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Lippisch

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[54] **SECURITY PADLOCK**

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[52] **U.S. Cl.** ..... **70/38 A,** 70/52, 70/36 B

[51] **Int. Cl.** **E05b 67/02,** E05b 67/22

[58] **Field of Search** ..... 70/38 R, 38 A, 38 B, 38 C, 70/51, 52, 367–369

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Attorney, Agent, or Firm—Hill, Gross, Simpson, Van Santen, Steadman, Chiara & Simpson

[57] **ABSTRACT**

A maximum security padlock having a shielding plate recessed and retained in the lock casing to minimize exposure of the lock's replaceable key cylinder permitting only limited access to the key slot therein. The shielding plate is dovetailed into a complementary recess in the bottom of the casing and cooperates therewith to provide a flush, crevice-free padlock closure case around the lock mechanism. A pair of retaining members secure the shielding plate in the casing and accommodate release of the plate, to replace the key cylinder, only when the lock is in an unlocked condition.

4 Claims, 4 Drawing Figures

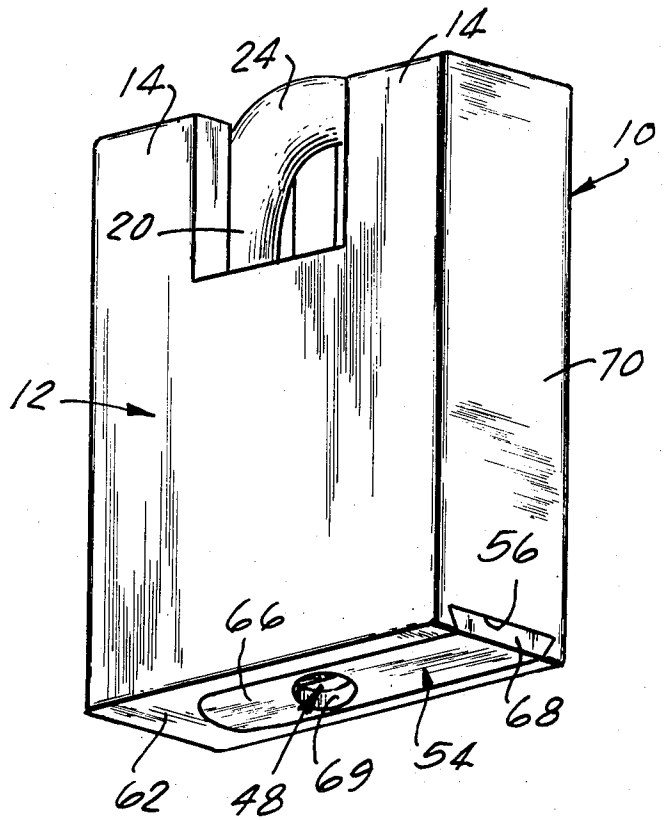


Fig. 1

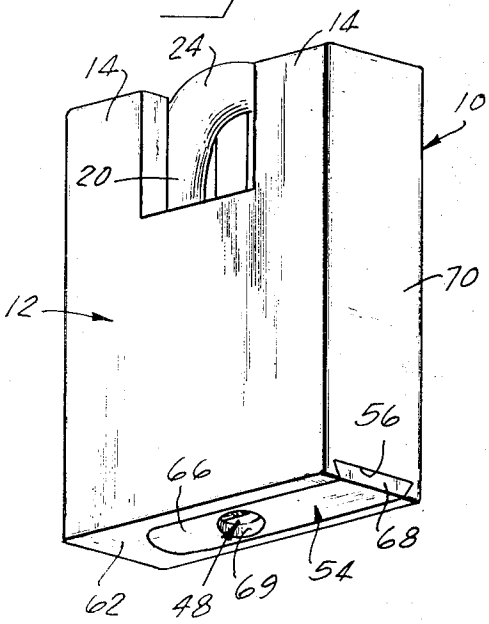


Fig. 2

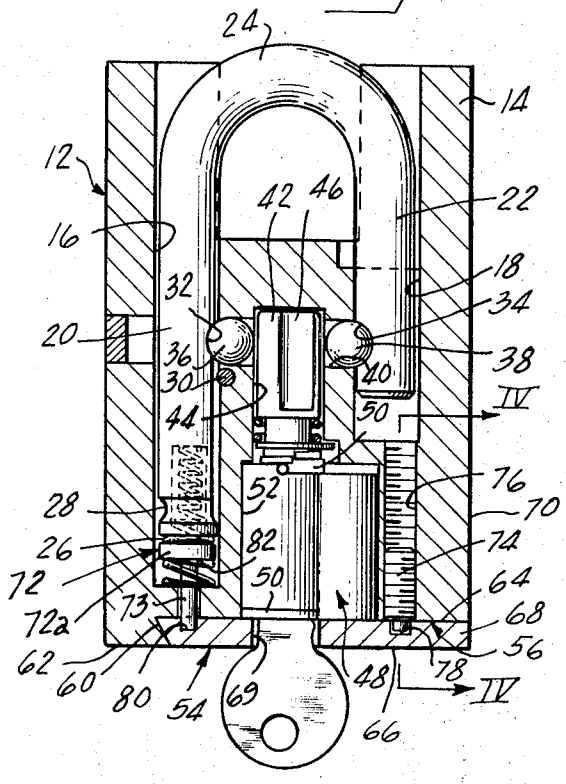


Fig. 3

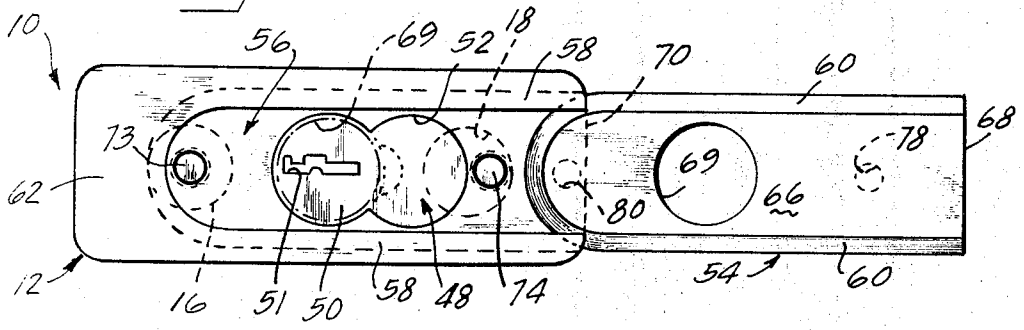
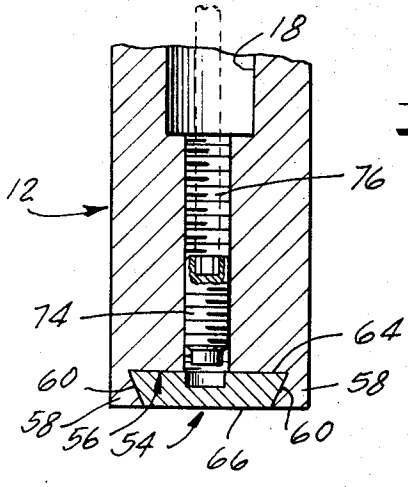


Fig. 4



SECURITY PADLOCK

BACKGROUND, SUMMARY AND ADVANTAGES OF THE INVENTION

Shackle-type padlocks have been developed in the past to resist tampering and damage, and provide the utmost in security. Lock casings have been constructed of special tough alloys or have been hardened to withstand attacks of various cutting and impact tools and further, the shackles have been shielded to lessen