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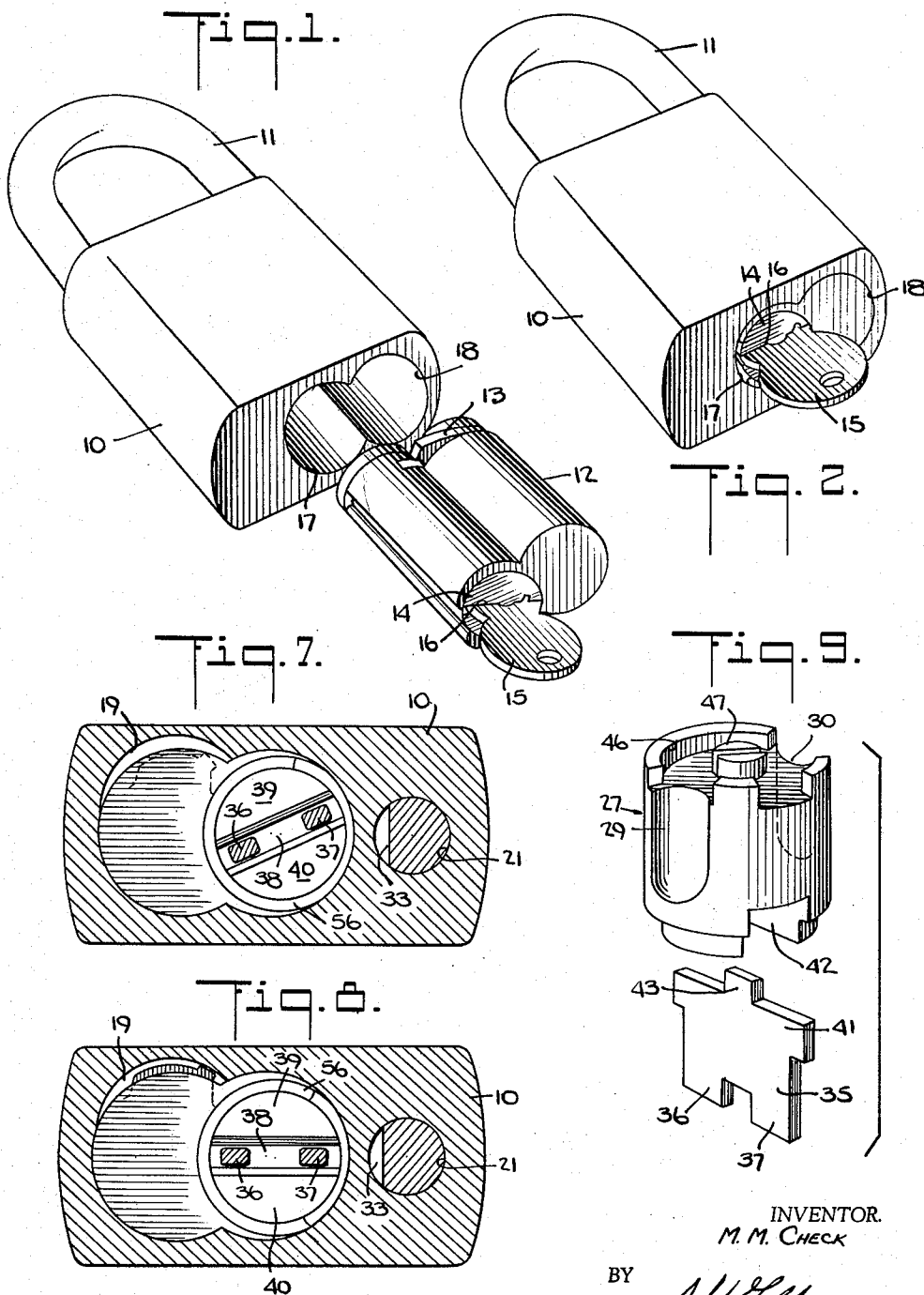
M. M. CHECK

