Dec. 29, 1970 R. E. NEARY ET AL 3,550,411

LOCK PROTECTING MECHANISM

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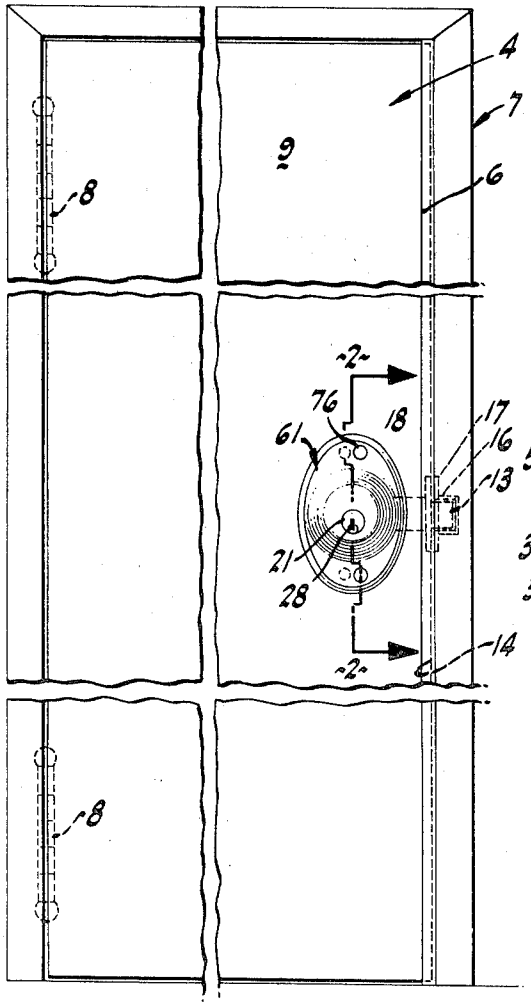


