Feb. 13, 1973 R. G. McCULLUM 3,715,899

RIM CYLINDER LOCK MECHANISM

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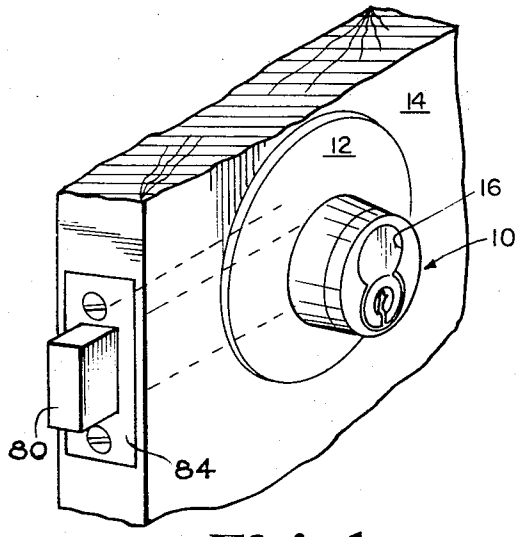


Fig. 1

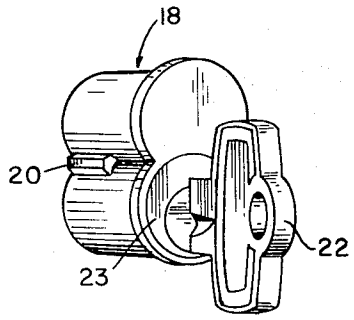


Fig. 2

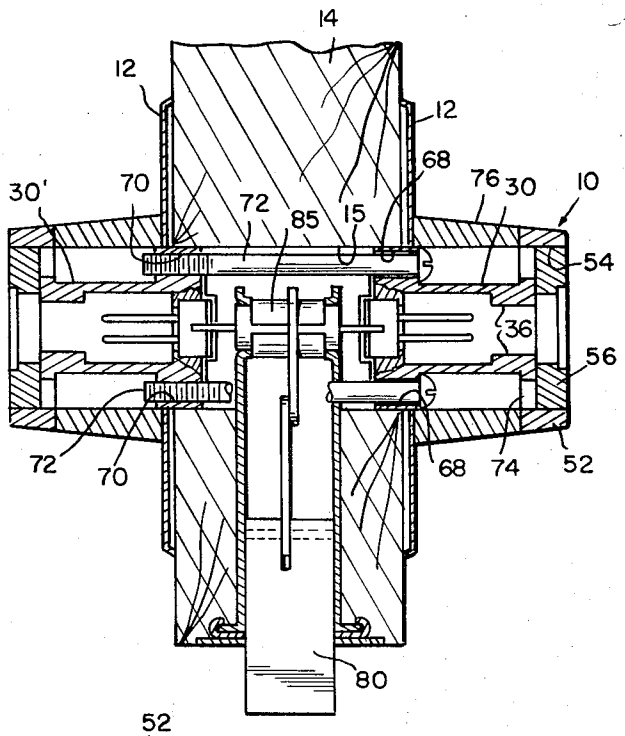


Fig. 3

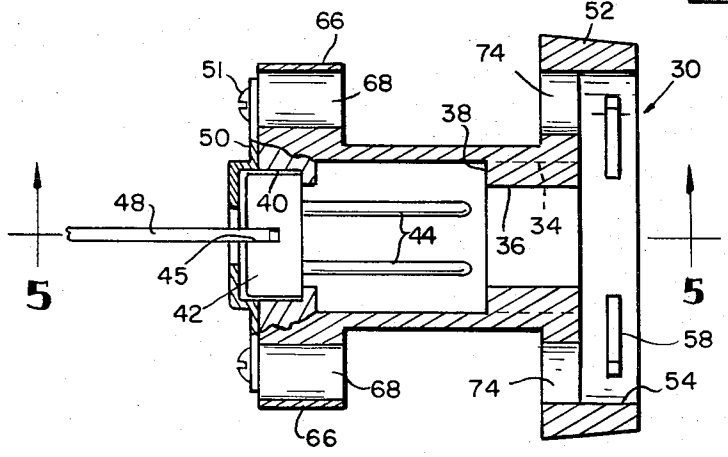


Fig. 4

RIM CYLINDER LOCK MECHANISM

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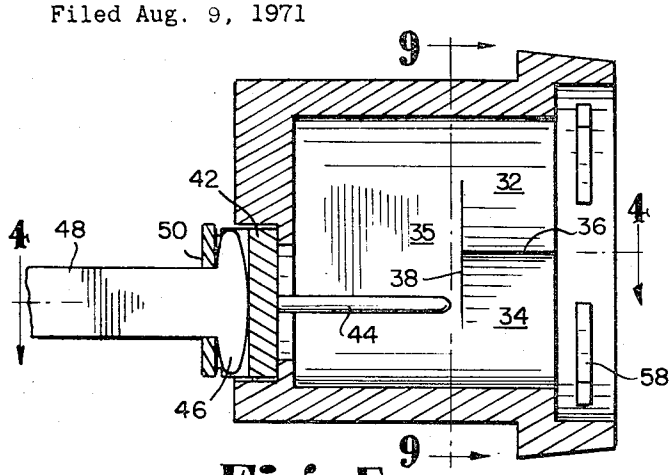


