June 28, 1966 E. L. SCHLAGE 3,257,831

CONSTRUCTION LOCK CYLINDER

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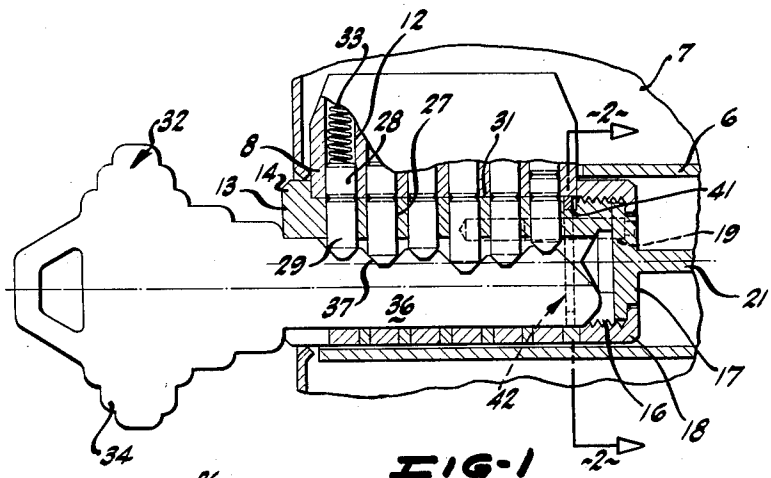


FIG-1

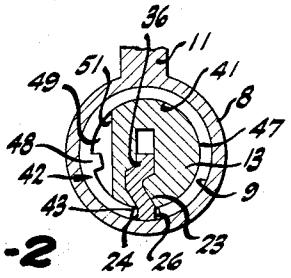


FIG-2

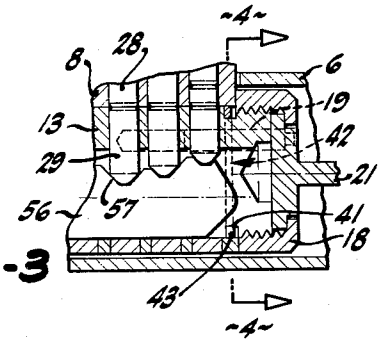


FIG-3

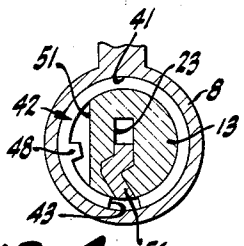


FIG-4

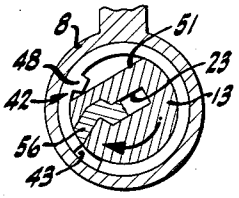


FIG-5

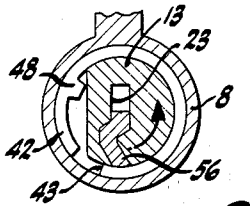


FIG-6

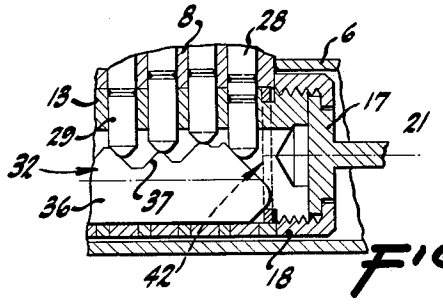


FIG-7

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CONSTRUCTION LOCK CYLINDER

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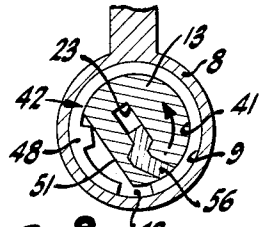


