KEY OPERABLE PADLOCK WITH SLIDABLE SEAL FOR PLUG

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ABSTRACT

A key operable padlock having a padlock body provided with sockets for the legs of a U-shaped shackle, and a central bore located between the sockets shaped to receive and removably house a key lock plug. The bottom wall of the padlock body has a key opening which projects into the key lock plug to operate the plug, and the upper portion of the padlock body has an elongated slot defining a slideway and the cover member is removably positioned. The sides of the slideway and the cover member have alternating tongue and groove formations which interfit with each other to permit the cover member to slide into covering relation over the central bore and through the region of one of the shackle legs to the adjacent end of the padlock body, and the cover member has a cylindrical opening which registers with the socket for one of the shackle legs to receive that shackle leg when the cover member is fully seated in the slideway. Interlocking means are provided to prevent removal of the cover member unless the key lock plug is operated in a special manner.

10 Claims, 10 Drawing Figures
1

KEY OPERABLE PADLOCK WITH SLIDABLE SEAL FOR PLUG

BACKGROUND AND OBJECTS OF THE INVENTION

The present invention relates in general to padlocks, and more particularly to padlocks of either the exposed shackle or shrouded type, having key lock plugs and a special construction permitting removal of the key lock plug and replacement with another plug to permit use of the padlock with a different key.

Heretofore, key operated padlocks have ordinarily been constructed in such a manner that the key lock plug is incorporated in the padlock body during manufacture so that it cannot be replaced without substantial destruction of the lock. However, it has been recognized that it is desirable in some instances, and particularly in connection with high security uses of padlocks, to provide for removal of the key lock plug in such a manner so that a key plug designed for another key can be substituted to permit operation of the lock by a different key. Customarily, such locks have been constructed so as to permit removal of the key lock plug either by use of a special change key, or by rotation of one or a pair of retaining screws accessible in the socket or sockets which normally receive the shackle legs, thus permitting change only when the lock is unlocked, or by retraction of a split ring accessible in a similar manner to operation of the retaining screw.

Other key operable padlocks have been constructed wherein an exposed cover is mounted over the bore for the key lock plug, with the cover held to the padlock body by rivets or similar fastening devices. However, such a construction does not meet the requirements of high security lock applications.

An object of the present invention is the provision of a novel key operable padlock construction wherein the key lock plug is protected from removal by a slidable seal which is removable from the padlock case in a special manner when the shackle has been withdrawn to release position, thus permitting substitution of a key lock plug designed for a different key.

Another object of the present invention is the provision of a novel key operable padlock wherein a slide member is normally held against movement from a protective position over the key lock plug by one of the legs of the padlock shackle and which is released for removal to a position permitting access to the key lock plug and substitution of a different plug when the shackle has been withdrawn to unlocking position and the key is rotated in a direction opposite normal unlocking rotation thereof.

In many uses of padlocks, the padlock is in an exposed position such that a person seeking unauthorized entry into the space secured by the padlock may attempt to saw through the shackle or insert a tool between the hasp members and the lock to wedge or chisel the lock open. A further object of the present invention, therefore, is the provision of a novel padlock construction for improving the security of such padlocks and enhancing their resistance against such efforts to gain unauthorized entry. This may be accomplished by providing a shrouded type padlock body wherein a portion of the padlock body forms a shroud about the shackle which denies direct access to the shackle by a saw or wedging tool.

2

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings illustrating preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is an exploded perspective view of an exposed shackle padlock embodying the present invention;
FIG. 2 is a vertical transverse section view thereof taken along the line 2—2 of FIG. 1;
FIG. 3 is a vertical section view thereof taken along the line 3—3 of FIG. 2;
FIG. 4 is a horizontal section view taken along the line 4—4 of FIG. 3;
FIG. 5 is a horizontal section view taken along the line 5—5 of FIG. 2;
FIGS. 6 and 7 are section views from the same position as FIG. 4, showing the locking bolt with respect to the locking bolt in unlocking position, and in slide release position;
FIG. 8 is a bottom view of the lock body;
FIG. 9 is a perspective view of the slide member removed from the lock body; and
FIG. 10 is a perspective view of a shrouded type padlock embodying the present invention, with the shackle shown exploded therefrom.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, there is illustrated in FIGS. 1 to 6 a form of padlock, indicated generally by the reference character 10, which is of the exposed shackle type. The padlock 10 comprises a padlock body 11 of generally elliptical configuration in top plan view, having a top surface 12 and a bottom surface 13. The padlock body 11 is preferably a unitary casted body, formed for example of hardened steel, and has a pair of closed bottom sockets or bores 14, 15 opening through the top surface 12 for receiving the legs of the shackle 16. The sockets 14, 15 have slightly constricted entrance portions 14a, 15a of cylindrical configuration defining downwardly facing transition surfaces or shoulders 14b, 15b, spaced below the top surface 12.

