March 30, 1965 F. J. RUSSELL ETAL 3,175,379

CONSTRUCTION MASTER KEY SYSTEM

Filed June 1, 1962

Fig. 1

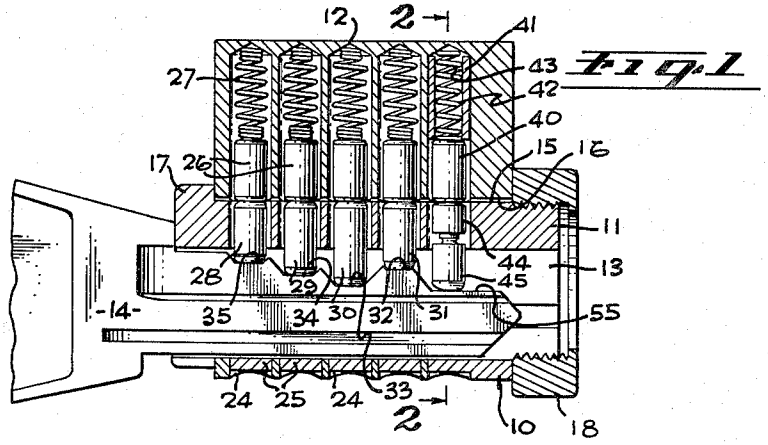


Fig. 2

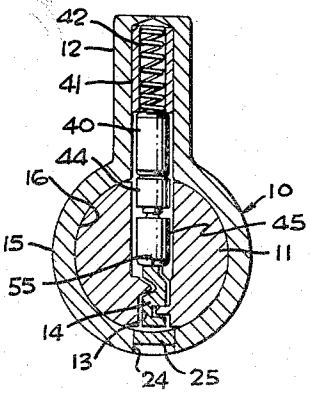


Fig. 3

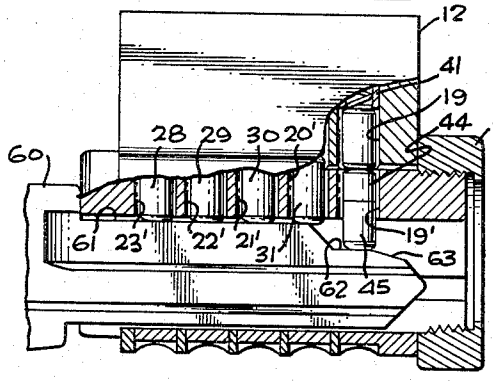


Fig. 4

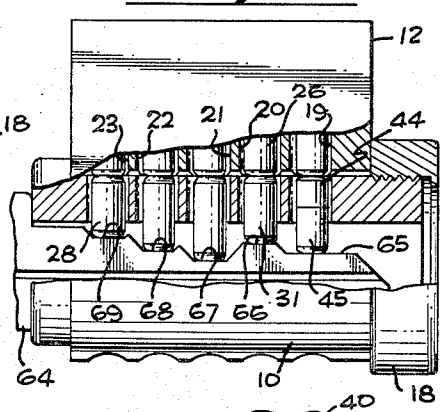


Fig. 5

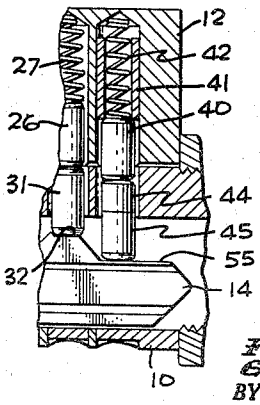
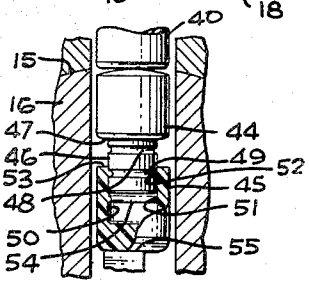


Fig. 6



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CONSTRUCTION MASTER KEY SYSTEM

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The invention relates to a construction key lock system for door locks and particularly pin tumbler locks. Systems of the kind here under consideration are such that locks when initially installed in a new building can be operated by keys made available to mechanics and workmen on the job, the locks being so constructed that when construction work is finished, the keying of the locks can be reset by simple means, thereby making it no longer possible to unlock any of the locks by use of the keys in the possession of construction personnel but only by the key which thereafter is in possession of the owner.