FIG. 1

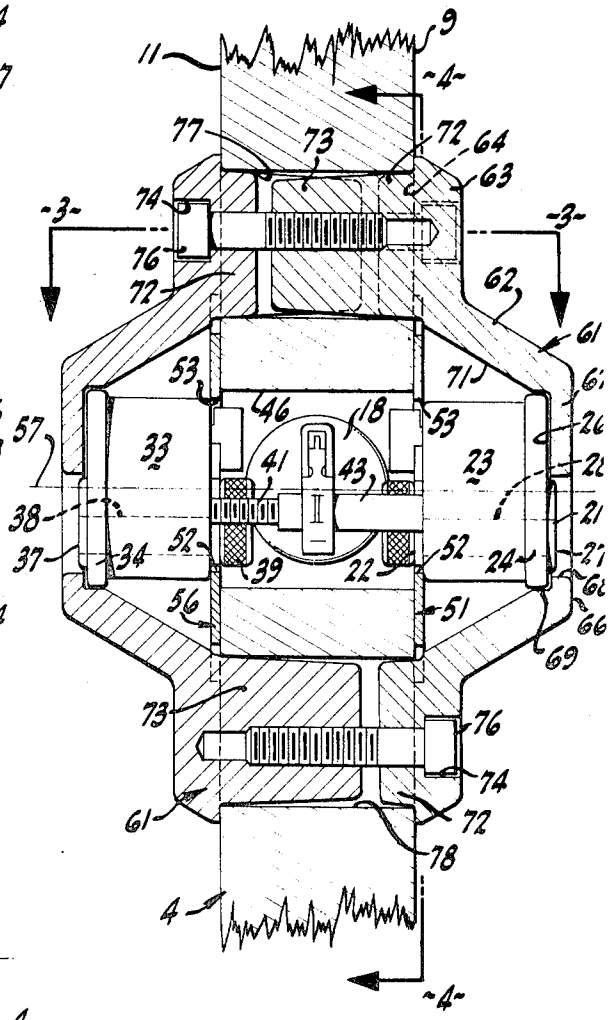


FIG. 2

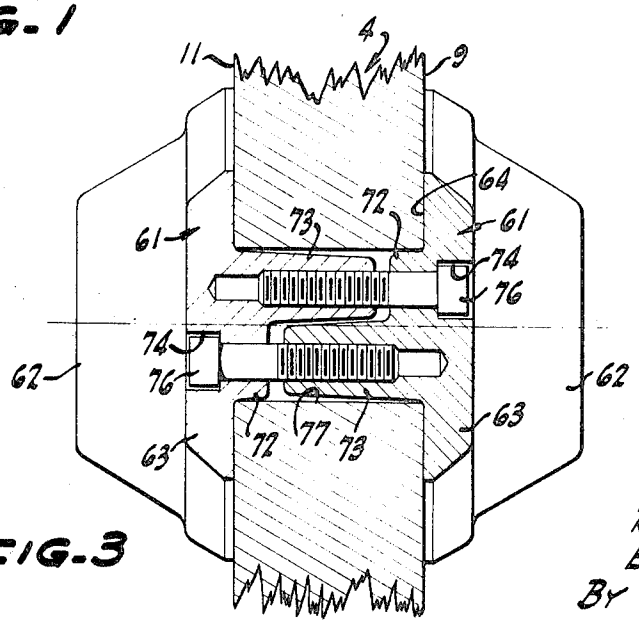


FIG. 3

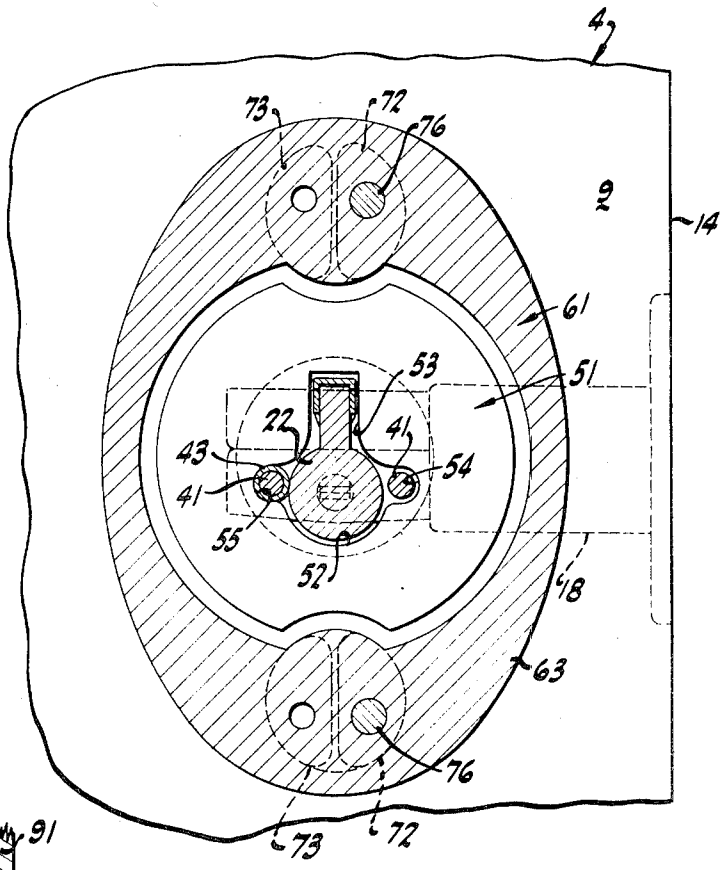
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LOCK PROTECTING MECHANISM

