

Aug. 2, 1966

J. A. TARTAGLIA

3,263,461

CYLINDER LOCK

Filed Nov. 21, 1963

2 Sheets-Sheet 1

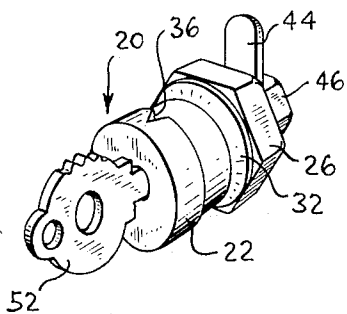


Fig. 1

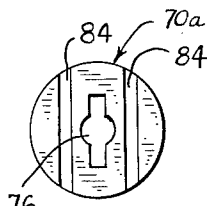


Fig. 4

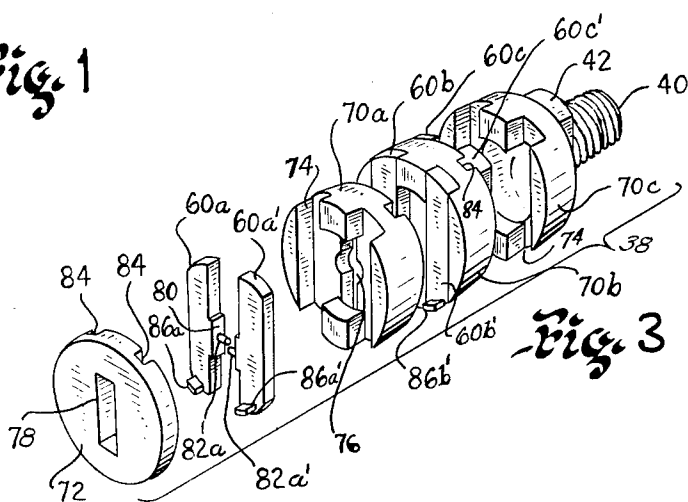


Fig. 3

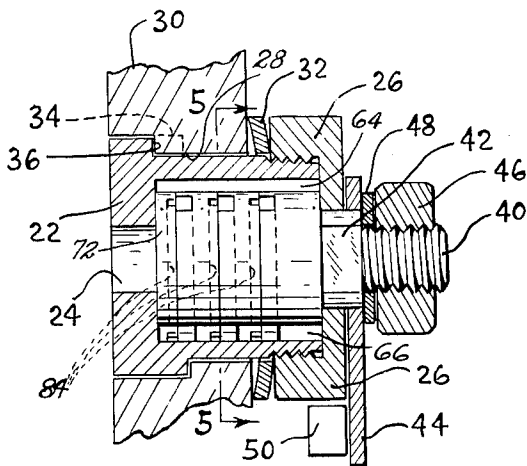


Fig. 2

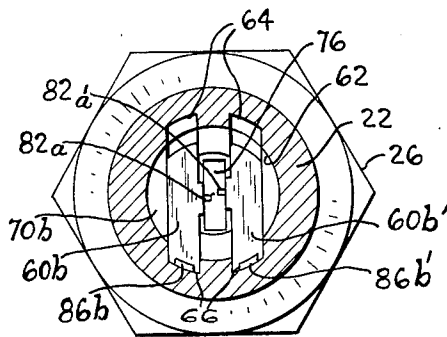


Fig. 5

INVENTOR.
JOHN A. TARTAGLIA
BY *Steward + Steward*

his ATTORNEYS

Aug. 2, 1966

J. A. TARTAGLIA

3,263,461

CYLINDER LOCK

Filed Nov. 21, 1963

2 Sheets-Sheet 2

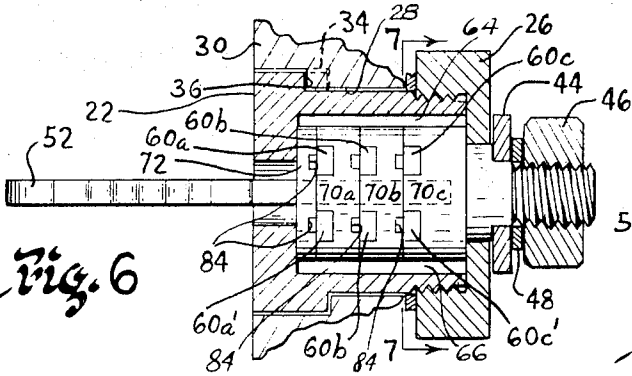


Fig. 6

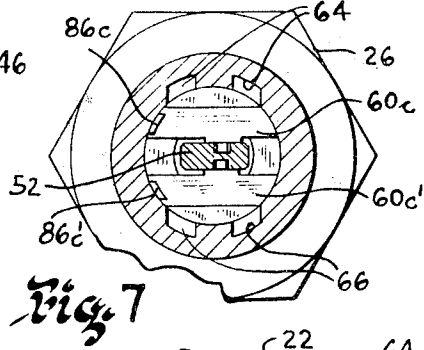


Fig. 7

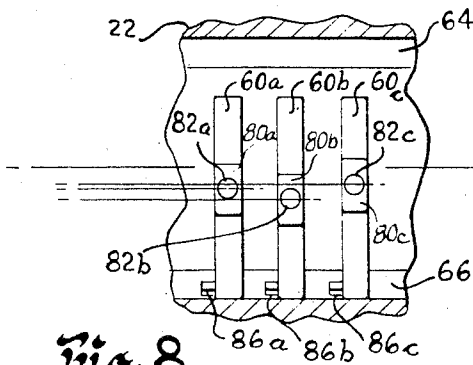


Fig. 8

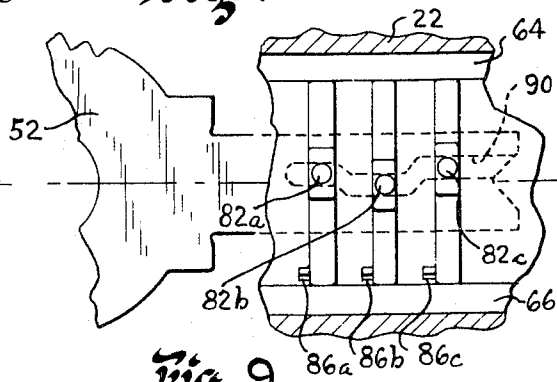


Fig. 9

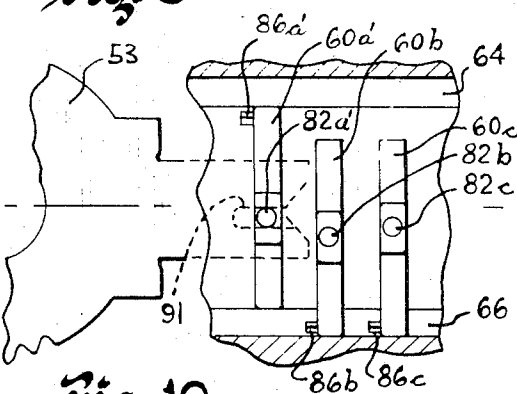


Fig. 10

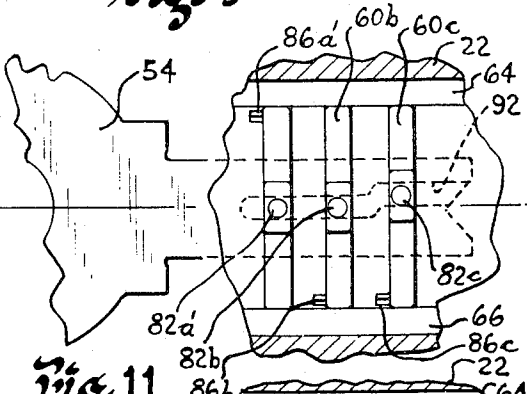


Fig. 11

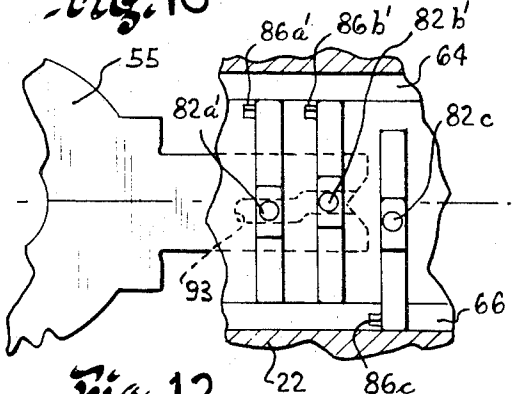
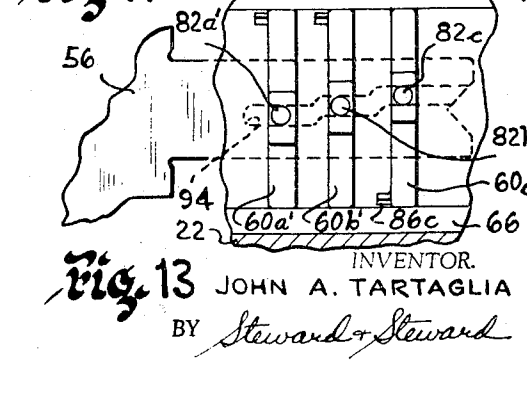


Fig. 12



INVENTOR.
 JOHN A. TARTAGLIA
 BY *Steward & Steward*

his ATTORNEYS

1

3,263,461

CYLINDER LOCK

John A. Tartaglia, 108 Stoddard Road, Waterbury, Conn.

Filed Nov. 21, 1963, Ser. No. 325,240

3 Claims. (Cl. 70—383)

This invention relates to locking devices, and more particularly to cylinder locks employing tumblers to provide a device affording good security against tampering and lock-picking.

