June 10, 1969 J. SCHREIBER 3,448,599

KEY-OPERATED LOCK MOUNTING AND REMOVING ARRANGEMENT

Filed Jan. 6, 1967 Sheet 1 of 2

FIG. 1

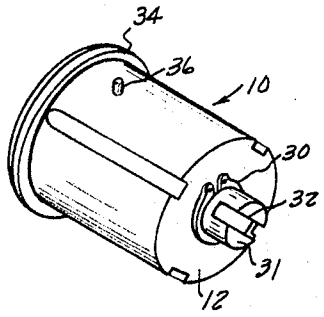

FIG. 2

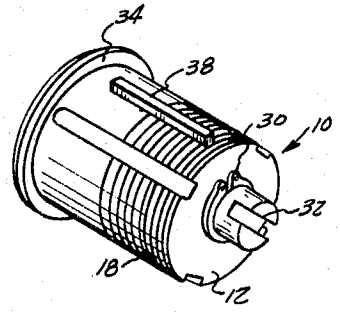

FIG. 3

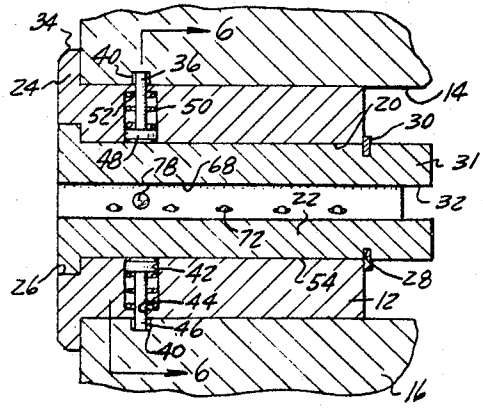

FIG. 4

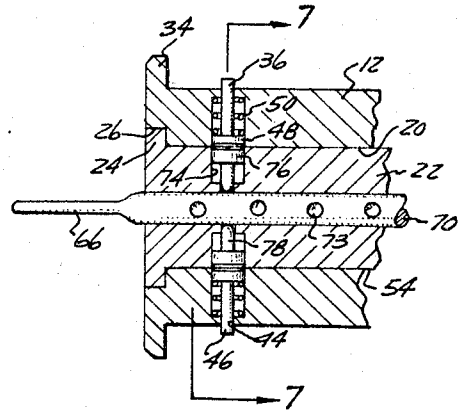

FIG. 5

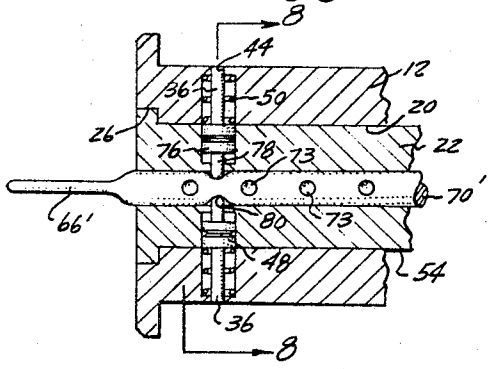

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FIG. 6

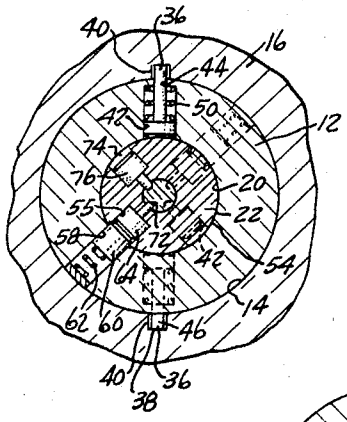


FIG. 7

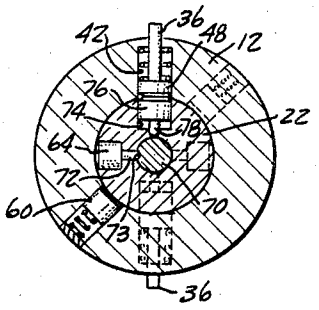


FIG. 8

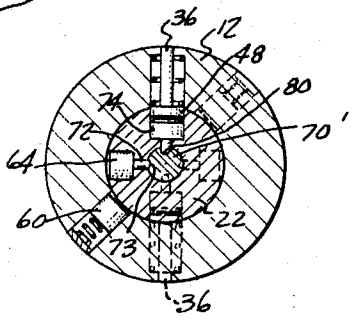


FIG. 9

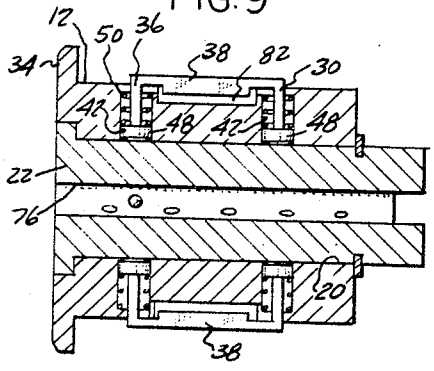


FIG. 10

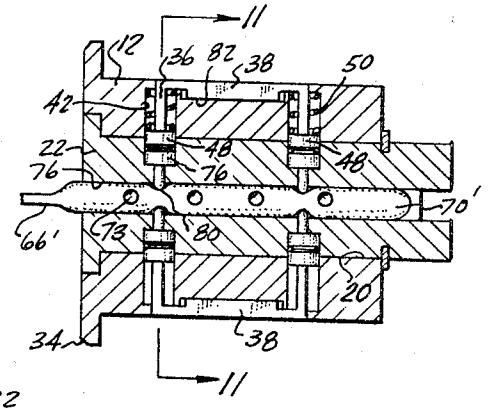
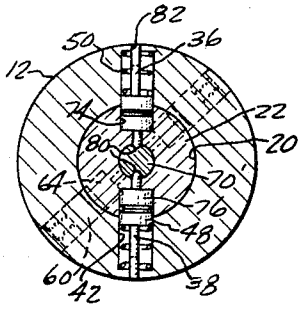


FIG. 11



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United States Patent Office 3,448,599 Patented June 10, 1969

3,448,599

KEY-OPERATED LOCK MOUNTING AND REMOVING ARRANGEMENT

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U.S. Cl. 70—371 2 Claims

ABSTRACT OF THE DISCLOSURE

A key operated mechanism for mounting, securing and fastening a lock securely in an appropriate aperture in a door, or the like, by way of a member, or a plurality of members, protruding from the casing of the lock and engaging appropriate recesses in the mounting aperture. The protruding members are retracted flush with the outer surface of the casing when a special key is used to unlock and remove the lock from its mounting aperture.

Background of the invention

Locking mechanisms, such as so-called cylinder locks and the like, are usually mounted in an operating position in an appropriate aperture in a door, a panel, or the like, by means which are designed to normally prevent removal of the locking mechanism, except by an authorized person. The locking mechanism is disposed in the mounting aperture in the door, panel, or the like, and is