Although construction key lock systems in general may be useful in many and varied types of locks, the system here under consideration is one especially adapted to incorporation in pin tumbler locks.

Among the objects of the invention is to provide a new and improved construction key lock system especially adapted for use in pin tumbler locks which is simple in its construction and also in the operation involved in rekeying, a singular advantage residing in the fact that no change need be made in the conventional pin tumbler casing parts to accommodate the unique pin tumbler principle which encompasses the invention.

Another object of the invention is to provide a new and improved construction key lock system whereby the keying arrangement of pin tumbler locks can be easily altered upon the completion of construction, the rekeying of the pin tumbler system being such that it is simple, positive and inexpensive and at the same time one capable of making certain that only the authorized user of the "setting" or rekeying key can make the change-over.

Still another object of the invention is to provide a new and improved construction key lock system especially well adapted to pin tumbler locks which is of such character that it employs merely the alteration in length of one or more of the pin tumblers which can be selected at random when the lock is constructed and which is of such character that there are no extra surplus parts to dispose of or to be received in the structure when the rekeying is accomplished such as are common in the construction key lock systems of other design heretofore employed.

With these and other objects in view, the invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

In the drawings:

FIGURE 1 is a longitudinal sectional view of a pin tumber lock showing the adjustment of the lock during construction periods and showing a construction key or construction master key in position in the lock.

FIGURE 2 is a cross-sectional view taken on the line 2—2 of FIGURE 1.

FIGURE 3 is a longitudinal sectional view similar to FIGURE 1 but showing the rekeying accomplished by operation of the setting key.

FIGURE 4 is a fragmentary longitudinal sectional view showing the condition of the critical pin tumbler when subject to operation by the occupant's key.

FIGURE 5 is a fragmentary longitudinal sectional view similar to FIGURE 4 showing the critical pin tumbler construction in the condition it would have for

barring operation of the lock by use of the construction key after the lock has been set for operation by the occupant's key only.

FIGURE 6 is a fragmentary longitudinal sectional view showing the critical pin tumbler in initial extended position.

FIGURE 7 is a fragmentary longitudinal sectional view of a modified form of the invention.

In an embodiment of the invention chosen for the purpose of illustration there is shown a pin tumbler lock comprising a cylinder barrel 10 in which is mounted a cylinder plug 11 and along one side of which extends a pin tumbler casing 12. In the cylinder plug is a keyway 13 for accommodating, at least initially, a construction key or construction master key 14. The general construction of the pin tumbler lock involving cylinder barrels, cylinder plugs and pin tumblers follows a substantially conventional constructional arrangement in that the cylinder plug has an exterior cylindrical circumference 15 which is adapted to rotate freely within a cylindrical passage 16. An annular shoulder 17 on the exterior end of the cylinder plug determines the positioning of the plug in the cylinder barrel, the plug being retained by threaded engagement of a sleeve 18 with the interior end of the cylinder plug.

As in the usual case of locks of this kind there are provided a series of sets of recesses 19, 19', 20, 20', 21, 21', 22, 22', 23, 23', the recesses of the respective sets being in alignment with each other in one position of rotation of the cylinder plug 11. In the chosen embodiment there are employed five sets of recesses evenly spaced in an axial direction along the length of the cylinder plug and cylinder barrel, the central axes of the recesses being radial with respect to the axis of rotation of the cylinder plug.

Moreover, in the chosen embodiment the pin tumbler assemblies are conventional with respect to the outer four sets of recesses 20, 21, 22 and 23. Further still, following conventional practice, the pin tumblers are loaded through bores 24 which are later permanently closed by means of plugs 25.

In the outer four sets of recesses 20, 21, 22 and 23 are pin tumblers 26 of uniform length and diameter urged endwardly by coil springs 27. The springs bottom at one end in the bottoms of the respective recesses and engage adjacent ends of the pin tumblers at the other ends urging them inwardly toward the cylinder plug.