vulnerability to intruders. Such padlocks, however, still suffer from the disadvantage that the key cylinder, formed of relatively soft brass or other similar alloys, remains exposed to the tampering devices of would-be intruders. If sufficient pry leverage is applied to the key cylinder to unseat it from the casing, the special alloys, heat treatments or shackle shielding are of little avail to provide the desired security.

Accessibility to the key cylinder in the casing of the padlock is, of course, extremely desirable in order to accommodate the changing of key cylinders having different tumbler pin combinations. Further, changing of the key cylinder is easily accomplished and without sacrificing the lock's security.

In accordance with the principles of the present invention, a shielding plate, of complementary alloy or hardening with the lock casing and secured therein, underlies the key cylinder, permitting only limited access to the key slot therein. The shielding plate is dovetailed and slidably seated into a complementary recess in the bottom of the casing and cooperates therewith to provide a crevice-free casing invulnerable to prying or wedging burglary tools.

A pair of retaining members secures the slidable, shielding plate in the casing. One of said members is a set screw adapted to release the shielding plate to accommodate replacement of the key cylinder when the lock is in an unlocked condition. The second of the retaining members is a plunger, biased against a spring by one leg of the shackle into locking engagement with the shielding plate when the shackle is in a locked condition.

A principal advantage of the present invention, therefore, is the maximum security provided for a lock accommodating replacement of its key cylinder.