secured and fastened in the aperture by fastening means that can not normally be reached, unless the locking mechanism has been unlocked and the enclosure protected by the locking mechanism has been open. Various fasteners are used for holding locking mechanisms in their appropriate mounting aperture, such as set screws, bolts and nuts, and the like. One of the disadvantages of such fastening means is that, when the casing of the locking mechanism is of a cylindrical shape, a hand tool, such as a pipe wrench, may be applied to the periphery of the protruding shouldered portion of the casing, and the casing may be rotated with enough force to break the set screws or the bolts for the purpose of removing the locking mechanism and breaking into the enclosure. It is also possible, in some locking mechanism designs, to drill through the casing from the outside of the enclosure sought to be protected, in the appropriate positions where the mounting screws or bolts are known to be located, according to the make of the lock, so as to destroy or weaken such mounting screws or bolts for the purpose of facilitating the removal of the locking mechanism.

Where it is desired to change the combination of a lock, it is conventional to remove only the plug of the lock and replace it with a plug having a different locking combination, without removing the lock casing. This is generally accomplished by providing means for holding the plug within the casing of the lock in such a manner that the plug may become longitudinally movable in the casing bore when appropriate pins or tumblers which are adapted to hold the plug against longitudinal motion are operated by means of a special key. Such an arrangement has many disadvantages, because the lock thus has been designed with a built-in weakness which tends to facilitate tampering and breakage of the locking mechanism.

