

Sept. 20, 1971

W. E. BEST

3,605,458

CABLE SHACKLE PADLOCK WITH PLUG-RETAINED CABLE

Filed July 15, 1970

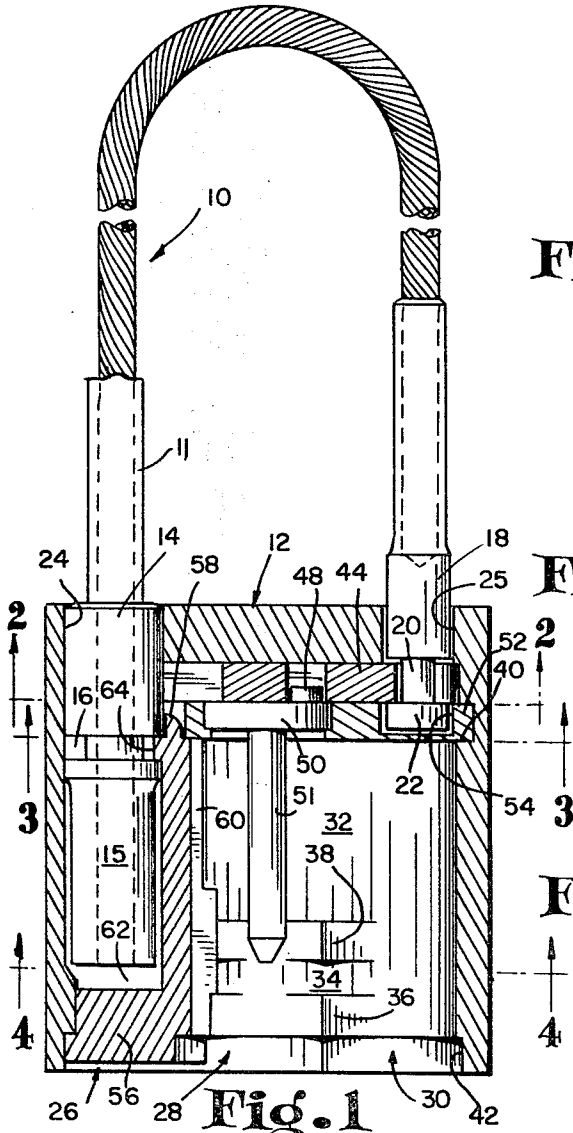


Fig. 1

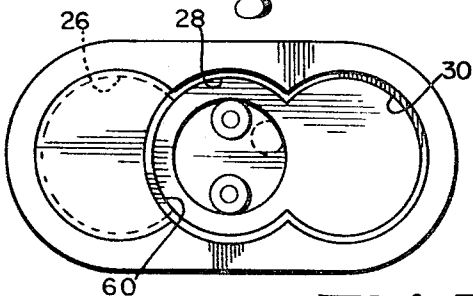


Fig. 5

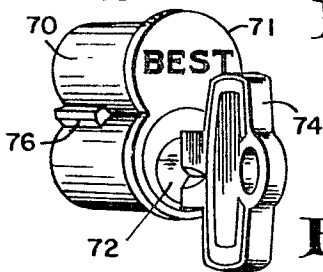


Fig. 6

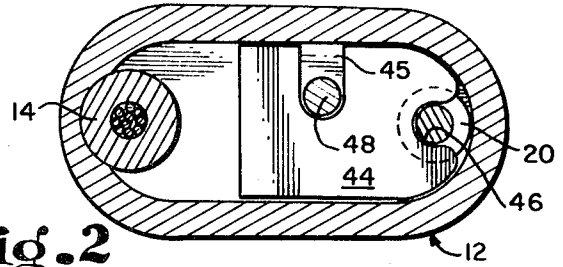


Fig. 2

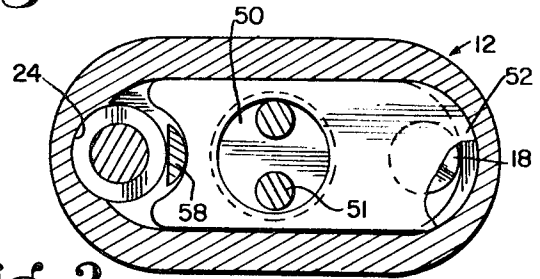


Fig. 3

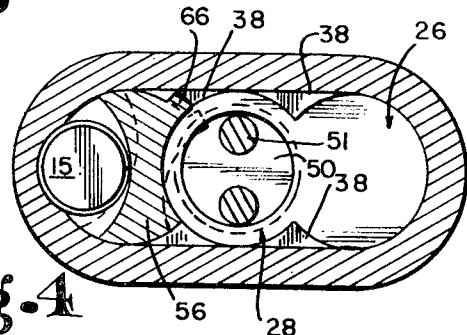


Fig. 4

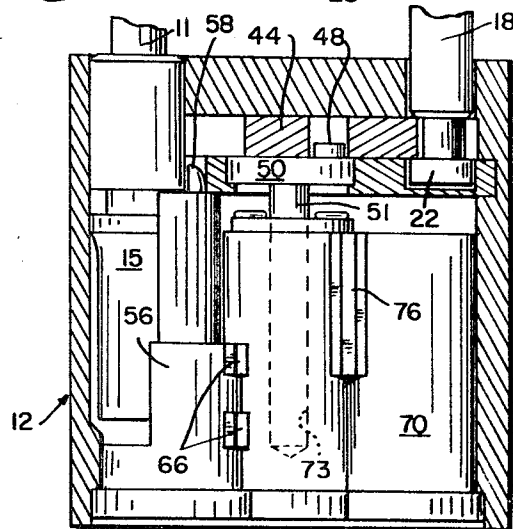


Fig. 7

INVENTOR
WALTER E. BEST

BY

Trask, Jenkins & Hanley
ATTORNEYS

1

3,605,458

CABLE SHACKLE PADLOCK WITH PLUG-RETAINED CABLE

Walter E. Best, Indianapolis, Ind., assignor to Best Lock
Corporation, Indianapolis, Ind.

Filed July 15, 1970, Ser. No. 54,974

Int. Cl. E05b 9/08, 35/10, 67/06, 67/22

U.S. Cl. 70-49

10 Claims

ABSTRACT OF THE DISCLOSURE

A padlock having a shackle in the form of a flexible cable of selected length. A secure construction and easy assembly is provided. The cable heel piece is permanently but rotatably secured in the lock case by interengagement inside the case with a shackle plug which is inserted with the heel piece from the rear and then turned to bayonet locked engagement with lugs in the case. Insertion of a lock core blocks release of the shackle plug. The cable toe piece is releasably secured by a slidable bolt. A bolt retaining plate is forced into, and retained in a supporting groove by a cam on the shackle plug as such plug is inserted, and the plate then braces the plug in secure engagement with the cable heel. To provide dead-bolt action, the bolt is actuated both for locking and release by a throw member controlled by key operation of the lock core.

SUMMARY OF THE INVENTION