Fig. 5

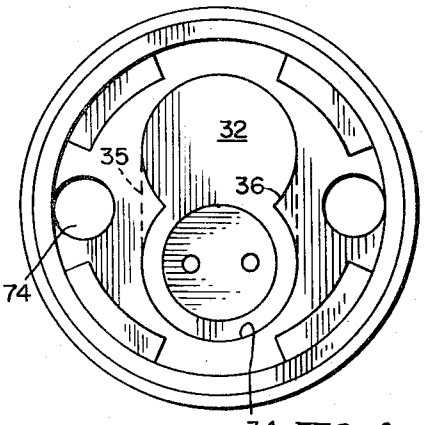


Fig. 6

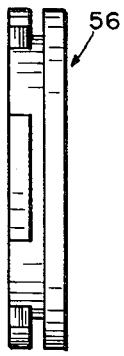


Fig. 7

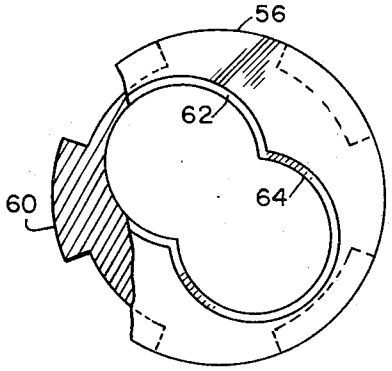


Fig. 8

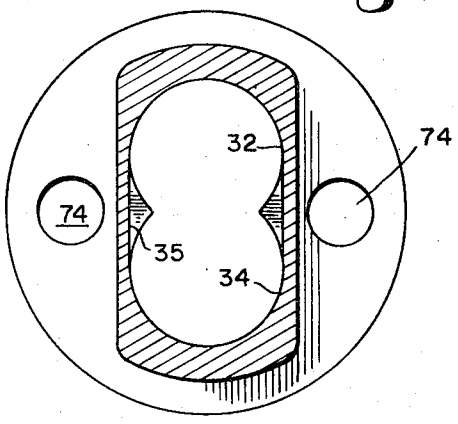


Fig. 9

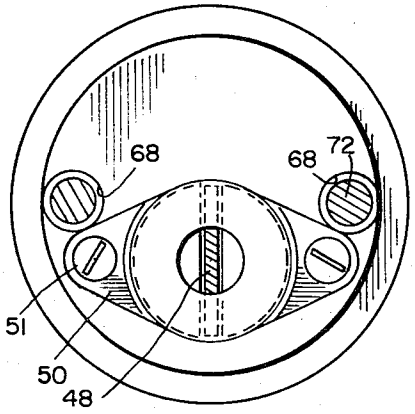


Fig. 10

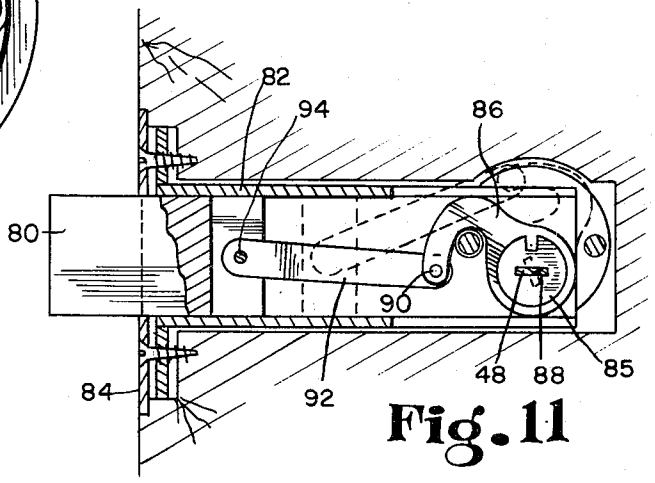


Fig. 11

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3,715,899

RIM CYLINDER LOCK MECHANISM

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Filed Aug. 9, 1971, Ser. No. 169,989
Int. Cl. E05b 27/00
U.S. Cl. 70—369 15 Claims

ABSTRACT OF THE DISCLOSURE

A lock cylinder for mounting on the face of a door with mounting screws which are concealed by a face plate which is breech locked to the cylinder body and held in locked position by reception of a lock core in non-concentric aligned openings in the face plate and body. The core and non-concentric openings are desirably figure-8 shaped, and the mounting screws located beside the narrow waist portion of the figure-8 shape, within a cylindrical envelope. A bolt is actuated by a bell crank which swings in an arc between the two screws.

BACKGROUND OF THE INVENTION

This invention relates to a rim cylinder and lock construction especially adapted for use in tubular cylinder locks in which two lock cylinders are mounted on opposite sides of a door and control a common deadlock or latch bolt, so that the door is key-locked from both sides. Such locks are used, for example, to lock communicating doors between hotel rooms. With such locks it is desirable to mount the lock cylinders in such a way that neither cylinder can be removed from its side of the door, since such removal would expose the mechanism for bolt retraction without key control. One practice has been to mount the two lock cylinders with two screws inserted from opposite sides of the door. It has been found, however, that a person having access to such a lock at certain times, as during cleaning or servicing operations, will remove the screw from one side of the door and thereby make it possible to remove the lock cylinder and open the door from the opposite side at a later time such as when the hotel room is occupied.

SUMMARY OF THE INVENTION