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FIG. 4



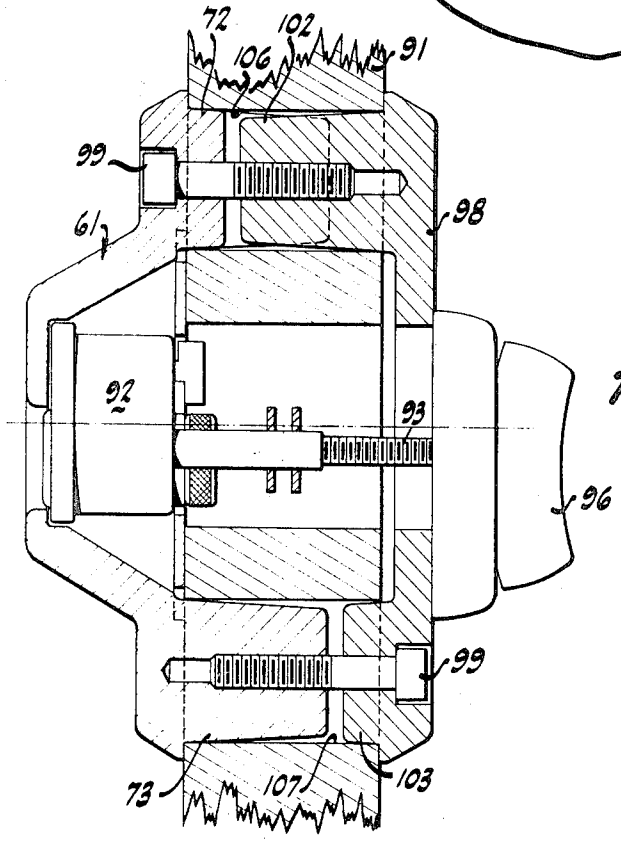


FIG. 5

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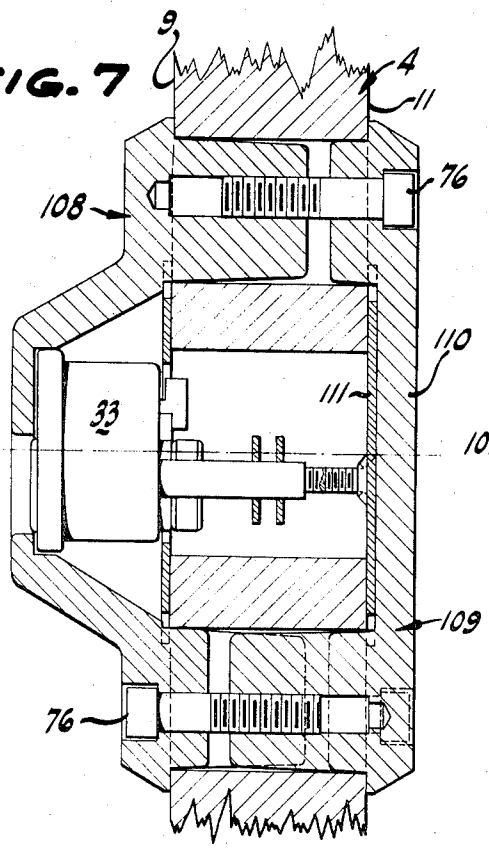
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LOCK PROTECTING MECHANISM

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FIG. 7



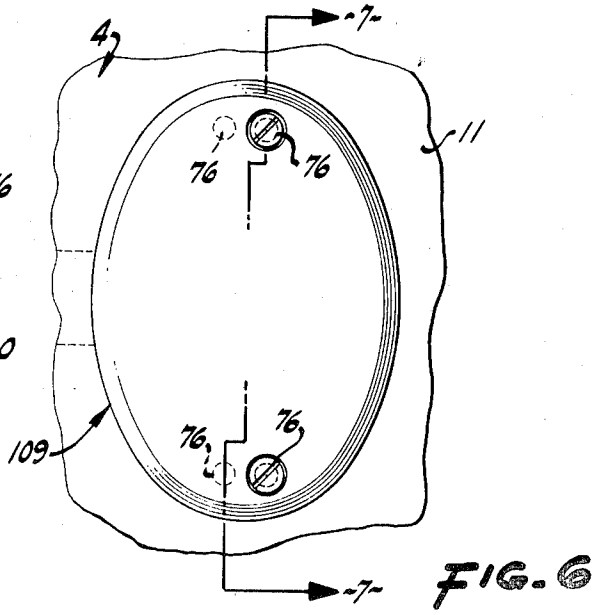
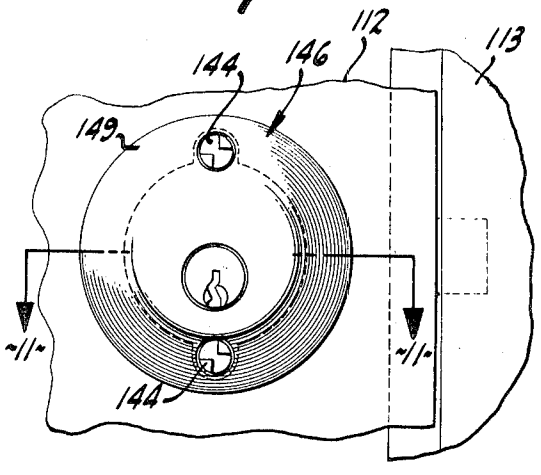


