Jan. 15, 1963 G. P. PATRIQUIN 3,073,146

PIN TUMBLER ASSEMBLY

Filed Nov. 4, 1960

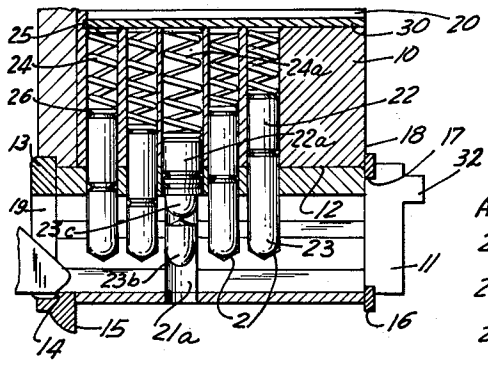


FIG. 1

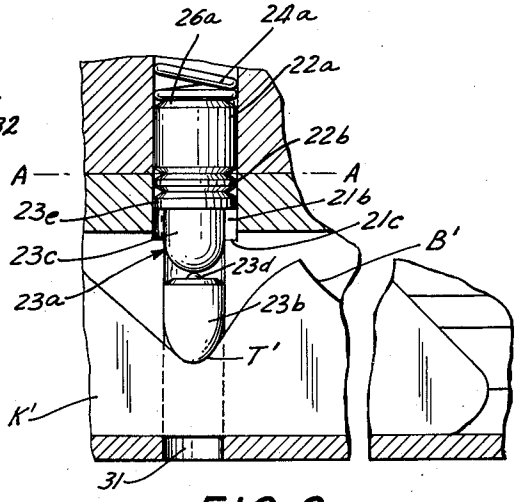


FIG. 2

FIG. 3

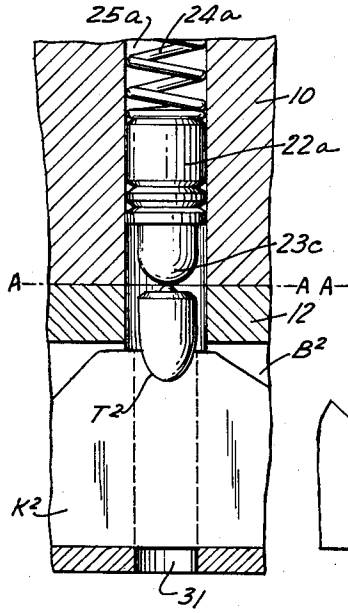


FIG. 4

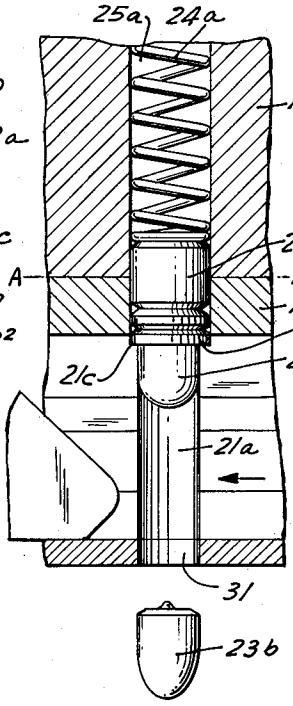
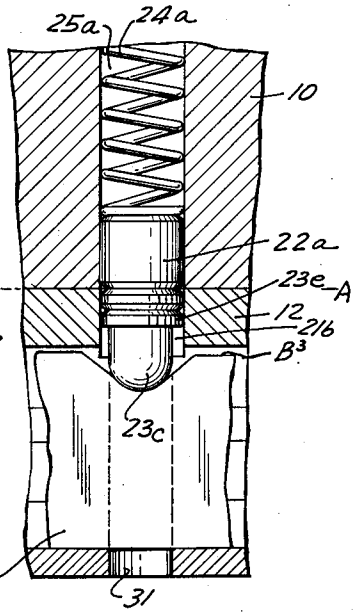


FIG. 5



INVENTOR.
GEORGE P. PATRIQUIN
BY Mark T. Basseches
his ATTORNEY

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PIN TUMBLER ASSEMBLY

George P. Patriquin, Gardener, Mass., assignor to Independent Lock Company, Fitchburg, Mass., a corporation of Massachusetts

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This invention relates to a method for providing, and the resultant improved lock assembly, and more particularly to a pin tumbler lock assembly.