It is an important object of the present invention to provide a lock of the foregoing type in which the locking combination may be altered by authorized means to change the combination, and hence to change the key required to unlock the device. Still further, it is a purpose to provide a cylinder lock construction capable of selective, authorized modification of the locking mechanism to provide a substantial number of different locking combinations whereby changes can readily be made to prevent opening of the lock by persons whose authority to have access to the compartment, etc., protected by the lock has been terminated.

In addition to providing a device of the foregoing type which is of relatively simple construction, it is of major importance that the locking device be capable of quick change so as to be opened only by an entirely different key than was formerly operative, without requiring detachment of the locking device from the unit protected thereby, or disassembly of the lock in any way. As a corollary of this, it is an object of the invention to enable the locking combination to be changed without requiring access to the interior of the compartment, etc., protected by the locking device.

These objectives are achieved in a unique manner in accordance with the invention herein disclosed. The means by which this is achieved are relatively simple, yet afforded a device having a high order of resistance to tampering and unauthorized access. Briefly and in general, the foregoing is achieved by a cylinder lock characterized in that the cylinder, which is rotatable to throw a bolt from locked to unlocked position, is divided into a plurality of tumbler retaining sections disposed transversely of the cylinder axis. Sets of tumblers are retained for sliding movement adjacent a face of each cylinder section. As is conventional, these tumblers are arranged to be cammed by a properly bitted key to move the respective sets of tumblers from positions eccentric of their respective cylinder sections to positions symmetrical or neutralized relative thereto to permit rotation of the cylinder in the lock casing or barrel to an unlocked position. These same tumblers are further provided with means for engaging the respectively adjacent cylinder sections when the tumblers are in neutral position, whereby all of the several sections of the cylinder are positively interconnected so that all are caused to rotate together as a single, integral lock cylinder. Thus, in this condition, the tumbler retaining sections act as an integral cylinder and permit the lock bolt to be thrown to its alternate positions. The aforesaid means on the tumblers by which interlocking of the cylinder sections is achieved is rendered inoperative, however, when the tumbler sets assume positions eccentric of their respective cylinder sections, which position they assume in the locked condition of the device.

