ABSTRACT OF THE DISCLOSURE

A cylinder-type door lock which can be actuated by two different keys—a construction worker's key and a homeowner's key. During construction of the house, plumbers, electricians and other construction workers can each have a construction key to enter the house. When the house is sold and the owner inserts his key for the first time, the lock's combination is permanently changed so that the construction keys will no longer operate the lock. The lock has a special tumbler which is altered when the owner uses his key for the first time.

This invention relates to a cylinder-type lock such as those commonly used on doors of residential and commercial buildings.

Locks of this type are often installed on doors of buildings before the interior construction of the building is completed. Electricians, plumbers, and other construction workers who need to work inside the building are each given a key so that they may enter and do their work. To insure that the workers can no longer get into a building after it is completed and sold to a new owner, the combinations of these locks are usually changed.

The cylinder lock of this invention has two keys—a construction key which the worker uses, and an owner key which is used by the purchaser or owner of the building. The locks will repeatedly work with the construction key; however, the owner key automatically changes the lock's combination the first time the owner key is used in the lock. After this combination change, the construction key will no longer open the lock, but the lock can be opened at will with the owner key.

This lock which changes combinations has the usual components of a cylinder lock. It has a hollow cylinder, a plug rotatable within the cylinder, a key slot in the plug that opens to an outer end of the plug, and a series of alignable bores in the plug and cylinder that have tumblers therein. These tumblers are urged toward the key slot by a spring in each bore of the cylinder. A key with a series of notches lifts the tumblers to a particular height in the aligned bores of the plug and cylinder so that the tumblers have a parting line between adjacent tumblers which matches a shear line between the plug and cylinder. When the parting line between the tumblers and the shear line are so aligned, the plug can rotate in the cylinder opening the lock.

In my invention, the lock's combination is changed by effectively shortening the combined longitudinal length of the tumblers in aligned bores when the owner key is used for the first time in the lock. This is done by laterally knocking a round ball from its perch on a longitudinally extending post of a special tumbler, which ball is deposited into a recess at an end of this tumbler. After the effective length of the tumblers has been shortened in this manner, the construction key will no longer align a parting line between tumblers with a shear line between the plug and cylinder. Therefore, the owner is assured that the construction worker cannot subsequently use his key to enter the house or building. Perhaps this invention will be easier to understand with reference to the attached drawings, in which:

FIG. 1 is a side elevational view of the cylinder lock;
FIG. 2 is an enlarged fragmentary cross-sectional view taken along line 2—2 of FIG. 1, showing the lock being operated by the construction key;
FIG. 3 is an enlarged fragmentary cross-sectional view similar to FIG. 2, but showing how the lock in the process of changing combination when opened by the owner key for the first time;
FIG. 4 is a further enlarged side elevational view partially in section of the special tumbler with a spherical ball perched on its longitudinally extending post;
FIG. 5 is a view similar to FIG. 4, but showing a modified form of the special tumbler; and
FIGS. 6 to 9 are schematic drawings of the tumblers relative to the shear line between the plug and cylinder—FIG. 6 showing the tumblers when operated by the construction key during construction of the house; FIG. 7 showing the tumblers when the owner first inserts his key; FIG. 8 showing the tumblers after the owner opens the lock for the first time; and FIG. 9 showing the tumblers when a construction worker inserts his key after the combination of the lock has been changed.

Referring to these drawings, the lock shown in FIG. 1 has a cylinder 1 in the form of a hollow shell with a rotatable plug 2 in the cylinder. As in conventional locks, the plug and cylinder have a series of alignable bores therein which have tumblers in these bores. A key 3 fits into a slot in plug 2 and urges the tumblers upwardly against springs in a protruding section 4 of the cylinder until parting lines between the tumblers match a shear line between the cylinder 1 and plug 2. Now the plug can be rotated in the cylinder and turn latch actuator 20 to open the lock. This is how a conventional lock works.

The usual way of changing the combination of a conventional lock is to take the plug out of the cylinder, and replace at least one tumbler with a shorter or taller tumbler. A new key is provided with a notch of different height to correspond to the new tumbler. The old key will not properly align the new tumbler with the lock's shear line and hence will not open the lock.

In my invention shown in FIGS. 2 and 3, the lock's combination is automatically changed without disassembling the lock. One of the plug bores 5 and its corresponding cylinder bore 6 have a special tumbler 7 therein. This special tumbler includes a reduced diameter post 8 extending from one end of the tumbler along its longitudinal axis. Perched on an outer end 9 of the post is a block in the form of a round steel ball 10. Preferably, the outer end 9 of the post is cupped to receive the ball and has a frictional adhesive 14 holding the ball to the post. Thus, the ball can act as a spacer between the special tumbler 7 and another tumbler 11.

When a worker uses his "construction key" in the lock, as in FIG. 2, the upper surface of the tumbler 11 is aligned with a shear line 21 between the plug and cylinder. The workman can therefore open the lock as often as he needs to with his key.