Still more particularly, this invention relates to a tumbler lock assembly having a factory pin tumbler combination which renders the lock operable by a first key, said lock including novel means whereby operation by a specially designed second key will disable subsequent operation by the first mentioned key.

In the construction of new homes, apartment houses, office buildings, and the like, it is desirable to provide the workers with means for locking the individual units on which they are working in order to safeguard tools, construction materials and the like, which are necessarily left on the job. After construction work has been completed, however, it is necessary to assure the security of the tenant or owner that the combination of the locks previously employed be changed, so that holders of keys during the construction period are not able, after completion of the job, to reenter the premises through the use of these construction keys.

In the past, changing of the pin tumbler combination has required removal of the lock from the door, disassembly of the tumbler mechanism, and substitution of new driver and follower pins for the pins originally provided—in short, an operation requiring the skills of an experienced locksmith. Accordingly, it is an object of the present invention to provide a pin tumbler mechanism for use in door locks, and the like, the combination of said mechanism being adapted to be changed without disassembly of the door lock mechanism or the pin tumbler unit.

A further object of this invention is to provide a pin tumbler assembly, the combination of which assembly may be changed through the use of a specially prepared key.

A further object of this invention is to provide a pin tumbler assembly, the combination of which is changeable in the manner aforesaid by a special change key, the construction of the tumbler mechanism being such that one change key may be effective to change the combinations of a plurality of tumbler mechanism, all of which mechanisms may have different combinations after such change.

Still a further object of this invention is to provide a pin tumbler mechanism as aforesaid, wherein the change key may, if desired, be adapted for use as a master key.

A still further object of this invention is to provide a pin tumbler mechanism having a frangible follower pin in at least one tumbler thereof, said mechanism being operable by a key having one combination prior to fracture of said frangible pin, and being operative to that key after fracture of said follower pin.

The invention also has for its object a method of quickly and inexpensively converting a pin tumbler lock from one combination to another whereby only a predeterminedly bitted key will operate the key actuating mechanism and the removal of the pin tumbler assembly to change the combination for key actuation is avoided.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, reference is made to the accompanying drawings, forming a part hereof in which:

FIGURE 1 is a vertical section through a pin tumbler assembly in accordance with the invention;

FIGURE 2 is a magnified fragmentary section illustrating the positions of the parts in the conversion or change tumbler with a construction or temporary key in position in the keyway;

FIGURE 3 is a section simlar to the section of FIGURE 2 with the conversion or change key positioned in the keyway;

FIGURE 4 is a view similar to the view of FIGURE 2 showing the changed combination; and

FIGURE 5 is a view similar to the view of FIGURE 2 showing the owner's key in position within the keyway of the plug.

In accordance with the invention, a tumbler casing **10** is provided with a plug **11** rotatably mounted within main bore **12** of the casing. An annular flange **13** on the outer face of plug **11** is seated within annular shoulder **14** formed in the face plate **15** carried by the casing **10**, thereby limiting the inward relative movement of the plug with respect to the casing **10**. Movement of the plug **11** outwardly of the casing **10** is prevented by split spring washer **16** seated in annular groove **17** of the plug **11**, said washer bearing against end wall **18** of the casing. The plug **11** is provided in the usual manner with a longitudinally extending keyway **19**.

The casing **10** and plug **11** are provided in the usual manner with rows of parallel cross bores or holes **20**, **21**, respectively, for the driver springs, driver pins and follower pins. It will be understood that the cross bores **21** by rotation of the plug **11** will be brought into registry with the bores **21** in the casing. The bores **20** and **21** are charged with paired driver and follower pins **22**, **23**, respectively, and with driver springs **24** bearing, at their upper ends **25**, against the cap plate **30**, and at their lower ends **26**, against the upper or outer ends of driver pins **22**. Springs **24** act in the usual manner normally to project the follower pins fully and the driver pins partly into the cross bores **21** of the plug, thereby causing the driver pins **22** to straddle the shear or parting line A—A, thereby preventing the rotation of the plug **11** with respect to the casing **10** without the use of a suitable key.

The structure thus far described is conventional in nature, and the invention herein is concerned with the cross borings **20***a*, **21***a*, of the casing and plug, respectively, and the associated novel pins or tumblers charged therein, as well as the novel key mechanisms hereinafter described, it being understood that while one such assembly is shown, it may be embodied in as many of the borings as it may be desired to alter by the present invention.