Summary of the invention

The present invention provides a substantial improvement over the means contemplated by the prior art for securing locking mechanisms in appropriate mounting apertures in doors, panels, or the like, while providing a convenient means for easy removal of the locking

mechanism by authorized persons having a special lock removing key in their possession. In order to accomplish its purpose, the present invention contemplates providing the casing of a locking mechanism with securing and fastening means which are normally partly engaged into both the casing and an appropriate recess or recesses in the locking mechanism receiving aperture, such securing and fastening means being adapted to be retracted flush with the peripheral surface of the casing by operation of a special key, without the use of any other conventional or special tool. As will become apparent from the hereinafter detailed description, the principle of the invention may be applied to any type of locking mechanism whatsoever and to any locking mechanism casing configuration, having a circular transverse cross section, square of any other shape. Also, the lock mounting and securing arrangement of the present invention may take whatever configuration and shape as convenient for the type of locking mechanism into which it is incorporated.

The principal object of the present invention, consequently, is to provide a simple, economical, and tamper-proof mounting and securing arrangement for a locking mechanism disposed in an appropriate aperture in a door, a panel, or the like, of an enclosure sought to be protected.

Another object of the present invention is to provide mounting and securing means for a locking mechanism which does away with the obligation of using mounting screws, bolts and nuts, mounting plates, etc., and which requires only a simple modification of the mounting aperture.

An additional object of the present invention is to provide a locking mechanism that can be easily removed and changed by an authorized person having in its possession an appropriate lock removing key.

Other objects and advantages of the invention will become apparent to those skilled in the art when the hereinafter description of some of the best modes contemplated to practice are read in conjunction with the accompanying drawings, wherein:

Brief description of the drawings

FIG. 1 is a perspective view of a conventional locking mechanism of the cylinder lock type provided with mounting and securing means of the present invention;

FIG. 2 is a perspective view of another type of a cylinder lock provided with a modification of the mounting and securing means according to the invention;

FIG. 3 is a longitudinal sectional view of a cylinder lock provided with the mounting and securing means of FIG. 1, shown in a secured position in an appropriate lock receiving aperture in a door, panel, or the like;

FIG. 4 is a partial view similar to FIG. 3, but showing the lock mechanism with the plug thereof rotated to an unlocked position by means of a lock operating key;

FIG. 5 is a partial view similar to FIG. 4, but showing the lock mechanism being operated by a special lock removing key to a lock removing position;

FIG. 6 is a transverse cross section along line 6—6 of FIG. 3;

FIG. 7 is a transverse cross section along line 7—7 of FIG. 4;

FIG. 8 is a transverse cross section along line 8—8 of FIG. 5;

FIG. 9 is a longitudinal sectional view of a cylinder lock provided with the mounting arrangement of FIG. 2;

FIG. 10 is a longitudinal sectional view of the arrangement of FIG. 9, but showing the mechanism in a position permitting inserting and removal of the locking mechanism into or from a lock receiving aperture; and

FIG. 11 is a transverse cross section along line 11—11 of FIG. 10.

Description of the preferred embodiments

Referring now to the drawings, and more particularly to FIGS. 1 and 3 thereof, a lock mechanism **10** is conventionally shown as comprising a housing or casing **12** which, as shown more clearly in FIGS. 3 and 6, is normally disposed in an appropriate aperture **14** in a door, panel, or the like, **16**. The casing **12** is generally cylindrical as shown, although it may evidently be of any other appropriate shape. When cylindrical, the casing **12** may be provided with a substantially smooth peripheral surface, as shown in FIG. 1, or, as shown in FIG. 2, it may be provided with a peripheral surface having a thread, shown at **18**, such that the casing may be screwed tight into an internally threaded aperture in the door, panel or the like. Such an arrangement is conventional and well known in the art.

As best shown in FIGS. 3 and 6, the housing or casing **12** has a longitudinal bore **20** in which is rotatably mounted a cylindrical plug **22**. The plug **22** is prevented from longitudinal motion by having a shouldered portion **24** adapted to engage an enlarged portion **26** of the casing longitudinal bore **20**, the other end of the plug being provided, for example, with a peripheral groove **28** in which is normally engaged a spring or snap ring **30**. The plug **22** has an inwardly projecting end **31** provided with a slot, as shown at **32**, or any other arrangement adapted to drive any conventional latch mechanism when the plug **22** is unlocked relatively to the casing **12** such as to be free to rotate with respect to the casing.

