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United States Patent Application Publication

20250263949

Kind Code

A1

Publication Date

August 21, 2025

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A PADLOCK BODY FOR ENGAGING WITH A REPLACEABLE LOCKING CYLINDER

Abstract

The invention relates to a padlock body (10) for engaging with a replaceable locking cylinder (20) comprising: an actuator (30) comprising a groove (32), the actuator (30) being rotatable about a vertical axis (X) between a locked position and an unlocked position; the actuator (30) further comprising a first end and a second end opposed to the first end, the first end comprising the groove (32) and the second end being operatively connectable to the replaceable locking cylinder (20); a shackle (12) comprising a first end (13) and a second end (14), the first end (13) being attached to said padlock body (10), the second end (14) being movable for engaging with the groove (32) of the actuator (30); and at least one fastener (40) for securing the padlock body (10) to the replaceable locking cylinder (20).

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Family ID: 1000008627865

Appl. No.: 18/859340

Filed (or PCT Filed): June 02, 2023

PCT No.: PCT/SE2023/050550

Foreign Application Priority Data

SE 2250726-3 Jun. 16, 2022

Publication Classification

Int. Cl.: E05B9/08 (20060101); **E05B17/20** (20060101); **E05B67/08** (20060101); **E05B67/24** (20060101)

U.S. Cl.:

CPC E05B9/084 (20130101); **E05B17/2084** (20130101); **E05B67/08** (20130101); **E05B67/24** (20130101); **E05B2017/2096** (20130101)

Background/Summary

TECHNICAL FIELD

[0001] The present invention relates generally to a padlock body for engaging with a replaceable locking cylinder, a padlock comprising a padlock body and a replaceable locking cylinder, and methods thereof.

BACKGROUND ART

[0002] A padlock is a detachable locking device comprising three basic components: a padlock body, a shackle and a locking mechanism. The padlock body comprises an internal cavity holding the locking mechanism. The shackle works with what is being secured, locked, by the padlock (e.g., chain link or hasp) and is usually elongated and has two ends. The shackle can be straight but usually the shackle is looped, on a somewhat U-shaped. A first end of the shackle is attached to the padlock body in a pivotal and/or rotatable manner and a second end, when the padlock is to be secured and locked in a working position, is to be pivoted/rotated and placed into an opening in the padlock body to get into a position where the locking mechanism is working on the second end of the shackle and by that locking the padlock.

[0003] A typical padlock comprises a padlock body having a shackle and a locking cylinder. The locking cylinder comprises a locking mechanism such as a plug having a cam at one end, chambers having springs and pins, and latches. When they key is inserted into the plug, the pins are moved such that the key can rotate the plug. Further, the rotation of the plug rotates a cam, which pulls the latches and releases the shackle. Some padlocks are both key-operated and combination-operated for allowing a backup solution in case the key or the combination is lost.

[0004] A problem with such padlocks is that they are costly to manufacture, and complex to substitute the locking mechanism and/or locking cylinder from the padlock body, since it must be fixed by a skilled locksmith. It may be more effective to substitute the whole padlock, which also increases the costs, the environmental impact, and requires that the padlock is unlocked. Moreover, said padlocks can have security issues, since the screw or pin that fixes the locking cylinder to the padlock body is in sight and may be easily accessed or removed, even when the padlock is in a locked position.

SUMMARY OF INVENTION

[0005] An object of the present disclosure is thus to overcome or at least mitigate one or more of the problems described herein. Another object of the present disclosure is to provide a low-cost padlock body that is easy to manufacture and that has an attached or attachable locking cylinder that is simple to substitute. Another object of the present disclosure is to provide a secure padlock body that avoids or reduces picking, jamming and other security breaches, such as the removal of one or more elements, such as screws, from the padlock or padlock body.

[0006] Other features and advantages of the invention will be apparent from the following detailed description, drawings and from the claims.

[0007] One or more objects of the disclosure are solved by providing a padlock body for engaging with a replaceable locking cylinder comprising: [0008] an actuator comprising a groove, the

actuator being rotatable about a vertical axis between a locked position and an unlocked position; the actuator further comprising a first end and a second end opposed to the first end, the first end comprising the groove and the second end being operatively connectable to the replaceable locking cylinder; [0009] a shackle comprising a first end and a second end, the first end being attached to said padlock body, the second end being movable for engaging with the groove of the actuator; and [0010] at least one fastener for securing the padlock body to the replaceable locking cylinder; [0011] wherein [0012] in the unlocked position, the actuator is rotated about the vertical axis X such that the groove of the actuator is positioned for engaging with the second end of the shackle; [0013] in the locked position, the actuator is rotated about the vertical axis X such that, when the second end of the shackle is engaged with the groove of the actuator, the second end of the shackle is restrained within the groove of the actuator.

