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PIN TUMBLER LOCK

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Fig. 1.

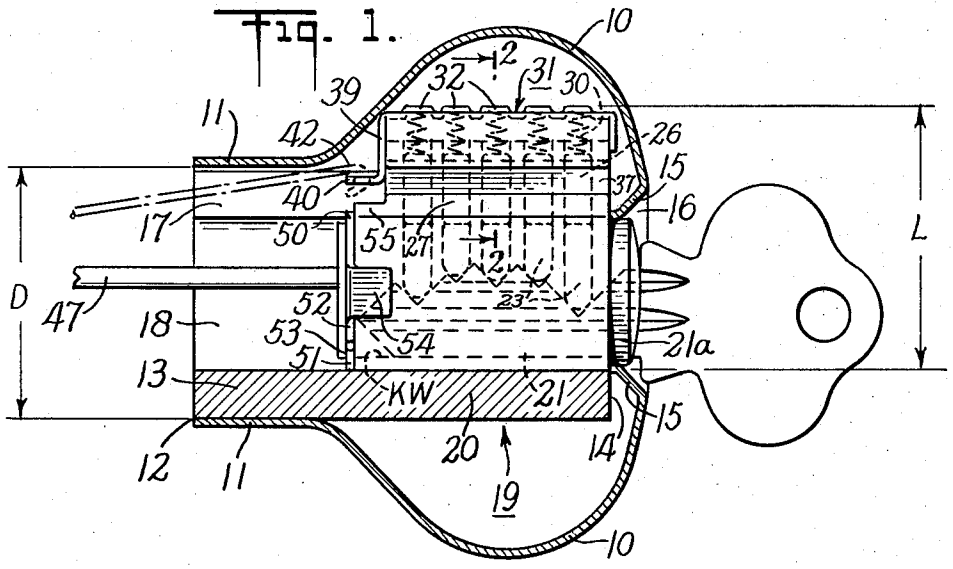


Fig. 2.

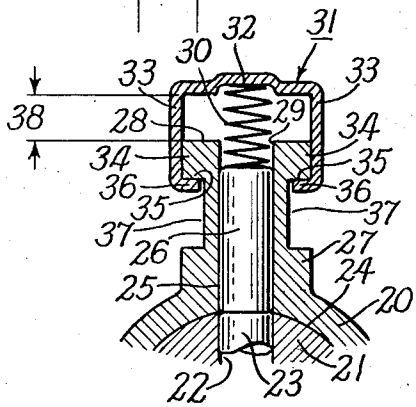
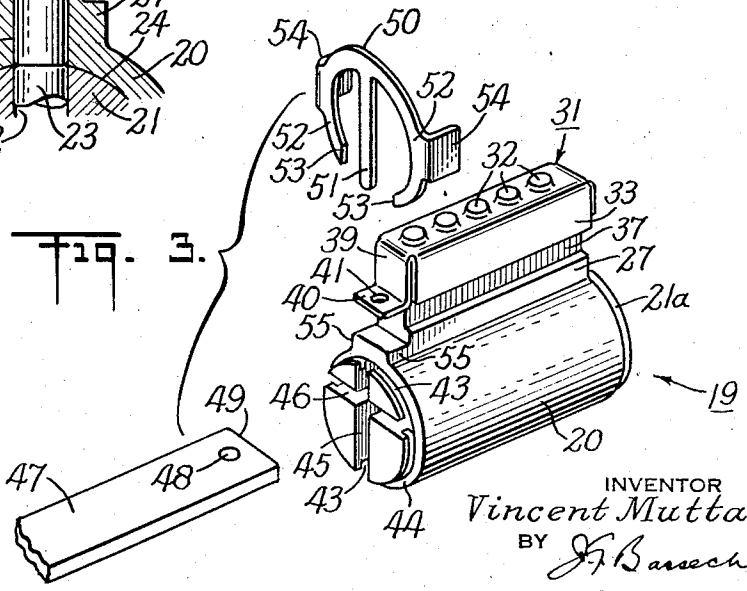


Fig. 3.



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PIN TUMBLER LOCK

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10 Claims. (Cl. 70—224)

This invention relates to locks and more particularly to a combination plug retainer and knob construction.

