United States Patent [19]

Surko, Jr.

[11] **3,713,310**

[45] **Jan. 30, 1973**

[54] LOCK CYLINDER

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[22] Filed: **June 28, 1971**

[21] Appl. No.: **157,264**

[52] **U.S. Cl.** ..... **70/364 A**, 70/337

[51] **Int. Cl.** **F05b 27/00**

[58] **Field of Search** 70/364, 337, 338, 379, 380, 70/369

[56] **References Cited**

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[57] **ABSTRACT**

A lock cylinder having an emergency function and including a housing containing a key-removable core supporting a rotatable key plug for driving a roll-back supported on the housing externally thereof. An axially movable control member received in the housing rearwardly of the key plug cooperates in one position with a stop lug associated with the housing to limit angular movement of the key plug and the roll-back in one and an opposite direction when an operating key is employed to operate the lock cylinder. An elongated emergency key is provided which extends through the key plug to engage and shift the control member to another position out of alignment with the stop lug to effect free rotation of the key plug and the roll-back in one and an opposite direction. The effective length of the emergency key is critical.

11 Claims, 5 Drawing Figures

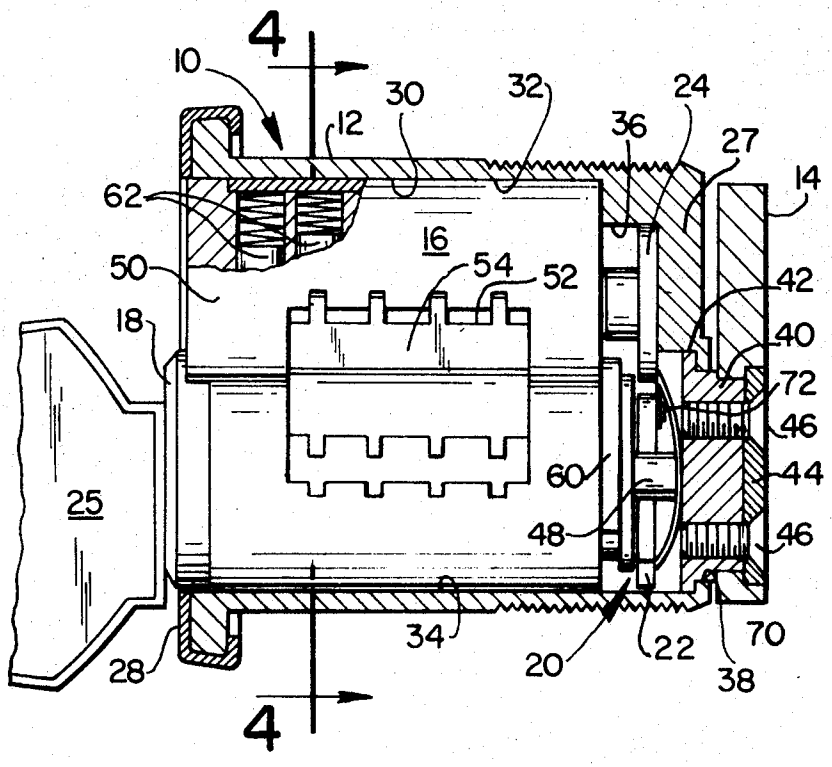


FIG. 1

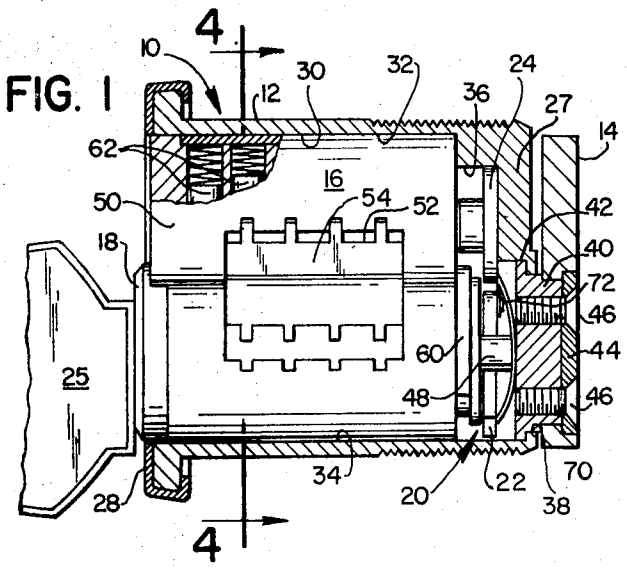


FIG. 2

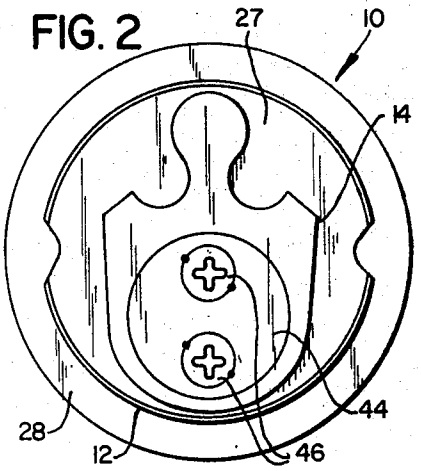


FIG. 3

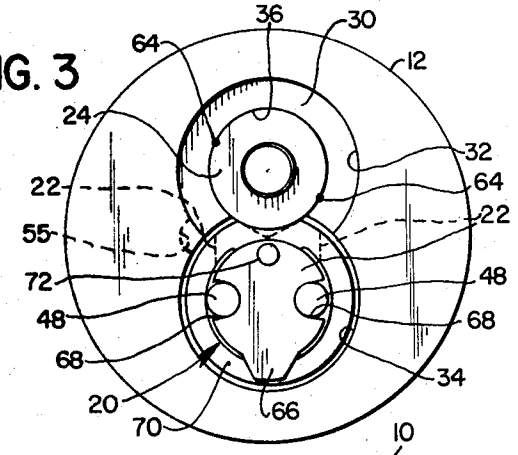


FIG. 4

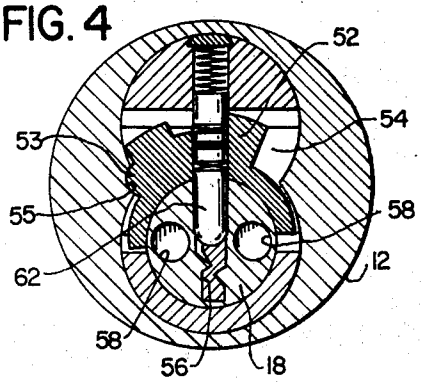
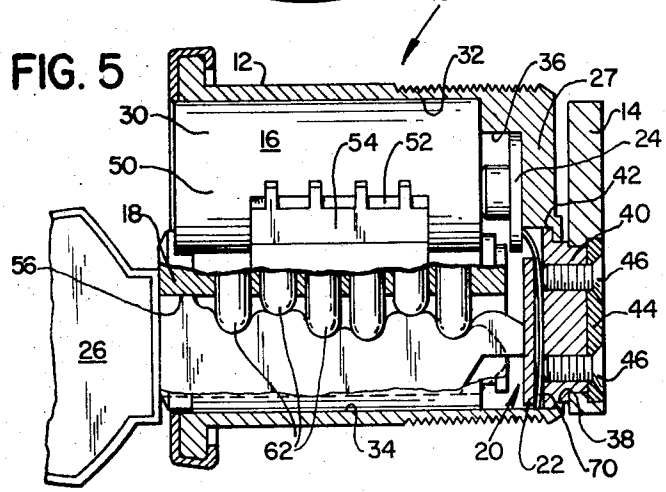