By use of special combination change-keys, as more fully described herein, to rotate up to one less than the total number of tumbler retainers in the device 180° from their respective original positions, the arrangement of the sections is reoriented. Such rotation renders the bitting of the key formerly operative for that lock now inoperative. Through change of relative rotated positions of adjacent sections in this manner in different se-

2

quencing, a substantial number of different locking combinations is achieved, the number of such combination changes depending of course on the number of tumbler sections into which the cylinder is divided. The novel lock thus provides a wide selection of key-change combinations which can be made entirely without removal or disassembly of the lock. Obviously a great many more combination changes can be made using the identical components in a given lock, by disassembly and reassembly with change of order of the tumbler sections along the cylinder axis.

For purposes of illustration, one embodiment of a cylinder lock incorporating the invention is disclosed in the accompanying drawings. It will be apparent that other modifications are possible, based on the novel teaching provided herein, and all such modifications which fall within the claims or within the scope of equivalency thereof are accordingly intended to be covered.

In the drawings:

FIG. 1 is a perspective view of a typical cylinder lock incorporating the invention, having a key inserted in the lock;

FIG. 2 is a cross sectional view, in side elevation, of the cylinder lock of FIG. 1 installed in a compartment door or removable partition to lock the latter in place;

FIG. 3 is an exploded view of the cylinder of the lock in FIG. 2, incorporating three tumbler-retainer sections and the corresponding sets of tumblers therein;

FIG. 4 shows the rear face of one of the tumbler-retainer sections seen in FIG. 3;

FIG. 5 is a sectional view taken on line 5—5 of FIG. 2;

FIG. 6 is a sectional view, similar to FIG. 2, but with the key inserted and the cylinder turned 90° with respect to the position shown in FIG. 2;

FIG. 7 is a cross sectional view taken on line 7—7 of FIG. 6;

FIG. 8 is a fragmentary view on an enlarged scale, partly in section, illustrating a three-section cylinder lock with tumblers in locking position;

FIG. 9 is a similar view of the same lock with the proper key inserted to orient the tumblers to symmetrical position relative to the cylinder and permit the cylinder to be rotated for unlocking the device;

FIG. 10 is a view similar to the foregoing showing the use of a change-key to change the locking combination;

FIG. 11 shows the changed combination and the new key bitting required to operate the changed lock; and

FIGS. 12 and 13 illustrate further key-change combinations possible and the resulting different key-bitting required to operate the new lock combinations.

A typical cylinder lock in accordance with the invention is shown in FIGS. 1 and 2. Lock 20 consists of a cylindrical barrel or casing 22 closed at one end except for a key-slot 24, and provided at its opposite end with a retaining cap 26 which is removably secured, as by threaded engagement with the barrel. As seen in FIG. 2, the barrel is adapted to be received in a suitable recess 28 of a compartment door or wall 30 which is to be secured by the device. In this instance retaining cap 26 is employed to compress a spring washer 32 against the inner face of the wall 30 to retain the lock in recess 28. Rotation of the lock barrel 22 in the recess is prevented by engagement of a lug 34 formed in wall 30 with a detent 36 formed in the shoulder of the barrel.

The lock cylinder, which is collectively designated in FIG. 3 at 38, is rotatably supported in barrel 22. It is provided with a tailpiece 40 having a bolt stud 42 which is of non-circular cross-section for engagement of a bolt 44. The latter is retained on the shoulder or bolt stud 42 by a retaining nut and washer 46, 48, respectively. The bolt is adapted to be rotated into and out of locking

engagement with a lug 50 on a non-removable partition or wall of the compartment which the locking device is intended to protect.

A key 52, as seen in FIG. 1, permits the lock cylinder to be rotated within barrel 22 to move bolt 44 from locked to unlocked position, whereby the compartment door or wall 30 may be swung open or removed to gain access to the compartment.