The lock casing **12** is preferably provided on the front end thereof with an enlarged shouldered portion **34** for abutment against the front face of the door or panel **16** when the lock is disposed within its mounting aperture **14** therein. In this mounted position, the lock casing **12** is normally maintained securely in a fixed location by way of protruding movable members which, in the embodiment of FIGS. 1 and 3–8, consist of, for example, a pair of projecting pins **36**, or, which, in the embodiment of FIGS. 2 and 9–11, consist of movable projecting bars **38**. When the lock is attached in proper position in its mounting aperture, the pins **36**, or bars **38**, or whatever shape of projecting mounting members has been chosen, are in an extended position and engaging appropriate recesses or pockets formed in the wall of the lock receiving aperture **14**. This is clearly shown at FIG. 3 and 6 wherein the pins **36** are shown extended and protruding from the peripheral surface of the casing **12** such that they are received within recesses **40** formed in the wall of aperture **14**.

Each pin **36** is disposed within a chamber **42**, disposed substantially in a radial direction in the casing **12**, and open to the casing longitudinal bore **20** on one end, and adapted to communicate with the outside of the casing **12** by way of reduced diameter portion **44**. Each pin **36** has a body **46** adapted to pass through the reduced diameter portion **44** of chamber **42**, and an enlarged body portion **48** adapted to fit the main portion of chamber **42** and disposed toward the end thereof open to longitudinal bore **20**. A spring means, such as coil spring **50**, is compressed between the enlarged body portions **48** of the pin and the shoulder **52** of chamber **42**, such that pin **36** is at all time urged inwardly, so as to be urged to a retracted position where it is not projecting outside of casing **12**. However, because the total body length of each pin **36** is greater than the depth of chamber **42**, the end of reduced diameter portion **46** of pin **36** is held in projection outside of the casing **12** in view of the end of the enlarged body portion **48** of the pin abutting against the peripheral surface **54** of plug **22**, thus engaging recess **40** in mounting aperture **14**.

As shown more clearly in FIG. 6, plug **22** and casing **12** are provided with a plurality of radial chambers **56** and **58** respectively which are normally radially aligned when the lock is in the locked condition of FIG. 6. In this locked condition, a tumbler **60** is urged by a spring

means **62** such that an end portion of the tumbler **60** projects into radial chamber **56** in the plug **22** so as to immobilize the plug with respect to the casing **12**, as is conventional and well known in the art. When an appropriate operating key, such as key **66** having shank **70** is introduced in keyway **68** in the plug, each pin **64** having a body portion **72** projecting, while in the locked condition, into keyway **68**, is lifted by key shank **70** to appropriate positions corresponding to the code of the lock as determined by the depth of key shank depressions **73**, at which position the abutting ends of each tumbler **60** and pin **64** are disposed substantially at the shear surface between the plug peripheral surface **54** and the housing cylindrical bore surface **20**.

Radially disposed in plug **22** there is a chamber **74** for each chamber **42** in the casing **12** and of the same diameter as chamber **42**, and capable of radial alignment therewith when the plug **22** has been unlocked and is rotated in relation to the housing. Within each chamber **74** is disposed a control member or slidable pin **76** having a reduced diameter body portion **78** capable of projecting within key way **68**. The overall body length of control member or pin **76** including reduced diameter body portion **78** is substantially equal to the wall thickness of plug **22**, such that when a normal operating key **66** is used to unlock the lock and to rotate the plug **22** with respect to the casing **12**, each pin **76** has its end of reduced diameter body portion **78** abutting against the peripheral surface of the keyshank **70** such that when chambers **74** and **42** are in radial alignment, as shown in FIG. 4, each pin **36** is prevented from being retracted as a result of the outer end of pin **76** being substantially flush with the end of chamber **74** and preventing the enlarged body portion **48** of pin **36** from projecting into chamber **74**. The lock can thus be operated in the usual manner from a locked to an unlocked position and the normal operating key **66** can be introduced, rotated and removed without interfering with the mounting and securing of the lock casing in the mounting aperture **14**.

In order to install the lock in the door or panel aperture **14**, or in order to remove an already installed lock, a special control or lock removing key **66'** must be used. Such a lock removing key is in all points similar to an ordinary operating key for the appropriate type of lock, with the exception that it is provided on the surface of its shank **70'** with depressions, shown at **80** on FIGS. 5 and 8, of a depth substantially equal to the distance at which each fastening pin **36** projects from the peripheral surface of the housing or casing **12**. Consequently, when lock removing key **66'** is introduced into keyway **68** to unlock the plug **22** relative to the casing **12**, and when the plug **22** is rotated relatively to casing **12** to the appropriate angular position that places each pair of chambers **74** and **72** in radial alignment, pins **36** are allowed to project within chambers **74** under the action of each spring **50** of a distance sufficient to completely retract the projecting end of each pin and to permit removal or introduction of the lock casing **12** in its appropriate mounting aperture.