3,143,872

PADLOCK

Filed June 28, 1962

2 Sheets-Sheet 1



INVENTOR.
M. M. CHECK

BY

A. H. Liden

ATTORNEY

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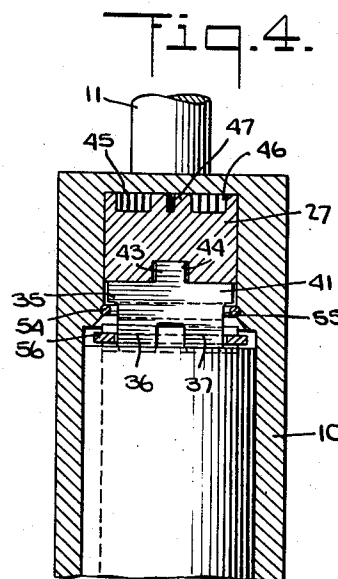
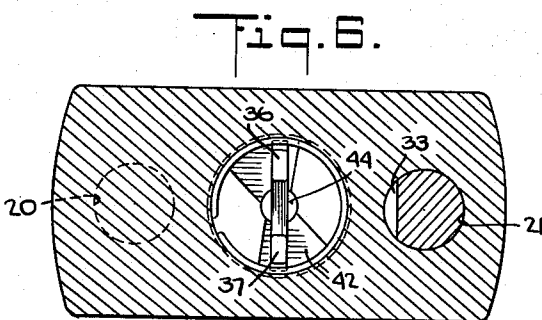
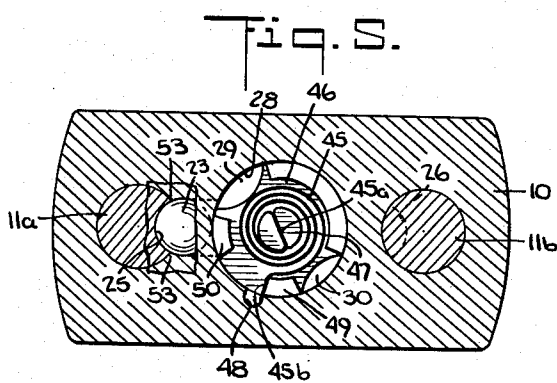
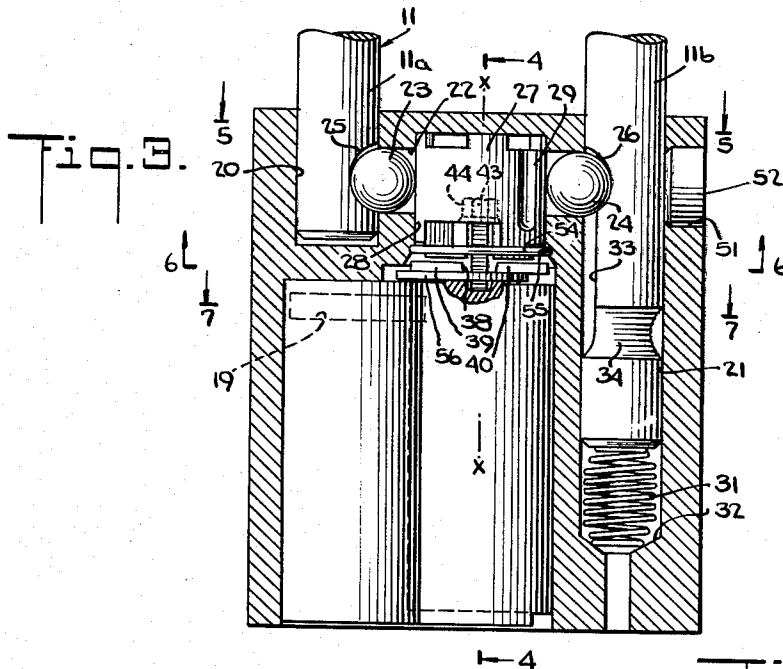
M. M. CHECK

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PADLOCK

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2 Sheets-Sheet 2



INVENTOR.
M.M. CHECK

BY

A. H. Golden

ATTORNEY

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3,143,872
PADLOCK

Mathias M. Check, Strafford, Pa., assignor, by mesne assignments, to Yale & Towne, Inc., New York, N.Y., a company of Ohio
Filed June 28, 1962, Ser. No. 205,956
7 Claims. (Cl. 70—38)

This invention relates to a padlock having a removable core.

Padlocks are quite frequently provided with removable cores which may be easily removed to change keying of the lock, or to permit replacement of a damaged or improperly functioning core.

The purpose of this invention is to provide an improved construction for a lock of this type which requires fewer different parts, which may be easily assembled or disassembled for maintenance and repair, which provides greater security, and which utilizes a removable core of a type that is interchangeable with cores used in other types of locks, such as mortise locks, cylindrical locks, rim locks, etc.