Known to me is the provision of cylinder pin tumbler locks arranged to be inserted in a housing or casing of limited dimensions such as for example door knobs. These assemblies coordinate the dimensions of the pin tumbler mechanism comprising the plug and the casing for the pin drivers and springs to the space within which this mechanism is to be retained by a two-part construction of the casing in order to hold the pin tumbler casing in position. Where the cylinder pin tumbler lock is to be mounted in a door knob, it has been the practice to make the knob structure for the cylinder tumbler lock of a plurality of parts such as a knob portion and a shank portion. This required assembling of the cylinder tumbler lock into position in the knob portion and then completing the assembly to incorporate the lock by attaching the shank portion. This relatively costly construction is occasioned by the necessity to keep the driver pins sufficiently long and to associate with the predeterminately long pin driver springs of adequate length and to provide clearances to compress the springs in sliding the key into and out of the key plug. Attempts to effect economies in the housing or knob assembly by integrally forming the knob portion and knob shank portion have made it commercially impractical to retain in such a knob construction a cylinder pin tumbler lock in which the driver pins and spring therefor are of adequate size.

Accordingly, it is an object of my invention, to provide a pin tumbler lock which may be associated in a relatively small housing such as in a door knob, particularly an integrally formed knob and knob shank or one in which the knob and knob shank are preliminarily assembled and to provide therefor a pin tumbler lock mechanism which is characterized by driver pins of adequate length to satisfy a wide range of requirements for security and key combinations.

More specifically, it is an object of my invention, to provide in an integral knob a cylinder pin tumbler lock construction which may be associated with the knob and effect large economies in manufacturing costs and without making the knob shank unduly large and cumbersome to preclude use of such knobs in cylindrical locks or key knob type of installations.

Still more particularly, it is an object of my invention to provide a cylinder pin tumbler lock in which the driver pins are of the standard length construction found in multi-part knobs, that is, those in which parts of the knob portion and shank portion are assembled only after the cylindrical lock has been mounted in the knob.

Still more particularly, it is an object of my invention to provide a cylinder pin tumbler lock which effects substantial economies in assembly of the various cylinder plug and cylinder casing parts with respect to each other and the knob or like casing without sacrificing the adaptability of the cylinder lock parts to a wide range of key bitting and security requirement.

To attain these objects and such further objects as

may appear herein or be hereinafter pointed out, I make reference to the accompanying drawing forming a part thereof, in which

Figure 1 is a longitudinal section of a cylindrical pin tumbler lock and knob construction in accordance with my invention;

Figure 2 is a fragmentary section taken on the line 2—2 of Figure 1;

Figure 3 is an exploded perspective view of the pin tumbler casing.

My invention may be summarized as applicable to the field of pin tumbler locks, in which the pin tumbler mechanism including the driver pins are desirably made of a size as long as possible and more specifically in accordance with some standards requiring that these pins be a minimum of .700" length for security reasons as well as to obtain a wide range of bitting combinations. In order to retain this desirable length of driver pins in an assembled pin tumbler mechanism, a novel driver spring casing is provided which has a size in its over-all dimensions which may be assembled by clearing through relatively small apertures such as the knob shank. Such casing is assembled with driver pin spring-supporting seats which compressibly are drawn into substantially the outlines permitting inesrtion in the knob or like casing to clear through such opening, as the knob shank, for filling purposes and to expand within the enlarged portion of the knob casing thereby to afford the requisite driver spring clearance for effective construction of the driving pin springs and expansion for projecting the driver pins into the key slot of the plug.

Still more particularly, my invention may be summarized as providing a cylinder pin tumbler lock assembly and novel cylinder plug retainer and plug stop mechanism which will effect substantial economies in labor and material.

Making reference to the drawing, I exemplify my invention in connection with a casing comprising a door knob 10 having an integral knob shank 11. In this construction the knob shank 11 has a mouth 12 in which may be extended a spindle sleeve 13 to have its forward edge 14 axially aligned with the plug supporting flange 15 defining the plug rotative bearing and key aperture 16. The sleeve 13 is formed with a radially extended slot 17 cooperating with the axial portion 18 to receive the irregular contour of a cylinder pin tumbler mechanism comprising the cylinder plug casing and driver pin and spring casing which will be amplified as this description proceeds.

In the construction constituting applicant's invention, the clearance of the opening of the knob shank 11 afforded by the diameter D and the minimum size of the opening 18 and the slot 17 is such, that a standard cylinder pin tumbler mechanism in which the driver pins may reach a size of .700" length, could not enter. In the illustration the over-all depth L is intended to refer to a size of pin tumbler plug and driver casings within which driver pins of .700" length may be retained with predetermined driver pin springs adequate for such pins.