As shown in FIG. 2, and more clearly in FIGS. 9–11, the projecting pins **36** of FIG. 1 may be modified or may be adapted to actuate any appropriate fastening means providing a strong connection between the lock casing and a mounting aperture in a door or panel. For example, on the end of each pin **36** may be mounted a split ring, not shown, capable of retraction into circular peripheral grooves cut on the peripheral outer surface of the casing **12**, or, such mounting means may take the form shown in the drawings at FIG. 2 and 9–11 wherein one or more bars **38** are longitudinally disposed in a longitudinal groove **82** formed on the peripheral surface of casing **12**. Each end of each bar **38** is supported by a pin **36**, affixed thereon, or made integral therewith, each pin **36** being provided with an enlarged body portion **48** disposed within a chamber **42** in the casing **12**

substantially as previously explained with respect to the example of FIGS. 1, and 3–8. The arrangement of the elements is generally as previously explained in detail and the operation thereof is also as previously explained in detail.

The lock removing key **66'** must, of necessity, have depressions **80** on the peripheral surface of the shank **70'** thereof that corresponds to each of the pair of radial chambers **42** and **74**, so as to permit each one of the mounting or fastening pins **36** to be retracted and each one the mounting means such as bars **38** supported by such pins to be also retracted flush with the peripheral surface of the casing **12** when it is desired to mount the lock in its mounting aperture or remove it therefrom. It is evident also that the recesses or pockets in the lock mounting aperture in the door, panel, or the like, have a configuration corresponding to the configuration of the mounting means and that when bars such as bars **38** are used, corresponding slots or grooves are disposed in the walls of the aperture.

In applications where the material of the door or panel on which the locking mechanism is mounted is substantially soft, such as would be the case if the door or panel was made of wood, a metallic insert is disposed in the aperture or metallic hollow plugs or rails are disposed in the pockets, recesses or slots in the aperture walls.

It is evident that, although the invention has been described and illustrated in applications wherein the locking mechanisms are according to the types disclosed in U.S. Patent Nos. 3,167,943, 3,348,392 and Re. 26,272, the principles of the present invention may be incorporated into any type of locking mechanisms whatsoever irrespective of the key shank shape or corresponding keyway shape.

Having thus described the invention by way of some examples of practical embodiments thereof, what is claimed as new and sought to be protected by United States Letters Patent is:

1. In a lock comprising a casing, a plug provided with a longitudinal keyway and rotatable in said casing, a plurality of radially disposed alignable chambers in both said casing and plug, spring biased pin-tumbler assemblies in said chambers for normally preventing said plug from rotation relatively to said casing when said chambers are aligned and an operating key capable of being introduced in said keyway for operatively engaging the pins of said pin-tumbler assemblies for permitting said plug to be rotatable relatively to said casing, means for securing said casing in an appropriate lock receiving aperture in a door or the like, said means comprising:

at least one radially disposed first chamber in said casing;

a radially disposed second chamber in said plug capable of alignment with said first chamber;

a first pin in said first chamber having an end normally projecting beyond the peripheral surface of said casing for engagement into an appropriate recess in said lock receiving aperture and another end normally engaging the peripheral surface of said plug;

biasing means urging said first pin in the direction that retracts the projecting end thereof;

a second pin in said second chamber of a length substantially equal to the length of said second chamber and having an end capable of projecting into said key-way for normally engaging the peripheral surface of said key when in said key-way; and

a lock removing key having a depression on the peripheral surface thereof disposed so as to permit the projecting end of said second pin to protrude within said depression at a predetermined angular position of said plug relatively to said casing wherein said chambers are radially aligned and the protruding end of said first pin is retracted.

2. The invention claimed in claim **1** further comprising:

at least one longitudinal slot on the periphery of said casing;

a bar member disposed in said slot; and

means operatively connecting said bar to the normally projecting end of said first pin for causing said bar to normally project from said slot for engagement into an appropriate recess in said lock receiving aperture.

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U.S. Cl. X.R.

70—378, 404