The shackle 16 is preferably in the form of a U-shaped rod of hardened steel having a longer leg 17 and a shorter leg 18. The longer leg 17 passes through the circular entrance opening 14a in the top surface 12 into the socket 14 and extends a substantial distance within the padlock body 11 toward the bottom surface 13. The leg 17 is permitted a selected amount of axial and rotatable movement relative to the padlock body 11, but is normally restrained against withdrawal from the socket 14 by means of a pin 19 driven through an opening 11a in the padlock body into a pin aperture 17b in the leg 17. An end of the pin 19 projects slightly from a side of the leg 17 into the socket 14 below the shoulder 14b in underlapping relation to the shoulder so that the shoulder 14b will intercept the projecting end of the pin upon upward movement of the shackle. The free end portion of the shorter leg 18 enters through the circular entrance opening 15a in the top surface 12 into the closed bottom socket 15 in the padlock body, when the
shackle is in locking position. By this construction, the shorter leg 18 of the shackle can be withdrawn from the padlock body 11 when the padlock is unlocked, and can be swung to an exposed position by rotating the shackle 16 about the axis of its longer leg 17, the abutment of the ends of pin 15 with shoulder 14b defining the limit of this withdrawal movement. The U-shaped shackle 16 also comprises the usual curved intermediate portion 20 extending between the legs 17 and 18, which serves as the portion which engages the usual apertured hasp members or pair of hasp members, as indicated at 21a and 21b, having apertures 22a and 22b which are of a diameter closely approximating the diameter of the shackle and are adapted to register with each other to receive the shackle therethrough. The shackle legs 17 and 18 each have a notch 17a, 18a located within the padlock body when the shackle is in locking position and which are disposed in the confronting or inwardly facing portions of the shackle legs to receive nose portions of a rotatable locking bolt 24 as later described.

The padlock body includes a closed bottom lower central bore portion 25 which communicates with the sockets 14 and 15 and is shaped and sized to snugly accommodate a key lock plug 26 of conventional construction, having a usual rotatable cylinder therein, including a bolt actuator 26a, disposed at the upper end of the plug 26 when the core is properly arranged in the padlock body. In this embodiment, the locking bolt 24 is removably secured to the cylinder of the plug 26 by screws 24b. The plug 26 also includes a key opening in the downwardly facing end portion of the rotatable cylinder, indicated at 26b in FIG. 2, located immediately above a key opening 27 in the bottom surface 13 of the padlock body for insertion of the key into the key opening of the plug cylinder. Referenced to the bottom view of FIG. 8 the key is to be rotated in a clockwise direction from center position through the appropriate arc to unlock the key lock, and to be rotated in a counterclockwise direction from center position to permit removal of the plug 26 as later described. Since the conventional key lock plug 26 usually has a pair of flat sides, indicated at 26c, and a pair of concave arcuate ends, the central bore 25 for the plug is either similarly shaped in horizontal cross-section or is cylindrical over most of its height and has flats at its upper end to embrace and hold the plug.

