United States Patent [19]

Zucca

[11] **3,720,085**

[45] **March 13, 1973**

[54] PICK PROOF LOCK

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[52] **U.S. Cl.** **70/358,** 70/363, 70/403, 70/419

[51] **Int. Cl.**.....**E05b 35/00,** E05b 19/08

[58] **Field of Search**.....70/351, 358, 362, 363, 403, 70/419, 401, 404, 349; 292/57, 59, 60, 62

[56] **References Cited**

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[57] **ABSTRACT**

A pick proof lock assembly in which an annular housing or body member having a plurality of axial grooves telescopically receives a cylinder having rows of radially extending lug projections receivable in the body grooves. The cylinder is connected to a bolt actuating mechanism in any conventional manner with rotation of the cylinder in the body effecting bolt movement for locking and unlocking a door. The cylinder is normally prevented from rotation in the body by engagement of one or more of the lug projections with the side walls of the grooves. A key is used to axially move selected ones of the key projections into alignment with transaxial peripheral notches communicating with an associated groove, and when so aligned, further key rotation will permit rotation of the cylinder for unlocking operation. The non-selected projections will already be normally aligned with such peripheral notches. As a further feature, a plurality of short dummy peripheral notches may be provided which are normally aligned with the selected operative lug projections, such notches not being sufficiently long to permit operative cylinder rotation, but their presence is intended to thwart any person attempting to pick the lock, since such person could not ascertain whether a lug projection was aligned with an operative or a dummy notch.

8 Claims, 9 Drawing Figures

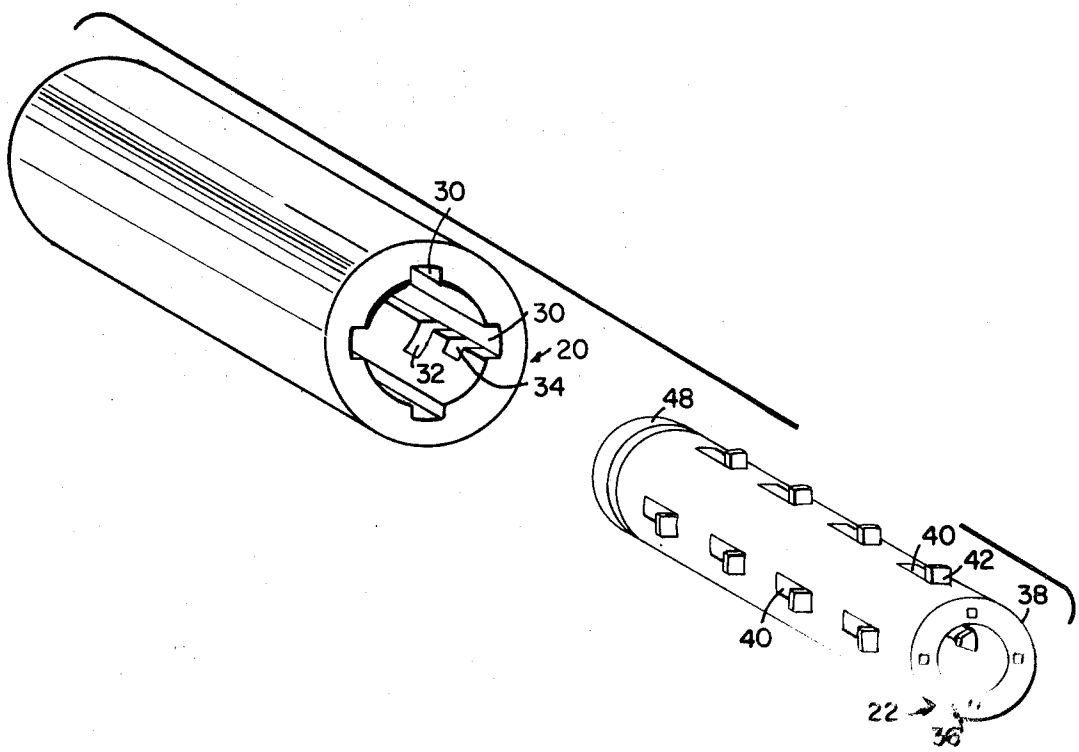
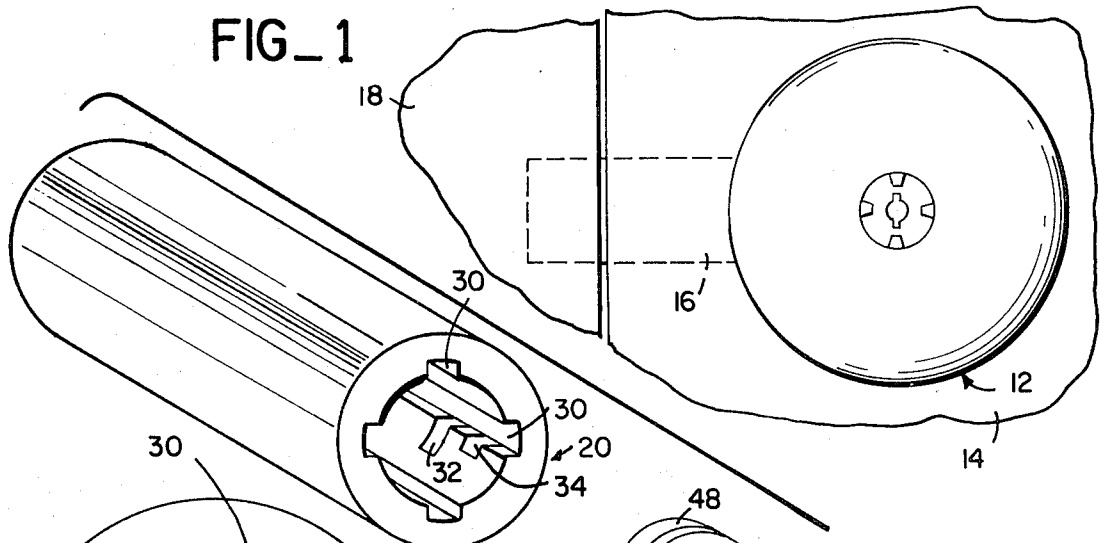