A further advantage of the present invention is in utilizing the dovetailed plate to retain and greatly limit exposure of the key cylinder when the padlock is in a locked condition.

A still further advantage of the present invention resides in the ease of removing the dovetailed plate to replace the key cylinder when the padlock is in an unlocked condition.

Other objects, features and advantages of the invention will be readily apparent from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts of the disclosure.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a padlock constructed in accordance with the principles of the present invention;

FIG. 2 is a transverse sectional view taken through the padlock shown in FIG. 1, showing the padlock in a locked condition;

FIG. 3 is a bottom view of the lock shown in FIG. 1, with the shielding plate removed to expose the key cylinder and the plate retaining members; and

FIG. 4 is a partial fragmentary sectional view taken substantially along the line IV—IV of FIG. 2 showing the release of the retaining member from the shielding plate.

DESCRIPTION OF PREFERRED EMBODIMENT OF THE INVENTION

In the embodiment of the invention illustrated in the drawings, I show in FIG. 1 a maximum security padlock **10** having a casing **12**, preferably constructed of a material especially resistant to damaging effects of burglary tools, with built-up or extended portions **14, 14** and having a pair of parallel bores **16** and **18** therein. The bores **16** and **18** slidably receive legs **20** and **22** of a generally U-shaped shackle **24.** A compression spring **26** seated on a heat **72**^{a} of a plunger **72** in the bottom of the bore **16,** biases the leg **20** of the shackle **24** upward, so that the leg **22,** being the shorter of the two shackle legs, can be withdrawn from the casing **12.** The longer leg **20** has an annular recess **28** extending thereabout and adapted to be engaged by a retainer pin **30** for retaining the longer leg **20** in the casing **12** when the padlock **10** is unlocked.

The legs **20** and **22** also have arcuate recesses **32** and **34** in the inner facing sides thereof and adapted to be engaged by balls **36** and **38** extending from a transverse extending passageway **40.** The balls **36** and **38** are engageable with the recesses **32** and **34** to lock the shackle **24** in the casing **12** when the balls **36** and **38** are in engagement with the cylindrical wall of a locking member **42** rotatably mounted in a bore **44** extending upward from the bottom of the casing **12.** The cylindrical wall of the locking member **42** has diametrically opposed flattened portions **46, 46** which when registered with the balls, accommodate retraction of the balls **36** and **38** out of engagement with the arcuate recesses **32** and **34** to accommodate opening of the padlock by upward pulling movement of the shackle **24,** to withdraw the shorter leg **22** from the bore **18,** whereupon the leg and shackle may be rotated about the axis of the leg **20.**

The extended portions **14, 14** of the casing **12** enclose the legs **20** and **22** of the shackle **24** so as to hinder attack of the shackle when in the locked position.

A standard replaceable key cylinder **48** is shown as being generally figure-8 in form and carrying a key plug **50** with a key slot **51** therein, having communication with the locking member **42,** for rotatably moving said locking member to lock and unlock the padlock **10** in a manner well known to those skilled in the art, so not herein shown or described further. The key cylinder **48** is seated in a matching generally figure-8 shaped aperture or socket **52** at the bottom of the casing **12,** and is retained therein by an elongated shielding plate **54,** underlying the key cylinder **48.** The shielding plate **54** is of a complementary alloy or hardness with the lock casing **12** and is dovetailed in configuration for seating into a complementary recess **56** formed into the bottom of the casing **12.**

The recess **56** is defined by a pair of gibs **58, 58** extending along the sides of the casing **12** and arcuately joined at an inner end of the recess **56** to form a U-shaped slot with a tapered retaining lip extending thereabout. The dovetailed shielding plate dimensions and tapered side walls **60** closely conform to the casing recess **56** so that when the shielding plate is in position in the recess **56,** a flush, crevice-free casing surface **62** is provided to resist entrance of prying or wedging tools.