The pin tumbler mechanism in accordance with my invention which may be mounted in the sleeve 13 and clear the diameter D with allowance for the thickness of the sleeve 13 diametrically opposite the slot 17, is more specifically illustrated in Figure 3 in the form of the pin tumbler mechanism 19 having a plug casing 20 in which may be extended the plug 21. The plug is formed with the usual drill holes 22 to carry the pin tumbler follower pins 23 of known pin tumbler lock construction into the path of the key slot to and adjacent the plug parting line 24. The follower pin apertures 22 are aligned with the drill holes 25 for the driver pins 26 within the driver pin casing 27. The casing 27 has its upper edge 28 terminat-

ing in respect of the diametrically opposite edge of the plug 21 to permit clearance through the apertures 12 diminished by the thickness of the wall of the sleeve 13 where this is employed. Such construction affords a seat 29 for the driver springs 30 inadequate to use a full length set of driver pins. In order to provide an anchor or abutment for the driver pin springs 30 in respect to which the springs project the driver pins, I provide a cap 31 having interior driver-pin spring seats 32 formed on the inner face thereof. The cap 31 has side branches 33 extending to each side of the flanges 34 which overlap the shoulders 35 with inwardly turned lips 36 engaging the shoulders 35. Clearance slots 37 are formed in the casing 27 for guiding the lips 36 on the driver casing 27 on the exterior wall thereof. The extent of the length of the side branches 33 with relation to the lips 36 provide a clearance gap 38, which in addition to the clearance remnant 29 serves as a housing for the driver springs 30 and the driver pins 26 dimensionally sufficient for the longest standard length driver pin 26 and the spring 30 without sacrificing adequate biasing force or becoming unyielding under the compressing force of the key bitting when inserted in the key way.

The construction described, providing driver pin spring seats 32 exetriorly of the driver pin casing 27 and particularly by the telescopic or slidable casing 31, permits compressive movement of the cap 31 in the direction of the edge 28 against the driver springs and driver pins, to a degree affording a clearance dimension less than the diameter D minus the thickness of the sleeve 13, whereby the pin tumbler mechanism may be moved through the shank aperture 12 into position where the plug trunnion 21*a* may be seated within the bearing 15. Upon being moved to enter the knob 10, the cap 31 is released to expand to the limit where the lips 36 engage the shoulders 35, to restrain further upward movement to form an abutment for the springs and maintain adequate seating for biasing the driver springs 30 against the rear ends of the driver pins 26.

The cap 31, at its rearward end 39, may be formed with means to manipulate the cap 31 within the space of the knob, and for this purpose is provided with a tongue 40, having an aperture 41. In the event that it is found desirable to withdraw the pin tumbler mechanism from the mounted position, a hooked key or like instrument 42 may be directed through the slot 17 to engage the aperture 41 and move the spring seat cap 31 to its lowermost position against the spring tension of the driver springs 30, to bring the cap 31 beneath the shank 11, thereby effecting removal rearwardly through the mouth 18, previously used for inserting the pin tumbler mechanism in the knob.

While the cylinder plug set forth above may be of standard construction, it is contemplated by my invention to provide the plug with a peripheral or annular slot 43 adjacent the rear wall 44 of the plug casing 20. The plug is slotted diametrically with the slot 45, terminating at its opposite end in the peripheral slot 43, previously described. A transverse slot 46 is arranged to receive the spindle bar 47, formed at one end with a drill hole 48.

With this construction, the spindle bar 47 has its end 49 directed into the slot 46, to align the aperture 48 with the slot 45. In this position, there is provided a plug retainer 50, having a center branch 51 arranged to enter the slot 45 and side branches 52, whose ends 53 span the plug to enter the slot 43 with friction contact. The pin 51 thereby enters the drill hole 48, locking the spindle bar 47 in engagement with the plug and providing a plug retainer in opposed relation to the flange 21*a* of the plug.

The retainer 50 has extended from the branches 52 thereof stop wings 54, overlying the plug casing 20 and extending co-terminously with the shoulders 55 of the driver pin casing 27. Rotary movement by key actuation of the plug 21 is limited by engagement of the stops 54, 54 with the shoulders 55.