Other advantages of the padlock construction of the invention will become apparent from the following description when read in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a padlock constructed in accordance with the invention, showing the core removed;

FIG. 2 is a perspective view similar to that of FIG. 1, but showing the core installed;

FIG. 3 is a sectional view of the padlock with the core installed;

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 3;

FIG. 6 is a sectional view taken on the line 6—6 of FIG. 3;

FIG. 7 is a sectional view taken on the line 7—7 of FIG. 3, showing the retainer of the core in a retracted position whereby the core may be removed;

FIG. 8 is a sectional view similar to that of FIG. 7, but showing the retainer of the core extended to lock the core in the padlock body; and

FIG. 9 is a perspective view of the rotary bolt of the padlock and an adapter providing a lost motion connection between the key plug of the core and the bolt.

Referring to the drawings and in particular to FIGS. 1 and 2, the padlock includes a body 10, a shackle 11 and a removable core 12.

The removable core 12 is of the type shown in my United States Patent No. 3,009,349 which may be used interchangeably in various types of locks including mortise locks, cylindrical locks, rim locks, etc. The removable core 12 includes a retainer 13 which is adapted to be extended or retracted through rotation of the key plug 14 by a special key 15 inserted in the usual key slot 16.

The core 12 is assembled or installed in the body 10 of the padlock by retracting the retainer 13 by the special key 15, inserting the core in a pair of communicating bores 17 and 18 formed inwardly of the body 10 from the bottom thereof, and then projecting the retainer 13 by the special key 15 to engage the retainer in a locking slot 19, best shown in FIG. 3, formed in the wall of the bore 17. The core 12 is thereby locked to the body 10 and the key plug 14 may thereafter be operated in the usual manner through a regular key inserted in the key slot 16.

As best shown in FIG. 3, a short leg 11a of the shackle 11 extends within a bore 20 formed inwardly from the upper side of the body 10, while a longer leg 11b extends into an elongated bore 21, also formed inwardly of the upper side of the body. A transverse bore 22 is formed

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in the body 10 between the bore 20 and bore 21, and the legs 11a and 11b of the shackle 11 are adapted to be locked in the bores 20 and 21 by engagement of a pair of balls 23 and 24, carried at opposite ends of the bore 22, in recesses 25 and 26 formed respectively in the shackle legs 11a and 11b. The balls 23 and 24 are held in the locked position as shown in FIG. 3, by a solid cylindrical rotary bolt 27, which is rotatably mounted in a cylindrical bore 28 which intersects the transverse bore 22.

The shackle 11 is released by rotating the bolt 27 to aligned diammetrically opposed recesses 29 and 30, best shown in FIG. 9, with the balls 23 and 24, so that the balls 23 and 24 may move inwardly of the recesses 25 and 26 of the legs 11a and 11b of the shackle 11 to release the shackle. When the balls 23 and 24 are so released, a compressed coil spring 31, extending between the bottom 32 of the bore 21 and the lower end of the shackle leg 11b, projects the shackle 11 outwardly from the body 10 until the leg 11a is released from the bore 20.

It will be noted that while the recess 29 in the rotary bolts 27 is of sufficient depth to completely release the ball 23 from the recess 25 of leg 11a of the shackle 11, the recess 30 is only of sufficient depth to allow the ball 24 to move inwardly a distance sufficient to allow the ball to engage in a longitudinally extending groove 33 formed in the surface of the lower portion of the shackle leg 11b. As the shackle 11 is projected outwardly of the body 10 by the spring 31, the ball 24 rides in the groove 33 until further outward movement of the shackle is stopped by engagement of the bottom of the groove 33 with the ball 24. The shackle 11 may then be pivoted on the leg 11b relatively to the body 10, with the ball 24 riding in an annular groove 34 formed in the leg 11b at the bottom of the groove 33. By this arrangement, the ball 24 provides the dual function of a locking member for locking the shackle leg 11b to the body 10 and also as a retainer for preventing complete removal of the shackle 11 from the body 10 when the shackle is unlocked.