FIG-8

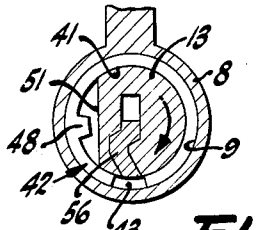


FIG-9

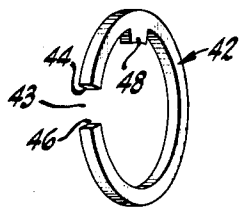


FIG-10

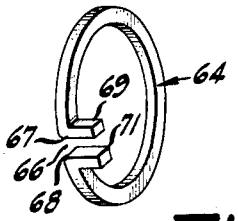


FIG-13

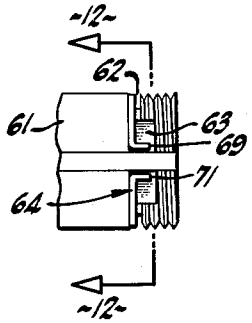


FIG-11

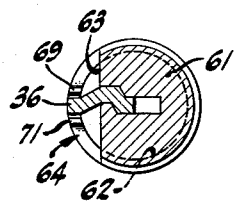


FIG-12

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3,257,831

CONSTRUCTION LOCK CYLINDER

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9 Claims. (Cl. 70—383)

My invention relates primarily to door locks operable by keys. In many circumstances it is desirable to provide a lock which will receive a primary key and will respond properly thereto and will receive a secondary or permanent key and will respond properly thereto. But when the secondary key is once used, the lock is conditioned so that the temporary, primary key is no longer effective. An instance of an appropriate environment is in connection with building construction. The builder is given a temporary, primary key effective to operate the lock during the construction period. The owner is given the permanent, secondary key. After the owner takes possession and once uses his key, the construction key is no longer effective. It is highly desirable to provide this transition in the lock in a safe and secure manner but without in any way requiring additional work on the lock itself. It is desirable to recondition the lock by the mere use of the secondary, permanent key.

It is therefore an object of the invention to provide a construction lock cylinder in which there is mechanism responsive to a permanent, secondary key to condition the lock so that a temporary, primary key is no longer effective therein.

Another object of the invention is to provide a construction lock cylinder in which the temporary, primary key is rendered ineffective by one use of the parmanent, secondary key, but in which the owner may restore the lock, simply by the use of his own key, to its original condition with the temporary, primary key again effective to operate the lock.

Another object of the invention is to provide a construction lock cylinder of a sort generally interchangeable with lock cylinders presently available and without major alteration in the lock itself.

Another object of the invention is to provide a construction lock cylinder to which the usual keys usable with the lock can readily be adapted.

Another object of the invention is to provide a construction lock cylinder of no greater compass than the customary lock cylinder.

Another object of the invention is to provide a construction lock cylinder without fugitive or frangible parts, so that the lock cylinder can be transferred between its temporary "construction" condition to its permanent "owner" condition in either direction and any number of times.

Other objects, together with the foregoing, are attained in the embodiments of the invention described in the accompanying description and illustrated in the accompanying drawings, in which:

FIGURE 1 for the most part is a cross section on a vertical, longitudinal plane showing a portion of a lock incorporating the construction lock cylinder of the invention with a primary, construction key therein;

FIGURE 2 is a cross section, the plane of which is indicated by the line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary cross section comparable to FIGURE 1 but showing a secondary, owner's key in position;

FIGURE 4 is a cross section, the plane of which is indicated by the line 4—4 of FIGURE 3, and showing the cylinder plug and ring in initial position with the owner's key therein;

FIGURE 5 is a view comparable to FIGURE 4 and

showing the cylinder plug and ring in a rotated position;

FIGURE 6 is a view comparable to FIGURE 4 and showing the cylinder plug in initial position and the ring in rotated position;

FIGURE 7 is a fragmentary cross section comparable to FIGURES 1 and 3 and showing a construction key partially in position;

FIGURE 8 is a cross section comparable to FIGURE 6 showing the cylinder plug in another rotated position and the ring in initial position;

FIGURE 9 is a view comparable to FIGURE 4 showing the cylinder plug and the ring in initial position;

FIGURE 10 is a prespective of one form of partial ring;

FIGURE 11 is a bottom elevation of a portion of a modified form of cylinder plug;

FIGURE 12 is a cross section, the plane of which is indicated by the line 12—12 of FIGURE 11; and

FIGURE 13 is an isometric view of a modified form of partial ring.

While the construction lock cylinder pursuant to the invention can be incorporated in a number of different locks and is readily embodied in a number of different forms, it has successfully been incorporated in a standard lock, particularly as shown in FIGURE 1.