[0014] The padlock body is advantageously simple to manufacture and is compatible with a number of different replaceable locking cylinders, such as replaceable locking cylinders having different shapes and/or from different manufacturers. A non-working or outdated locking cylinder may be easily substituted by removing the fastener that engages the replaceable locking cylinder to the padlock body. Furthermore, the padlock body may not need to comprise moving components such as springs and latches, which simplifies manufacturing and reduces costs. Finally, said padlock body is cheaper to manufacture due to its relatively simpler operation mechanism and it may be commercialized without a replaceable locking cylinder (thus as a standalone product) compatible with replaceable locking cylinders, which further reduces costs and increases flexibility. [0015] Another advantage that reduces the cost of the padlock body is that the padlock body is arranged to allow the second end of the shackle to reach the actuator when the second end of the shackle is merely rotated towards the actuator. In other words, the locked/unlocked positions may be reached by merely radially moving the second end of the shackle to/out of the groove of the actuator and rotating an actuating device (e.g. key) to the respective locked/unlocked position. Thus, the padlock body may be locked or unlocked without the need of mechanisms (e.g., springs) that axially move the shackle into or out of the actuator. Thus, the padlock body is simpler and cheaper to manufacture.

[0016] According to one exemplary embodiment, the padlock body comprises a first opening adapted for attaching and allowing a free rotation of the first end of the shackle. The shackle may be attached to the first opening of the padlock body by any means known by the skilled person and which hinders the axial movement of the shackle in relation to the padlock body, for instance as described elsewhere herein.

[0017] According to another exemplary embodiment, the padlock body comprises a second opening opposed to the first opening, the second opening adapted for receiving the replaceable locking cylinder. Said second opening may be located on the opposite side (i.e., remote from) of the first opening and advantageously allows the reception of commercial and standardized locking cylinders to the padlock body.

[0018] According to another exemplary embodiment, the padlock body comprises a third opening arranged for receiving the actuator. Said third opening is arranged to allow the actuator to receive the second end of the shackle when said second end of the shackle is moved towards the actuator. The actuator may be at least partly or fully contained within the third opening, so that in the locked state, the second end of the shackle is restrained between the groove of the actuator and the padlock body. Advantageously, the actuator is less exposed to the outside environment and less prone to picking.

[0019] According to one exemplary embodiment, the padlock body comprises the first, the second and/or the third opening as discussed above.

[0020] According to one exemplary embodiment, the padlock body further comprises an indentation, said indentation being aligned with the groove of the actuator in the unlocked position. One effect of the indentation being aligned with the groove of the actuator when said padlock body

is in the unlocked position is that the indentation may guide positioning the second end of the shackle for engaging with the groove of the actuator, particularly when the actuator is at least partly inside the padlock body. The size of the indentation is equivalent to the size of the second end of the shackle and/or the size of the groove of the actuator to allow free movement of the second end of the shackle into and out of the groove. Furthermore, the padlock body may comprise two indentations such as to receive the second end of the shackle that rotates clockwise and counterclockwise.

[0021] According to another exemplary embodiment, the first end of the shackle rotates about a vertical axis which is parallel to the vertical axis X of the actuator. The first end of the shackle rotates and thus pivots the second end of the shackle for engaging with the groove of the actuator. The first end of the shackle may rotate clockwise and/or counterclockwise.

[0022] According to another exemplary embodiment, the second end of the shackle comprises a depression adapted to interlock with the groove of the actuator. One effect thereof is that the second end of the shackle is tightly fit into the groove of the actuator, thus axially and radially locking the second end of the shackle when the padlock body is in the locked position. The second end of the shackle that engages with the groove of the actuator (i.e., depression) may have a smaller diameter than the rest of the shackle, such that the smaller diameter region of the second end of the shackle matches with the size of the groove of the actuator, providing a tight grip that does not allow a radial and axial movement of the shackle, in the locked position. Furthermore, the axial movement of the second end of the shackle is hindered when said second end of the shackle is engaged with the groove of the actuator. Thus, the axial movement of the shackle is hindered by the interlock between the second end of the shackle and the groove of the actuator, as well as by the first end of the shackle attached to the padlock body, which further increases the safety of the device.

[0023] According to one exemplary embodiment, the actuator rotates about 90 degrees between the unlocked position and the locked position. Said 90 degrees rotation may be advantageous to sufficiently rotate the actuator and move the groove between the unlocked and locked positions, as disclosed elsewhere herein. Moreover, said 90 degrees rotation may be the same degree of rotation of a key during locking and unlocking the device. Alternatively, the first end of the shackle may rotate 360 degrees, 270 degrees, 180 degrees or 45 degrees.