After the house has been completed and sold, the new owner inserts his "owner key" as in FIG. 3. The owner key has a higher notch and raises the special tumbler 7 until ball 10 is in the cylinder bore 6. The upper surface of the post is approximately at the shear line 21. As the plug is rotated in the cylinder, the ball 10 is laterally knocked from its perch and physically separated from an end surface of the post. The ball 10 then drops into recess 11a surrounding the post. The spring 12 forces the tumbler 11 down to the shear line. The owner can now open the lock at will even though the effective length of the tumblers in the plug and cylinder bores has been shortened.

Once the owner has used his key, the ball 10 is permanently in the recess 11a. This allows tumbler 13 in FIG. 2 to move down and extend across the shear line when
the worker again tries to use his construction key. Since the parting line between the tumblers is not aligned with the shear line, the lock will not open.

The described sequence is shown schematically in FIGS. 6 to 9. In FIG. 6, the worker can open the lock with his construction key because the tumbler's parting line is aligned with the shear line. FIG. 7 shows the owner inserting his key for the first time, forcing the ball into the cylinder bore. When the owner turns the plug in the cylinder, the ball is laterally knocked into the recess surrounding the post, as in FIG. 8. Finally, when the construction key is reinserted it will no longer operate the lock as shown in FIG. 9.

An enlarged view of the special tumbler is shown in FIG. 4. Here, the post 8 has been shown in section to bring out more detail of the cupped end surface 9 of the post and the adhesive 14 holding the ball to the post. The small drop of adhesive on the post allows the special tumbler 7 and ball 10 to be preassembled and inserted as a unit into the plug bore. This adhesive, however, breaks loose when the lock's combination is changed as described above.

The special tumbler has a post and recess structure which is simple but very effective. The post being along a longitudinal axis of the tumbler with the recess completely surrounding it needs no rotational alignment in the plug bore. The ball 10 can be knocked from the post and physically separated from the post in any direction. Once the ball is in the recess it is approximately even with an outer surface of the post and the shear line.

A modified version of the special tumbler is shown in FIG. 5. This version is very similar to the special tumbler of FIG. 4. However, this tumbler 15 has an annular groove 16 in an end surface of the tumbler separating the central post 17 and a land 18 around an outer edge of the tumbler. When the lock's combination is changed the ball 19 is laterally knocked from the post into the annular groove.

In the foregoing specification and drawings, I have used specific examples to describe my invention. It is understood that persons skilled in the art can make certain modifications to these specific examples without departing from the spirit and scope of this invention.

1. In a lock having a key-rotatable plug in a hollow cylinder and having axially alignable bores in the plug and cylinder, the improvement of: a tumbler in one of said bores, said tumbler having at one end a longitudinal post of reduced cross-sectional area with a recess adjacent said post; and a block temporarily positioned on an outer end surface of said post, said block adapted to be laterally knocked and physically separated from said post and deposited in said recess in the tumbler within said bore upon rotation of the plug within the hollow cylinder by a key, thereby altering the effective length of the tumbler and block and thus permanently changing the lock's combination.

2. The improvement in a lock as set forth in claim 1, wherein the tumbler is cylindrical and the post is located along a longitudinal axis of this cylindrical tumbler, and said recess is an annular groove completely encircling said post.

3. The improvement in a lock as set forth in claim 1, wherein the recess is in the form of an annular groove in an end of the tumbler, which groove is surrounded by a land at an edge of the tumbler, said land having a height approximately equal to the post's height.

4. The improvement in a lock as set forth in claim 1, wherein the block is a spherical ball.

5. The improvement in a lock as set forth in claim 4, wherein the outer end surface of the post is cupped to receive the spherical ball.

6. The improvement in a lock as set forth in claim 1, wherein the block is temporarily held to the end surface of the post by an adhesive, said adhesive breaking loose when said block is laterally knocked from said post and deposited in the tumbler's recess.

7. A lock comprising: a hollow cylinder having a series of bores therein; a key-rotatable plug within said cylinder, said plug having a key slot and having a series of bores axially alignable with the cylinder bores across a shear line between the plug and cylinder; one of the plug bores and its axially alignable cylinder bore having first and second tumblers therein, said first tumbler being cylindrical and having at one end a reduced diameter longitudinally extending cylindrical post surrounded by a recess; a spherical ball temporarily positioned on an outer end surface of said post providing a spacing means between the first and second tumblers, said spherical ball adapted to be laterally knocked and physically separated from the end surface of the post and deposited in said recess in the tumbler upon rotation of the plug in the hollow cylinder by a key, thus shortening the combined length of the first and second tumblers to permanently change the lock's combination.

8. A lock as set forth in claim 7, wherein the post's outer surface is cupped to receive the spherical ball.

9. A lock as set forth in claim 7, wherein the spherical ball is temporarily held to the end surface of the post by an adhesive, said adhesive breaking loose when said ball is laterally knocked from said post and deposited in the tumbler's recess.

10. A lock as set forth in claim 7, wherein the recess is of a size and dimension so that the spherical ball is approximately even with the outer surface of the post when the ball is in the recess.

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