The rotary bolt 27 is adapted to be rotated from the locked position, as shown in FIG. 3, to a release position, in which the recesses 29 and 30 are aligned with the balls 23 and 24, by rotation of the key plug 14 through a seating of the tumblers of the core 12 by a regular key inserted in the key slot 16. The key plug 16 is operatively connected to the rotary bolt 27 by a simple sheet metal adapter 35, best shown in FIGS. 4 and 9. The adapter 35 includes a pair of lower legs 36 and 37, which extend into a slot 38 formed between ribs 39 and 40 on the inner end of the key plug 14, and a transversely extending upper portion 41 which extends into a slot 42 formed in the lower end of the rotary bolt 27. A projection 43 on the upper end of the adapter 35 engages in a centering hole 44 in rotary bolt 27 to hold the adapter 35 centered relatively to the bolt 27.

As best shown in FIG. 6, the slot 42 tapers outwardly from the center toward opposite sides of the bolt 27 whereby a lost motion, or lazy action, connection is provided between the adapter 35 and the rotary bolt 27. This allows the rotary bolt 27 to be rotated to a release position by rotation of the key plug 14, and the key plug 14 then rotated in the opposite direction a sufficient distance to allow the key to be removed from the key plug 14, without rotating the bolt 27.

The rotary bolt 27 is urged toward the locked position by a simple spiral torsion spring 45 which seats in an annular recess 46, formed in the upper end of the bolt 27. The inner end 45a of the spring 45 extends through a slot formed in an integral center post 47 projecting from the upper surface of the bolt 27 and the outer end 45b of the spring 45 is engaged in a notch 48 formed in the wall of the bore 28 in which the bolt 27 is mounted. When the bolt 27 is rotated in the counterclockwise di-

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rection, as viewed in FIG. 5, to align the recesses 29 and 30 with the balls 23 and 24, the spring 45 is energized. The rotary bolt 27 is held in the release position against rotation by the spring 45 by engagement of the ball 24 in the recess 29 when the shackle 11 is released. When the shackle 11 is again pushed inwardly of the body 10 to lock the shackle 11 to the body, the ball 24 is released from the recess 29 when the recess 26 of the leg 11b is moved into alignment with the ball 24, and the energized spring 45 rotates the rotary bolt 27 to the locked position.

As best shown in FIG. 5, the outer end 45b of the spring 45 extends outwardly from the recess 46 between spaced projections 49 and 50 extending from the upper end of the rotary bolt 27. The spacing of the projections 49 and 50 is such that when the projection 49 engages the end 45b of the spring 45, as shown in FIG. 5, the bolt 27 is in the locking position, and when the projection 50 engages the end of the spring 45, the bolt 27 is in the release position. The end 45b of the spring 45, in conjunction with the projections 49 and 50, therefore, serve as a stop arrangement for the bolt 27, thereby eliminating the necessity of a separate element for this purpose. The use of a flat spiral torsion spring mounted in the manner described permits the bolt 27 to be of solid construction thereby contributing to the security of the lock.

As best shown in FIG. 3, the axis of rotation X—X of the bolt 27 and the key plug 14 is substantially equally spaced from the shackle legs 11a and 11b. This permits the use of only two balls 23 and 24 and allows the balls to be of the same size thereby decreasing the number of different required parts.

The padlock may be easily assembled by first inserting the balls 23 and 24 into the bore 22 through a side opening 51, which is subsequently closed by a plug 52. The end of the bore 22 adjacent the bore 20 is provided with opposed lips 53, as shown in FIG. 5, which prevent the ball 23 from passing completely into the bore 20. The spring 31 is next inserted into the bore 21 and the shackle legs 11a and 11b inserted into the bores 20 and 21. The rotary bolt 27 with the spring 45 assembled thereon is inserted through the bore 18 into the bore 28 with the recesses 29 and 30 aligned with the balls 23 and 24. As best shown in FIG. 9, the upper ends of the recess 29 and 30 open to the upper end of the rotary bolt 27, thereby permitting the balls to enter the recesses 29 and 30 as the bolt 27 is inserted into the bore 28. The adapter 35 is next inserted through the bore 18 until the projection 43 is engaged in the opening 44 in the bolt 27 and the end portion 41 engaged in the slot 42 of the bolt 27. A simple snap ring retainer 54 is then inserted in the bore 18 and engaged in a groove 55 formed in the body 10 adjacent the lower end of the bore 28. The snap ring retainer 54 therefore holds the rotary bolt 27 and adapter 35 assembled in the lock body. The removable core 12 is next inserted into the bores 17 and 18 and locked to the body 10 by engagement of the retainer 13 in the locking groove 19, as previously described. The key plug 14 is held assembled to the core 12 by a suitable split ring retainer 56.