FIG. 5



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LOCK CYLINDER

BACKGROUND OF THE INVENTION

This invention relates in general to locks and deals more particularly with a key-operated pin tumbler lock cylinder. The lock cylinder of the present invention is particularly adapted for use with a lock mechanism embodying multiple locking functions, as for example, a lock mechanism including both a latch bolt and a dead bolt. Such a lock mechanism is particularly suitable for use on the door of a hotel room or the like where it is desirable that the latch bolt be operable by a plurality of keys of differing class and the dead bolt be protractible by the room occupant to assure complete privacy. However, in the event of an emergency, it may be desirable that an authorized person gain immediate access to the room even though the dead bolt has been protracted by the occupant thereof. Accordingly, the general aim of the present invention is to provide an improved lock cylinder for use with a lock mechanism of the aforedescribed general type and operable by a class of key superior to all other classes for retracting all of the bolts of an associated lock mechanism.

SUMMARY OF THE INVENTION

In accordance with the present invention an improved lock cylinder is provided which includes a rotatable key plug, an external roll-back driven by the key plug and a movable control member contained within the lock cylinder and operable in one position to limit angular movement of the key plug and the roll-back in response to operation of any one of a plurality of keys of differing class. An emergency key, superior to the keys of all other classes, is employed to move the control member to another position wherein the key plug and roll-back are freely rotable in one and an opposite direction in response to operation of the emergency key.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevational view of a lock cylinder embodying the present invention and having a key-removable core shown with an operating key therein, the housing and roll-back being shown in vertical section. FIG. 2 is a rear elevational view of the lock cylinder of FIG. 1.

FIG. 3 is a front elevational view of the lock cylinder of FIG. 1 shown with the core removed therefrom.

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 1.

FIG. 5 is generally similar to FIG. 1 but shows the lock cylinder with an emergency key therein.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is illustrated and described with reference to a lock cylinder of key-removable core type, however, it should be understood that the invention is not limited to lock cylinders of this type. Referring now to the drawing, a lock cylinder embodying the present invention and indicated generally by the reference numeral **10** comprises a cylindrical housing or shell **12** which has a conventional roll-back or cam **14** supported externally thereof for rotation relative thereto. A key-removable core **16** locked in the housing supports a rotable key plug **18** for driving the roll-back **14**. All of the aforesaid parts may be and preferably are of substantially standard construction. In accordance with the present invention, a control mechanism disposed within the housing **12** and indicated generally by the reference numeral **20** is operable to control angular movement of the key plug **18** and the roll-back **14**. More specifically, the control mechanism **20** includes a movable control member **22** biased to one position shown in FIG. **1** wherein it is aligned and engageable with a fixed stop lug **24** on the housing to limit angular movement of the key plug and the roll-back in response to manual manipulation of an operating key **25**. An emergency key **26**, superior to all other keys associated with the lock cylinder, moves the control member **22** to and retains it in another position out of alignment with the stop lug **24**, as shown in FIG. **5**. When the control member **22** is in the latter position, the key plug **18** and the roll-back **14** are freely rotable in one and an opposite direction in response to rotation of the key **26**.

Considering the lock cylinder **10** in further detail, the cylindrical housing **12** has a rear wall **27** and is externally threaded for connection with an associated lock mechanism (not shown). A flange **28** at the forward end of the housing is adapted to engage the outer face of a door (not shown) or an escutcheon plate secured thereto. The housing **12** also includes a recess or core receptacle **30** which has a figure-**8** shaped cross section formed by parallel intersecting parti-cylindrical upper and lower bores **32** and **34** which open through the outer end thereof. The lower bore **34** extends into the rear wall **27** for some distance beyond the upper bore **32**. Another forwardly opening parti-cylindrical bore **36** coaxially aligned with the upper bore **32**, but of somewhat smaller diameter, is formed in the rear wall **27** and intersects the lower bore **34**. A generally cylindrical bore **38** of somewhat smaller diameter than the lower bore **34** and coaxially aligned therewith extends through the rear wall **27** to provide a journal for a generally cylindrical cam driver **40**. An integral annular flange **42** on the inner end of the cam driver **40** bears against the forwardly facing surface of the rear wall **27**. The cam **14** is received on a reduced cylindrical rear end portion of the cam driver **40** and secured thereto by a retaining disc **44** and a pair of screws **46, 46** substantially as shown in FIGS. **1** and **4**. A pair of diametrically spaced drive pins **48, 48** mounted on the cam driver **40** extend into the lower bore **34**.

