April 21, 1970 M. T. BASSECHES 3,507,133

PICK PROOF LOCKS

Filed April 3, 1968

FIG. 1

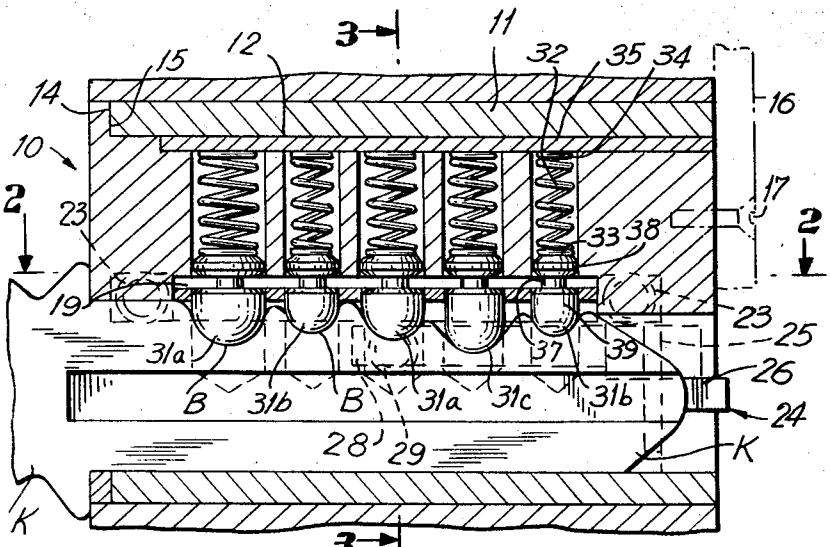


FIG. 2

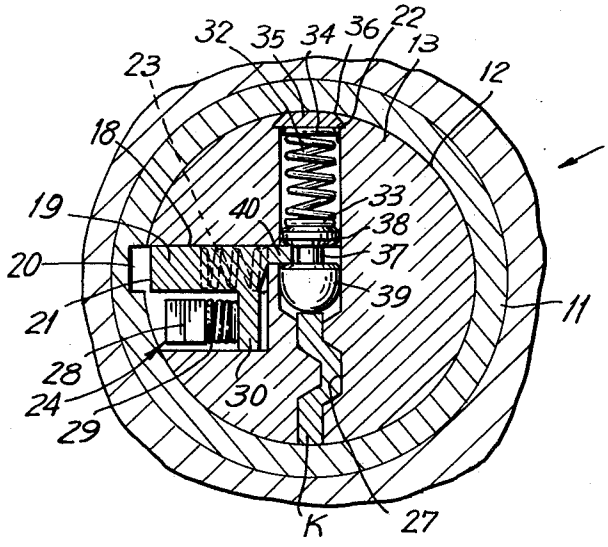


FIG. 3

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PICK PROOF LOCKS

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Continuation-in-part of application Ser. No. 683,166, Nov. 15, 1967. This application Apr. 3, 1968, Ser. No. 718,576
The portion of the term of the patent subsequent to July 15, 1986, has been disclaimed
Int. Cl. E05b *15/14, 27/10*
U.S. Cl. 70—421 2 Claims

ABSTRACT OF THE DISCLOSURE

An improved pick proof lock utilizing tumbler pins contained within the plug and a side bar shiftable into engagement with said pins, the lock being released by alignment of the side bar with reduced diameter portions of the pins, the lock being characterized by tumbler pins of disparate diameters whereby at least some of said tumbler pins will be free to reciprocate in said cross bores notwithstanding engagement of other of said pins with portions of said side bar mechanism.

CROSS REFERENCE

This application is a continuation-in-part of my copending application Ser. No. 683,166, filed Nov. 15, 1967, now U.S. Patent No. 3,455,130, issued July 15, 1969, entitled Pick Proof Lock.

BACKGROUND OF THE INVENTION

Field of the invention

This invention is in the field of pick proof lock mechanisms.

In my copending application there is taught an improved pick proof lock mechanism. While such device provides essentially the highest security currently available, there are applications, e.g. government security files and the like, wherein it is imperative that any expedient whcih will further assure that the lock cannot be compromised by even the most skilled operative is justified.

The prior art

The above referred to copending application is directed to a totally new lock concept wherein locking pins are contained entirely within the plug or rotatable component of the lock, wherein the locking bar is shiftable across the shear line to effect locking of the apparatus and wherein the lock bar is yieldably urged inwardly against the pins only after insertion of a key. By these expedients, plus the positive limitation on the force with which the lock bar is projected against the pin tumblers, it is impossible to pick the lock of the above noted application.