In the recesses 20', 21', 22' and 23' are pin tumblers 28, 29, 30 and 31 each usually of different length but of the same diameter as the pin tumblers 26. Varying the length of the last identified pin tumbers is the means resorted to for varying the keying of the locks. Notches 32, 33, 34 and 35 on the construction key are set at such elevations that when they engage the pin tumblers in the manner shown in FIGURE 1, the pin tumblers 28, 29, 30 and 31 will be lifted so that their upper ends precisely coincide with the cylindrical exterior 15 of the cylinder plug, this action being such as to compress the springs 27 by movement of the pin tumblers 26 in response to urging by the lower pin tumblers. The junction of the upper and lower pin tumblers as shown in FIGURE 1 lies at the surface of the exterior of the cylinder plug, thereby providing no obstruction to rotation of the plug when the proper key is inserted to open the lock.

Of special note is the construction of the pin tumbler assembly in the set of recesses 19, 19'. Although in this chosen embodiment the specially constructed pin tumbler assembly is located in the innermost of the five sets of recesses, it will be understood that this location is one primarily of convenience in that it could be located in one or another of the other sets of recesses.

The pin tumbler assembly of special construction consists of two separate assemblies, one being located in the recess 19 and the other being located in the recess 19'. The assembly in the recess 19 includes a pin tumbler 40 which is substantially the same length and diameter as the pin tumblers 26. Above the pin tumbler 40, as illustrated particularly in FIGURES 1 and 2, is a sleeve 41 which fills the balance of the length of the recess 19. Hence, with a sleeve 41 of the length shown, the pin tumbler 40 can be pushed no further into the recess 19 than a position which will provide that its outer end coincide with the cylindrical passage 16 and cylindrical exterior 15.

A spring 42, smaller in diameter than the springs 27 and in particular small enough to be contained within an interior bore 43 of the sleeve 41, is provided. The length of the spring 42, however, is substantially the same as the length of the springs 27.

The pin tumbler assembly in the recess 19' comprises a specially constructed pin tumbler part 44, constructed as usual of metal and a second pin tumbler part 45 joined to it, the last pin tumbler part being if preferred formed of some one of the conventional, commercial, tough, synthetic plastic materials.

The pin tumbler part 44 has a reduced end portion 46 providing a shoulder 47 and accommodating in the chosen embodiment two annular grooves 48 and 49. Within the pin tumbler part 45 is a recess 50 of substantially the same circumference as the exterior circumference of the reduced portion 46. Extending into the recess 50 are annular projections 51 and 52, these projections being spaced axially at the same spacing as the axial spacing of the grooves 48 and 49, the radius and size of the projections being such as permits them to be pressed into engagement with the annular grooves.

In initial position of adjustment the projection 52 is in engagement with the annular groove 49, the annular groove 48 being exposed above a top edge 53 of the cap and the annular projection 51, if desired, being in engagement with a lower edge 54 of the reduced portion 46. In this position the pin tumbler assembly comprising the pin tumbler parts 44 and 45 is extended to its relatively longest position. Moreover, in this position the pin tumbler part 45 is adapted to rest upon a notch 55 of the construction key 14, the notch being of such proper elevation that when the construction key is in place, as shown in FIGURE 1, the pin tumbler part 45 will be lifted so that its upper end coincides with the cylindrical exterior of the cylinder plug and the pin tumbler 40 is lifted so that the junction between them clears at the surface of the cylinder plug.

Consequently, the last identified special pin tumbler assembly cooperates with the other pin tumbler assemblies during this stage of adjustment so that the lock can be unlocked by employment of the construction key 14. As is the common practice, many keys like the key 14 are passed around to mechanics and workmen so that any one of them can then lock and unlock the locks which have been installed in a building at any time and with perfect freedom during the construction period.

In the modified form of invention shown in FIGURE 7 a recess 70 is provided in the pin tumbler casing 12 which has a portion 71 of smaller diameter in which is located a spring 72. A shoulder 73 acts in a manner similar to the lower end of the sleeve 41 of the first form of the invention to limit upward movement of a pin tumbler 40'. In this form a pin tumbler piece 74 has a projection 75 provided with an annular bead 75' which is urged by action of the spring 71 into engagement with a rim 76 of the pin tumbler piece 77. A recess 78 is adapted to receive the projection when the pin tumbler piece 74 is forced upwardly by action of the setting key 60 until the annular bead is received within an annular recess 79 and the rim 76 is pressed into engagement with a shoulder 80 of the pin tumbler piece 74.