The core **16** comprises a removable or interchangeable figure-**8** pin tumbler lock core and includes a body **50** supporting the rotable key plug **18** and a locking element **52** arranged for limited angular movement relative to the body **50** and with the key plug to lock the core **16** in or release it form the housing **12** when the key plug is operated by a control key (not shown). More specifically, the body **50** includes a recess **54** for containing the locking element **52**. The locking element has a locking shoulder **53** thereon and is arranged for limited angular movement with the key plug **18** and relative to the body **50** between a releasing position wherein the locking element **52** is wholly disposed within the recess **54** and the core **16** is removable from the housing **12** and a locking position wherein the locking shoulder **53** is disposed outwardly or beyond

the figure-8 shaped profile of the body **50**. In the locking position, the locking shoulder **53** is at least partially disposed within a recess **55** in the housing to releasably retain the lock core **16** in assembly with the housing.

The key plug **18** is of a generally conventional type and has a cylindrical body with a paracentric fluted keyway **56** formed therein which extends axially therethrough. A pair of cylindrical holes **58, 58** extend axially into the key plug on opposite sides of the keyway **56** and open through the rear face of the key plug to receive the drive pins **48, 48**. A generally U-shaped retaining washer **60** received in an annular recess at the rear end of the key plug **38** cooperates with an annular shoulder formed at the forward end of the plug to retain the plug in assembly with the body **50**.

The key plug **18** and the locking element **52** are locked against rotation by conventional stacks of pin tumblers indicated at **62, 62** and received in a plurality of pin tumbler holes formed in the body **50**, the locking element **52** and the key plug **18**. A control line of shear is formed between the locking element **52** and the body **50**. An operating line of shear is formed between the locking element **52** and the key plug **18**. When a control key (not shown) is inserted in the key plug **18**, the pin tumblers **62, 62** are aligned with the control line of shear so that the locking element **52** may be moved through a limited angle with the key plug **18** and relative to the body **50** to a position wherein the locking shoulder **53** is disposed within the locking recess **55** in the housing **12**. When the control key is in its shed position, the core **16** is locked within the housing **12**. Thereafter when the operating key **24** or another key of higher order is inserted in the key plug **18**, the pin tumblers **62, 62** move into alignment with the operating line of shear so that the key plug **18** may be rotated, key rotation being limited only by the control mechanism **20**. For a more complete disclosure of a lock core of the aforedescribed type, reference may be had to copending application Ser. No. 10,190 of Surko et al. for "Lock Core," filed Feb. 10, 1970, and assigned to the assignee of the present application.

Further considering the control mechanism **20**, the stop lug **24** is received in the bore **36** and comprises a generally circular disc which has a diameter substantially equal to the diameter of the parti-cylindrical bore **36**. A forwardly projecting central portion of the stop lug bears against the rear surface of the body **50** when the core **16** is locked in the housing **12**. The stop lug is preferably staked into assembly with the housing as indicated at **64, 64** in FIG. **3** so that it remains in assembly therewith when the core **16** is removed. The central member **22** is a generally cylindrical disc which has a radially outwardly extending projection **66**, as best shown in FIG. **3**, and a pair of diametrically spaced notches **68, 68** for slidably receiving the drive pins **48, 48**. An annular spring washer **70** staked to the rear surface of the control member as indicated at **72** has a marginal portion thereof disposed rearwardly of the stop lug **24** and cooperates therewith to retain the control member **22** in assembly with the cam driver **40**. The spring washer **70** biases the control member toward the rear surface of the key plug **18** or toward a first position wherein it engages the rear surface of the key plug. When the control member **22** is in its first position, it is generally aligned with the stop lug **24** so that the projection **66** is engageable with the stop lug to limit rotation of the cam **14** and the key plug **18**, as shown in FIG. **3**, the limits of rotation being indicated by broken line positions of the control member **22**.