This invention relates to a padlock having a shackle formed of a flexible cable of selected length. One end of the cable is fixed in a heel piece which is permanently and rotatably secured in a bore at one side of the lock case by interlocking engagement inside the case with a shackle plug inserted from the rear and bayonet-locked in place. Insertion of a lock core blocks release of such plug. The free end of the cable is releasably locked to the case by a slidable bolt. Such bolt is retained by a retainer plate and actuated by a throw member mounted in such plate and controlled by the key plug of the lock core. The retainer plate is held in position at one end by the shackle plug and at its other end by engagement with a groove in the case, into which it is forced by a cam on the shackle plug as such plug is assembled into the case. The retainer plate then braces the plug in secure engagement with the shackle heel piece. Dead-locking action of the bolt is desirably provided by connecting it for positive actuation to locked and released positions by the throw member controlled by key operation of the lock core.

The arrangement provides a secure construction and secure locking. The lock is easily assembled by first inserting the bolt and retaining plate in position in the case, then threading the shackle assembly through the shackle heel opening in the case, from the rear, and inserting the shackle plug and heel in interlocked relation. Such insertion fixes the retainer plate in proper position to retain the bolt and brace the shackle plug. The shackle plug is rotated into bayonet-locked engagement with ribs on the inner wall of the case, and then co-acts with the case to form an opening for mounting the removable lock core.