[0024] According to another exemplary embodiment, the actuator comprises a first end and a second end opposed to the first end, the first end comprising the groove and the second end being operatively connectable to the replaceable locking mechanism, such as a locking mechanism of the replaceable locking cylinder. The actuator may thus not be an integral part of the replaceable locking cylinder, which advantageously replacing the locking cylinder without the need of exchanging the actuator, thereby saving costs and simplifying the replacement process. The skilled person knows different locking mechanisms that are compatible with the padlock body, and thus padlock body may be combined with a replaceable locking cylinder comprising different locking mechanisms. The groove of the actuator may be shaped to be slightly wider than the second end of the shackle, thereby allowing said second end of the shackle to be positioned within the groove of the actuator.

[0025] According to one exemplary embodiment, the fastener comprises at least one screw or bolt, each of the at least one screw or bolt being releasably fixed into a hole extending through part of the padlock body and part of the replaceable locking cylinder. One effect thereof is that the padlock body is tightened to the replaceable locking cylinder in an effective and stable manner. Preferably, the fastener comprises two screws or bolts, each of which being releasably fixed into a hole extending through part of the padlock body and part of the replaceable locking cylinder. The advantage of using two screws or bolts is that they provide a more stable tightening of the padlock body to the replaceable locking cylinder. The skilled person is aware that other fasteners may be used, even though screws are preferred since they are the standard fastening means in the field.

[0026] According to one exemplary embodiment, the padlock body further comprises a first

blocking element and a first lateral hole for receiving the first blocking element, the first lateral hole intersecting a fastening direction of the fastener, such that removal of the fastener is hindered by the first blocking element; and [0027] the first end of the shackle further comprises a first recess, the first recess radially enclosing part of the first lateral hole when the shackle is disengaged with the groove of the actuator, such that [0028] in the unlocked position, the first recess and the first lateral hole are aligned in a same plane, thereby exposing the first blocking element inserted therein; and [0029] in the locked position, the first recess is moved away from the radially enclosing position, such that the first end of the shackle hinders access to the first blocking element inserted therein.

[0030] One effect thereof is that the fastener tightening the padlock body to the replaceable locking cylinder cannot be removed and is not exposed to for instance lock picking. In other words, the first blocking element is positioned to at least partially cover the at least one fastener, thereby avoiding or reducing access to the fastener by an unauthorized user. Furthermore, the first blocking element is also protected from manipulation or removal due to the at least partial cover of the first blocking element by the first end of the shackle, as disclosed elsewhere herein. Only in the unlocked position it is possible to first access and then remove the first blocking element, to then access and remove the fastener.

[0031] According to one exemplary embodiment, the first lateral hole is arranged to perpendicularly intersect the fastening direction of the fastener.

[0032] According to one exemplary embodiment, in the unlocked position, the first recess and the first lateral hole are aligned in a same horizontal plane, thereby exposing the first blocking element inserted therein.

[0033] According to another exemplary embodiment, the first blocking element is a screw or a bolt. The first blocking element is easily inserted/removed from the first lateral hole using for instance a screwdriver. Any blocking element that may be easily inserted and removed from the first lateral hole may be used.

[0034] According to one exemplary embodiment, the padlock body further comprises a second blocking element and a second lateral hole for receiving the second blocking element, the second lateral hole being substantially perpendicular to a fastening direction of the fastener; and [0035] the first end of the shackle further comprises a second recess, the second recess radially enclosing part of the second lateral hole, such that [0036] the second blocking element inserted into the second lateral hole engages with the second recess, thereby fixing the first end of the shackle to the padlock body and hindering axial movements of the first end of the shackle.

[0037] One effect thereof is that the second blocking element provides a secure way to attach the first end of the shackle to the padlock. In other words, the interaction between the second blocking element and the second recess provides a free rotational movement of the first end of the shackle (and thus the whole shackle), while blocking axial movements of the first end of the shackle (and thus the whole shackle). Further, said second blocking element may be substituted in case it becomes damaged. In the locked position, the removal of the second blocking element does not compromise the safety of the padlock body since the second end of the shackle is restrained and/or interlocked with the groove of the actuator, thus the shackle is still maintained locked in position.

[0038] According to another exemplary embodiment, the second blocking element is a pin or a rod. Any blocking element that may be easily inserted and removed from the second lateral hole may be used.

[0039] According to another exemplary embodiment, the padlock body is adapted for engaging with a standard replaceable locking cylinder, such as an oval replaceable locking cylinder. One effect thereof is that the padlock body is readily compatible with standard locking cylinders, particularly oval locking cylinders. This feature provides a simple and cost-effective padlock body that is adapted for use with standard locking cylinders on the market.

[0040] Another object of the disclosure is a padlock comprising the padlock body as defined herein

and a replaceable locking cylinder. The padlock provides a cost-effective device for securing an object. Further, the whole padlock does not need to be exchanged in case of mal functioning of the replaceable locking cylinder, since the replaceable locking cylinder may be easily detached from the padlock body for attaching a new replaceable locking cylinder, thereby reducing costs and simplifying the process. The safety of the padlock may be easily updated by replacing the current locking cylinder with an improved locking cylinder.