FIG. 6

FIG. 9



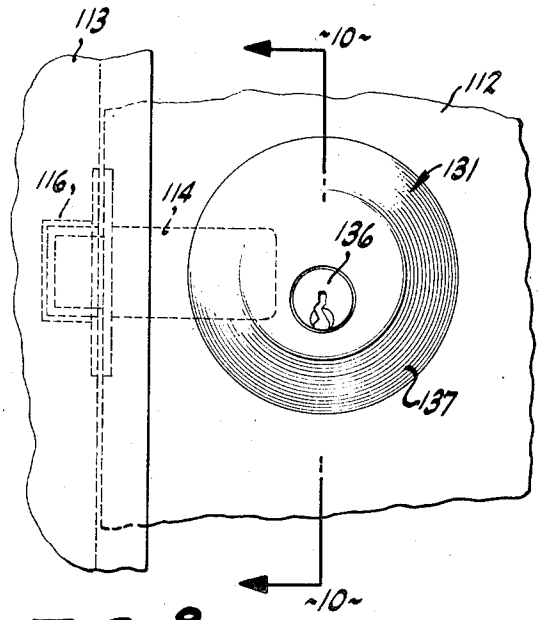


FIG. 8

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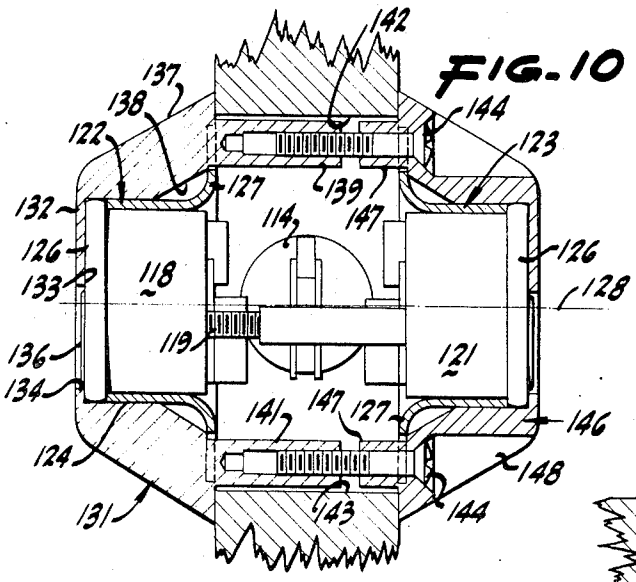