In accordance with the illustrated embodiment, cross bore **20***a* is enlarged as compared with cross bores **20**. The bore **20***a* is charged with a driver pin **22***a* and an auxiliary driver pin **23***b*, the pins being urged radially inwardly toward the axis of the main bore **12** by a driver pin spring **24***a*, having its upper end **25***a* biased against the cap **30**, and its lower end **26***a* biased against driver pin **22***a*. The bore **21***a* of the plug **11** is, in contrast to the bores **21**, optionally but preferably drilled entirely through the plug **11**. In addition, the bore **21***a* includes an enlarged counter-bored entering portion **21***b*, defining with the remainder of said bore an annular shoulder **21***c*. A frangible follower pin **23***a* is seated within the bore **21***a*. The follower pin **23***a* includes an inner section **23***b*, an outer section **23***c*, and a weakened or frangible neck connecting portion **23***d*.

In addition, the outer section **23***c* is provided with a mushroom like head portion **23***e* of a diameter substantially conforming with the enlarged portion **21***b* of the bore **21***a*.

The casing **11** is provided with an opening **31**, opening into the main bore **12** and preferably positioned to

register with the bore 21*a* in the locked position of the plug. The opening 31 is of a size which will permit the inner portion 23*b* of follower pin 23 to pass therethrough, the size of said opening 31 being smaller than the head portion 23*e*, however. As seen in FIGURES 1 and 4, driver spring 24*a* in the locked position of the plug is effective to force the head portion 23*e* of the follower pin 23*a* against the shoulder 21*c* formed in the cross bore 21*a*.

As shown in FIGURE 2, a temporary key K1, having a bitted upper face B1, has been inserted into the keyway 19 of the plug 11. While the entire bitted face of key K1 has not been shown, it should be understood that said face is provided in the usual manner with a predetermined bitting suitable to raise the follower pins 23 to a point whereat their outermost ends lie precisely on the shear line A—A, and thereby present no obstacle to the turning of the plug 11 within the cylinder 10.

The bitting B1 of the key K1 is likewise effective when engaged with the lower section 23*b* of follower pin 23*a* to raise the outermost end of the auxiliary driver pin 22*b* to the parting or shear line A—A, thereby enabling the plug 11 to be turned within the casing 10, bringing the eccentric actuator finger 32 carried by the plug 11 into tripping contact with any known suitable locking mechanism.

The combination of the pin tumbler assembly is changed by actuating said assembly with a special change or master key K2 (see FIGURE 3). In the inserted position of key K2, the land or trough T2 of said key, which is of a greater height than the trough T1 of key K1, serves to lift the follower pin 23*a* sufficiently to position the weakened neck portion 23*b* at the shear line A—A. The key K2 is then forcibly rotated in the plug 11, causing the lower portion 23*b* of follower pin 23*a* to become separated from the upper portion 23*c* thereof, by fracturing the follower pin at the neck portion 23*a*. Under these circumstances, the lower portion 23*a* will be retained within the plug, and the upper portion 23*c* will be shifted to the bore 20*a* in the casing. As the plug 11 is turned by key K2, the widened portion 21*b* of bore 21 is brought into registry with opening 31 in the casing 10, and the separated lower part 23*b*, at such registering position, may fall through the passage 31. If the lower or inner section 23*a* does not fall through opening 31, as the plug is rotated to unlock the door mechanism, this part will, as shown in FIGURE 4, fall through said opening when the key K2 is withdrawn after the plug has been returned to the locked position thereof, since the opening 31 is optionally but preferably, positioned in the casing 10 to register with cross bore 21*a* when the plug is in said locked position.

It will be readily recognized that opening 31 need not be aligned with the bore 21*a* in the locked position of the plug so long as said opening is positioned to register with the upper end 21*b* of said bore during some rotated position of the plug 11.

It will be further recognized that the opening 31 is desirably located at a point beneath the axis of the main bore 12 so that the inner section 23*b* will be induced to pass through said opening under the influence of gravity. At any rate, after the key K2 has been withdrawn, the combination of the tumbler assembly has been effectively changed by reason of the removal of the section 23*b*.

As shown in FIGURE 5, the owner's key K3 is bitted at its upper edge B3, and provided with a trough T3, which registers in the inserted position of the key K3 with the cross bore 21*a*. The trough T3 of key K3 is of a height calculated to raise the junction of follower pins 22*a* and 22*b* to the parting or shear line A—A when the lower face of the outer follower pin section 23*a* is seated in said trough. Further, the comparison of FIGURES 2 and 5 will indicate that after the section 23*b* has been removed from the follower pin 23*a*, the construction or temporary key K1 will be ineffective to align the pins in the bores 20*a*, 21*a*, with the shear line A—A, and thus will no longer be capable of operating the lock.