THE DRAWING

The accompanying drawing illustrates the invention, and shows a preferred embodiment. In such drawing,

FIG. 1 is a central longitudinal section view through a cable shackle padlock embodying the invention;

FIG. 2 is a section on the line 2-2 of FIG. 1;

FIG. 3 is a section on the line 3-3 of FIG. 1;

FIG. 4 is a section on the line 4-4 of FIG. 1;

FIG. 5 is a bottom end elevation of the lock shown in FIG. 1;

2

FIG. 6 is an isometric view of a removable lock core used in the lock of FIG. 1; and

FIG. 7 is a view similar to FIG. 1 but with a lock core in place, and showing the lock core and shackle plug in elevation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The padlock shown in the drawing comprises a cable shackle 10 and a lock case 12. The cable may be either a bare cable or may be covered with a sheath 11. The fixed end of the cable 10 is secured by swaging in a heel piece 14 of generally cylindrical shape having a peripheral groove 16 intermediate its length. The free end of the cable 10 is secured by swaging in a toe piece 18 of generally cylindrical shape and having a wide bolt-receiving groove 20 adjacent its end. The toe piece 18 has a flat disk-shaped end 22 adapted to be engaged behind a bolt in the lock case to releasably lock the toe end of the cable to the case. The flat shape of the end prevents the toe from being used to cam the bolt to retracted position, and the bolt is designed to be actuated by the key mechanism both to lock and released positions.

The case 12 is a machined body of flat-sided oval configuration. Its end wall 13 contains spaced bores 24 and 25 to receive the shackle heel-piece 14 and the shackle toe-piece 18. The cavity in the body 12 is formed by cutting three spaced, overlapping bores 26, 28 and 30, as indicated in FIG. 5, and by subsequently milling away portions of the longitudinal ribs between the bores to form flat side faces 32 and 34 for the cavity but to leave inwardly-projecting lugs 36 adjacent the outer end of the cavity and lugs 38 spaced inward from such outer lugs 36. In addition, the right end of the cavity is milled to form a groove 40. The outer ends of the bores 26, 28, and 30 are desirably counterbored to form a peripheral groove 42 at the open end of the cavity. Such cavity forms a lock chamber for reception of lock mechanism.

A tumbler or bolt 44 is slidably mounted against the upper end wall of the case 12. Such bolt has an end slot 46 and is slidable into and out of engagement with the groove 20 of the cable toe piece 18. The bolt also has a cross slot 45 which engages an eccentric lug 48 on a throw member 50 rotatably mounted in a retaining plate 52 that lies immediately below the bolt 44 to retain it in place. The throw member has legs 51 for engagement with the key plug of a lock core. The retaining plate is bored to form a pocket 54 to receive the flat end 22 of the cable toe piece 18, and is engaged at its right end in the groove 40 in the edge of the case.

The opposite end of the retaining plate 52 is supported by a shackle plug 56. This carries a cam lug 58 projecting across the end of the retaining plate 52, which serves during assembly to force the retaining plate 52 to the right into the groove 40 and which thereafter serves to block the retaining plate 52 against movement out of such groove 40. Conversely, the retaining plate braces the upper end of the shackle against lateral movement.

The shackle plug 56 is a formed body which is slidable axially into the bore 26 in the case. It is formed on its right face 60 to form an arc of a cylindrical wall co-axial with the central bore 28, and thus to define with such bore 28 and the bore 30 an 8-shaped opening for the reception of the correspondingly-shaped lock core shown in FIG. 6. The left side of the shackle plug 56 is milled away to form a cavity 62 for the reception of the lower end 15 of the shackle heel piece 14. The upper end of the shackle plug 56 carries a transverse lug 64 engaged in the groove 16 in the heel piece 14 to retain such heel piece 14 securely in the case. The interengagement of such lug 64 with the heel piece 14 is well inside the case 12 in a position which is inaccessible from outside, to improve the security

of the lock. The retaining lug 64 lies substantially opposite the end of the retaining plate 52 and is braced by the retaining plate 52 against retraction from the groove 16.