The present invention provides a lock cylinder assembly in which mounting screws are wholly concealed by a removable face plate mounted at the front of the cylinder and held in place by an inter-fitting key-controlled lock core. The face plate is desirably breech-locked to the cylinder and held from release by the insertion of a non-concentric core. The core may have a front rim which seats in a counter bore in the face plate.

I prefer to use a lock core of the "figure-8" shape shown in Best Pat. No. 1,575,092, which is locked in the cylinder by a key-controlled cam lug. However, for purposes of retaining the breech-locked face plate against removal, other non-concentric key-removable cores may be used.

The concealed mounting screws have heads engaged against seats behind the removable face plate, which are accessible only when the face-plate is removed. In a preferred embodiment the screw heads seat against a flange at the rear of the cylinder, and access to them is through openings covered by the removable face plate. When a figure-8 core is used, the screw holes and their access openings may be located at opposite sides of the figure-8 shape, in the waist portion thereof, which disposes them in a horizontal plane above the axis of the key plug of the core, and hence above the axis of rotation of the tail piece by which key plug rotation is transmitted to the bolt mechanism. The bolt is desirably linked to an

elbow crank rotatable on the axis of the tail piece and formed to swing in an arc between the two cylinder mounting screws, which may serve to limit its movement.

When two cylinders are mounted on opposite faces of the door, to operate a common bolt or latch, the mounting screws may have their heads in one of the cylinders and their threaded ends engaged in the opposite cylinder to clamp the two cylinders against the opposite faces of the door, in which case the opposite cylinder need not include a removable face plate.

Each cylinder desirably has a peripheral rim at its front end, and is surrounded over at least a portion of the length of its body by a ring engaged beneath the rim and against the face of the door or against an escutcheon plate mounted on the door face.

While a concealed screw cylinder in accordance with the invention is especially useful when two cylinders are mounted on opposite faces of a door, it is also advantageous for use alone and in other combinations to prevent unauthorized removal of lock parts.

DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIG. 1 is an isometric fragmental view showing a lock assembly having two lock cylinders on opposite faces of the door connected to operate a common deadbolt;

FIG. 2 is an isometric view of the preferred form of lock core;

FIG. 3 is a horizontal section through the lock assembly shown in FIG. 1;

FIG. 4 is a horizontal section through a cylinder body and throw assembly of the type used in the lock assembly of FIGS. 1–3, taken on the line 4—4 of FIG. 5;

FIG. 5 is a vertical section through the cylinder body of FIG. 4 taken on the line 5—5 of FIG. 4;

FIG. 6 is a front elevation of the cylinder body shown in FIGS. 4 and 5;

FIG. 7 is a side elevation of a face plate for insertion in the front recess of the cylinder body of FIGS. 4–6;

FIG. 8 is a front elevation of the face plate shown in FIG. 7, with parts broken away to show the breech lock lugs;

FIG. 9 is a section taken on the line 9—9 of FIG. 5;

FIG. 10 is a rear elevation of the cylinder body shown in FIGS. 4–6; and

FIG. 11 is a sectional view taken longitudinally of the bolt, showing the bolt actuating elbow crank and link.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The lock mechanism shown in the drawings comprises two lock cylinders **10** mounted in escutcheon plates **12** at opposite ends of a bore **15** through a door **14**. Each cylinder has an 8-shaped opening **16** for the reception of a correspondingly shaped core **18**. The core has a front peripheral rim **19** and has a retaining lug **20** adapted to be moved between locking and releasing positions by means of a control key **22** inserted in the key plug **23**. The two lock cylinders are connected to control a dead bolt **80** mounted in a suitable mounting **84** in the edge of the door **14**.

Each lock cylinder comprises a cylinder body assembly as shown in FIGS. 4–6 and 9–10. This comprises a body **30** of generally cylindrical shape, bored with two parallel intersecting bores **32** and **34** to form an 8-shaped cavity for reception of the correspondingly shaped core **18**. Inwardly from the front end of such cavity, the side walls **35** thereof are milled flat to leave an elongated lug **36** projecting inward from the face of the flat sides **35** to form a rearward-facing shoulder **38** behind which the re-

taining lug 20 of the core is adapted to be engaged to retain the core 18 in the cavity. The lower bore 34 is coaxial with the key plug 23 of the core, and has a rearward counterbored extension forming a seat 40 in which a throw member 42 is rotatably mounted. The throw member 42 carries a pair of forwardly extending legs 44 which take into corresponding openings in the rear of the key plug 23 for connecting the throw member to such key plug. The rear face of the throw member 42 contains a vertical slot 45 to receive the head 46 of a tail piece 48, which is held in place by a bridge 50 fixed against the rear face of the cylinder body 30 by screws 51 spaced below the horizontal centerline of the cylinder body.

The front of the cylinder body 30 is formed with a peripheral rim 52, within which the body forms a recess 54 for the reception of a face plate 56 as shown in FIGS. 7 and 8. The walls of the recess 54 are formed with four circumferentially spaced lugs 58, and the rear portion of the face plate 56 is formed with complementary lugs 60 adapted to be engaged behind the lugs 58 to form a breech lock for holding the face plate 56 in place. As shown in FIG. 8, the face plate is provided with two parallel intersecting bores 62 and 64 which form the front of the figure-8 opening 16 for reception of the core 18, and these are counterbored to receive the core rim 19. The bores 62 and 64 are so oriented that they will be aligned with the cylinder bores only after the face plate inserted in the recess 54 of the cylinder body has been rotated to its breech-locked position. When the key controlled lock core 18 is inserted in the thus-aligned bores, it prevents rotation of the face plate to unlocked position.

As shown in FIGS. 4 and 9, the mid-portion of the cylinder body 30 is cut away at its sides to a generally oval cross section (FIG. 9) having its long axis intersecting the axes of the two bores 32 and 34. The remaining circular section at the rear forms a pair of laterally projecting lugs 66, spaced from the front circular rim 52. The lugs 66 are formed with bored holes 68 as shown at the right in FIG. 3, or with threaded openings 70 as shown in the cylinder at the left in FIG. 3, to receive the mounting screws 72. In alignment with the bored holes 68 or threaded holes 70, the front wall of the body is bored to provide access openings 74 for access to the heads of the screws 72. Such access openings 74 are closed by the face plate 56 when it is inserted in the recess 54 at the front of the cylinder body, and the plate conceals and prevents access to the screws 72 except when the key-controlled core 18 is first removed to permit the face plate to be rotated to release position and removed to expose the access openings 74.