In the illustrated embodiment, the key K2 may serve as a master key to operate the lock even after the combination has been changed to deactivate the temporary or construction key K1. To permit the key K2 to serve the function of a master after a combination change has been effected, the weakened neck portion 23*d* is located precisely at the center point of the follower pin 23*a*. Under these circumstances the trough T2 of the key K2 will be effective to lift the outer end of the outer section 23*c* of the follower pin precisely to the shear line A—A, thus permitting the plug to be rotated in the casing. It will be readily recognized that while the cross bores 20*a*, 21*a* are illustrated in the third position of a five pin tumbler unit, this positioning may be varied to provide additional security.

Likewise, while the cylinder plug device has been illustrated in connection with a pair of driver pins 22*a*, 22*b* in the change bore, it will be readily recognized that if no mastering is desired, a single driver pin in the change bore may be employed. In such instance, the neck or fracture point of the follower pin should be positioned otherwise than at the center of such pin, and the change key K2, after effecting the removal of the inner follower pin section, will thereafter be ineffective to operate the lock mechanism since the remaining follower pin section will not be raised by the key K2 to the shear line A—A. In such instance, the owner's key will be bitted to raise the outer end of the outer follower pin section to the parting line. While the mastering through the use of following pins having a medially located fracture point has been suggested, it will be readily recognized that conventional mastering and the grand mastering methods utilizing a plurality of driver pins may be resorted to where desired.

The above described device will be found highly useful in the construction of hotels, office buildings, apartments, developments and the like, as providing a simplified system for changing the lock combination after construction is completed. The great advantage in the use of the invention herein described lies in the fact that the combination changing key will not be effective to operate the lock mechanism where the follower pin has not been fractured at a central point. Thus, a maximum of security is assured.

By my invention I have provided a method of quickly and simply changing the pin length of one or more pins to change the pin tumbler combination of a lock in its mounting by the simple expedient of shearing the frangible neck of the mushroom like auxiliary pin at a predetermined frangible point and disposing of the sheared off section without detection. Thus by aligning the boring 31 with the opening in a hollow door or within the shell of a door knob, whichever the pin tumbler assembly lock is mounted in, an inner tumbler section may be removed, predeterminedly to change the key combination to provide the desired security from a temporary key to another key and without removing the lock from its mounting.

Having thus described the invention and illustrated its use, what is claimed as new and is desired to be secured by Letters Patent is:

1. In a pin tumbler mechanism, a casing having a main bore, a plug rotatably mounted in said bore, a radially extending cross bore in said casing communicating with said main bore, a radial passage formed through said plug in alignment with said cross bore, a keyway formed in said plug intersecting the longitudinal axis of said passage, a frangible follower pin reciprocable in said passage, said pin including inner and outer sections separated by a weakened neck portion, a driver pin reciprocable in said cross bore, spring means in said casing urging said driver pin against said outer section of said follower pin normally to project said driver pin partly into said passage, an opening in said casing angu-

larly offset from said cross bore and positioned to register with said passage in at least one rotated position of said plug, said opening being of a size to permit passage thereinto of said inner but not said outer section of said follower pin, first key means bitted to raise the outer end of said outer section to the periphery of said plug when engaged with the inner end of said inner section, second key means bitted to raise said neck to the periphery of said plug when engaged with the inner end of said inner section, and third key means bitted to raise the outer end of said outer section to the periphery of said plug when engaged with the inner end of said outer section.

2. In a pin tumbler mechanism, a casing having a main bore, a plug rotatably mounted in said bore, a radially extending cross bore in said casing communicating with said main bore, a radial passage formed through said plug in alignment with said cross bore, a keyway formed in said plug intersecting the longitudinal axis of said passage, a frangible follower pin reciprocable in said passage, said pin including inner and outer sections separated by a weakened neck portion, blocking means on said outer section of said follower pin engaging said plug to limit movement of said pin into said passage, a driver pin reciprocable in said cross bore, spring means in said casing urging said driver pin against said outer section of said follower pin normally to project said driver pin partly into said passage, an opening in said casing angularly offset from said cross bore and positioned to register with said passage in at least one rotated position of said plug, said opening being of a size to permit passage thereinto of said inner section but not said blocking means, first key means bitted to raise the outer end of said outer section to the periphery of said plug when engaged with the inner end of said inner section, second key means bitted to raise said neck to the periphery of said plug when engaged with the inner end of said inner section, and third key means bitted to raise the outer end of said outer section to the periphery of said plug when engaged with the inner end of said outer section.