FIG. 10

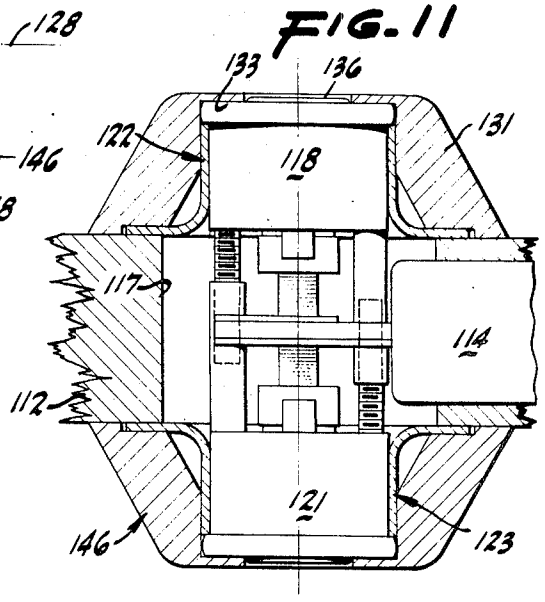


FIG. 11

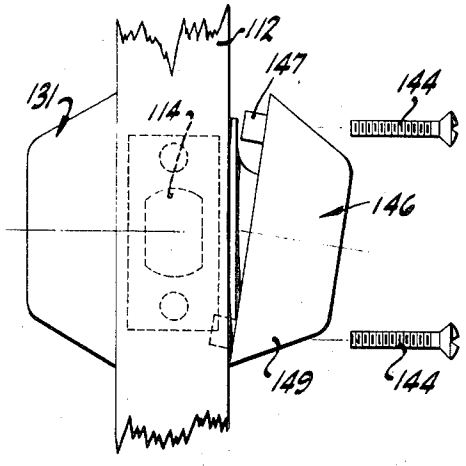


FIG. 12

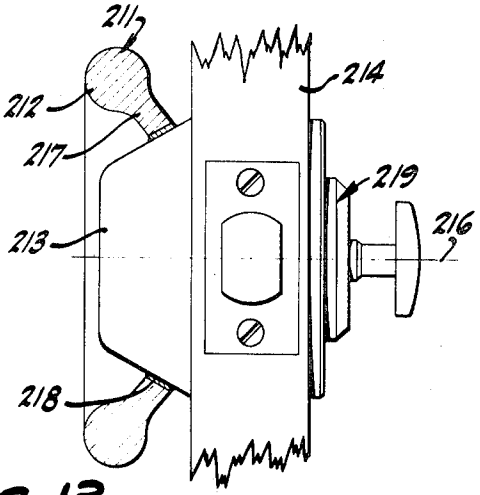


FIG. 13

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3,550,411

LOCK PROTECTING MECHANISM

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Continuation-in-part of application Ser. No. 590,564, Oct. 31, 1966. This application June 13, 1968, Ser. No. 736,750

Int. Cl. E05b 9/04, 9/10

U.S. Cl. 70—370 2 Claims

ABSTRACT OF THE DISCLOSURE

A protective lock mechanism includes shells applicable to a door and having portions to overlie and cover lock units installed thereon except for access holes for keys or manual operators, the shells having interior lugs received in extra bores through the door and engaging capped fastening screws disposed in opposite directions.

This application is a continuation-in-part of an application entitled "Lock Mechanism" filed in the name of Ralph E. Neary on Oct. 31, 1966 with Ser. No. 590,564, and now abandoned and assigned ot the assignee hereof.

Our invention generally relates to locking devices and particularly to those portions of a lock mechanism exposed on the side faces of a door panel and carrying the key-receiving portion or other operating or exposed portions of a lock unit.

Some lock units mounted on door panels, for example, project from or are exposed on one or both sides of the panel. This is often the case with high security lock units having pin tumbler lock elements operated by a key and disposed on the outside and the inside of a door panel. Sometimes a thumb turn structure or simply a fastening plate is substituted for a key-actuated device on the interior side of the door if high security is not needed at that location. In certain installations, the pin tumbler unit when mounted either with or without intervening spacers projects quite far from the surface of the door panel. It has been found that vandals equipped with pliers or pipe wrenches or comparable tools can engage the projecting, drum-like or circular cylindrical portion of the lock unit surrounding the pin tumbler mechanism. By imposing a severe torque on the projecting portion, the intruder can so disable the lock set that access to the interior can be gained.

It is therefore an object of the invention to provide a lock protecting mechanism in which the parts exposed on the side of the door panel are not readily engaged by any of the usual tools and are very difficult to turn or dislodge.

Another object of the invention is to provide a lock protecting mechanism which can be added to lock units presently available so that additional security can be provided.

Another object of the invention is to provide a lock mechanism of this sort which will readily indicate tampering.

Another object of the invention is to provide a lock protecting mechanism which is neat in appearance and which will blend well with lock mechanisms now generally available.

Another object of the invention is in general to provide an improved lock mechanism having more than the customary security.

A further object of the invention is to provide an improved mounting for a lock unit having a protecting mechanism.

An additional object of the invention is to provide an improved support for parts of a lock unit having a protecting mechanism.