The elongated emergency key **26** is adapted to extend through and beyond the key plug **18** to engage the control member proximate its center and bias it rearwardly to a second position out of alignment with the stop lug **24**, as shown in FIG. **4**. The cam driver arrests the rearward movement of the control member **22** when the control member attains its second position. When the control member **22** is in its second position the key plug **18** and the cam **14** may be freely rotated in one and an opposite direction in response to manual manipulation of the emergency key **26**.

The lock cylinder **10** is so constructed and arranged that the length of the emergency key **26** is quite critical. Thus if an attempt is made to use a properly bitted key of excessive length in place of a proper emergency key, the control member will attain its second position before the key bits are properly aligned with the pin tumblers **62, 62**. Thus, the lock cylinder cannot be operated. If an attempt is made to use a properly bitted key of insufficient length as an emergency key, the control member will not be biased to a position out of alignment with the stop lug **24** to free the key plug and cam for unlimited rotation. It will now be apparent that the key plug, the control member and the roll-back will be freely rotable in one and an opposite direction only when the control member is in its second position.

I claim:

1. A lock cylinder comprising a housing having a recess therein, a key plug supported in said recess for rotation relative to said housing and having a keyway therein, a roll-back supported externally of said housing for rotation relative thereto, drive means for connecting said roll-back to said key plug for rotation therewith, a stop lug in said housing rearwith of said key plug, a control member in said housing rearward of said key plug and rotable with said key plug and said roll-back, said control member being movable relative to said key plug and said housing between a first position wherein said control member is in general alignment with said stop lug and a second position out of alignment therewith, means for biasing said control member toward said key plug and to said first position, said control member in said first position being engagable with said stop member to limit angular movement of said key plug and said roll-back in one and an opposite direction, said key plug said control member and said roll-back being freely rotable in one and an opposite direction when said control member is in said second position, an operating key insertable in said keyway for rotating said key plug with said control member in said first position, and an emergency key insertable in said keyway and engagable with said control member to bias said control member to and retain said control member in said second position and for rotating said key plug with said control member in said second position.

2. A lock cylinder as set forth in claim **1** wherein said control member is axially movable relative to said key plug and in general radial alignment therewith in said first position.

3. A lock cylinder as set forth in claim 1 including means for arresting further movement of said control member when said control member attains said second position, said control member, said key plug and said roll-back being freely rotable in said one and said opposite direction only when said control member is in said second position.

4. A lock cylinder as set forth in claim 1 including a removable core slidably received in said recess and adapted for releasable locking engagement with said housing, said key plug comprising a part of said core, and a change key insertable in said keyway for rotating said key plug in one and an opposite direction respectively to lock said core in said housing and to release said core therefrom.

5. A lock cylinder as set forth in claim 4 wherein said control member is axially movable relative to said key plug and in general radial alignment therewith in said first position.

6. A lock core as set forth in claim 4 wherein said recess has a generally figure-8 cross sectional configuration and said core has a generally figure-8 cross sectional configuration complementing the cross sectional configuration of said recess.

7. A lock core as set forth in claim 4 wherein said recess is defined by a pair of parallel intersecting particylindrical bores, said stop lug is received in one of said bores and said control member is received in the other of said bores.

8. A lock core as set forth in claim 4 wherein said biasing means cooperates with said stop lug to retain said control member in assembled relation with said housing when said core is removed therefrom.

9. A lock core as set forth in claim 1 wherein said biasing means comprises a spring washer connected to said control member for rotation therewith.

10. A lock cylinder as set forth in claim 1 wherein said drive means comprises a drive member journaled on said housing for coaxial rotation with said key plug and having a pair of axially parallel drive pins extending into said recess and said key plug has a pair of axially extending openings therein respectively receiving said drive pins, said control member supported for axial movement on said pins and relative to said drive member and for rotation with said drive member.

11. A lock cylinder as set forth in claim 1 wherein said control member is supported for axial movement by said drive means.

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