From the preceding description, it can be seen that there is provided an improved padlock construction incorporating a removable core which requires relatively few parts, which may be easily assembled or disassembled for maintenance and repair, which provides greater security because of the solid bolt construction and which utilizes a removable core of a type that is interchangeable with the cores used in the other types of locks, such as mortise locks, cylindrical locks, rim locks, etc. The core may be easily removed without disassembly of the adapter or rotary bolt, and the rotary bolt and adapter may be easily removed for replacement or repair merely by removal of a simple snap ring.

While one embodiment of the invention has been shown and described, it will be appreciated that this is for the purpose of illustration and that changes and modifica-

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tions may be made therein without departing from the spirit and scope of the invention.

I now claim:

1. A padlock comprising,
 - a body part having a pair of spaced bores extending inwardly from one side thereof,
 - a shackle having a short leg and a long leg slidably received in said pair of bores,
 - a transverse bore in said body part extending between and communicating at each end with said pair of bores,
 - a notch in each leg of said shackle adapted to align with the ends of said transverse bore when said legs of said shackle are both inserted in said pair of bores,
 - a pair of locking balls disposed in said transverse bore with one ball at each end thereof in a position to engage with said notches in said legs of said shackle to lock said shackle to said body part,
 - a cylindrical chamber in said body intersecting said transverse bore between said locking balls and having an axis substantially equally spaced from said pair of bores,
 - a cylindrical bolt rotatably mounted in said cylindrical chamber, said cylindrical bolt in a first rotated position presenting surfaces for holding said locking balls engaged in said notches in said legs of said shackle and in a second rotated position presenting a recess for completely releasing the ball engaged with the notch in the short leg of said shackle and a recess for partially releasing the ball from engagement with the notch in the long leg of said shackle,
 - an elongated groove in the long leg of said shackle extending from said notch in said long leg and terminating short of the free end of said long leg in which said locking ball engaged with the notch in said long leg may ride when said ball is partially released from said notch by said bolt, whereby said shackle may be moved outwardly of said body part to release said short leg from said body part while said long shackle leg remains attached to said body part through engagement of said locking ball in said groove,
 - a circumferentially extending groove in said long leg at the end of said longitudinal groove in which said ball may ride to permit pivoting of said shackle when said short leg of said shackle has been released,
 - a spiral torsion spring at one end of said cylindrical bolt connected at the inner end to said bolt and connected at the other end to said body part for rotating said bolt to locking position, said outer end of said spring extending between spaced projections on said bolt which cooperate with the outer end of the spring to limit rotation of said bolt between a locking position and a releasing position,
 - a core receiving bore extending inwardly from a side of said body part and communicating with said cylindrical chamber, a removable core having a key plug received in said core receiving bore, a retainer carried by said core projectable by rotation of said key plug by a special key inserted in the same key slot for setting the tumblers of said key plug,
 - means in said body part engageable by said retainer to lock said core to said body part,
 - a sheet metal adapter extending between the inner end of said key plug and said cylindrical bolt providing a lost motion connection between said key plug and said cylindrical bolt whereby said bolt may be rotated to a releasing position by rotation of said key plug by a key and
 - a snap ring retainer retaining said adapter and said bolt in said body part, whereby said core cylinder may be removed without removal of said adapter and cylindrical bolt.
2. A padlock comprising,
 - a body part having a pair of spaced bores extending inwardly from one side thereof,