In the lock arrangement shown in FIG. 3, a lock core body 30 is mounted against the right face of the door 14, and is located axially with respect to that face by a ring 76 and an escutcheon plate 12 disposed about the cylinder body and between its front rim 52 and the face of the door 14. A like cylinder body 30' is mounted with a ring 76 and escutcheon plate 12 against the left face of the door 14, and the two cylinder bodies are connected to each other and fixed to the door by a pair of screws 72 which pass through the lug openings 68 of the cylinder body 30 and through the bore 15 in the door, and are threaded into the threaded openings 70 of the cylinder body 30'.

As shown in FIGS. 10 and 11, the screws 72 lie in the horizontal central plane containing the axis of the cylinder bodies 30 and 30', and hence lie above the axis of the key plug 23 and the tail piece 48.

The bolt mechanism shown in FIGS. 3 and 11, comprises a bolt 80 mounted in a tube 82 fixed to an edge plate 84 adapted to be mounted in the edge of the door. The tube 82 extends rearward to a position of intersection with the axis of the tail piece 48 and is formed to rotatably support on that axis the hub 85 of an elbow crank 86 having an elongated opening 88 for reception of the tail piece 48. The elbow crank 86 extends upward between the two screws 72 and then counterclockwise to a pivot pin 90 by which it is connected to a link 92 pinned to the rear end of the bolt 80 by a pin 94. The elbow crank has sufficient throw from its full line position to its dotted line position in FIG. 11 to retract the bolt 80 from advanced locking position to a retracted unlocked position. In the full line position of the elbow crank, the bolt 80 is extended, and the pivot point 90 between the crank and the link 92 lie below a line connecting the center of the pivot 94 to the rotation axis of the elbow crank, so that a toggle-locking condition exists which prevents forceful retraction of the bolt from its outer end.

Mounting and operation of the lock mechanism is summarized as follows: A bolt assembly 80–82 is mounted in an edge bore in the door 14. Two like cylinder bodies 30 and 30' are then mounted with trim rings 76 and escutcheon plates 12 against opposite faces of the door 14, at opposite ends of the cross bore 15 through the door, and the tail pieces 48 of their throw members 42 are engaged in the slot 88 in the crank hub 85. When mounted, the cylinder bodies 30 contain no face plates 56 in their front recesses 54, so that the screw access openings 74 are open and exposed. The mounting screws 72 are inserted through such access openings and through the holes 68 in the lugs 66 at the rear of the cylinder body 30, and are threaded into the threaded openings 70 of the cylinder body 30'. The screws 72 pass through or past the end of the bolt mounting tube 82. The two screws 72 securely hold the two cylinder assemblies to the door.

When the cylinder assemblies have been mounted, face plates 56 are then inserted and locked in the recesses 54. To this end, each face plate 56 is first inserted in its recess 54 in a counterclockwise-rotated position as shown in FIG. 8, to carry the lugs 60 on the face plate 56 between the lugs 58 to a position behind them. The face plate is then rotated clockwise to bring its bores 62 and 64 into alignment with the bores 32 and 34 of the cylinder, and this carries the lugs 60 behind the lugs 58 and locks the face plate in position. A key-controlled core 18 is then inserted in the aligned bores, and its lug 20 is advanced to a position behind the shoulder 38 in the cavity of the cylinder body, to lock the core in place. It then prevents rotation of the face plate to disengage it from its breech locked position. The face plate wholly covers and conceals the access openings 74 in the cylinder body, and as long as the key-controlled core 18 remains in place, access to the screws 72 is completely prevented.

Insertion of the lock core 18 engages its key plug with the legs 44 of the throw member 42, and thus connects the key plug for operation of the tail piece 48 which is engaged in the hub of the elbow crank 68 which operates the bolt 80. Accordingly, operation of the key plug 23 by an operating key will rotate the tail piece and the elbow crank 86 to retract and advance the deadlock bolt 80.

While I have shown and described the lock mechanism with two similar cylinders connected to operate a common deadlock bolt, the lock cylinder is not limited to this use, but is adapted for use in any of many mounting situations where a cylinder is mounted at the face of the door and it is desirable to conceal its mounting screws for security or to prevent vandalism.