FIG_1



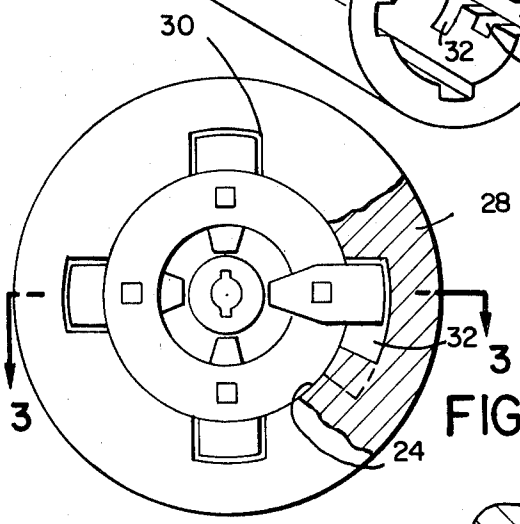


FIG_4

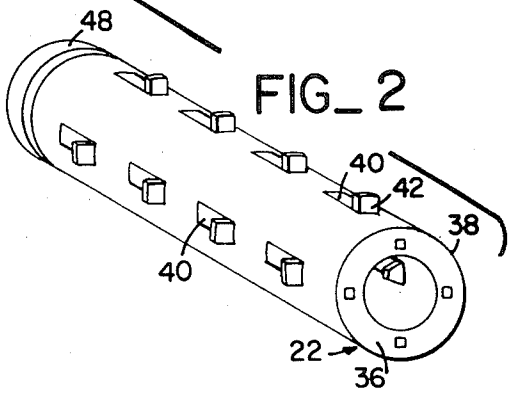


FIG_2

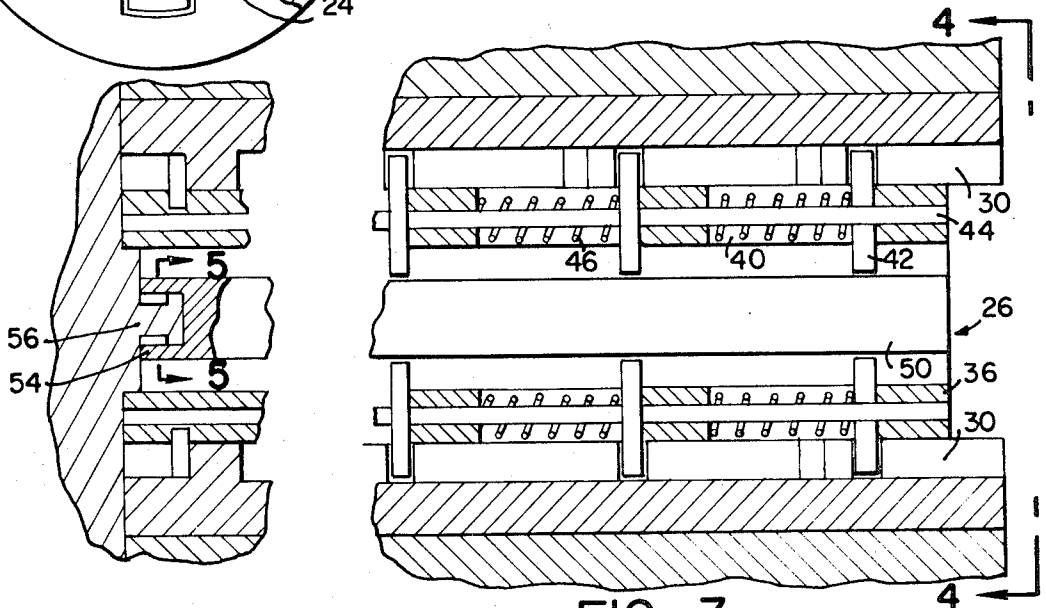


FIG_3

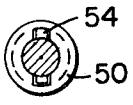


FIG_5

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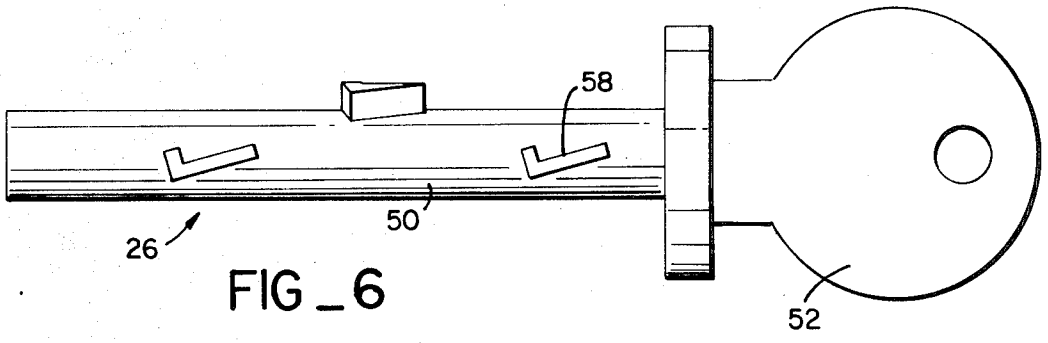


FIG_6

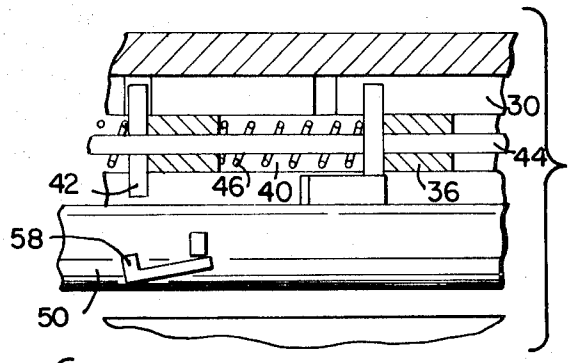


FIG_7A

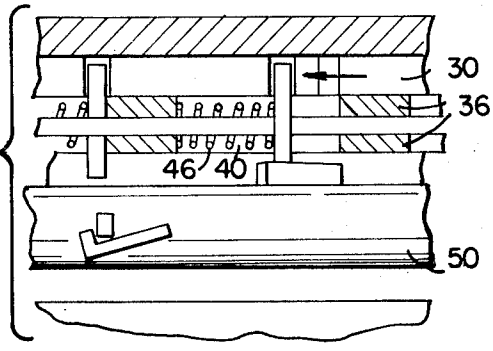


FIG_7B

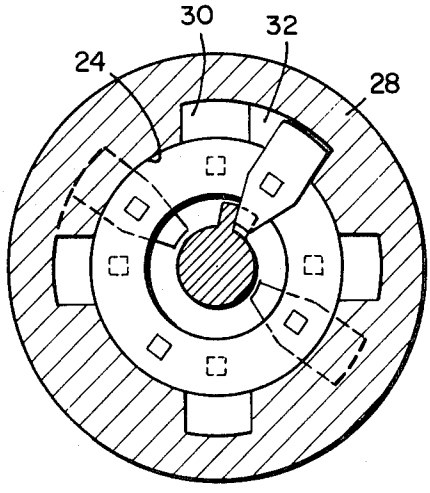


FIG_8

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PICK PROOF LOCK

BACKGROUND OF THE INVENTION

The art of key actuated locks is highly developed, and the present invention provides an improved lock which will effectively prevent any actuating device other than the appropriate key from operating the same. A wide variety and number of combinations are possible, and depending on the particular requirements any number of operating lugs from one upwardly may be employed, with the remaining lugs not being actuated by the key, but nevertheless positioned so that a pick or like instrument would be ineffective in determining which one or more of the lug projections have to be moved to effect unlocking.