a shackle having a short leg and a long leg slidably received in said pair of bores,
 a transverse bore in said body part extending and communicating at each end with said pair of bores,
 a notch in each leg of said shackle adapted to align with the ends of said transverse bore when said legs of said shackle are both inserted in said pair of bores,
 a pair of locking balls disposed in said transverse bore with one ball at each end thereof in a position to engage with said notches in said legs of said shackle to lock said shackle to said body part,
 a cylindrical chamber in said body intersecting said transverse bore between said locking balls and having an axis substantially equally spaced from said pair of bores,
 a cylindrical bolt rotatably mounted in said cylindrical chamber, said cylindrical bolt in a first rotated position presenting surfaces for holding said locking balls engaged in said notches in said legs of said shackle and in a second rotated position presenting a recess for completely releasing the ball engaged with the notch in the short leg of said shackle and a recess for partially releasing the ball from engagement with the notch in the long leg of said shackle,
 an elongated groove in the long leg of said shackle extending from said notch in said long leg and terminating short of the free end of said long leg in which said locking ball engaged with the notch in said long leg may ride when said ball is partially released from said notch by said bolt, whereby said shackle may be moved outwardly of said body part to release said short leg from said body part while said long shackle leg remains attached to said body part through engagement of said locking ball in said groove,
 a spiral torsion spring at one end of said cylindrical bolt connected at the inner end to said bolt and connected at the outer end to said body part for rotating said bolt to locking position, said outer end of said spring extending between spaced projections on said bolt which cooperate with the outer end of the spring to limit rotation of said bolt between a locking position and a releasing position,
 a core receiving bore extending inwardly from a side of said body part and communicating with said cylindrical chamber, a removable core having a key plug received in said core receiving bore, a retainer carried by said core projectable by rotation of said key plug by a special key inserted in the same key slot for setting the tumblers of said key plug,
 means in said body part engageable by said retainer to lock said core to said body part,
 a sheet metal adapter extending between the inner end of said key plug and said cylindrical bolt providing a lost motion connection between said key plug and said cylindrical bolt whereby said bolt may be rotated to a releasing position by rotation of said key plug by a key, and
 a snap ring retainer retaining said adapter and said bolt in said body part, whereby said core cylinder may be removed without removal of said adapter and cylindrical bolt.

3. A padlock comprising,
 a body part having a pair of spaced bores extending inwardly from one side thereof,
 a shackle having a short leg and a long leg slidably received in said pair of bores,
 a transverse bore in said body part extending between and communicating at each end with said pair of bores,
 a notch in each leg of said shackle adapted to align with the ends of said transverse bore when said legs of said shackle are both inserted in said pair of bores,
 a pair of locking balls disposed in said transverse bore with one ball at each end thereof in a position to

engage with said notches in said legs of said shackle to lock said shackle to said body part,
 a cylindrical chamber in said body intersecting said transverse bore between said locking balls and having an axis substantially equally spaced from said pair of bores,
 a cylindrical bolt rotatably mounted in said cylindrical chamber, said cylindrical bolt in a first rotated position presenting surfaces for holding said locking balls engaged in said notches in said legs of said shackle and in a second rotated position presenting a recess for completely releasing the ball engaged with the notch in the short leg of said shackle and a recess for partially releasing the ball from engagement with the notch in the long leg of said shackle,
 an elongated groove in the long leg of said shackle extending from said notch in said long leg and terminating short of the free end of said long leg in which said locking ball engaged with the notch in said long leg may ride when said ball is partially released from said notch by said bolt, whereby said shackle may be moved outwardly of said body part to release said short leg from said body part while said long shackle leg remains attached to said body part through engagement of said locking ball in said groove,
 a circumferentially extending groove in said long leg at the end of said longitudinal groove in which said ball may ride to permit pivoting of said shackle when said short leg of said shackle has been released,
 a core receiving bore extending inwardly from a side of said body part and communicating with said cylindrical chamber, a removable core having a key plug received in said core receiving bore, a retainer carried by said core projectable by rotation of said key plug by a special key inserted in the same key slot for setting the tumblers of said key plug,
 means in said body part engageable by said retainer to lock said core to said body part,
 a sheet metal adapter extending between the inner end of said key plug and said cylindrical bolt providing a lost motion connection between said key plug and said cylindrical bolt whereby said bolt may be rotated to a releasing position by rotation of said key plug by a key, and
 a snap ring retainer retaining said adapter and said bolt in said body part, whereby said core cylinder may be removed without removal of said adapter and cylindrical bolt.

4. A padlock comprising,
 a body part having a pair of spaced bores extending inwardly from one side thereof,
 a shackle having a short leg and a long leg slidably received in said pair of bores,
 a transverse bore in said body part extending between and communicating at each end with said pair of bores,
 a notch in each leg of said shackle adapted to align with the ends of said transverse bore when said legs of said shackle are both inserted in said pair of bores,
 a pair of locking members disposed in said transverse bore with one member at each end thereof in a position to engage with said notches in said legs of said shackle to lock said shackle to said body part,
 a cylindrical chamber in said body part intersecting said transverse bore between said locking members,
 a solid cylindrical bolt rotatably mounted in said cylindrical chamber, said cylindrical bolt in a first rotated position presenting surfaces for holding said locking members engaged in said notches in said legs of said shackle and in a second rotated position presenting recesses for releasing said locking members from said notches to allow outward movement of said shackle relatively to said body part,
 a spiral torsion spring on the outer end of said cylin-