The present invention relates to a further expedient resulting in cumulative security effects. More specifically, in essentially all picking methods, the operator lifts the tumbler pins or like expedients back and forth across the proper unlocking position for the specific pin. At the same time a torque is applied with the objective of hanging or engaging the pin at the proper unlocking position.

The device of the above noted application prevents picking in this manner primarily by limiting the forces which may be exerted to hang or trap the pins at their

release positions to a value below the forces projecting the pins to locking position.

SUMMARY OF THE INVENTION

The present invention may be summarized as relating to a lock device including a multiplicity of tumbler pins which, when lifted to selected heights by a key, will permit a lock bar to be moved across the shear line defined between the lock plug and the locking housing.

In order to increase the security of the lock, the present invention is characterized by the provision of tumbler pins of a multiplicity of different diameters. By this expedient, even if a lock picker could perhaps retain one or more pins at the release height, as by frictional engagement with the lock bar mechanisms, such an occurrence would not compromise security since, by reason of the varying diameters of the pins, the pins of lesser diameter would be cleared from contact with the lock bar and be free to oscillate within their cross bores.

The invention relates to an improved side bar type lock mechanism of a novel construction which prevents picking by assuring that the tumbler elements cannot be hung on the side bar mechanism at the proper releasing height.

The invention further relates to side bar lock mechanism wherein the pins or other tumbler elements are of disparate transverse dimensions whereby, even if the side bar mechanism is projected against certain tumblers with sufficient force to hang such tumblers, there will be no possibility of contact between the bar and other tumblers and, hence, it will be impossible to locate and retain such other tumblers in unlocking position.

It is therefore an object of the invention to provide an improvement in side bar type lock mechanisms.

It is a further object of the invention to provide a device of the class described, utilizing tumblers of disparate transverse dimensions whereby it will be impossible to hang and retain, through the use of a pick tool, all of the tumblers at the side bar release position.

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 sectional view through a lock in accordance with the invention;

FIGURE 2 is a horizontal section taken on the line 2—2 of FIGURE 1;

FIGURE 3 is a vertical transverse section taken on the line 3—3 of FIGURE 1.

Reference will now be made to the drawings wherein there is shown a lock device **10** comprising a housing **11** having an axial bore **12**, within which bore a generally cylindrical plug **13** is mounted for rotation. The plug is prevented from movement in an inward direction by annular shoulder portion **14** abutting against the outer facing **15** of the housing **11**. A lock operator cam **16** is secured to the rear end of the plug, as by machine screws **17**, the cam thus preventing outward removal of the plug.

The details of the lock mechanism per se are fully disclosed in my above referred to copending application and will be described herein only to the extent necessary for an understanding of the present invention. It will, however, be understood that the advance of the present invention is not limited to use with the lock structure of the copending application but, rather, will increase the security of a variety of side bar lock mechanisms.

A clearance slot **18** is formed in the lock plug and supports the lock bar assembly **19** for radial movement within the slot. A locking slot **20** is formed in the housing in registry with the clearance slot in the locked position of the assembly, it being understood that the outer end portion **21** of the lock bar, in said locked position, is disposed within the lock slot **20**, to key the plug and housing against relative rotation.

The plug is provided with a series of cross bores **22***a*, **22***b*, **22***c*, the cross bores being of varying diameters for purposes hereinafter set forth. Preferably there are at least two cross bores **22***a* of widest diameter.

The lock bar assembly **19** is normally outwardly pressed to lie in the lock slot **20** by spaced locking springs **23**, **23**, boased against opposed portions of the plug and lock bar.

To unlock the mechanism, it is necessary to urge the lock bar **19** radially inwardly. Such radial inward force is provided by a bell crank lever **24**, pivoted at **25** to the plug. The bell crank lever includes a generally radially directed offset arm **26** which lies at the inner end of the keyway **27** formed in the plug.

The bell crank lever includes an actuator arm **28** which extends generally parallel with the lock bar assembly **19**. A spring **29** is interposed between the arm **28** of the bell crank lever and a tab or shoulder **30** formed on the lock bar.

It will be understood that when a key K is inserted into the keyway **27**, the tip of the key will engage the offset arm **26**, resulting in an anti-clockwise rotation of the bell crank lever about the pivot **25**. When the lever is rotated in the manner aforesaid, the inward radial force exerted by the now-compressed spring **29** exceeds the outward biasing forces exerted by the springs **23** by a predetermined small amount and the lock bar **19** is yieldably and lightly urged inwardly toward the cross bores **22***a*, **22***b*, **22***c*.

The cross bores which intersect the upper edge of the keyway **27** are charged with locking tumblers **31***a*, **31***b*, **31***c*, etc. The locking tumblers are pressed downwardly within the cross bores by a series of driver springs **32** which have their lower ends **33** biased against the upper ends of the pins. The upper ends **34** of the springs are compressed against a retainer plate **35**, which is slidably mounted in a dovetail slot **36** formed at the upper end of the plug.