The dovetailed shielding plate **54** further includes upper and lower surfaces **64** and **66** and a straight end wall **68.** The lower surface **66** and end wall **68** align with the casing bottom surface **62** and side wall surface **70** thereof. While the shielding plate **54** covers much of the key cylinder **48,** a minimum size aperture **69** therein accommodates use of a key in the key slot **51** of the key plug **50.**

Now with reference to FIG. **2,** it can be seen that the shielding plate **54,** when seated in the recess **56,** extends from the casing side wall **70** to a location which underlies the bore **16.** The shielding plate **54** also underlies the bore **18** and key cylinder socket **52** and is secured in the recess **56** by a pair of retaining members, comprising a plunger **72** having a head **72**^{a} forming a seat for the compression spring **26** in the bore **16,** and by a dog point set screw **74** screwed into a threaded bore **76** at the bottom of the bore **18** and arranged to engage a bore **78** in the upper surface **64** of the plate **54.** A second bore **80** in the upper surface **64,** aligns with a pin projection **73** of the plunger **72** to secure the shielding plate **54** against slidable disengagement with the recess **56,** whenever the shackle leg **20** is depressed into the casing **12.** The plunger **72** is biased downward by the spring **26** into locking engagement with the bore **80** and is biased upward out of locking engagement by a spring **82.**

Accordingly, whenever the padlock is in an unlocked condition, the spring **82** moves the plunger **72** upward out of engagement with the bore **80,** against minimal compressive resistance of the spring **26** which is virtually fully extended when the annular recess **28** of the shackle leg **20** engages the retaining pin **30** at a time when the lock is open. Conversely, when the shackle leg **20** is fully depressed into the bore **16** as in the locked condition, the greater compressive force of the spring **26** overcomes the opposing biasing force of the spring **82** to move the plunger pin **73** downward into locking engagement with the bore **80.**

It may now be seen that only when the padlock is in an unlocked condition with the plunger pin **73** disengaged and the shackle leg **22** withdrawn from the bore **18** and rotated about the axis of the shackle leg **20** that the second retaining member, set screw **74,** is accessible at the bottom of the bore **18** to unscrew it from locking engagement with the bore **78** of the shielding plate **54,** as best shown in FIG. **4.** Now, with both retaining members **73** and **74** released, the plate **54** may be slid out of the recess **56** to expose the key cylinder **48,** as best seen in FIG. **3,** to facilitate the removal thereof from the aperture **52** of the casing **12,** and accommodate replacing of the key cylinder **48** with another having different tumbler pin combinations.

It will be apparent from the foregoing that a maximum security padlock is provided without the shortcomings of prior designs, which do not adequately protect the key cylinder. Further, simple guarded release means for the shielding plate to retain the key cylinder has been provided to accommodate quick removal of the key cylinder for replacement by a different key cylinder, by merely unlocking the padlock and withdrawing the short leg **22** of the shackle from its bore **18** to gain access to the set screw **74** at the bottom of the bore **18.** A tool, reaching down the bore **18,** can then unscrew the set screw **74** from locking engagement with the shielding plate bore **78** to permit the plate to be slid out of the recess **56,** whereupon the key cylinder may be withdrawn for replacement with another key cylinder.

I claim as my invention:

1. In a shielded padlock,

a casing having a pair of parallel bores,

a shackle having a pair of parallel legs slidably engaged in said bores,

locking means to secure said shackle in said casing when the legs are depressed into said bores,

an interchangeable means for releasing said locking means including:

a key cylinder mounted in said casing,

a key plug rotatably carried in said cylinder and having a key slot operable by turning movement of a key to release said shackle to allow one of said legs to be withdrawn from said casing,

a cover place for said key cylinder slidably received in said casing to retain said key cylinder in said casing and releasable to afford access to said key cylinder, to accommodate changing of the key cylinder to a key cylinder having a different tumbler pin combination only when the shackle is released,

a slidable interengaging connection between said cover plate and said casing extending along opposite sides and an inner end of said cover plate and providing a crevice-free, flush exterior casing surface, and

spaced retaining means releasably pocketed in mating recesses in an unexposed surface of said cover plate in alignment with said parallel legs of said shackle, to retain said cover plate to said casing and to prevent release thereof except when said shackle is released.

2. The shielded padlock of claim **1,** wherein the interengaging connection is dovetailed in configuration, and wherein the retaining means retaining said cover plate in fixed engagement with said casing comprises a pair of spaced pins, each aligned with one of said shackle legs and unexposed except when said shackle is released.

3. The shielded padlock of claim **2,** wherein one of said pins comprises a plunger depressible into locking engagement with one of said cover plate recesses by one of said shackle legs upon depressing the shackle into a locked condition in the casing, and wherein a second of said pins comprises a set screw, threaded into said casing and turned down into locking engagement with the other of said cover plate recesses.

4. The shielded padlock of claim **3,** wherein means affording release of said retaining means includes spring biasing means for said plunger to disengage the plunger from its locking engagement with said cover plate concurrently with the release of said shackle and withdrawal of one of said shackle legs from its related casing bore to provide access to said set screw.

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