Other objects together with the foregoing are attained in the various versions of lock protecting mechanism pursuant to the invention described in the accompanying description and illustrated in the accompanying drawings, in which:

FIG. 1 is an elevation of the outside of a door and frame, portions being broken away, showing the lock protecting mechanism mounted thereon;

FIG. 2 is a cross-section to an enlarged scale, the cross-section being taken on the lines **2—2** of FIG. 1;

FIG. 3 is a cross-section taken on a plane indicated by the line **3—3** of FIG. 2;

FIG. 4 is a cross-section taken on a plane indicated by the line **4—4** of FIG. 2;

FIG. 5 is a cross-section like FIG. 2 but showing a modified form of lock protecting mechanism;

FIG. 6 is an elevation of a further modified form of lock protecting mechanism;

FIG. 7 is a cross-section taken on planes indicated by the lines **7—7** of FIG. 6;

FIG. 8 is a fragmentary view in vertical elevation of the obverse face of a door panel and its associated frame and on which another modified form of protecting mechanism is mounted;

FIG. 9 is a view similar to FIG. 8 but showing the reverse face of the structure illustrated in FIG. 8;

FIG. 10 is a cross-section to an enlarged scale, the plane of section being indicated by the line **10—10** of FIG. 8;

FIG. 11 is a cross-section to an enlarged scale, the plane of section being indicated by the line **11—11** of FIG. 9;

FIG. 12 is an end elevation of the structure of FIG. 9 in partially disassembled posiiton; and

FIG. 13 is a view comparable to FIG. 12 but showing a modified form of lock protecting mechanism on the obverse side of the door panel.

In one embodiment, as illustrated in FIGS. 1–4 inclusive, a lock mechanism is mounted on a door panel **4** adapted to lie against a stop **6** forming part of a door frame **7**, the panel having appropirate hinge mounts **8** on the frame to permit the panel **4** to swing about a hinge axis parallel to the stop **6**. The door panel **4** has a pair of planar, parallel sides **9** and **11**, the side **9** being considered as the obverse side or outside and the side **11** being considered as the reverse side or inside. In some instances the installation is substantially identical on the opposite sides so that the nominal distinction between them is arbitrary and merely for convenience.

In the instance illustrated in FIGS. 1–4, the door panel **4** is arranged a lock set including a translating lock bolt **13** designed to project, as shown in FIG. 1, and also to retract substantially flush with the edge face **14** of the door panel **4**. The bolt **13** when projected lies within a strike box **16** forming part of or secured in place by a strike plate **17** secured to the door frame. The bolt **13** is translated to and fro by appropriate mechanism **18**, not disclosed in detail.

The mechanism **18** is actuated by operation of a plug **21** rotatable about its own axis within a pin tumbler housing **22** mounted in an actuator unit **23**. The unit **23** encompassing the housing **22** is of a circular cylindrical envelope configuration having a slightly projecting peripheral rim **24**. The unit **23** terminates in a planar, circular face **26** disposed parallel to the face **9** of the door panel. The end face **27** of the rotatable plug **21** projects slightly beyond the planar face **26**. A keyway **28** is formed in the plug **21** so that when a key is introduced

therein and is rotated with the plug about the plug axis, a lost motion connection retracts or projects the bolt **13**.

In many installations a similar arrangement is provided on the reverse side of the door panel, there being a similar actuator mechanism **33** having a peripheral, circular rim **34** beyond which slightly projects the planar face of a rotatable plug **37** having a keyway **38**. A key-actuated, pin tumbler mechanism **39** has a lost motion control of the bolt **13**.

As an effective way of mounting and interconnecting the parts so far described, both of the pin tumbler actuators **23** and **33** are pierced axially to receive oppositely directed fasteners **41**. One of the threaded fasteners **41** extends from the exterior face of one of the actuators **23** or **33** and engages with a threaded bore in the respective one of a pair of oppositely disposed asymmetrical, axial lugs **43**, one extending from each of the mechanisms **23** and **33**. The other fastener **41** passes through the other actuator and engages the other lug **43**.