By the construction as described, substantial economies in material and labor are afforded by the combination plug retainer and plug stop, as well as affording a simple coupling for the spindle bar 47.

By the construction described it will also be observed that integral casings may be employed to house the pin tumbler mechanism, without sacrificing dimensional requirements of the driver pins necessary in a rugged, all-purpose pin tumbler mechanism. The casing may be charged with the pin tumbler lock assembly without the need for costly multi-part casings or knobs and simple integral or pre-assemblies of the knobs and shanks may be employed. Likewise, predeterminedly assembled knob portions and shank pieces may be employed to fit the same with a pin tumbler mechanism of adequate driver pin length and driver spring clearance space, which heretofore could not be attained except in a multi-part knob and shank piece assembly.

It will be observed that while, in the preferred embodiment of my invention, a driver pin spring seat casing is provided which is exteriorly positioned by a compressible spring seat casing, my invention, in the broader phases thereof, contemplates a driver pin casing and plug casing assembly, the over-all dimensions of which are smaller than the knob shank aperture with a driver spring seat or spring seat anchored outside of the driver pin casing.

In general, I have provided a pin tumbler mechanism which effects substantial economies in assembly in casings of limited size, without sacrificing the ruggedness necessary in established pin tumbler lock assemblies.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. A pin tumbler lock cylinder having a rotatable key plug comprising a housing having a driver pin casing extending therefrom, driver pins in said driver pin casing, biasing springs for said driver pins, abutment means for at least one of said driver pins and biasing springs, said abutment means being radially movably mounted relatively to the axis of the plug and along said driver pin casing.

2. A pin tumbler lock cylinder having a rotatable key plug comprising a housing having a driver pin casing extending therefrom, driver pins in said driver pin casing, biasing springs for said driver pins, abutment means for at least one of said driver pins and biasing springs, said abutment means being radially movably mounted relatively to the axis of the plug and along said driver pin casing, and means for holding said abutment means captive to said driver pin casing.

3. A pin tumbler lock cylinder comprising a housing having a driver pin casing extending therefrom, driver pins in said driver pin casing, biasing springs for said driver pins, a cap forming an abutment for said biasing springs for said driver pins, said cap being movably mounted along said driver pin casing in the direction of movement of said springs.

4. A pin tumbler lock cylinder comprising a housing having a driver pin casing extending therefrom, driver pins in said driver pin casing, biasing springs for said driver pins, a cap forming an abutment for said biasing springs for said driver pins, said cap being movably mounted along said driver pin casing in the direction of movement of said springs, and means for holding the cap captive on the driver pin casing.

5. A pin tumbler lock cylinder comprising a housing having a driver pin casing to one side thereof, driver pins in said driver pin casing, abutment means for said driver pins, biasing springs engaging said abutment means and driver pins, said abutment means being movably mounted relatively to said driver pin casing and along said casing in the direction of movement of said springs, and means for holding said abutment means captive.

6. A pin tumbler lock cylinder comprising a housing having a driver pin casing extending therefrom, spring

biased driver pins in said driver pin casing, a cap movably mounted on said driver pin casing forming an abutment for the springs biasing the driver pins, said cap being movable in the directions of movement of said driver pins.

7. A pin tumbler cylinder comprising a housing having a driver pin casing joined thereto and extended therefrom, spring biased driver pins in said driver pin casing, a cap movably mounted on said driver pin casing, forming an abutment for at least one of the springs biasing the driver pins, said cap being movable in the directions of movement of said driver pins, and means for holding the cap captive on the driver pin casing.

8. A lock assembly comprising in combination, a pin tumbler lock cylinder and a housing incorporating said pin tumbler cylinder having a space within said housing therefor, said space having a filling opening smaller than required for insertion of said cylinder, said cylinder comprising a key plug housing having a driver pin casing fixedly extending therefrom, driver pins therein, said casing supporting driver pin biasing springs, at least one of which is inwardly biased by abutment means movably mounted relatively to said driver pin casing exteriorly of said casing whereby the cylinder may be inserted through said filling opening.

9. In a lock assembly in accordance with claim 8 where said housing is a door knob and the filling opening is defined by axially extended wall portions of the knob.

10. A lock assembly in accordance with claim 8 wherein said housing is an integrally formed knob and spindle shank, and the filling opening is defined by the walls of the spindle shank.

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