When the construction period has finished and the need arises to render all of the construction keys inoperable to unlock the locks in place in the building, the special pin tumbler assembly in the innermost set of recesses 19, 19' is modified. Although sundry means may be employed for this purpose, a particularly simple and advantageous means consists in the employment of the setting key 60 which can be a relatively simple key having one long, level edge 61 and a special setting notch 62 which in this embodiment is at the innermost end. For ease and convenience a cam track 63 may form the approach to the setting notch from the innermost end of the key.

In operation as this key is inserted the cam track by wedge action as the setting key is forced into place forces the pin tumbler part 45 endwardly, in an upward direction, as shown in FIGURES 1, 2 and 3 from the position of FIGURES 1 and 2 to the position of FIGURE 3. Inasmuch as the pin tumbler part 45 is of somewhat yieldable material, the projection 52 is disengaged from the annular recess 49 and pressed upwardly until it engages the annular recess 48. At the same time the projection 51 is forced over the lower end of the reduced portion 46 and upwardly until it is received in the annular recess 49. The spacing of the projections and recesses is such that in this uppermost position the top edge 53 of the tumbler part 45 will be in engagement with the shoulder 47 of the tumbler part 44.

By reason of forming the construction key 60 with a notch 61 as shown of such elevation that when it is inserted the pin tumblers at their junctions are out of alignment with the exterior circumference of the cylinder plug, the setting key cannot be used as a master key to open any of the locks. It can, however, be safely entrusted to any one of the construction personnel for, in effect, destroying the setting of all the locks for any but the occupant's key. The setting key must be inserted in only one position of rotation of the cylinder plug and this position of rotation is assured by the projecting of the pin tumblers 28, 29, 30 and 31 upwardly into the recesses of the pin tumblers 26.

Thereafter when an occupant's key 64 is employed, it is capable of unlocking the lock. This resides in the fact that the occupant's key is provided with notches 65, 66, 67, 68 and 69 which are properly placed at such elevations that when they lift the appropriate pin tumblers including particularly the innermost pin tumbler consisting of the tumbler parts 44 and 45, all of the tumblers will be in endwise engagement at the circumference of the cylinder plug and hence free the plug for rotation.

As shown in FIGURE 5, should the construction key be inserted after the lock has been reset or rekeyed, it will be incapable of rotating the cylinder plug because the notch 55 of the construction key will not lift the pin tumbler parts 44, 45 high enough to coincide with the exterior circumference of the cylinder plug and hence the cylinder plug will be blocked against rotation.

From the foregoing description it will be clear that the recesses for all of the pin tumblers in this particular type of construction key lock system can be made in the ordinary fashion without change in either length or diameter. The only change lies in the construction of one of the pin tumbler assemblies which may be any one of those assemblies provided that a suitable setting key is constructed to manipulate the adjustment of the special pin tumbler assembly. No special holes or bores need be provided for either permanent retention of extra parts after resetting has been accomplished or for the ejection of any surplus parts thereafter. All of the parts initially employed continue to be employed but with respect to one of those parts only in a slightly revised condition. Once having been set for the occupant's key, the lock thereafter continues to function in the ordinary conventional fashion and it could on occasions, should the need arise, be rekeyed also in conventional fashion.

While the invention has herein been shown and described in what is conceived to be the most practical and

preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. In a key lock system a pin tumbler lock comprising a cylinder barrel having a cylindrical passage therethrough, a cylinder plug rotatably mounted in the passage, and a pin tumbler casing on one side of the barrel, said plug having a keyway therethrough, said plug and said casing having a plurality of sets of complementary pin tumbler recesses in axial alignment in one position of rotation, the recesses in the plug being in communication between the keyway and the exterior circumference of the plug and with the respective recesses of the casing in said one position of rotation, and a set of pin tumblers in each set of recesses, one of said sets including a two-part pin tumbler, said two-part pin tumbler initially having an extended position and responsive to operation by a construction key, rigid stop means for one of the sets of pin tumbler recesses within the respective recess in the casing, said stop means being resistant to movement of said two-part pin tumbler, said two-part tumbler being adapted when forced endwise toward said means to shift to a contracted position whereby to shorten the effective length of said two-part pin tumbler.