The locking pins **31***a*, **31***b*, **31***c* include reduced waist portions **37** separated by upper and lower enlarged-diameter blocking portions **38**, **39**. Preferably the diameter of the reduced portions **37** in all of the pins is the same. However, the larger diameter blocking portions **38**, **39** of the pins will vary in width from pin to pin. Thus, in the illustrated embodiment, the diameter of pins **31***a*, **31***a* is greater than the diameter of pins **31***b*, **31***c*. In similar manner, the diameter of the blocking portions **38**, **39** of pin **31***c* is greater than that of the comparable portions of pin **31***b*.

The lock bar assembly **19** includes an innermost tongue **40**, the vertical dimension of which is adapted to fit with minimum clearances into reduced diameter portions **37** of the locking pins.

From the foregoing description it will be apparent that when a key K is inserted to activate the bell crank lever, the lock bar assembly **19** will be urged radially inwardly. When a proper key K is inserted into the lock mechanism, i.e. a key whose various bits B, B are cut to such height as to align the narrow portions **37** of the pins with the tongue **40**, the lock bar will be permitted to shift into the clearance slot **18** and out of the locking slot **20** under the influence of the compressed spring **29**, freeing the plug for rotation relative to the housing. On the other hand, if an improper key is inserted and, thus, the narrow waist portions **37** of the pins are not in alignment with the tongue **40**, the lock bar **19** will be blocked from movement out of the clearance slot and relative rotation of the plug and housing will be prevented.

Should an attempt be made to pick the lock mechanism by inserting a tool into engagement with the offset arm **26**, to actuate the bell crank lever, the compressed spring **29** will again project the tongue **40** inwardly. With the tongue **40** maintained in the inwardly projected condition, the normal picking procedure would be to attempt to oscillate the pins up and down for the purpose of engaging the junction between the blocking and waist portions of all of the pins frictionally against the innermost projected end of the tongue **40**, to align the narrow waist portions with the tongue. However, it is evident that in the device of the present invention, frictional engagement between the tongue portions and all of the pins is impossible since, by reason of the varying diameters, if the tongue were engaged against a blocking portion of wider pins **31***a*, **31***a*, no part of the tongue could engage against any part of the narrower pins **31***b*, **31***c*. Thus, even if a skilled lock picker were able to hang one or both of the widest pins **31***a*, **31***a*, at releasing position on the tongue **40** (an unlikely feat in a lock having the features of the illustrated embodiment in view of the fact that the downward pressure exerted by the driver springs **32** overbalances the inward pressure exerted by the spring **29**), the lock would not be compromised since all of the narrower diameter pins would be free to return to blocking position within the cross bores.

Moreover, since the lock construction may include pins of three or more different diameters, the lock picker's task would be infinitely multiplied since it would be necessary serially to pick the widest pin or pins, and to maintain them at the proper height while thereafter picking the next widest pins, etc.

It will be evident that the physical size of the keyway simply will not permit the insertion and manipulation of the various picking and holding tools which would be required to effect the complicated maneuvers noted.

While the apparatus has been described in conjunction with a side bar lock assembly incorporating the features of the aforesaid copending application, it will be readily recognized that the principles thereof may be employed in a variety of side bar type lock mechanisms. In any such combination, compromising of the lock will be rendered materially more difficult.

It will be noted, however, that the provision of varying diameter tumbler pins will not, without modification, increase the security of conventional pin tumbler lock assemblies wherein the pins themselves cross the shear line, since in such adaptation, application of a torque to the plug will be equally likely to hang narrow and greater diameter pins.

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. A pin tumbler lock comprising a housing, a plug rotatably mounted in said housing and having a keyway, a plurality of cross bores in said plug intersecting said keyway, said bores being of different diameters, a plurality of tumbler pins mounted for movement in said cross bores, said pins including blocking portions of diameter closely approximating the diameter of said cross bores, and reduced diameter clearance portions, an access slot extending laterally from said cross bores and including portions in said plug and said housing, spring means in said cross bores engaging said pins for yieldably urging said blocking portions of said pins into alignment with said slot, a side bar mounted in said access slot for movement toward and away from said cross bores, spring means urging said side bar toward said housing to a position displaced from said cross bores, and lock bar actuator means in said keyway for shifting said lock bar toward said cross bores responsive to insertion of a key in said keyway, the differential diameters of said blocking portions of said pins preventing simultaneous engagement of said lock bar with said portions.

2. A device in accordance with claim **1** wherein said

pins are divided into series of at least two pins per series, the diameters of the blocking portions of the pins in each series being the same, and being different from the diameters of blocking portions of the pins of at least one other said series.

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U.S. Cl. X.R.

70—378, 364