[0041] According to one exemplary embodiment, the replaceable locking cylinder is an oval replaceable locking cylinder. The oval replaceable locking cylinder is standardized, which makes it simple and easy to attach the oval replaceable locking cylinder to the padlock body.

[0042] Another aspect of the disclosure relates to a method of replacing a replaceable locking cylinder from a padlock comprising a padlock body and a replaceable locking cylinder, the padlock body comprising: [0043] an actuator comprising a groove, the actuator being rotatable about a vertical axis between a locked position and an unlocked position; the actuator further comprising a first end and a second end opposed to the first end, the first end comprising the groove and the second end being operatively connectable to the replaceable locking cylinder; [0044] a shackle comprising a first end and a second end, the first end being attached to said padlock body, the second end being movable for engaging with the groove of the actuator; and [0045] at least one fastener securing the padlock body to the replaceable locking cylinder; [0046] a first blocking element and a first lateral hole for receiving the first blocking element, the first lateral hole intersecting a fastening direction of the fastener, such that removal of the fastener is hindered by the first blocking element; and [0047] the first end of the shackle further comprises a first recess, the first recess radially enclosing part of the first lateral hole when the second end of the shackle is disengaged with the groove of the actuator, [0048] said method comprising the steps of: [0049] positioning the padlock into an unlocked position, whereby the first recess and the first lateral hole are aligned in a same plane, thereby exposing the first blocking element inserted therein; [0050] removing the first blocking element from the first lateral hole, thereby exposing the fastener; [0051] removing the fastener attaching the padlock body to the replaceable locking cylinder; and [0052] replacing the replaceable locking cylinder.

[0053] Advantageously, said method provides a padlock wherein the fastener tightening the padlock body to the replaceable locking cylinder cannot be removed and is not exposed to a user to for instance lock picking. In other words, the first blocking element is positioned to at least partially cover the at least one fastener, thereby avoiding or reducing access to the at least one fastener by an unauthorized user. Furthermore, the first blocking element is also protected from manipulation or removal due to the at least partial cover of the first blocking element by the first end of the shackle. Only in the unlocked position it is possible to first access and then remove the first blocking element, and then access and remove the at least one fastener. An overall improvement in the safety of the method of replacing the replaceable locking cylinder is thus achieved.

[0054] Furthermore, the method of replacing a replaceable locking cylinder from a padlock comprising a padlock body and a replaceable locking cylinder may be performed using the padlock and/or the padlock body as defined elsewhere herein.

Description

BRIEF DESCRIPTION OF DRAWINGS

[0055] The invention is now described, by way of example, with reference to the accompanying drawings, in which:

[0056] FIG. 1 illustrates a front view of the padlock body, according to an exemplary embodiment.

[0057] FIG. 2A illustrates an upper view of the padlock body in the locked position, and FIG. 2B

illustrates an upper view of the padlock body in the unlocked position, according to an exemplary embodiment.

[0058] FIG. 3 illustrates a shackle isolated from the rest of the padlock body, according to an exemplary embodiment.

[0059] FIG. 4A illustrates a lateral view of the padlock body in the unlocked position, and FIG. 4B illustrates a lateral view of the padlock body in the locked position, according to an exemplary embodiment.

[0060] FIG. 5 illustrates the padlock comprising a padlock body and a replaceable locking cylinder, according to an exemplary embodiment.

Description of embodiments

[0061] In the following, a detailed description of the padlock body **10** and the padlock **1** is disclosed.

[0062] The term “unlocked position” is to be understood as a position where the actuator is positioned for engaging with the shackle.

[0063] The term “locked position” is to be understood as a position where the actuator is engaged with the shackle and the actuator is positioned for restraining the shackle in place.

[0064] As shown in FIG. 1, the padlock body **10** for engaging with a replaceable locking cylinder **20** comprises a shackle **12** having a first end **13** and a second end **14**. The first end **13** of the shackle **12** is pivotally attached to a first opening of the padlock body **10**, while the second end **14** freely rotates about the first end **13** of the shackle **12**. The shackle **12** has a U-shaped design, however the skilled person is aware of different designs that are also suitable for the padlock body **10** disclosed herein.

[0065] Unless otherwise disclosed herein, the padlock body **10** comprises a second opening which is suitable for engaging with any standard locking cylinder **20**. Said second opening is located on the opposite side (i.e., remote from) of the first opening and allows connecting the padlock body **10** to the replaceable locking cylinder **20**, such as the connection between the actuator **30** and the replaceable locking cylinder **20**. There are many known standard locking cylinders on the market, and the padlock body **10** is preferably arranged for engaging with a replaceable locking cylinder **20** having an oval profile.