THE DRAWINGS

FIG. 1 is a front view of a door with the lock of the present invention installed;

FIG. 2 is an exploded perspective view of the lock body and cylinder;

FIG. 3 is a longitudinal cross-sectional view of the lock taken in the plane indicated by line 3—3 of FIG. 4;

FIG. 4 is an end view taken in the plane indicated by line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken in the plane indicated by line 5—5 of FIG. 3;

FIG. 6 is a plan view of the key used in operating the lock;

FIG. 7A is a longitudinal cross-sectional view of a portion of the lock shown in FIG. 3 with a key inserted therein;

FIG. 7B is a view similar to FIG. 7A, but sharing the key in a second position;

FIG. 8 is a cross-sectional view of the parts in an unlocked position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In broad terms, the lock of the present invention, generally designated by the numeral 12, is adapted for installation in a door 14, and as is conventional in the art, such lock is operatively connected to a latch member 16, movable from the locked position within a door joint 18 as shown in FIG. 1, to a retracted unlocked position to permit opening of the door.

The lock 12 includes an annular housing 20 which is permanently secured to an opening provided in the door 14 and a rotatable cylinder 22 disposed within the axially extending bore 24 of the housing. As will be later explained in more detail, the cylinder is normally prevented from rotation in the housing until a proper key 26 (FIG. 6) is inserted in the lock. Turning of the key will then effect cylinder rotation, and by suitable and conventional connection (not shown) to the latch 16, will cause retraction of the latch.

Referring first to the housing 20, it will be noted that it is of generally annular configuration with the bore 24 of greater transaxial extent than the thickness of the housing wall 28. At least one, and preferably a plurality of axially extending grooves 30 are provided in the wall 28, with each groove being in communication with the bore 24. The grooves have a substantially rectangular cross-sectional configuration. In communication with the grooves 30 and with the bore 24 are a plurality of transaxial peripherally extending primary notches 32, and in some instances, there may also be provided a plurality of transaxial peripherally extending secondary or dummy notches 34 likewise communicating with groove 30 and bore 24, but extending for a lesser peripheral extent than the primary notches 32.

Next referring to the cylinder 22, this member likewise has a generally annular body portion 36 whose outer surface 38 is adjacent the inner surface of housing bore 24 when the cylinder is telescopically inserted in the bore. Cylinder 22 is provided with a plurality of rows of axially extending aligned slots 40, the number of rows corresponding in number and radical position to that of the housing grooves 30. Extending radially outwardly from each of the slots 40 is a lug 42 which substantially fills the width of the slot but which has a substantially lesser axial extent than the length of the slot. Such lugs are mounted for axial movement along the length of their respective slots, and as illustrated, are normally positioned to the right end portion of the slot (FIGS. 2, 3 and 7A), but are movable to the left end portion of the slot (FIG. 7B) as will be later described.

To permit such movement, a plurality of pins or shafts 44 extend axially through the cylinder body 36 and through the slots 40 provided therein. The respective lugs are slidably mounted on their respective shafts and by means of springs 46 provided in each slot are resiliently urged to their normal or inoperative position.

With the housing 20 secured to the door 14, and with the cylinder lugs 42 seated in the grooves 30, rotation of the cylinder is normally prevented. The cylinder may be prevented from axial displacement within the housing in any suitable manner, such as providing a flange 48 at the inner or left hand end of the cylinder body 36 which will permit relative rotation but prevent axial withdrawal. Likewise, if desired, after the cylinder is engaged with the housing, a suitable annular disc may be inserted over the outer or right hand end of the housing which will block the ends of the grooves 30 and prevent withdrawal of the lugs and consequently the cylinder from the housing.

It should be understood from the foregoing description that with the lugs in the grooves 30, if all of the lugs were likewise aligned with a primary notch 32, the cylinder could be rotated in the housing and permit opening of the lock. Thus, in accordance with the present invention, while some of the lugs may in their normal position be so aligned, selected lugs will be axially spaced from an associated primary notch, and such latter lugs must consequently first be axially displaced into alignment with their respective notches before cylinder rotation can be effected. The key 26 is utilized to engage such selected lugs.