When installation is made, it is preferred to provide spacers to hold the units **23** and **33** in appropriate locations with respect to the main bore **46** through the door and at proper distances from the outer faces **9** and **11** of the door panel. Thus, in accordance with the present invention, a spacer **51** is disposed between the end of the actuator **23** and the adjacent door face **9**. The spacer is a flat, generally circular plate having a cut-out circular portion **52** and a cut-out radial portion **53** receiving the housing **22** and having a pair of circular notches **54** and **55** for clearing the fastener **41** and lug **43**. A similar spacer **56** is interposed between the end of the actuator **33** and the face **11** of the donor panel. When the parts are in position and the fasteners **41** are tightened, the two units **23** and **33** are drawn toward each other. The ends of the actuators **23** and **33** abut the spacers **51** and **56** and press them against the door panel to hold the mechanism tightly in position. Appropriate keys can be introduced into the keyways **28** and **38** to rotate the respective pin tumbler plugs and operate the latch bolt **13**.

There is a difficulty in that the projecting actuators, whether or not covered with trim rings, afford good engagement for a heavy pair of pliers or a pipe wrench, for example. A twist of either of the units **23** or **33** about the cross axis **57** can bend and break the fastenings **41** and **43** or otherwise destroy much of the lock unit so that the bolt **13** can be withdrawn.

To obviate this situation, we provide in accordance with the invention and for installation on one side of the panel **9** a protective shell **61**. This is centrally in the form of a frustum of a cone **62** symmetrical about the axis **57**. The cone frustum at its larger end merges with an elliptical plate **63** having a generally planar surface **64** designed to abut the side **9** of the door panel. The outer surface **66** of the conical portion of the shell is also a planar surface and partly defines a relatively thin wall **67** overlying at least part of the end face of the unit **23**. The wall **64** is preferably cut away but only enough to provide a circular opening **68** slightly larger than and in substantial registry with the end of the circular plug **21** so that free access can be had to the keyway **28** therein. The wall **67** does not interfere with use of the usual actuating key. Part of the interior of the shell **61** is a circular wall **69** to receive and help support the rim **24** and the rest of the shell interior is a partial cone **71** generated about the axis **57**.

Preferably, the angle or slope of the exterior, conical frustum surface **62** is such that pliers or a pipe wrench having the usual parallel jaws or even having special conical jaws will not bite into the material of the cone, but rather will slide toward the smaller end of the cone. This angle or slope is so steep and the coefficient of friction between the engaging tool and the material is such as to make the tool slide off rather than engage the cone. To enhance this effect, the exterior of the conical shell is made smooth, even polished. On many cases it is of a hard material such as armor plate. Engagement by any tool normally available is virtually impossible.

Means are provided for holding the shell in place and for preventing it from rotating, so that the eccentric opening **68** therein always registers with the end of the plug **21**. Integral with the elliptical plate **63** are short lugs **72** and long lugs **73**. These lugs are close enough together to merge at their bases. One lug **72** has a socket **74** receiving a fastener **76** threadedly engaging a threaded lug **73** on a similar shell **61**, while the other threaded lug **73** receives a similar fastener **76** extending from a socket **74** in the opposite lug **72**. The long lugs **73** overlap (FIG. 3) and are duplicated top and bottom to lie with auxiliary bores **77** and **78** extending through the door panel parallel to the main bore **46**. Since the long lugs overlap, they and their fasteners are laterally displaced.

If security is not required on the reverse side of the door panel, the arrangement of FIG. 5 is suitable. In this installation, the door panel **91** has an exterior unit **92** held in position by screws **93** passing through an interior thumb turn unit **96** of a standard kind. An interposed closure plate **98** accommodates fasteners **99** in lugs **102** and **103** but is devoid of a conical central portion. The fasteners **99** engage the lugs **72** and **73** on a shell **61** disposed on the other side of the door panel. As before, the spacing of the lugs is such that separate auxiliary bores **106** and **107** are provided for them. In this fashion the exterior mechanism **92** is secure as previously described.

In some cases there is no manual control on the interior of the door panel. In those cases an arrangement as shown in FIGS. 6 and 7 is provided. The exterior shell **108** is as before but the inside shell **109** includes a recessed planar plate **110** having lugs and fasteners identical with those of the shell **98** (FIG. 5), for example, and affords complete protection to the lock unit. The actuator mechanism **33** is secured in placed by screws engaging a spacer **111**.