In this instance the lock, details of which are omitted, includes a hollow spindle **6** mounting a knob **7** and adapted to be secured to a door. Within the spindle **6** there is disposed a cylinder body **8** having a portion circular in cross section containing a circular cylindrical plug bore **9**. The body **8** also has a radial extension **11** provided with a number of parallel tumbler bores **12** intersecting the plug bore **9**.

Rotatably mounted within the plug bore **9** is a cylinder plug **13** of greater length than the plug bore and having a flanged end **14** bearing against the end of the cylinder body **8**. The other end of the cylinder plug is provided with a threaded terminal **16** against which a driving disk **17** is disposed. A collar **18** engages the threaded terminal **16** and has a flange overlying and holding the driving disk **17**. An eccentric, removable pin **19** causes the plug **13** and the disk **17** to rotate together. A driving blade **21** on the disk **17** is connected to an associated lock actuating mechanism, not shown. The lock is standard. Whenever the plug **13** is rotated within the cylinder body, the blade **21** is similarly rotated in order to actuate the lock mechanism.

The plug **13** is formed with an axially extending key channel **23**. The key channel is of irregular cross section and extends along the periphery of the cylinder plug for substantially the entire length of the cylinder plug. The key channel **23** is generally bonded near the periphery of the cylinder plug by a pair of parallel, axially extending walls **24** and **26**.

Formed in the cylinder plug **13** and in one rotary position thereof adapted to align with the tumbler bores **12** are corresponding pin bores **27**. These intersect the key channel. The tumbler bores and the pin bores are designated to contain a number of tumblers **28** and pins **29** of such length and characteristics as to provide an aligned shear line **31** whenever an appropriate key **32** is fully received with the cylinder plug. The tumblers **28** and pins **29**, no matter what their number, are urged toward the key channel by means of springs **33** within the tumbler bores **12**.

A temporary or primary key **32** has an operating bow **34** and a shank **36** effective to occupy substantially the entire length of the key channel when the key is in position. The key also has a serrated operating edge **37** complementary to the tumblers **28** and pins **29** to

establish the shear line 31. The cylinder plug can be rotated by rotation of the fully inserted key 32, when the key configuration is appropriate, and thus move the blade 21.

In accordance with the present invention, the cylinder plug 13 adjacent one end thereof and preferably between the driving mechanism 17 and the next adjacent tumbler or pin bore is provided with a circumferential groove 41 extending entirely therearound and particularly intersecting the radially outward portion of the key channel adjacent the walls 24 and 26.

Disposed within the groove 41 is a partial ring 42 (FIGURE 10). Conveniently, this is a metallic or other slightly springy member substantially rectangular in cross section and is a complete circle except for a gap 43 formed between the facing ends 44 and 46 of the ring. The internal diameter of the ring is slightly greater than the diameter of the wall 47 at the bottom or radially inner portion of the groove 41, and there is adequate clearance between the side walls of the ring and the side walls of the groove so that the ring 42 is freely rotatable (within limits) within the groove. The outer diameter of the ring 42 is such that the ring has a frictional engagement with the interior surface of the cylinder body 8 defining the plug bore. This engagement is light enough so that the ring 42 can be manually turned from one rotary location to another about its own axis without undue force, but affords sufficient braking or drag so that the ring will remain in any oriented position until intentionally dislodged.

In order to provide a lost motion, rotary interconnection between the ring 42 and the cylinder plug 13, the ring 42 has an inwardly directed lug 48 spaced from the gap 43 and designed to be received within a chamber 49 in the cylinder plug 13. The chamber 49 is partially defined by the side walls of the groove 41, and is also defined by a chordal wall 51 merging with the bottom wall 47 of the groove. The chordal wall 51 is so located as to define the limits of the chamber 49 adjacent to but spaced from the lug 48. Since the chamber 49 is larger than the lug 48, the chordal wall 51 being a substantial distance away from the lug 48, there is a lost motion rotary interconnection provided between the ring 42 and the cylinder plug.

When the temporary key 32 is in position in the plug 13, its extreme end lies between the ends 44 and 46 of the ring virtually in contact therewith. Rotation of the plug by the key also produces comparable rotation of the ring so that the relative position of the plug and ring are not substantially altered. This is true for both directions of rotation. Thus, with the temporary construction key, the plug and the ring can be considered as one unit and can be so actuated any number of times.