3. In a pin tumbler mechanism, a casing having a main bore, a plug rotatably mounted in said bore, a radially extending cross bore in said casing communicating with said main bore, a radial passage formed through said plug in alignment with said cross bore, a keyway formed in said plug intersecting the longitudinal axis of said passage, a frangible follower pin reciprocable in said passage, said pin including inner and outer sections separated by a weakened neck portion, a head on said outer section of said follower pin, a driver pin reciprocable in said cross bore, spring means in said casing urging said driver pin against said outer section of said follower pin normally to project said driver pin partly into said passage, an opening in said casing positioned to register with said passage in at least one rotated position of said plug, said opening being of a size to permit passage thereinto of said inner section but not said head, first key means bitted to raise the outer end of said outer section to the periphery of said plug when engaged with the inner end of said inner section, second key means bitted to raise said neck to the periphery of said plug when engaged with the inner end of said outer section, and third key means bitted to raise the outer end of said outer section to the periphery of said plug when engaged with the inner end of said outer section.

4. In a pin tumbler mechanism, a casing having a main bore, a plug rotatably mounted in said bore, a radially extending cross bore in said casing communicating with said main bore, a radial passage formed in said plug rotatable into alignment with said cross bore, a keyway in said plug intersecting said passage, a frangible follower pin reciprocable in said passage, said pin including inner and outer sections separated by a weakened neck portion, a driver pin reciprocable in said cross bore, spring means in said casing urging said driver pin against said outer section of said follower pin normally to project said driver pin partly into said passage said outer section including means thereon limiting movement of said outer section into said passage, an opening in said casing communicating with said main bore at a point beneath the axis of said main bore positioned to register with said passage in at least one rotated position of said plug, said opening being of a size to receive said inner section of said follower pin.

5. In a pin tumbler mechanism, a casing having a main bore, a plug rotatably mounted in said bore, a radially extending cross bore in said casing communicating with said main bore, a driver pin reciprocable in said cross bore, a radial passage formed through said plug in alignment with said cross bore, a keyway formed in said plug intersecting the longitudinal axis of said passage, a frangible follower pin reciprocable in said passage, said pin including inner and outer sections separated by a weakened neck portion, an auxiliary driver pin interposed between said driver and follower pins, spring means in said casing urging said driver pin against said auxiliary driver pin normally to project said driver pin partly and said auxiliary driver and follower pins fully into said passage, an opening in said casing angularly offset from said cross bore and positioned to register with said passage in at least one rotated position of said plug, said opening being of a size to permit passage thereinto of said inner but not said outer section of said follower pin, first key means bitted to raise an end of said auxiliary driver pin to the periphery of said plug when engaged with the inner end of said inner section, second key means bitted to raise said neck to the periphery of said plug when engaged with the inner end of said inner section, and other key means bitted to raise an end of said auxiliary driver pin to the periphery of said plug when engaged with the inner end of said outer section.

6. A pin tumbler mechanism in accordance with claim 1 wherein said passage includes an enlarged portion adjacent the periphery of said plug and a constricted portion, and said driver pin is of a size to enter said enlarged portion but not said constricted portion.

7. A device in accordance with claim 5 wherein said inner and outer sections of said follower pin are of equal length.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,073,146 January 15, 1963

George P. Patriquin

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the sheet of drawings, in Figures 1 to 5, a reference numeral "20a" should identify the cross bores in casing 10 within which the pin 22a is disposed; that, in Figure 1, the lead line from reference numeral 20 should extend within the cross bore in the casing 10 within which the follower pin 22 is disposed; and that, in Figure 5, a legend "T3" should identify the trough on the upper edge B3 of key K3 directly beneath outer follower pin section 23c; column 2, line 32, for "21", first occurrence, read -- 20 --; line 54, for "23b" read -- 22b --; same column 2, line 71, for "11" read -- 10 --; column 3, line 33, for "23b" read -- 23d --; line 37, for "23a" read -- 23d --; lines 38 and 45, for "23a", each occurrence, read -- 23b --; same column 3, line 71, for "23a" read -- 23c --.

Signed and sealed this 19th day of November 1963.

(SEAL)

Attest:

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Attesting Officer

EDWIN L. REYNOLDS

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