In some instances somewhat less security is adequate and it is desirable to remove less of the door panel. Consequently a comparable but lighter duty arrangement is shown in FIGS. 8–11. Herein the door panel **112** swings, as before, with respect to a frame **113** and carries a locking bolt **114** to engage a strike box **116**. Disposed in a main bore **117** through the door is an exterior, key-operated lock unit **118** connected by fasteners **119** to an interior key-operated lock unit **121**. Both lock units are effective upon the bolt **114** in the usual way.

Surrounding each of the lock units **118** and **121** are spacers **122** and **123**. These have tubular portions **124** engaging beads **126** on the lock units and have planar flanges **127** abutting the adjacent face of the door panel. The lock units are thus properly spaced along the central axis **128**.

Adapted to overlie the exterior lock unit **118** is a protecting shell **131**. This has a generally planar face **132** defined by a wall **133** overlying the end of the lock unit except for a circular opening **134** around the rotatable, key-receiving plug **136** of the lock unit. Smoothly merging with the face **132** is a frusto-conical surface **137** extending from the face to the surface of the door panel. This surface is formed on the shell without roughness and at a relatively steep angle so that a tool such as pliers or a wrench does not grip the shell but tends to slide off of the surface.

On the interior, the shell **131** has a conical recess **138** opening to the main bore **117** and also has a pair of lugs **139** and **141** passing through cut-outs in the adjacent flange **127** and lying within arcuate channels **142** and **143** cut into the door panel material and constituting offset enlargements of the main bore, which is therefore not circular in entirety. The shell is thus non-rotatable about the axis **128**.

The lugs **139** and **141** are internally threaded to receive non-removable fasteners **144** rotatably received in an interior shell **146** surrounding the lock unit **121**. While the shell **146** is much like the shell **131**, it differs in that lugs **147** are relatively short and are in line with channels **148** interrupting the conical surface **149** of the interior shell **146**.

The center of gravity of the shell **146** is such that it tends to fall away from the door panel, as shown in FIG. 12, when the fasteners **144** are removed. This affords a visible warning if, as sometimes occurs, an attempt is made surreptitiously to remove the screws pending later tampering.

In some installations only a key is utilized as a knob or handle for moving the door panel. In other instances it is preferred to provide an auxiliary grip so that the panel can more readily be swung. One way of doing this, as shown in FIG. 13, is to dispose a ring **211** having a toroidal rim **212** on the obverse shell **213** mounted on the door panel **214**. All of the surfaces of the ring **211** are surfaces of revolution about the shell axis **216**. Since the rim **212** can be engaged by an ordinary tool and so rotated, it is attached to the shell **213** only through a relatively thin web **217** secured by a band **218** of yieldable adhesive. The ring **211** is attached strongly enough for normal pushing and pulling, but any attempt to rotate it strongly enough to budge the shell **213** causes the adhesive band **218** to fail. The lock unit is still protected by the conical shell **213**. The interior can be provided with a thumb turn **219** or can be arranged with an interior shell as in FIG. 12.

It is preferred, especially in the FIGS. 1–7 devices, to slip protective covers or caps over all of the exposed fastener heads. These are ordinarily small cups frictionally received by the recess walls surrounding the fastener heads. As the last step in an installation, after the fasteners have been tightened, the cups are pressed flush into place at least over the exterior fasteners. The caps are not readily removed and preclude removal of the fasteners by ordinary means. For clarity of disclosure the caps are omitted from the drawings. Wherever desired, non-removable fasteners, as shown in FIG. 9, may be used whether or not caps are used.

What is claimed is:

1. A mechanism for use with a door panel having a main bore extending therethrough and adapted to receive a lock actuator unit and having an auxiliary bore extending therethrough alongside of the parallel to said main bore and adapted to receive lugs therein comprising a continuous integral first shell on one side of said panel and having a central portion overlying and obstructing said main bore except for an opening smaller than said main bore and disposed eccentrically with respect to said main bore, a first lug on said shell extending into said auxiliary bore, a second shell on the other side of said panel, a second lug on said second shell extending into said auxiliary bore alongside said first lug and fasteners extending from the opposite sides of said panel through said first shell and said second shell into said auxiliary bore and into engagement with respective ones of said lugs.

2. A mechanism as in claim **1** in which at least portions of said lugs on each of said shells are flat and extend in opposite directions alongside each other in said auxiliary bore, and said fasteners are disposed alongside each other.

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