[0066] The padlock body **10** further comprises an actuator **30** comprising a groove **32** at a first end and operatively connectable to a locking mechanism of the replaceable locking cylinder **20** at a second end, the second end being opposed to the first end. The second end of the actuator **30** may face the second opening of the padlock body **10**, while the first end of the actuator **30** may face the opposite direction. The actuator **30** may be placed within a third opening of the padlock body **10**, said third opening being arranged for allowing the groove **32** of the actuator **30** to receive the second end **14** of the shackle **12**. The second end of the actuator **30** may be for instance rotatably and/or operatively connectable to the locking mechanism of the replaceable locking cylinder **20**, such that a rotational force generated at the locking mechanism is transferred to the actuator **30**, thus moving the actuator **30** between an unlocked and locked positions. Many locking mechanisms are known by the skilled person, which is aware of compatible locking mechanisms to the replaceable locking cylinder **20**. Further, the actuator **30** has preferably a circular shape adapted for connecting with the locking mechanism at the second end, and has a groove **32** having a circular or oval shape that substantially matches the shape of the second end **14** of the shackle **12**.

[0067] In a preferred embodiment, the second end of the actuator **30** is operatively connectable to a plug within the replaceable locking cylinder **20**. Said plug and said second end of the actuator **30** may be operatively connected by a cam, such that a rotational force generated by an actuator device (for instance, a key inserted into a keyhole) to the plug is transferred to the actuator **30** by the rotation of the cam, thus moving the actuator **30** between an unlocked and locked positions.

[0068] The actuator **30** rotates about a vertical axis X between a locked position and an unlocked position, for instance about 90 degrees. In the unlocked position, the groove **32** of the actuator **30** is

positioned such as to engage with the second end **14** of the shackle **12** when said second end **14** is moved to the groove **32**. In the locked position, the actuator **30** is rotated about the axis X, thereby rotating the groove **32** of the actuator **30** and locking the second end **14** of the shackle **12** between the groove **32** and the body of the padlock body **10**. The second end **14** of the shackle **12** (and thus the whole shackle **12**) is not movable in any direction, such as a radial or axial direction. Consequently, the padlock body **10** secures an object placed between the shackle **12** and the padlock body **10**.

[0069] The actuator **30** may be made of metal or an alloy, such as stainless steel or brass. Further, the groove **32** of the actuator **30** is only accessible to the second end **14** of the shackle **12** when said actuator **30** is in the unlocked position. The groove **32** may have a substantially circular or oval shape and tightly engages with the second end **14** of the shackle **12**.

[0070] As illustrated on FIG. 2A, the padlock body **10** further comprises a fastener **40**, such as two screws **40** fitted into two tapped holes. The at least one fastener **40** may comprise one or more tapped holes extending from the surface of the padlock body **10** receiving the shackle **12** and the actuator **30** to the direction of the replaceable cylinder **20** (or the second opening of the padlock body **10**). Standard replaceable locking cylinders **20** typically have two tapped holes for inserting screws **40** and fastening the padlock body **10** to the replaceable locking cylinder **20**. However, the skilled person is aware that one screw may be sufficient for fastening the padlock body **10** to the replaceable locking cylinder **20**. The fasteners **40** may have a fastening direction parallel to the rotational axis X of the actuator **30**, i.e., the fastening direction is from the padlock body **10** to the replaceable locking cylinder **20**. When the fastener **40** is inserted into the tapped hole of the padlock body **10**, said fastener **40** reaches a corresponding tapped hole of the replaceable locking cylinder **20**, thus attaching the padlock body **10** to the replaceable locking cylinder **20**.

[0071] Additionally, one of the fasteners/screws **40** may be at least partially covered by a first blocking element **55**, which physically blocks the removal of said fastener/screw **40** from the padlock body **10**. Furthermore, said first blocking element **55** cannot be removed from the padlock body **10**, when in the locked position, since access to the first blocking element **55** is hindered by the first end **13** of the shackle **12**, which at least partly covers the first blocking element, as described elsewhere herein. On the other hand, in the unlocked position illustrated on FIG. 2B, the first blocking element **55** may be removed since the first end **13** of the shackle **12** no longer hinders access to the first blocking element **55**, and therefore the fasteners/screws **40** become accessible from the top of the padlock body **10** (i.e., the surface of the padlock body **10** where the shackle **12** and the actuator **30** are located) and may be removed/screwed off using any compatible device, such as a screwdriver. Details about the functioning of the first blocking element **55** are disclosed elsewhere herein.

