a point at which the key has a relatively great thickness or where the groove formed in the special key does not interfere with that portion of the key shank reserved for the notches which accommodate the pin tumblers. In such a case the plug **60** (FIGS. 14, 15) may be provided with a slanting bore **61** which is generally in alignment with the short slanting portion **62** of the keyway. The operation of the device in such a case is the same as described above.

It will be understood that the means for projecting the shut out mechanism **16** (FIG. 9) is conventional, and usually comprises a member which abuts the free end of bar **34** and forces the shut out mechanism to the position of FIG. 3. Such conventional means usually involves the use of a push button or turn button carried by the inner knob of the lockset, and which, when moved inwardly, locks the latch retracting mechanism against rotation. The actual means used to reciprocate bar **34** is therefore not described herein as the invention does not rely on any particular form of actuating means.

The very specific description herein set forth of the preferred form of the invention is not to be taken as restrictive thereof as it is obvious that minor variations in design may be resorted to without departing from the spirit of the invention.

I claim:

1. In a lock cylinder plug having a keyway extending longitudinally thereof, a bore formed in said plug and extending transversely thereof into said keyway, a key obstructing element movable from a position within said bore to a position partially within said keyway for blocking movement of a key along said keyway, an actuating pin slidably received in said plug and slidable from a first position permitting movement of said element in said bore out of said keyway to a second position blocking such movement, whereby a key is prevented by said element from being inserted along the length of said key way when said actuating pin is in said second position, said pin being formed with a notch intermediate its ends to receive said element therein when said pin is in said first position, and said notch being formed with a camming surface for urging said element toward said keyway when said pin is moved to said second position.

2. In a lock cylinder plug having a keyway extending longitudinally thereof and operatively connected with an actuator bar for actuating the retractor mechanism of an associated lockset, said actuator bar and plug being movable axially relative to each other, a bore formed in said plug and extending transversely thereof into said keyway, a key blocking element movable in said bore from a position within said keyway for blocking movement of a key along said keyway to a nonblocking position out of said keyway, an actuating pin supported in said plug for movement axially thereof from a holding position to an inoperative position and vice versa, said pin being provided with a portion adapted to move across the path of travel of said blocking element within said bore when said pin is moved to said holding position for holding said element in said blocking position and adapted to move out of the path of travel of said blocking element to an inoperative position permitting movement of said element out of said keyway to said nonblocking position when said pin is in said inoperative position, and means connecting said pin to said actuator bar for movement therewith.

3. In a lock cylinder plug having a keyway extending longitudinally thereof, a bore formed in said plug and extending transversely thereof into said keyway, a key blocking element movable in said bore from a position within said keyway for blocking movement of a key along said keyway to a nonblocking position out of said keyway, an actuating pin supported in said plug for movement axially thereof from a holding position to an inoperative position and vice versa, said pin being provided with a portion adapted to move across the path of travel of said blocking element within said bore when said pin is moved to said holding position for holding said element in said blocking position and adapted to move out of the

path of travel of said blocking element to an inoperative position permitting movement of said element out of said keyway to said nonblocking position when said pin is in said inoperative position, said pin being formed with a notched portion adapted to move into registration with said bore when said pin is moved to said inoperative position for permitting movement of said element into said notched portion when said element is in said nonblocking position.

4. In a lock cylinder plug having a keyway extending longitudinally thereof, a bore formed in said plug, and extending transversely thereof into said keyway, a key obstructing element movable from a position within said bore to a position partially within said keyway for blocking movement of a key along said keyway, an actuating pin slidably received in said plug and slidable from a first position permitting movement of said element in said bore out of said keyway to a second position blocking such movement, whereby a key is prevented by said element from being inserted along the length of said keyway when said actuating pin is in said second position, said pin being formed with a notch intermediate its ends to receive said element therein when said pin is in said first position, said pin urging said element towards said keyway when the pin is moved to said second position, the outer end of said actuating pin being flush with the outer face of said plug when said pin is in the first position, and projecting outwardly of said face when the pin is in the second position to indicate that the keyway is blocked.

5. In a lock cylinder plug having a keyway extending longitudinally thereof, a bore formed in said plug, and extending transversely thereof into said keyway, a key obstructing element movable from a position within said bore to a position partially within said keyway for blocking movement of a key along said keyway, an actuating pin slidably received in said plug and slidable from a first position permitting movement of said element in said bore out of said keyway to a second position blocking such movement, whereby a key is prevented by said element from being inserted along the length of said keyway when said actuating pin is in said second position, said pin being formed with a notch intermediate its ends to receive said element therein when said pin is in said first position, said pin urging said element towards said keyway when the pin is moved to said second position, the outer end of said actuating pin being flush with the outer face of said plug when said pin is in the first position, and projecting outwardly of said face when the pin is in the second position to indicate that the keyway is blocked, and spring means urging siad pin toward said first position at all times.

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