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drical bolt connected at the inner end to said bolt and connected at the outer end to said body part for rotating said bolt to locking position, said outer end of said spring extending between spaced projections on the upper side of said bolt which cooperate with the outer end of the spring to limit rotation of said bolt between a locking position and a releasing position, 5

a core receiving bore in said body part and a lock core having a key plug received in said core receiving bore, 10

means for locking said core in said core receiving bore, and

means extending between the inner end of said key plug and said cylindrical bolt providing a lost motion connection between said key plug and said cylindrical bolt whereby said bolt may be rotated to a releasing position by rotation of said key plug by a key. 15

5. A padlock comprising,

a body part having a pair of spaced bores extending inwardly from one side thereof, 20

a shackle having a short leg and a long leg slidably received in said pair of bores,

a transverse bore in said body part extending between and communicating at each end with said pair of bores, 25

a notch in each leg of said shackle adapted to align with the ends of said transverse bore when said legs of said shackle are both inserted in said pair of bores,

a pair of locking members disposed in said transverse bore with one member at each end thereof in a position to engage with said notches in said legs of said shackle to lock said shackle to said body part,

a cylindrical chamber in said body part intersecting said transverse bore between said locking members, 35

a solid cylindrical bolt rotatably mounted in said cylindrical chamber, said cylindrical bolt in a first rotated position presenting surfaces for holding said locking members engaged in said notches in said legs of said shackle and in a second rotated position presenting recesses for releasing said locking members from said notches to allow outward movement of said shackle relatively to said body part, 40

a spiral torsion spring on the outer end of said cylindrical bolt connected at the inner end to said bolt and connected at the outer end to said body part for rotating said bolt to locking position, 45

a core receiving bore in said body part and a lock core having a key plug received in said core receiving bore, 50

means for locking said core in said core receiving bore, and

means extending between the inner end of said key plug and said cylindrical bolt providing a lost motion connection between said key plug and said cylindrical bolt whereby said bolt may be rotated to a releasing position by rotation of said key plug by a key. 55

6. A padlock comprising,

a body part having a pair of spaced bores extending inwardly from one side thereof, 60

a shackle having a short leg and a long leg slidably received in said pair of bores,

a transverse bore in said body part extending between and communicating at each end with said pair of bores, 65

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a notch in each leg of said shackle adapted to align with the ends of said transverse bore when said legs of said shackle are both inserted in said pair of bores,

a pair of locking members disposed in said transverse bore with one member at each end thereof in a position to engage with said notches in said legs of said shackle to lock said shackle to said body part,

a cylindrical chamber in said body part intersecting said transverse bore between said locking members,

a solid cylindrical bolt rotatably mounted in said cylindrical chamber, said cylindrical bolt in a first rotated position presenting surfaces for holding said locking members engaged in said notches in said legs of said shackle and in a second rotated position presenting recesses for releasing said locking members from said notches to allow outward movement of said shackle relatively to said body part,

a spiral torsion spring on the outer end of said cylindrical bolt connected at the inner end to said bolt and connected at the outer end to said body part for rotating said bolt to locking position, and

means for rotating said bolt to a releasing position.

7. A padlock comprising,

a body part having a pair of spaced bores extending inwardly from one side thereof,

a shackle having a short leg and a long leg slidably received in said pair of bores,

a transverse bore in said body part extending between and communicating at each end with said pair of bores,

a notch in each leg of said shackle adapted to align with the ends of said transverse bore when said legs of said shackle are both inserted in said pair of bores,

a pair of locking members disposed in said transverse bore with one member at each end thereof in a position to engage with said notches in said legs of said shackle to lock said shackle to said body part,

a cylindrical chamber in said body part intersecting said transverse bore between said locking members,

a solid cylindrical bolt rotatably mounted in said cylindrical chamber, said cylindrical bolt in a first rotated position presenting surfaces for holding said locking members engaged in said notches in said legs of said shackle and in a second rotated position presenting recesses for releasing said locking members from said notches to allow outward movement of said shackle relatively to said body part,

a spiral torsion spring on the outer end of said cylindrical bolt connected at the inner end to said bolt and connected at the outer end to said body part for rotating said bolt to locking position, said outer end of said spring extending between spaced projections on the upper side of said bolt which cooperate with the outer end of the spring to limit rotation of said bolt between a locking position and a releasing position, and

means for rotating said bolt to a releasing position.

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