The shackle plug 56 is retained in the case by bayonet-lock engagement of a pair of lugs 66 on the side of the shackle plug 56 with the rib lugs 36 and 38 on the inner face of the case 12. To permit assembly, the cam 58 at the top of the shackle plug and the cavity 62 formed in such plug are so shaped that the plug can be inserted axially in the bore 26 in a rotationally oriented position in which the lugs 66 lie in the central bore 28 and thus can move past the ribs 36 and 38, as shown in dotted lines in FIG. 4. When the shackle plug 56 is fully inserted in the bore 26, it is then rotated to the full line position shown in FIG. 4 to carry its lugs 66 over the casing lugs 36 and 38 to lock the shackle 56 against axial movement. Desirably, there is sufficient frictional engagement between the parts to make this assembly self-sustaining in the absence of a lock core in the bores 28 and 30.

The lock core shown in FIG. 6 is of the type shown in Best Pats. 1,384,022 and 2,814,941. Such core comprises a body 70 of 8-shaped configuration which contains a key plug 72 in its lower lobe, operable by a key 74. The body 70 has a narrow radial flange 71 at the front, adapted to be received in the counterbore groove 42 of the case when the 8-shaped body 70 is inserted in the correspondingly-shaped opening formed by the bores 28 and 30 of the case 12. A retaining lug 76 projects from the side of the body 70 at the rear, and is retractable by use of a control key in the key plug 72, to permit insertion and removal of the core from the case. When the lock core body 70 is in place in the case 12, the retaining lug 76 is projected from the body 70 by turning the control key. The lug 76 engages over one of the lugs 38 on the inside of the case to retain the lock core in place until it is removed by use of the control key. The presence of the lock core in the case 12 blocks rotation of the shackle plug 56 from its bayonet-locked position and thus prevents removal of the shackle plug from the case.

The lock core is operable for normal purposes by an operating key 74, which turns the key plug 72 without retracting the lug 76. The key plug contains two diametrically spaced holes 73 which receive the legs 51 of the throw member 50 so that the key plug 72 is connected to the throw member 50 to turn it and thereby activate the bolt 44.

The lock is of secure construction and provides for easy assembly. For assembly, the bolt 44 is first inserted in the case. A retaining plate 52 containing a throw member 50 is then laid against the bolt 44 and the eccentric lug 48 engaged in the slot 45 of such bolt. A cable shackle assembly is then threaded, toe-end first, through the heel-receiving opening 24 from the open end of the bore 26. Before inserting the heel piece 14 into the case, a shackle plug 56 is assembled to it with its retaining lug 64 engaged in the groove 16 of the heel piece, and this subassembly is then thrust axially to its fully-inserted position. As it approaches such position, the cam 58 at the upper end of the shackle plug 56 engages the left end of the retaining plate 52 and forces such plate to the right to engage its right end in the groove 40 in the case. As previously noted, during insertion of the shackle plug, it is slightly rotated from its final position to permit its retaining lugs 66 to pass the ribs 36 and 38 in the case, as shown in dotted lines in FIG. 4. When fully inserted, the shackle plug is then rotated from such dotted line position to its full line position shown in FIG. 4, to carry its lugs 66 into bayonet-lock relation with the ribs 36 and 38. A lock core as shown in FIG. 6 is then inserted into the 8-shaped opening formed by the shackle plug and the bores 28 and 30. The mounted position of the core is shown in FIG. 7.

When assembled, the lock parts securely hold the shackle heel piece 14 permanently but rotatably in the opening 24 of the case 12. The shackle-retaining lug

64 is located in a secure position, inaccessible from the outside of the case, and is rigidly braced by interlocking engagement with the retaining plate 52. The bolt 44 is of a type which requires key-operated retraction for either insertion or withdrawal of the toe piece 18 of the shackle. When the bolt is in locked engagement with such toe piece, it is blocked from retraction by the eccentric cam 48 on the throw member 50, which in turn is engaged with the key plug 72 and held from rotation except when a proper operating key is present in the key plug. In the absence of such a key, the bolt is positively blocked from retraction, and the shackle is thus deadlocked against removal. Rotation of the key plug 72 by a proper key rotates the throw member 50 and causes the eccentric lug 48 to retract the bolt 44 and thus to open the toe receiving passage to allow insertion and retraction of the toe member 18 in the lock.