Key 26 includes a cylindrical shank 50 and a manually engageable grip portion 52. The distal end of the key is provided with a T-shaped projection 54 which, when inserted through the bore of cylinder 22, forms a bayonet-type engagement with a member 56 positioned adjacent the inner or left hand end of the cylinder so that rotation of the cylinder with the key may be effected. The key shank is provided with one or more L-shaped cam projections 58, with one of such projections adapted for operative engagement with the

selected lugs **42** which must be moved axially in order to align the same with its appropriate primary notch **32**. As best illustrated in FIGS. **7A** and **7B**, the longer leg portion of each projection forms an acute angle with the axis of the key shank, and upon initial key rotation, the sloping cam surface will urge the radially inwardly projecting portion of the lug inwardly or to the left as viewed in the drawing against the weak pressure imposed by spring **46**. When the lug reaches the inner end of its slot **40**, it will be aligned with a primary groove **32**, and continued key rotation will cause the lug to rotate in the groove **32**, and thus likewise rotate the cylinder, performing the unlocking operation.

As above explained, one, some or all of the lugs may be initially offset from their respective primary grooves, and each key would have a number of projections **58** therein corresponding in number and position to that of the offset lugs. The non-selected lugs, i.e., the lugs already aligned with a primary groove, will not be axially displaced by the key, but are free to be rotated in their grooves after the selected lugs have been axially displaced and rotated.

As a further feature of this invention, means are provided to prevent a person from inserting a pick or similar tool in the lock in order to determine which of the lugs **42** are not aligned with a groove **32**, which would of course indicate that such lugs would have to be axially displaced before cylinder rotation is possible. Such means include the secondary or dummy notches **34** which are normally aligned with the selected lugs **42** so that if a pick is inserted, the user could not ascertain whether the lug is aligned with a primary notch **32** or a dummy notch **34**. Since the dummy notches **34** do not extend for a sufficient distance to permit cylinder rotation effecting unlocking of the door, a practical safeguard is thus provided.

I claim:

1. A lock including an outer tubular housing, defining a longitudinally extending cylindrical bore, and a cylinder with a central axial bore rotatably mounted and axially fixed within said housing bore, said housing having at least one longitudinally extending groove formed in said housing in communication with said housing bore and extending toward but terminating short of the outer surface of said housing, at least one set of axially spaced transaxial peripherally extending primary notches formed in said housing in communication with said housing bore and with said groove, at least one set of axially spaced transaxial peripherally extending secondary notches formed in said housing in communication with said housing bore and with said groove and each being axially spaced from a corresponding primary notch, said secondary notches extending a lesser peripheral distance from said groove than said primary notches, said cylinder having at least one set of axially aligned and axially spaced radial lugs extending outwardly and into said groove and selective ones thereof normally being axially offset from corresponding primary notches, inner portions of said lugs extending into said cylinder axial bore, said lugs being each capable of independent axial displacement relative to said cylinder, and means for moving said selective ones of said lugs axially into registration with the corresponding primary notches.

2. A lock as set forth in claim **1** including spring means normally urging said lugs into said normal offset positions.

3. A lock as set forth in claim **1** in which said last named means includes a key insertable in said cylinder bore, said key comprising a shaft having at least one ramplike cam projection on the periphery of said shaft, said cam projection being engageable with an inner portion of one of said lugs.

4. A lock as set forth in claim **1** in which said housing is provided with a plurality of said grooves, a plurality of said sets of primary and secondary notches extending from the respective grooves, and a plurality of said sets of lugs on said cylinder in circumferentially spaced relation disposed within the respective grooves.

5. A lock as set forth in claim **4** in which selected ones of said lugs are aligned with selected ones of said primary notches and other of said lugs are normally axially offset from their adjacent primary notches.

6. A lock as set forth in claim **5** in which said housing is provided with a plurality of said sets of said secondary notches, each notch extending a lesser distance from its respective groove than said primary notches, and in which said other of said lugs are aligned with said secondary notches.

7. A lock as set forth in claim **5** in which said cylinder is provided with a plurality of sets of axial slots, said slots being in alignment with said grooves, said lugs extending through said slots, and one end of each slot being adjacent to a primary notch.

8. A lock as set forth in claim **7** in which a spring means normally urges each of said lugs toward an end of its respective slot.

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