[0072] Furthermore, the padlock body **10** may comprise an indentation **11** aligned to the groove **32** of the actuator **30** when said actuator **30** is in the unlocked position. The indentation **11** guides and allows the second end **14** of the shackle **12** to reach the groove **32** of the actuator **30**, before rotating the actuator **30** to the locked position. Said indentation **11** advantageously provide a padlock body **10** that may be locked merely by positioning the second end **14** of the shackle **12** into the groove **32** of the actuator **30** and rotating said actuator **30** to the locked position. Thus, no axial (e.g., upward/downward) movement of the shackle **12** in relation to the padlock body **10** is required for operating the device. In an alternative embodiment, the padlock body **10** may comprise two indentations **11**, each of which positioned for guiding the second end **14** of the shackle **12** to the groove **32** of the actuator **30** whether the shackle **12** is rotated clockwise or counterclockwise.

[0073] FIG. 3 illustrates a shackle **12** removed from the rest of the padlock body **10**. The shackle **12** has a U shape, however other variations are known by the skilled person and may be used. The first end **13** of the shackle **12** may be longer than the second end **14**, thus allowing rotatably attaching the first end **13** of the shackle **12** to the padlock body **10**, while the second end **14** of the shackle **12** can rotate to the locked and unlocked positions. The first end **13** of the shackle **12** is

located inside the padlock body **10** when the shackle **12** is connected to it and comprises a first recess **15**. Said first recess **15** is located on part of the surface of the first end **13** of the shackle **12** and thus does not completely surround said surface. The first recess **15** comprises a smaller diameter when compared to a region of the first end **13** of the shackle **12** not comprising said first recess **15**. Furthermore, the first recess **15** has preferably a circular or oval shape. The first recess **15** is positioned such that, in the unlocked position, said recess **15** aligns with the first lateral hole **50** in a same plane, for instance the same horizontal plane. The recess **15** radially encloses part of the first lateral hole **50**. In other words, said part of the first lateral hole **50** is fitted in the first recess **15** in a position where both are aligned, and thus the first lateral hole **50** is unobstructed by the first end **13** of the shackle **12**. In the locked position, (or when the second end **14** of the shackle **12** is moved towards the groove **32** of the actuator **30**), said recess **15** is moved away and thus no longer aligns with the first lateral hole **50**, which hinders placing or removing the first blocking element **55** from the first lateral hole **50** due to the presence of part of the first end **13** of the shackle **12**.

[0074] The shackle **12** further comprises a second recess **16**. The second recess **16** occurs about the whole surface of part of the first end **13** of the shackle **12**, wherein said second recess **16** has a smaller diameter than the first end **13** of the shackle **12**. The second recess **16** is positioned to align with a second lateral hole **60** of the padlock body **10**, and therefore does not obstruct said second lateral hole **60**, regardless of whether the device is in the locked position or in the unlocked position. When a second blocking element **65** is fitted into the second lateral hole **60**, said second blocking element **65** is arranged within the second recess **16** of the shackle **12**, thereby blocking an axial movement of the shackle **12**.

[0075] Further, the second end **14** of the shackle **12** is adapted to interlock (i.e., tightly attach) with the groove **32** of the actuator **30**. Said second end **14** of the shackle **12** may comprise a region having a smaller diameter when compared with the diameter of a non-engaging region of the shackle **12**. Furthermore, the groove **32** may have a shape adapted to engage with the second end **14** of the shackle **12** having a smaller diameter such that at least part of the groove **32** is comprised in the region having a smaller diameter. Said region having a smaller diameter engages and interlocks with the groove **32** of the actuator **30**, therefore locking the axial movement of the second end **14** of the shackle **12**. When the actuator **30** is rotated to the locked position, the radial movement of the second end **14** of the shackle **12** is also obstructed.

[0076] As illustrated by FIG. 4A, a lateral side of the padlock body **10** which is closer to the first end **13** of the shackle **12** comprises a first lateral hole **50** for receiving a first blocking element **55**. Said first blocking element **55** may be a screw or a bolt. The first lateral hole **50** is substantially perpendicular to the fastening direction of the fastener **40**. Further, said first lateral hole **50** extends through the padlock body **10** and intersects with the fastener **40**. Additionally, the first end **13** of the shackle **12** comprises a first recess **15** (not visible), which radially encloses part of the first lateral hole **50** when the shackle **12** is disengaged with the groove **32** of the actuator **30**. The first recess **15** at the first end **13** of the shackle **12** is substantially circular and abuts with the first lateral hole **50**, such that the first recess **15** and the first lateral hole **50** are aligned in a same plane (for instance, the same horizontal plane), in the unlocked position. In other words, the first recess **15** is adapted to align with the first lateral hole **50** only in the unlocked position, thereby exposing the first blocking element **55** inserted into the first lateral hole **50**. Thus, the first blocking element **55** is at sight and may be removed from or inserted to the first lateral hole **50** of the padlock body **10** by using for instance a screwdriver.