In the locked position, rotation of cylinder 38 in barrel 22 is prevented by sets of tumblers 60 which are slidable in cylinder 38 transversely of the axis thereof. As seen more particularly in FIG. 5, barrel 22 is formed with an internal bore 62 with which cylinder 38 forms a bearing fit. Bore 62 is provided in its surface with pairs of axially extending slots or grooves 64, 66. These slots are oriented with relation to detent 36 so that the two sets of tumblers are positioned astride the central vertical plane of the lock in its installed position. Thus tumblers 60 slide by gravity into engagement with whichever set of the slots 64, 66 may be lowermost in the installed lock. As seen in FIG. 5, the tumblers 60, upon sliding into engagement with slot 66, project beyond the cylindrical periphery of cylinder 38 and prevent its rotation in barrel 22. Upon insertion of a proper key 52, the cylinder assembly 38 and bolt 44 may be rotated 90° to unlocked position, as shown in FIGS. 6 and 7.

The cylinder assembly is shown in greater detail in FIG. 3 in which the several sections or tumbler retainers 70a, 70b, 70c, and their associated tumbler sets 60a-60a', 60b-60b', 60c-60c' are depicted in exploded positions. Cylinder 38 also includes, at its forward end, a key plug 72 to complete the assembly.

Tumbler retainers 70a and 70b are identical, while the terminal section 70c is generally similar but is provided with the integral tail piece 40 previously mentioned. Each of the retainers 70 is of cylindrical form, and each is provided in its front face with guide-ways 74 for the sliding reception of tumblers 60. Two such guide-ways, one on each side of the central vertical plane of the cylinder, are milled in the forward faces of retainers 70. The depth of these guide-ways is such as to receive tumblers 60 and dispose the outer surfaces thereof flush with the face of the retainers. The chordal extent of the tumblers is such that their ends are flush with the periphery of retainers 70 when the tumblers are located symmetrically with respect to the axis of cylinder 38. Thus, when all of the tumblers of the several sets are symmetrically positioned in cylinder 38, the cylinder is free to rotate in bore 62 of the barrel 22.

Retainers 70a and 70b are each provided with a central key aperture 76 (see FIG. 3). Key plug 72 at the front end of the cylinder 38 is provided with a corresponding key-slot 78. No corresponding slot is necessary in the rear retainer section 70c.

Each of tumblers 60 is formed on its inner face with a central boss 80 having a key follower or camming pin 82 projecting therefrom in the plane of the tumbler. Pins 82 of each tumbler set thus extend toward each other in the tumbler retainers 70, intersecting the key-slot 76 of the retainer sections. (See FIG. 5.) As will become apparent hereinafter, longitudinal displacement of bosses 80 and pins 82, in combination with the axial displacement of tumbler camming slots in the blade of key 52, determine whether the several sets of tumblers 60 are brought into symmetrical relation to the respective retainer sections 70 when a key is inserted in the lock. This relationship provides the first order of variation possible, providing a whole series of different locking combinations. This relationship, however, is built into the tumblers at the time of manufacture and is determined upon assembly. This order of combination variation cannot be changed without disassembling the lock.

Except for the division of the cylinder 38 into separate retainer sections 70, so much of the lock construction is generally known in the prior art. In the earlier construc-

tions, it has been conventional to employ an integral cylinder, and to bore and broach this to form the key-slot and tumbler guide-ways. In such a construction, only by disassembling the lock and exchanging the positions of the tumblers in the guide-ways, can the lock combination be altered.

The essential improvement whereby the present invention differs from the prior art is provided by the arrangement now to be described, wherein the locking combination of the basic lock just described may be changed without necessity for removing the lock from installed position or disassembling the lock in any manner.