Immediately above the lower central bore portion 25 is an enlarged upper central bore portion 28 for accommodating the rotatable locking bolt 24. The rotatable locking bolt 24, as will be apparent from FIGS. 1, 2 and 3, has a downwardly extending boss formation 24a which is recessed to define a downwardly facing slot shaped to properly interfit with the bolt actuator 26a of the key lock plug so as to be rotated by the cylinder of the plug 26 when the latter is shifted to unlocking position by the proper key. The locking bolt 24 also includes a pair of diametrically oppositely projecting nose portions 24c and 24d which interfit into the notches 17a, 18a of the shackle legs 17, 18 when the key lock plug cylinder, and therefore the locking bolt 24, are in locking position. Suitable extension recesses 29a of the upper bore 28 at the level of the locking bolt 24 communicate with the sockets 14, 15 in one direction from center position to accommodate rotary arcuate movement of the locking bolt nose portions 24c, 24d from the locking position to the unlocking position to free the shackle 16 for withdrawal to its unlocking position, and extension recesses 29b accommodate similar arcuate movement of the bolt 24 in the opposite direction.

The upper end of the upper bore portion 28 is closed by a slide member 30 forming a closure seal over the top of the locking bolt 24. The slideable seal member 30 includes opposite convex inner and outer ends 31 and 32, the latter being of a radius to correspond to the curvature of the end portion of the padlock body which lies immediately below the end 32 when the slide member 30 is in the closed or covering position. Each of the sides 33 and 34 and the inner end 31 of the slide member 30 have a plurality of alternating ribs and channels, or tongues and grooves, indicated at 35 and 36, to complement and slidably interfit with and track in ribs and channels or tongues and grooves indicated at 37 and 38 bounding the sides and inner end of the slot 39 in the upper portion of the padlock body designed to slidably receive the slide member 30. The slide member has a cylindrical opening 40 therein designed to align with the entrance portion 15a of the socket 15 in the illustrated embodiment, when the slide member 30 is in the closed or sealing position, so that the leg 18 of the shackle 16 extends through the cylindrical opening 40 and prevents movement of the slide member 30 from closed position when the padlock is in locked condition.

A downwardly opening interlock slot 30a is provided in the lower face of the slide 30, which includes an arcuate slot portion 30b concentric with the axis of the cylinder of plug 26 and a straight slot portion 30c forming an access leg extending from one end of curved portion 30b through the inner end of slide 30 parallel to the axis of movement of the slide in the slot 39. The locking bolt 24 has an interlock pin 24e projecting upwardly into the curved portion 30b of the slot 30a to restrain the slide 30 against movement from the sealing or covering position of FIG. 6 when the bolt 24 is at any position other than the slide release position of FIG. 7.

Before the shackle 16 has been assembled in the padlock body, the key lock plug 26 is inserted into the lower central bore portion 25 of the padlock body, after which the locking bolt 24 is fitted downwardly on the bolt actuator portion 26a of the plug and secured by the screws 26b. The slide member 30 is then installed in the padlock body by starting it into the slot 39 with its tongues and grooves 35, 36 interfitting with the tongues and grooves 37, 38 forming the side walls of the slot, and, with the key lock cylinder and bolt 24 disposed at the slide release position of FIG. 7, the slide is shifted longitudinally to closed position wherein its convex end 32 aligns with the adjacent curved end portion of the padlock body. The locking bolt 24 is then rotated by the key in a clockwise direction from the FIG. 7 position to the FIG. 6 position to fix the slide member in closed position. With the bolt 24 and key lock in unlocked condition, shown in FIG. 6, wherein the nose portions 24c, 24d of the locking bolt are withdrawn from the sockets 14, 15, the shackle legs 17 and 18 can be inserted into the sockets 14 and 15 until the longer leg 17 bottoms in its socket 14, and the pin
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19 is then driven into the padlock body and into the opening therefore in the lower portion of the shackle leg 17 to restrain the shackle in the padlock body.

In the embodiment illustrated, the key lock plug 26 can be removed and replaced by another plug for use with a different key whenever the lock is first shifted to an unlocked condition and the shackle 16 is withdrawn to aline its lower notch 17b in its leg 17 with the bolt nose 24c, followed by rotation of the shackle through 180° to face the notch 17b toward the bolt and rotation of the key and bolt 24 to the release position of FIG. 7 alining interlock pin 24e with interlock slot portion 30C. The slide member 30 can then be withdrawn from the slot 39 in the padlock body. The locking bolt 24 can then be fastened from the plug 24 by withdrawing screws 24d and the padlock body can then be inverted to permit the locking bolt 24 and key lock plug 26 to drop out of the bore portions 28 and 25. The padlock body is then again inverted to upright position, and another key lock plug 26 is inserted into the lower central bore portion 25, after which the locking bolt 24 is reassembled onto the bolt actuator 26 of the new plug. The slide member 30 is then reinserted in the slot 39 with the key and locking bolt in slide release position, after which the key is returned to unlocking position, the shackle is moved downwardly into locking position, and the key and bolt are returned to locking position.