[0077] As seen in FIG. 4B, when the shackle **12** is pivoted to the actuator **30** in the locked position, the first recess **15** is also pivoted away from the first lateral hole **50**. Then, the first end **13** of the shackle **12** at least partly obstructs the first lateral hole **50** and the first blocking element **55** therein becomes inaccessible for removal from the outside.

[0078] Furthermore, when fully screwed into the first lateral hole **50**, the first blocking element **55**

is arranged upon the fastener **40** (e.g., the screw), thereby blocking access to the fastener **40** from the outside and hindering removal of the fastener **40** while in the locked position (visible on FIG. 2A).

[0079] As also illustrated by FIGS. 4A and 4B, a side of the padlock body **10** which is closer to the first end **13** of the shackle **12** further comprises a second lateral hole **60** for receiving a second blocking element **65**. Said second blocking element **65** may be a pin or a rod. The second lateral hole **60** extends through the padlock body **10** and is substantially perpendicular to the fastening direction of the fastener **40**. Further, the first end **13** of the shackle **12** comprises a second recess **16** which radially encloses part of the second lateral hole **60**, regardless of whether in the unlocked or locked position. The second recess **16** at the first end **13** of the shackle **12** is substantially circular and abuts with the second lateral hole **60**, such that the second recess **16** and the second lateral hole **60** are aligned in a same horizontal plane, in both locked and unlocked positions. Further, the second blocking element **65** inserted into the second lateral hole **60** is positioned within the recess **16**, and thus attaches the second end **13** of the shackle **12** to the padlock body **10** and hinders an axial movement of the second end **13** of the shackle **12** in relation to the padlock body **10**. The second blocking element **65** may be any element that is tightly fixed into the second lateral hole **60**, such as a pin or a rod. The second blocking element **65** may be arranged to further avoid removal, for instance being glued or welded to the second lateral hole **60**.

[0080] As illustrated by FIG. 5, the padlock **1** comprises a padlock body **10** as disclosed elsewhere herein, and a replaceable locking cylinder **20**. As previously discussed, the padlock body **10** and the replaceable locking cylinder **20** are engaged by fasteners **40**, such as screws. Furthermore, the replaceable locking cylinder **20** may comprise all necessary elements that constitutes a working padlock **1**. For instance, the replaceable locking cylinder **20** may comprise a plug, an opening for inserting an actuator device such as a key (not shown) and a cam for transferring the rotational movement of the plug to the actuator **30**.

[0081] The skilled person is aware of locking mechanisms suitable for the replaceable locking cylinder **20**. The locking mechanisms is preferably aligned with the actuator **30** in the same axis X when the replaceable locking cylinder **20** is attached to the padlock body **10**. In general terms, a correct key is inserted into a keyhole and rotated about 90 degrees. The rotation of the key also rotates the plug and the cam at the end of the plug, which is in operatively contact with the actuator **30**. The rotation of the cam operatively connected to the actuator **30** promotes the rotation of the actuator **30** between a locked and an unlocked position. When the second end **14** of the shackle **12** is engaged with the groove **32** of the actuator **30**, the rotation of the actuator **30** to the locked position hinders any axial and/or radial movement of the second end **14** of the shackle **12**, thus locking an object located between the shackle **12** and the padlock **1**. When the key is removed from the keyhole, the locking mechanism of the replaceable locking cylinder **20** hinders any movement of the actuator **30**.

[0082] The padlock body **10**, the replaceable locking cylinder **20** and/or the padlock **1** may be made of metal or an alloy, such as stainless steel or brass.

[0083] It is to be understood that while the invention has been described in conjunction with the detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention, which is defined by the scope of the appended claims. Other aspects, advantages, and modifications are within the scope of the following claims.

[0084] Unless expressly described to the contrary, each of the preferred features described herein can be used in combination with any and all of the other herein described preferred features.

Claims

1-14. (canceled)

15. A padlock body (**10**) for engaging with a replaceable locking cylinder (**20**) comprising: an

actuator (30) comprising a groove (32), the actuator (30) being rotatable about a vertical axis (X) between a locked position and an unlocked position; the actuator (30) further comprising a first end and a second end opposed to the first end, the first end comprising the groove (32) and the second end being operatively connectable to the replaceable locking cylinder (20); a shackle (12) comprising a first end (13) and a second end (14), the first end (13) being attached to said padlock body (10), the second end (14) being movable for engaging with the groove (32) of the actuator (30); and at least one fastener (40) for securing the padlock body (10) to the replaceable locking cylinder (20), wherein: in the unlocked position, the actuator (30) is rotated about the vertical axis (X) such that the groove (32) of the actuator (30) is positioned for engaging with the second end (14) of the shackle (12); and in the locked position, the actuator (30) is rotated about the vertical axis (X) such that, when the second end (14) of the shackle (12) is engaged with the groove (32) of the actuator (30), the second end (14) of the shackle (12) is restrained within the groove (32) of the actuator (30).