Referring more particularly to FIGS. 3 and 4, it will be seen that the key plug 72 and each of retainer sections 70a, 70b is provided on its respective rear face with paired clearance slots 84. These are parallel to guide-ways 74 on the opposite face of the retainers, or in the case of plug 72, parallel to the key slot 78. Likewise each of the tumblers 60a-60a', 60b-60b' and 60c-60c' in the several sets is provided at one end with an integral projection or lug 86. This lug extends generally perpendicular to the plane of the tumblers i.e. axially of cylinder 38. Projections 86 are slidably received in clearance slots 84 in the adjacent rear faces of the respective retainer sections or key plug, as the case may be, when such retainer sections are similarly oriented angularly with respect to the cylinder axis. However, should retainer section 70a, for example, be rotated, as it may be by a proper locking-combination change-key to neutralize the tumblers 60a-60a' in that section, then projecting legs 86b-86b' of the next set of tumblers 60b-60b' prevent the latter from being neutralized in their retainer section 70b, at least until registry of guide-ways 74 of retainer 70b and slots 84 is again effected upon 180° rotation of the retainer. And, if section 70a is turned 180° in the barrel with respect to the other sections, the relative axial displacement of camming pins 82a-82a' of those tumblers, relative to the central longitudinal axis of the lock cylinder, is altered. A new locking combination is thus established, requiring a key in which the contour of the camming slot is different from that which was formerly operative in the lock.

The foregoing is illustrated more fully in FIGS. 8 through 13 of the drawings.

FIG. 8 represents a first condition or arrangement of the tumblers at one side of the central vertical plane of the lock in a typical locking combination. As here shown, the several tumblers, 60a, 60b, 60c have slid downwardly in their respective guide-ways 74 so as to be positioned eccentrically of their retainer sections 70, with their lower ends engaged in longitudinal slots 66 of the lock barrel. The arrangement of bosses 80 and their camming pins 82 as here shown places the camming pins 82a, 82b, 82c at different radial displacements from the midpoint of the tumblers 60. When a proper key 52 is inserted into the lock, as shown in FIG. 9, the camming slot 90 on the back side of the key blade as viewed in this figure (which is the side that will be immediately adjacent pins 82a, 82b, 82c) is so contoured as to elevate the several tumblers into symmetrical alignment with the cylinder sections 70, thus withdrawing the lower ends of the tumblers from engagement in the locking slot 66 of the barrel. The lock may thus be opened.

In order to change the locking combination of this same lock, without disassembly thereof, a change-key 53 is employed, as seen in FIG. 10. This key is generally similar to key 52 but its blade is of shorter extent so that when inserted in the lock, engagement is made only with the first set of tumblers 60a-60a'. Camming slot 91 of change-key 53 engages camming pin 82a and moves tumbler 60a (and the corresponding tumbler 60a', not shown) to symmetric position in the cylinder, independently of the other sets of tumblers and retainers. Key 53 may then be turned 180°, reversing the relative positions of tumblers 60a, 60b. This is the condi-

tion actually shown in FIG. 10. In making this reversal, tumbler 60a' will be brought to the same side of the key as formerly occupied by tumblers 60a. By assumption, the predetermined displacement of the camming pin 82a' of tumbler 60a' will be different from that of pin 82a. This condition is illustrated in FIG. 11. A new key 54, having a differently contoured camming slot 92, is thus now required to bring each of the tumblers of the respective sections into unlocked position. Thus, key 54 is the operative key for the altered lock and key 52 no longer will work.

A similar change of the lock, involving two of the tumbler sets, e.g., both 60a-60a' and 60b-60b', is illustrated in FIG. 12. Starting with the combination illustrated in FIG. 8, a change-key 55 inserted into the lock and rotated 180° reverses the respective positions of these tumblers and their retaining sections with respect to the remaining set of tumblers and their retaining section. As thus modified, a new master key 56, having a still different configuration of its camming slot 94 is now required to operate the altered lock. Several other locking combinations may be obtained. For example, the first and last sets of tumblers and retainers may be reversed in relation to the middle set by modifying the combination shown in FIG. 12 through the use of change-key 53; or the third tumbler set may be reversed in relation to the first two. All such changes are possible through the employment of one or more change-keys without disassembly of the lock.

Locks containing a greater number of tumbler sets and retaining sections will obviously provide a greater number of possible key-change combinations without any disassembly of the lock. And, as previously mentioned, the order of positioning of the sets of tumblers along the axis of a given lock cylinder may be changed by disassembly of the lock, thereby providing still further combination changes. And finally the right and left positions of the tumblers in each set may be reversed to give still further combination changes. The latter two types of changes, of course, entail disassembly and re-assembly of the lock.