For the operation of the device when in the owner's hands after construction, there is provided for use with the cylinder plug 13 a secondary or owner's key 56 (FIGURE 3). This is identical with the key 32 except that it is made to clear the ring 42, being notched or, as shown herein, being somewhat shorter than the key 32. It has serrations 57 identical with those shown in FIGURE 1, but the far end of the key is truncated. The key 56 instead of travelling past the groove 41 stops short thereof and well away from the ring 42. When this permanent or secondary key is introduced into the cylinder plug and is rotated, the plug is actuated in the normal way to cause the lock to function. But the key 56 does not engage the ring and the cylinder plug 13 in rotating within the cylinder body 8 does not in any way disturb the ring until such time as the chordal wall 51 abuts the lug 48. Thereafter, the lost motion having been taken up, the ring and the plug rotate together.

After the cylinder plug has been rotated sufficiently to actuate the blade 21 to operate the lock; for example, by a partial turn clockwise from the position shown in FIGURES 2 and 4 into the position shown in FIGURE 5, the key 56 is then rotated counterclockwise and the plug

rotates counterclockwise therewith. Because of the lost motion between the lug 48 and the wall 51, and because of the friction of the ring 42 against the inner wall of the cylinder body, although the plug is rotated back to its initial position as shown in FIGURE 6, the ring 42 is not rotated back to its initial position. In the restored position of the cylinder plug, the key 56 can be withdrawn, leaving the lock in condition for further operation by the key 56. But the ring 42, having been displaced and not returned, acts as a barrier spanning the key channel. Thus the lock has been conditioned by one use of the secondary key 56 to block out the primary key 32.

The effect of the barrier is shown in FIGURE 7. The long shank 36 of the primary or construction key 32 can be inserted in the key channel only until the end of the primary key comes into physical abutment with the barrier formed by the ring 42 spanning the key channel. In this only partially introduced position of the primary key 32, the serrations 37 do not align the pins 29 properly and there is no shear line permitting relative rotation between the cylinder plug and the cylinder body. Thus the primary construction key is no longer operable.

Under some circumstances, it may be desired to render the primary construction key 32 again effective. This requires that the lock be one in which the cylinder body can be rotated in either direction from initial, central position. The permanent key 56 is again introduced into the keyway. Instead of being rotated clockwise, the key 56 is first rotated counterclockwise, as shown in FIGURE 8. Then the wall 51 comes into contact with the lug 48 and upon further turning the plug moves the ring 42 counterclockwise also until the ends 44 and 46 again lie on opposite sides of the keyway. After this ring position has been attained, the cylinder plug is rotated clockwise, as shown in FIGURE 9, until the parts are all in their original position, as shown in FIGURE 4. The permanent, secondary key is then withdrawn. The key channel has been cleared and the barrier previously provided by the ring 42 has been removed. It is again feasible to reintroduce the temporary, primary construction key 32 for its full length again to actuate the lock. At any time thereafter, the first use of the secondary permanent key 56, without the counterclockwise resetting operation, restores the lock to its shut-out condition, precluding further use of the primary construction key.

There may be provided, as especially shown in FIGURES 11, 12 and 13, an arrangement identical with that previously disclosed, except that the cylinder plug 61 is provided with a circumferential groove 62 like the groove 41, and is also provided with a chordal wall 63 like the wall 51 except that the chordal wall 63 is in a position to intersect the keyway 23.

Designed to be received in the groove 62 is a ring 64 of somewhat springy material of the same dimensions and characteristics as the ring 42 but devoid of the radial lug 48. Rather, the ring 64 has a gap 66 defined by ring ends 67 and 68 from which individual, axially extending lugs 69 and 71 are provided. The lugs 69 and 71 are so disposed as to have lost motion but to be in the path of rotation of the extremes of the chordal wall 63. Thus, there is afforded a lost motion connection for rotary movement between the cylinder plug and the ring 64. The operation of this version of the structure is the same as that previously disclosed.