16. The padlock body (10) according to claim 15, further comprising an indentation (11), said indentation (11) being aligned with the groove (32) of the actuator (30) in the unlocked position.

17. The padlock body (10) according to claim 16, wherein the first end (13) of the shackle (12) rotates about a vertical axis which is parallel to the vertical axis (X) of the actuator (30).

18. The padlock body (10) according to claim 15, wherein the first end (13) of the shackle (12) rotates about a vertical axis which is parallel to the vertical axis (X) of the actuator (30).

19. The padlock body (10) according to claim 15, wherein the second end (14) of the shackle (12) comprises a depression adapted to interlock with the groove (32) of the actuator (30).

20. The padlock body (10) according to claim 15, wherein the actuator (30) rotates about 90 degrees between the unlocked position and the locked position.

21. The padlock body (10) according to claim 15, wherein the fastener (40) comprises at least one screw or bolt, each of the at least one screw or bolt being releasably fixed into a hole extending through part of the padlock body (10) and part of the replaceable locking cylinder (20).

22. The padlock body (10) according to claim 15, wherein: the padlock body (10) further comprises a first blocking element (55) and a first lateral hole (50) for receiving the first blocking element (55), the first lateral hole (50) intersecting a fastening direction of the fastener (40), such that removal of the fastener (40) is hindered by the first blocking element (55); the first end (13) of the shackle (12) further comprises a first recess (15), the first recess (15) radially enclosing part of the first lateral hole (50) when the second end (14) of the shackle (12) is disengaged with the groove (32) of the actuator (30); in the unlocked position, the first recess (15) and the first lateral hole (50) are aligned in a same plane, thereby exposing the first blocking element (55) inserted therein; and in the locked position, the first recess (15) is moved away from the radially enclosing position, such that the first end (13) of the shackle (12) hinders access to the first blocking element (55) inserted therein.

23. The padlock body (10) according to claim 22, wherein the first blocking element (55) is a screw or a bolt.

24. The padlock body (10) according to claim 15, wherein: the padlock body (10) further comprises a second blocking element (65) and a second lateral hole (60) for receiving the second blocking element (65), the second lateral hole (60) being substantially perpendicular to a fastening direction of the fastener (40); the first end (13) of the shackle (12) further comprises a second recess (16); and the second recess (16) radially enclosing part of the second lateral hole (60), such that the second blocking element (65) inserted into the second lateral hole (60) engages with the second recess (16), thereby fixing the first end (13) of the shackle (12) to the padlock body (10) and hindering axial movements of the first end (13) of the shackle (12).

25. The padlock body (10) according to claim 24, wherein the second blocking element (65) is a pin or a rod.

26. The padlock body (10) according to claim 15, wherein the padlock body (10) is adapted for

engaging with a standard replaceable locking cylinder (20).

27. The padlock body (10) according to claim 15, wherein the padlock body (10) is adapted for engaging with an oval replaceable locking cylinder (20).

28. A padlock (1) comprising: the padlock body (10) of claim 15; and a replaceable locking cylinder (20).

29. The padlock (1) according to claim 28, wherein the replaceable locking cylinder (20) is an oval replaceable locking cylinder (20).

30. A method of replacing a replaceable locking cylinder (20) from a padlock (1), the method comprising the steps of: providing a padlock (1) having a padlock body (10) and a replaceable locking cylinder (20), the padlock body (10) comprising: an actuator (30) comprising a groove (32), the actuator (30) being rotatable about a vertical axis (X) between a locked position and an unlocked position; the actuator (30) further comprising a first end and a second end opposed to the first end, the first end comprising the groove (32) and the second end being operatively connectable to the replaceable locking cylinder (20); a shackle (12) comprising a first end (13) and a second end (14), the first end (13) being attached to said padlock body (10), the second end (14) being movable for engaging with the groove (32) of the actuator (30); at least one fastener (40) securing the padlock body (10) to the replaceable locking cylinder (20); and a first blocking element (55) and a first lateral hole (50) for receiving the first blocking element (55), the first lateral hole (50) intersecting a fastening direction of the fastener (40), such that removal of the fastener (40) is hindered by the first blocking element (55), wherein the first end (13) of the shackle (12) further comprises a first recess (15), the first recess (15) radially enclosing part of the first lateral hole (50) when the second end (14) of the shackle (12) is disengaged with the groove (32) of the actuator (30); positioning the padlock (1) into an unlocked position, whereby the first recess (15) and the first lateral hole (50) are aligned in a same plane, thereby exposing the first blocking element (55) inserted therein; removing the first blocking element (55) from the first lateral hole (50), thereby exposing the at least one fastener (40); removing the at least one fastener (40) attaching the padlock body (10) to the replaceable locking cylinder (20); and replacing the replaceable locking cylinder (20).