2. In a key lock system a pin tumbler lock comprising a cylinder barrel having a cylindrical passage therethrough, a cylinder plug rotatably mounted in the passage, and a pin tumbler casing on one side of the barrel, said plug having a keyway therethrough, said plug and said casing having a plurality of sets of complementary pin tumbler recesses in axial alignment in one position of rotation, the recesses in the plug being in communication between the keyway and the exterior circumference of the plug and with the respective recesses of the casing in said one position of rotation, and a set of pin tumblers in each set of recesses, one of said sets including a two-part pin tumbler, said two-part pin tumbler initially having an extended position and responsive to operation by a construction key, rigid stop means for one of the sets of pin tumbler recesses within the respective recess in the casing, said stop means being resistant to movement of said two-part pin tumbler, said two-part pin tumbler being adapted when forced endwise toward said means to shift to a contracted position whereby to shorten the effective length of said two-part pin tumbler, and a setting key having a notch raised relative to a corresponding notch of the construction key whereby to force said two-part pin tumbler into a contracted condition thereby adjusting the lock to fit the setting key and destroying its adjustment with respect to the construction key.

3. In a key lock system a pin tumbler lock comprising a cylinder barrel having a cylindrical passage therethrough, a cylinder plug rotatably mounted in the passage, and a pin tumbler casing on one side of the barrel, said plug having a keyway therethrough, said plug and said casing having a plurality of sets of complementary pin tumbler recesses in axial alignment in one position of rotation, the recesses in the plug being in communication between the keyway and the exterior circumference of the plug and with the respective recesses of the casing in said one position of rotation, and a set of pin tumblers in each set of recesses, a stop means in at least one of the sets of recesses, a first pin tumbler and a second two-part pin tumbler located in the set of recesses which includes said stop means, said two-part pin tumbler initially having an extended position responsive to operation by a construction key, said two-part pin tumbler being adapted when forced endwise against said stop means to shift to a contracted position whereby to shorten the effective length of said two-part pin tumbler, said two-part pin tumbler when forced into a contracted position being adapted to adjust the lock to fit an occupant's key and destroy its adjustment with respect to the construction key.

4. In a key lock system a pin tumbler lock comprising a cylinder barrel having a cylindrical passage therethrough, a cylinder plug rotatably mounted in the passage, and a pin tumbler casing on one side of the barrel, said plug having a keyway therethrough, said plug and said casing having a plurality of sets of complementary pin tumbler recesses in axial alignment in one position of rotation of said plug, the recesses in the plug being in communication between the keyway and the exterior circumference of the plug and with the respective recesses of the casing in said one position of rotation, and a set of spring urged pin tumblers in each set of recesses, the set of pin tumblers in at least one of the sets of complementary recesses including a two-part pin tumbler, rigid stop means for the set of complementary recesses containing the two-part pin tumbler, said stop means being located entirely within the respective recess in the casing and being resistant to movement of said two-part pin tumbler, said two-part pin tumbler comprising a pin tumbler body piece and a cap piece, said body piece and cap piece together initially having an extended position, said cap piece being adapted when forced endwise toward said means to shift to a contracted position whereby to shorten the effective length of said two-part pin tumbler, a construction key having a notch adapted to lift the respective two-part pin tumbler assembly to unlocking position, and a setting key having a notch raised relative to the corresponding notch of the construction key whereby to force said two-part pin tumbler into a contracted position thereby adjusting the lock to fit the setting key and destroying its adjustment with respect to the construction key.

References Cited by the Examiner

UNITED STATES PATENTS

1,850,323	3/32	Heyer	70—364
2,194,469	3/40	Fremon	70—364
2,232,017	2/41	Wilder	70—364
2,232,137	2/41	Rolph	70—364
2,895,323	7/59	Kennedy	70—383
3,073,146	1/63	Patriquin	70—383

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