This padlock construction employing a reciprocative slide member 30 forming the closure seal over the bore portions housing the locking bolt 24 and plug 26 may also be employed in a shrouded type padlock body as illustrated in FIG. 10 and indicated generally by the reference character 45. In such a shrouded type padlock body 45, the body includes a shroud portion 46 which is integral with the lower padlock body portion 47 and extends to a top surface 48 at the level of or slightly above the uppermost extent of the curved portion 20 of the shackle 16. To accommodate the shackle 16 and the lower portions of the hasps members 21a, 21b, the upper or shroud portion 46 of the padlock body 45 has a cross shape or cruciform recess 49 extending downwardly from its top surface 47. The recess 49 has arms 49a in a first plane defining the recess portion for accommodating the shackle 16, and has arms 49b in a second plane perpendicular to the first plane, with one of the arms opening rearwardly through the upper or shroud portion of the padlock body 45 at the location indicated at 49b', to define a recess for snugly accommodating the hasps portions 21a, 21b which project into the portions 49a of the recess to permit the shackle 16 to extend through the apertures 22a, 22b in the hasps members. The construction of the shrouded type padlock is otherwise the same internally as the padlock construction of the embodiment of FIGS. 1 to 8, except that the pin 19 is omitted so that the shackle can be wholly withdrawn from the padlock body when the locking bolt 24 is in unlocking position. If desired, the two shackle legs may be the same length in this embodiment.

Also, in the embodiment illustrated, the front wall of the shrouded type padlock body 45 is provided with a central recess 51 for receiving the end of a chain, indicated at 52, and is provided with a pair of small flanking recesses 53, together with drilled openings 54 extending between the recesses 53 and intersecting the upper portion of the recess 51 to receive a drive pin therethrough to be driven through the drilled openings 54 and a link of the chain 52 for coupling the padlock body 45 to the door or other security close by means of the chain.

What is claimed is:

1. A padlock comprising a padlock casing having a bottom wall portion, a main body portion, and an upper body portion, a U-shaped shackle including a curved intermediate portion and a pair of shackle legs, said casing having laterally spaced sockets opening through said upper body portion for receiving the shackle legs and accommodating axial reciprocative movement of the shackle between a lower locating position and an upper release position, said main body portion having a central bore therein located between said sockets shaped to receive and removably house a key lock plug, a key lock plug removably received in said bore including bolt means movable into and out of locking engagement with said shackle legs, said bottom wall defining the bottom of said bore and having a key opening therein for projection of a key into said key lock plug for operating the latter, said main body portion having a laterally elongated slot defining a slideway extending along an axis paralleling the plane of said pair of shackle legs from the space overlying said central bore through one end of the padlock casing, said slideway being bounded laterally by alternating tongue and groove formations, and a reciprocatively slidable cover member shaped to complement said slideway and extend in covering relation over the central bore through the region of one of said shackle legs to the adjacent end of the main body portion, said slidable cover member having alternating tongue and groove formations positioned to interfit with the tongue and groove formations laterally bounding said slideway and having a cylindrical opening therethrough registering with the socket for said one of said shackle legs when said slide member is fully seated in said slideway in convering relation to said bore.

2. A padlock as defined in claim 1, wherein said key lock plug includes a bolt operator projecting upwardly therefrom, and said bolt means comprises a locking bolt member coupled to said bolt operator.

3. A padlock as defined in claim 1, wherein said key lock plug includes a bolt operator projecting upwardly therefrom, and said bolt means comprises a locking bolt member coupled to said bolt operator for angular movement about a vertical axis having end portions projecting into said sockets within said main body portion at a locking position thereof, and said shackle legs having confronting notches receiving said end portions of said locking bolt when the latter occupies said locking position.