The embodiment of the invention described above for purposes of illustration is not to be interpreted as restrictive of the invention beyond that necessitated by the following claims. Those skilled in the art will readily appreciate that various modifications and adaptations of the precise form here shown may be made to suit particular requirements. It is accordingly intended that such modifications which incorporate the novel concept disclosed are to be construed as coming within the scope of the claims or the range of equivalency to which they are entitled in view of the prior art.

What is claimed is:

1. In a cylinder lock employing multiple tumblers and individual retainers therefor, wherein said tumblers are slidably received transversely of the axis of the lock, a barrel rotatably receiving said retainers and tumblers, means for maintaining said tumblers and retainers against movement axially of said barrel, a bolt operatively associated with the innermost retainer in said barrel and fixedly rotatable therewith to throw said bolt from a locking to an unlocking position, said barrel having axial slot means on its inner surface for engagement by said tumblers to dispose them eccentrically of their respective retainers thereby preventing rotation thereof in the barrel, a keyway extending through said retainers, and camming means on said tumblers projecting into said keyway for camming said tumblers to a position symmetrical with

said retainers upon the insertion of a proper key, the improvement which comprises:

- (a) first means comprising an axial projection fast with each of said tumblers adjacent an end thereof;
- (b) cooperative second means comprising a mating groove in the opposing face of each adjacent tumbler retainer for each of said first means;
- (c) said first means being slidable into and out of engagement with said second means upon transverse sliding movement of said tumblers from positions symmetrical with the respective retainers to positions eccentric thereof as occasioned by movement of said tumblers into said barrel slot.

2. In a cylinder lock employing tumblers and retainer means therefor wherein said tumblers are slidably received, a barrel rotatably receiving said retainer means and tumblers, means for maintaining said tumblers and retainer means against movement axially of said barrel, a bolt operatively associated with the innermost retainer means in said barrel and fixedly rotatable therewith to throw said bolt from a locking to an unlocking position, said barrel having axially extending slot means on its inner surface engageable by said tumblers in non-retracted position relative to said retainer means and preventing rotation thereof, a keyway in said retainer means, and camming means on said tumblers projecting into said keyway for camming said tumblers to respective retracted positions symmetrical with their retainer means upon insertion of a proper key, the improvement comprising the structural arrangement wherein said retainer means is divided transversely of the cylindrical axis to provide a plurality of tumbler retainer sections each having a guideway extending across one face and a tumbler slidably disposed therein substantially flush with that face, said retainer sections being rotatable relative to each other to permit one section, whose tumbler is retracted, to be rotated relative to another section held stationary by a tumbler in non-retracted position, each of said tumblers having at one of its ends a lug projecting axially of the cylinder lock, and each of said tumbler retainer sections having a groove extending across its other face for slidably receiving the projecting lug of the tumbler in the adjacent retainer section, said projecting lugs being movable with said tumblers to non-engaging positions relative to the respective adjacent retainer sections when the respective tumblers are disposed eccentrically of said sections by engagement in said barrel slot, whereby rotation of one retainer section and its associated tumbler relative to another may be effected by a change-key engageable with less than all of the retainer sections and tumblers in the lock.

3. A cylinder lock as defined in claim 2, wherein said tumblers are disposed in sets of two, one set for each retainer section, with the tumblers of each set located astride said keyway, each of said tumblers being of chordal extent in its respective retainer section and being slidable therein in its respective chordal axis.

References Cited by the Examiner

UNITED STATES PATENTS

2,766,611 10/1956 Hagel ----- 70-364

PATRICK A. CLIFFORD, *Primary Examiner*.

ALBERT H. KAMPE, *Examiner*.

P. TEITELBAUM, *Assistant Examiner*.

Notice of Adverse Decision in Interferences

In Interference No. 95,789 involving Patent No. 3,263,461, J. A. Tartaglia, CYLINDER LOCK, final judgment adverse to the patentee was rendered Mar. 17, 1969, as to claims 1, 2 and 3.
[*Official Gazette October 28, 1969.*]