I claim:

1. A lock cylinder, comprising:
   - a generally cylindrical body,
   - a front portion thereof formed for the reception of a face-plate thereon,
   - a face plate receivable on said front portion in a release position and rotatable to a locked position,
   - locking-means on said face plate and body which interengage when the face plate is rotated from release position to locked position,
   - non-concentric core openings in said body and face plate which are mis-aligned when the face plate is in release position and aligned when the same is in locked position,

said openings and body being shaped to receive a lock core in the openings when the same are aligned and to have the core locked in place to prevent movement of the face plate to release position, and

one or more mounting openings in said body behind and concealed by said face plate when the same is in locked position.

2. A lock cylinder as in claim 1, further comprising:

a rim portion at the front of the cylinder body and forming a recess for the reception of said face plate, and

breech-locking lugs on said rim portion and face-plate for locking the face plate in locked position in said recess.

3. A lock cylinder as in claim 1 further comprising:

a front wall on said body which is covered by said face plate when the same is in locked position, and

mounting access openings in said wall which are closed by the face plate.

4. A lock cylinder as in claim 1 in which:

said non-concentric openings are figure-8 openings and the mounting openings in the body are located beside the waist portion of the figure-8 opening therein.

5. A lock cylinder as in claim 3 in which:

said access openings are figure-8 openings and the mounting openings in the body are located beside the waist portion of the figure-8 opening therein.

6. A lock cylinder as in claim 1 further comprising:

a front circular portion on the body arranged for the reception of the face plate,

a mid portion on the body of generally oval cross-section,

a rear portion on the body forming mounting lugs projecting laterally from the sides of the oval portion,

mounting screw engaging means in said lugs and access openings in said front portion in alignment therewith,

said core-opening in said body being elongated in the direction of the long axis of the oval cross-section.

7. A lock cylinder as in claim 6 in which said core opening in the body is a figure-8 opening with its narrow waist portion disposed between the mounting screw engaging means in said lugs.

8. A lock cylinder as in claim 1 in which:

said body and face plate, when assembled, have a laterally projecting rim portion at the front thereof,

in combination with a mounting ring engaged about the body behind the rim and abutting the rim to enclose the body and position the same axially with respect to its mounting support.

9. A lock cylinder as in claim 2 in combination with a mounting ring engaged about the body behind the rim and abutting the rim to enclose the body and position the same axially with respect to its mounting support.

10. A lock mechanism comprising:

a lock cylinder body having a central vertically-elongated core opening for the reception of a key-removable core having a key plug rotatable on an axis,

a pair of screw openings for the reception of mounting screws at opposite sides of said core opening in a plane spaced from said plug-rotation axis,

a face plate having breech-locking engagement with said body and an opening in said plate which in the locked position thereof is aligned with said body core opening for reception of the core to prevent movement of the face plate from such locked position, said face plate in locked position covering and preventing access to the mounting screws in said screw openings.

11. A lock mechanism as in claim 10 further comprising:

a lock mechanism including a retractable bolt,

a crank disposed for rotation on the axis of the key-plug of said core and extending therefrom between the positions of the mounting screws in said screw openings, and

a link connecting the crank to the bolt.

12. A lock mechanism as in claim 11 in which:

said crank is a bell crank having a radial portion extending between the position of said mounting screws and an arcuate end portion adapted to project circumferentially to a link point laterally beyond one of said screws and substantially to a line extending from the crank rotation axis to the point of connection of the link to the bolt.

13. A lock cylinder and core assembly, comprising:

a cylinder body,

a face place removably mounted at the front of said cylinder body,

aligned openings in said face plate and body for the reception of a lock core,

a core received in said openings, and interengaged with the face plate to retain the same in place,

said core having key-operable retaining means interengaged with the cylinder to retain the core therein and thereby prevent removal of the face plate, and

one or more mounting openings in said cylinder body behind and concealed by said face plate when the same is in core-retrained position.

14. A lock cylinder and core assembly as set forth in claim 13, in which said core has a peripheral rim and said face plate has a forwardly opening seat in which the rim is interengaged.

15. A lock cylinder and core assembly as set forth in claim 14 further comprising:

locking means on said face plate and body which interengage to lock the face plate to the cylinder when the face plate is rotated from a release position to a locked position,

said aligned openings in said face plate and body being non-concentric with the axis of said rotation of the face plate whereby the same move to misaligned positions when the face plate is rotated from its locked position,

the core interfitting with said aligned openings when in place therein to block rotation of the face plate from locked to release position.

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ROBERT L. WOLFE, Primary Examiner

U.S. Cl. X.R.

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