4. A padlock as defined in claim 1, wherein said padlock casing has a flat top wall surface through which said sockets open, said shackle projecting from said top wall surface and having one leg thereof slidably retained in said casing by removable means, and said cover member having a flat top surface located flush with said top wall surface and forming the portion of said top wall surface through which one of said sockets opens.

5. A padlock as defined in claim 2, wherein said padlock casing has a flat top wall surface through
which said sockets open, said shackle projecting from said top wall surface and having one leg thereof slidably retained in said casing by removable means, and said cover member having a flat top surface located flush with said top wall surface and forming the portion of said top wall surface through which one of said sockets opens.

6. A padlock as defined in claim 1, wherein said padlock casing has a flat top wall surface through which said sockets open, said shackle projecting from said top wall surface and having one leg thereof slidably retained in said casing by removable means, said cover member having a flat top surface located flush with said top wall surface and forming the portion of said top wall surface through which one of said sockets opens, said bolt means being movable responsive to a key to a first unlocking position and a second release position and having an interlock pin projecting upwardly therefrom eccentric to the axis of rotation of the bolt means, said cover member having a downwardly facing interlock slot therein receiving said interlock pin shaped to prevent movement of the cover member from its fully seated position when the bolt means occupies its locking and unlocking positions and said slot having a leg portion opening through an end of the cover member accommodating relative movement of said pin when the bolt occupies said second release position to permit withdrawal of the cover member from said slideway when the shackle is in upper release position.

7. A padlock as defined in claim 2, wherein said padlock casing has a flat top wall surface through which said sockets open, said shackle projecting from said top wall surface and having one leg thereof slidably retained in said casing by removable means, said cover member having a flat top surface located flush with said top wall surface and forming the portion of said top wall surface through which one of said sockets opens, said bolt means being movable responsive to a key to a first unlocking position and a second release position and having an interlock pin projecting upwardly therefrom eccentric to the axis of rotation of the bolt means, said cover member having a downwardly facing interlock slot therein receiving said interlock pin shaped to prevent movement of the cover member from its fully seated position when the bolt means occupies its locking and unlocking positions and said slot having a leg portion opening through an end of the cover member accommodating relative movement of said pin when the bolt occupies said second release position to permit withdrawal of the cover member from said slideway when the shackle is in upper release position.

8. A padlock as defined in claim 3, wherein said padlock casing has a flat top wall surface through which said sockets open, said shackle projecting from said top wall surface and having one leg thereof slidably retained in said casing by removable means, said cover member having a flat top surface located flush with said top wall surface and forming the portion of said top wall surface through which one of said sockets opens, said bolt means being movable responsive to a key to a first unlocking position and a second release position and having an interlock pin projecting upwardly therefrom eccentric to the axis of rotation of the bolt means, said cover member having a downwardly facing interlock slot therein receiving said interlock pin shaped to prevent movement of the cover member from its fully seated position when the bolt means occupies its locking and unlocking positions and said slot having a leg portion opening through an end of the cover member accommodating relative movement of said pin when the bolt occupies said second release position to permit withdrawal of the cover member from said slideway when the shackle is in upper release position.

9. A padlock as defined in claim 1, wherein said bolt means is angularly movable responsive to a key to a first unlocking position and a second release position and having an interlock pin projecting upwardly therefrom eccentric to the axis of rotation of the bolt means, said cover member having a downwardly facing interlock slot therein receiving said interlock pin shaped to prevent movement of the cover member from its fully seated position when the bolt means occupies its locking and unlocking positions and said slot having a leg portion opening through an end of the cover member accommodating relative movement of said pin when the bolt occupies said second release position to permit withdrawal of the cover member from said slideway when the shackle is in upper release position.

10. A padlock as defined in claim 2, wherein said bolt means is angularly movable responsive to a key to a first unlocking position and a second release position and having an interlock pin projecting upwardly therefrom eccentric to the axis of rotation of the bolt means, said cover member having a downwardly facing interlock slot therein receiving said interlock pin shaped to prevent movement of the cover member from its fully seated position when the bolt means occupies its locking and unlocking positions and said slot having a leg portion opening through an end of the cover member accommodating relative movement of said pin when the bolt occupies said second release position to permit withdrawal of the cover member from said slideway when the shackle is in upper release position.