What is claimed is:

1. A construction lock cylinder comprising a cylinder body having a plug bore therethrough and having a plurality of tumbler bores intersecting said plug bore, a cylinder plug rotatably disposed in said plug bore, means defining a key channel in said cylinder plug, means in said cylinder plug defining a plurality of pin bores intersecting said key channel and in one rotated position of said cylinder plug adapted to align with said tumbler bores, pin tumblers in said tumbler bores and said pin bores, springs in said tumbler bores urging said pin tumblers toward said key channel, means on said cylinder plug for transmitting

rotation of said plug, means including a circumferential wall defining a groove in said cylinder plug intersecting said key channel and disposed axially between said rotation transmitting means and said pin and tumbler bores, means on said cylinder plug defining a chordal flat merging with said circumferential wall, a partial ring rotatably disposed in said groove and frictionally engaging said cylinder body, said ring having ends adapted to lie on opposite sides of said key channel, and a lug on said ring extending toward said chordal flat.

2. A construction lock cylinder comprising a cylinder body having a plug bore therein and having a tumbler bore intersecting said plug bore, a cylinder plug rotatably disposed in said plug bore, means defining a key channel in said cylinder plug, means in said cylinder plug defining a pin bore intersecting said key channel and in one rotated position of said cylinder plug adapted to align with said tumbler bore, pin tumblers in said tumbler bore and said pin bore, a spring in said tumbler bore urging said pin tumblers toward said key channel, means on said cylinder plug for transmitting rotation of said plug, means including a circumferential wall defining a groove in said cylinder plug intersecting said key channel, means on said cylinder plug defining a flat merging with said circumferential wall, a partial ring rotatably disposed in said groove and frictionally engaging said cylinder body, said ring having ends adapted to lie on opposite sides of said key channel, and means on said ring engageable with said flat.

3. A construction lock cylinder comprising a cylinder body having a plug bore therein, a cylinder plug rotatably disposed in said plug bore, means defining a key channel in said cylinder plug, said key channel being adapted to receive successively a long key and a short key both effective to rotate said cylinder plug in said cylinder body, means including a circumferential wall defining a groove in said cylinder plug in a location between the end positions of said long key and said short key, a partial springy ring rotatably disposed in said groove and extending around more than one half of the circumference of said cylinder body and frictionally gripping said cylinder body, said ring having ends adapted to lie on opposite sides of said key channel, and a lost motion rotational interconnection between said ring and said cylinder plug.

4. A construction lock cylinder as in claim 3 in which said rotational interconnection is provided by a lug on said ring spaced from but in the rotational path of a chordal wall on said cylinder plug.

5. A construction lock cylinder as in claim 3 in which said rotational interconnection between said ring and said cylinder plug is constituted by a lug on one of said members received within a large chamber on the other of said members.

6. A construction lock cylinder comprising a cylinder body having a plug bore therein, a cylinder plug rotatably disposed in said plug bore, means defining a key channel extending axially along the periphery of said cylinder plug, a partial ring rotatably engaging said cylinder body and having ends adapted to lie on opposite sides of said key channel, and means on said cylinder plug for rotating said ring to move said ends to lie on the same side of said key channel.

7. A construction lock cylinder comprising a cylinder body having a plug bore therein, a cylinder plug rotatably disposed in said plug bore, means defining a key channel extending axially along the periphery of said cylinder plug, a partial ring disposed within said plug bore and rotatably and frictionally engaging said cylinder body and having ends adapted to lie on opposite sides of said key channel, and lost motion means interconnecting said cylinder plug and said ring for rotating said ring ends to lie on the same side of said key channel upon rotation of said cylinder plug.

8. A construction lock cylinder comprising a cylinder body having a plug bore therein, a cylinder plug rotatably disposed in said plug bore, means defining a key channel extending axially in said cylinder plug, means defining a cross channel in said cylinder plug intersecting said key channel between the ends thereof, a barrier in said cross channel and movable between a first position within said key channel and a second position out of said key channel, and means depending upon relative rotation between said cylinder plug and said cylinder body for moving said barrier between said first position and said second position.

9. A construction lock cylinder comprising a cylinder body having a plug bore therein, a cylinder plug rotatably disposed in said plug bore, means defining a key channel extending axially in said cylinder plug, means defining a cross channel in said cylinder plug and intersecting said key channel, a barrier in said cross channel, means responsive to relative rotation between said cylinder body and said cylinder plug for moving said barrier between one position blocking said key channel and another position out of said key channel, and means for frictionally holding said barrier in said positions.

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