I claim:

1. A cable shackle padlock, comprising:

a cable shackle having a heel piece and a toe piece attached to its ends,

a lock case having side walls and an end wall defining a lock chamber,

spaced bores through said end wall to receive the heel piece and toe piece of the cable shackle,

a bolt slidable transversely of the toe piece opening to releasably lock the toe piece in the case,

a plate support formed in the case,

a retaining plate adjacent the bolt and movable endwise away from said heel piece bore into supported engagement with said plate support, and

a shackle plug having a seated position in said case in overlapping relation with said heel piece bore and with its axis parallel with the axis of said heel piece bore, said plug having a side cavity in which said heel piece is at least partly received, and said plug being interlocked with the heel piece and with the case to secure the heel piece against axial movement in the case,

said plug having an end portion extending across the end of the retaining plate to block it against movement out of engagement with said plate support.

2. A cable shackle padlock as in claim 1, in which the plate in blocked position forms a brace between the case and the plug opposing lateral movement of the plug in the direction of disengagement of the plug from interlocked relation with the heel piece, the plate thereby serving to secure the engagement of the plug and heel piece.

3. A cable shackle padlock as in claim 1 in which said plate support comprises a groove in the case wall into which one end of the plate moves for support of such end, and said shackle plug has an end surface supporting the opposite end of the plate.

4. A cable shackle padlock as in claim 1 in which said case and plug are so shaped that the plug is received in the case by relative axial movement thereof, and said end portion on said plug is shaped as a cam to move the retaining plate endwise in response to movement of the shackle plug to its seated position.

5. A cable shackle padlock as in claim 4 in which the plug and case have bayonet-locking lugs formed thereon in position to be interengaged by rotation of the shackle plug in its axially inserted position in the case.

6. A cable shackle padlock as in claim 1 in which said case and plug are so shaped that the plug is received in the case by relative axial movement thereof, and have bayonet-locking lugs thereon in position to be interengaged by rotation of the shackle in its axially inserted position in the case.

7. A cable shackle padlock as in claim 6 in which the case and plug are so shaped as to define a lock-core opening when the plug is in bayonet-locked position, the plug having an edge portion which projects into said

5

opening when the plug is rotationally oriented with said lugs in disengaged relation, and a lock core received in said opening and blocking movement of said edge portion into said opening and thereby blocking said shackle plug from disengagement from said case.

8. A cable shackle padlock as in claim 1, with the addition of a throw member rotatably mounted in said retaining plate and having an eccentric lug engaged with a cross slot in said bolt to advance and retract the same to and from locking position.

9. A cable shackle padlock as in claim 8 with the addition of a pocket formed in said retaining plate in position to receive the end of the shackle toe piece, a key-actuated lock core in said case operatively connected to said throw member, said throw member and lug being operative to block retraction of said bolt except when said throw member is rotated by key-actuated operation of said core.

10. A cable shackle padlock, comprising:

- a cable shackle having a cylindrical heel piece and a toe piece attached to its ends,
- a lock case having side walls and an end wall defining a lock chamber,
- spaced bores through said end wall to receive the heel piece and toe piece,
- a shackle plug of generally cylindrical shape received in said case in offset alignment with said heel piece bore,
- said plug having a laterally open cavity formed therein

6

in alignment with said heel piece bore and the plug being formed to embrace said heel piece therein, a circumferential groove in said heel piece and a transverse retaining lug on said plug interfitting with said groove to secure the heel piece in axially fixed, rotatable position in the lock case, said plug being interlocked with the case, and a key-removable lock core mounted in the case and operative to block release of said plug from interlocked position, and lock means in said case and operable by key actuation of said lock core for locking the shackle toe piece in said toe piece bore.

References Cited

UNITED STATES PATENTS

1,786,511	12/1930	Warren	70—49
1,947,443	2/1934	Bargman	70—370
2,933,915	4/1960	Gossner	70—49
3,143,872	8/1964	Check	70—38A
3,435,642	4/1969	Del Pesco	70—49

ERNEST R. PURSER, Primary Examiner

EDWARD J. MCCARTHY, Assistant Examiner

U.S. Cl. X.R.

70—38B, 340, 370

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,605,458 Dated September 20, 1971

Inventor(s) Walter E. Best

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 5, change "inseretion" to -- insertion --
line 70, after "shackle" insert -- plug --
line 71, after "position" insert -- in --.

Signed and sealed this 25th day of April 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents