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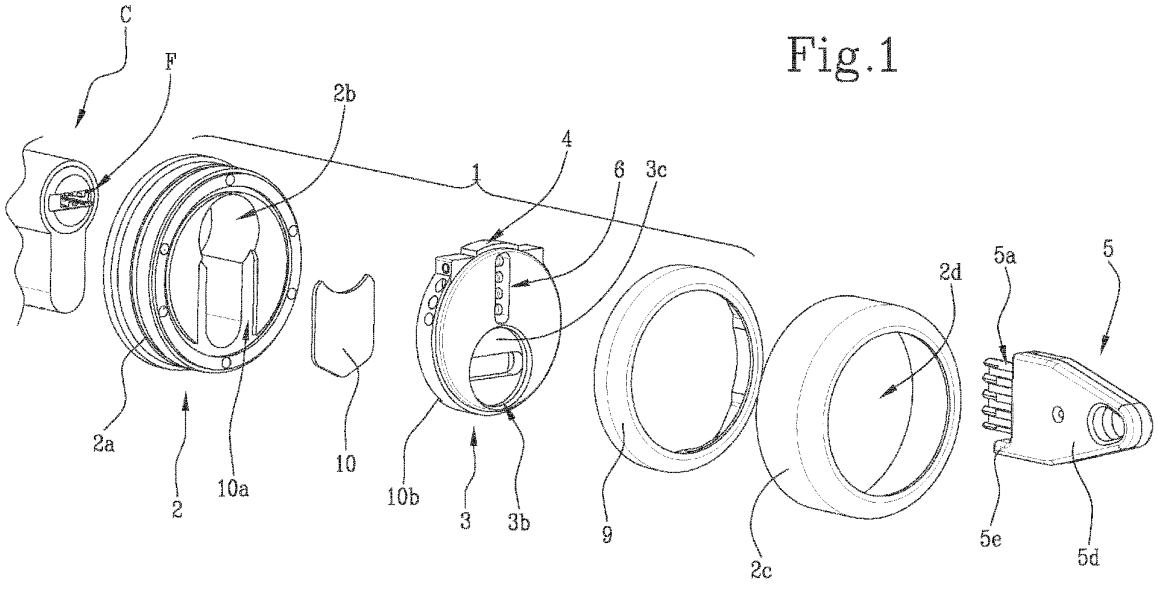
# (54) PROTECTION DEVICE FOR A LOCK CYLINDER

(57) Protection device (1) of a lock cylinder (C) comprising a stator body (2) and a rotor body (3) inserted into the stator body (2) and rotatable about an axis of rotation (A) of the rotor body (3). The rotor body (3) is selectively rotatable, in use, between a closed position, wherein a locking wall (3a) of the rotor body (3) completely occludes an inlet section of an insertion slot "F" of the cylinder (C), and an open position, wherein an access window (3b) of the rotor body (3) is coaxially arranged to the inlet section of the insertion slot (F). The rotor body (3) further comprises a mechanical locking device (4) which may be switched between an unlocking configuration, wherein the rotor body (3) is rotatable between the closed position and open position and vice versa, and a locking configuration, wherein the rotor body (3) is locked at least in the closed position. The device (1) further comprises an actuating key (5) of the rotor body (3), which may be inserted into an access portion (6) of the mechanical locking device (4) opposite, in use, to the locking wall (3a), configured to switch the mechanical locking device (4) from the locking configuration to the unlocking configuration and vice versa.

Fig.1

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## Description

**[0001]** The present invention relates to a protection device for a lock cylinder.

**[0002]** In other words, the present invention relates to the field of lock protection mechanisms, and more specifically the cylinders into which the key must be inserted in order to open the lock.

**[0003]** Generally, cylinders protrude from the lock or are otherwise exposed and are therefore susceptible to possible tampering, e.g. through the use of acid and/or tampering devices such as a drill.

**[0004]** It is known to apply devices (known as defenders or protectors) that are installed at the front (in a portion of the cylinder outside an apartment) to protect the cylinder (generally made of brass) so as to prevent the possible drilling of the cylinder by means of a drill, effectively defining hardened and tempered anti-drill systems.

**[0005]** Nevertheless, more traditional defenders of the known type always leave the key insertion channel (or slot) exposed.

**[0006]** The technical task of the present invention is therefore to make available a protection device capable of overcoming the drawbacks resulting from the prior art.

**[0007]** The object of the present invention is therefore to provide a protection device that is capable of preventing tampering of the protection device itself.

**[0008]** A further object of the present invention is therefore to provide a protection device that can effectively protect the cylinder by preventing it from being exposed in a way that could facilitate tampering.

**[0009]** The specified technical task and the specified aims are substantially achieved by a protection device, comprising the technical characteristics set forth in one or more of the appended claims. The dependent claims correspond to possible embodiments of the invention.

**[0010]** In particular, the specified technical task and the specified purposes are substantially achieved by a protection device for a lock cylinder comprising a stator body comprising a coupling portion which may be coupled, during a configuration of use of the device, to a lock comprising a cylinder and a rotor body inserted into the stator body and rotatable about an axis of rotation of the rotor body, that is parallel, in use, to an insertion axis of a key of the cylinder which may be inserted into an insertion slot defined by the cylinder.

**[0011]** The rotor body is selectively rotatable, in use, between a closed position, wherein a locking wall of the rotor body completely occludes an inlet section of the insertion slot, and an open position, wherein an access window of the rotor body is coaxially arranged to the inlet section of the insertion slot.

**[0012]** The rotor body further comprises a mechanical locking device which may be switched between an unlocking configuration, wherein the rotor body is rotatable between the closed position and open position and vice versa, and a locking configuration, wherein the rotor body is locked at least in the closed position.

**[0013]** The device further comprises an actuating key of the rotor body, which may be inserted into an access portion of the mechanical locking device opposite, in use, to the locking wall, configured to switch the mechanical locking device from the locking configuration to the unlocking configuration and vice versa.

**[0014]** According to an aspect of the present invention, the mechanical locking device comprises at least one set of pins and corresponding counter-pins, wherein each pin and counter-pin may be translated along a respective translation axis extending along a respective longitudinal extension axis of the pin, depending on an insertion of the actuating key into the access portion. The pins and counter-pins may be translated between a first position adapted to define the unlocking configuration and a second position, different for each pin and corresponding counter-pin from the first position, adapted to define the locking configuration of the mechanical locking device.

**[0015]** According to an aspect of the present invention, the stator body comprises at least one shaped guide defined in a perimeter portion of the stator body, and wherein the mechanical locking device comprises at least one locking box having a first end at least partially counter-shaped with respect to the shaped guide.

**[0016]** The locking box is switchable, according to an insertion of the actuating key in the access portion, between the locking configuration wherein the first end is kept in contact with the shaped guide preventing the rotor body from rotating, and the unlocking configuration wherein the locking box is movable along a movement axis perpendicular to the axis of rotation of the rotor body so that the first end slides freely on the shaped guide allowing the rotor body to rotate.

**[0017]** According to an aspect of the present invention, the locking box comprises a plurality of seats each adapted to define a translation axis of a respective pin and counter-pin, wherein in the first position the counter-pins are contained within respective seats defining the unlocking configuration, and the second position wherein the counter-pins are at least partially contained within the seat defining the locking configuration of the rotor body i.e. of the mechanical locking device.

**[0018]** In other words, the counter-pins and/or pins can be positioned in their respective seats in order to define the second position adapted to prevent the locking box from translating along its movement axis. Therefore, the pins and/or counter-pins or seats extend transversely, preferably perpendicularly, to the movement axis of the locking box.

**[0019]** According to an aspect of the present invention, the mechanical locking device comprises at least two sets of pins and counter-pins and a pair of locking boxes opposite to each other with respect to the access portion of the mechanical locking device or the locking wall. In other words, the sets of pins and counter-pins and the pair of boxes are arranged laterally to the locking wall or access portion.

**[0020]** According to an aspect of the present invention,

the stator body comprises a pair of shaped guides opposite to each other along the perimeter portion of the stator body. This allows the stator body to be locked in both the closed and open position. Locking the rotor body in the open position prevents unwanted rotation from the open position to the closed position.

**[0021]** According to an aspect of the present invention, the actuating key comprises an engagement portion that can be inserted, in use, into the access portion of the locking device.

**[0022]** The engagement portion comprises a plurality of supporting elements and slats interposed between the supporting elements. The slats extend, when the actuating key is inserted into the access portion, along an extension axis of the slats perpendicular to said extension axis of the pins and each slat has a profile adapted to move the respective set of pins and counter-pins from the second position to the first position while the actuating key is being inserted into the access portion.

**[0023]** According to an aspect of the present invention, the slats may be removably replaced by further slats depending on the different second positions taken by the set of pins and counter-pins. In other words, if necessary, new second positions of the set of pins and counter-pins can be defined and the actuating key can be customised according to the new second positions by replacing the specific slats.

**[0024]** According to an aspect of the present invention, the actuating key comprises an engagement portion which may be inserted, in use, into the access portion of the mechanical locking device and a grip portion configured, in use, to be gripped so as to rotate the rotor body between the closed position and the open position. Advantageously, only a user with the actuating key is able to open the protection device.

**[0025]** According to an aspect of the present invention, the access window of the rotor body comprises a protection cap.

**[0026]** Preferably, the stator body comprises a protective plate configured, in said closed position, to prevent access to said cylinder via the access window of the rotor body.

**[0027]** According to an aspect of the present invention, the protective plate is movable sliding along a movement direction, perpendicular in use to the axis of rotation of the rotor body.

**[0028]** According to an aspect of the present invention, the rotor body comprises a step having a predetermined thickness which, in the closed position, is placed in contact with an end of the protective plate so as to maintain the protective plate at least partially superimposed, in use, on the cylinder and which, in the open position, is not placed in contact with the protective plate so that the protective plate is not superimposed on the cylinder. In this way, the step prevents interference between the protective plate and the cylinder, when the rotor body is in the open position, which would otherwise cause an obstruction when inserting the key into the cylinder.

**[0029]** According to an aspect of the present invention, the stator body further comprises a protective portion configured to define, when mounted with the coupling portion, a containment volume for the rotor body.

**[0030]** According to an aspect of the present invention, the protective portion defines a perimeter protection for the rotor body. Advantageously, the protective portion therefore defines a perimeter protection of the rotor body adapted to prevent tampering when in use.

**[0031]** According to an aspect of the present invention, the protective portion is mounted or mountable to the coupling portion by at least four screws.

**[0032]** According to an aspect of the present invention, the rotor body is rotatable between the open and closed position with a rotation of at least 90°.

**[0033]** According to an aspect of the present invention, the rotor body is rotatable between the open and closed position with a rotation of at least 180°.

**[0034]** Further characteristics and advantages of the present invention will become more apparent from the indicative and thus non-limiting description of an embodiment of a protection device.

**[0035]** Such description will be set forth herein below with reference to the accompanying drawings, provided for merely indicative and therefore non-limiting purposes, wherein:

- Figures 1 and 2 are different exploded views of the protection device according to the present invention;
- Figures 3A-3D are schematic representations of different configurations of use of the protection device;
- Figures 4A, 4B, 5a, 5B and 6A-6C are schematic representations of different components of the protection device according to the present invention.

**[0036]** With reference to the accompanying figures, a protection device 1 for a lock cylinder "C" has been comprehensively referred to as device 1 for the sake of simplicity of description.

**[0037]** The term cylinder "C" refers to the device connected to the lock that allows a door or window to be opened or closed. Preferably, but not necessarily, the present solution refers to a protection device for a cylinder "C" of the European type.

**[0038]** The cylinder "C" comprises an insertion slot "F". In particular, the insertion slot "F" allows the insertion of a key and defines an insertion axis for the key itself.

**[0039]** The device 1 comprises a stator body 2 and a rotor body 3 inserted into the stator body 2.

**[0040]** The stator body 2 comprises a coupling portion 2a which may be coupled, during a configuration of use of the device 1, to a lock comprising the cylinder "C".

**[0041]** Preferably, in use, the coupling portion 2a is placed to cover the cylinder "C".

**[0042]** Alternatively, the coupling portion 2a has a coupling seat 2b (as depicted for example in Figure 1 and Figure 2), which is adapted to contain, at least partially, the cylinder "C". In other words, the coupling seat 2b is

counter-shaped with respect to the cylinder "C" so that the coupling portion 2a is fitted around the cylinder "C" itself during the configuration of use.

**[0043]** Preferably, and as depicted in the accompanying figures, the coupling portion 2a further comprises a protective portion 2c coupled to the coupling portion 2a. The protective portion 2c defines, when mounted with the coupling portion 2a, a containment volume adapted to contain the rotor body 3.

**[0044]** Preferably, the protective portion 2c defines a perimeter protection for the rotor body 3. In other words, the protective portion 2c defines a frame having a front opening 2d to allow access to a user intending to use the device 1. The front opening 2d preferably lies on a plane perpendicular to the insertion axis of the key into the slot "F" of the cylinder "C".

**[0045]** The term "front" is intended to mean an orientation of a user with respect to the device 1 (or vice versa) when it is installed or applied or mounted to the cylinder "C".

**[0046]** Preferably, the protective portion 2c is mounted or mountable to the coupling portion 2a by at least four screws.

**[0047]** The rotor body 3, inserted into the stator body 2, is rotatable about an axis of rotation "A" of the rotor body 3 itself, in use parallel to the insertion axis of the cylinder key, which can be inserted into the slot "F" defined by the cylinder "C" itself. Preferably, the axis of rotation "A" coincides with an extension axis of the stator body 2 or the rotor body 3.

**[0048]** With reference to the accompanying figures, the front opening 2d is in use perpendicular to the axis of rotation "A".

**[0049]** Preferably, and as depicted in the accompanying figures, the stator body 2 and the rotor body 3 are essentially cylindrical or disc-shaped. In particular, the stator body 2 or at least the protective portion 2c of the stator body 2 defines a hollow disc or cylinder within which the rotor body 3 is contained.

**[0050]** Preferably, the stator body 2 or at least the protective portion 2c may have another conformation, e.g. square or rectangular, in which at least internally a cylindrical containment volume is defined which is adapted to contain and allow for the rotation of the disc-shaped rotor body 3.

**[0051]** The rotor body 3 is selectively rotatable, in use, between a closed position (Figure 3A) and an open position (Figure 3D).

**[0052]** The closed position means a position of the rotor body 3 in which a locking wall 3a of the rotor body 3 itself completely occludes an inlet section of the insertion slot "F". In other words, in the closed position of the rotor body 3, the device 1 makes it possible to prevent access to the slot "F" or the cylinder "C" by means of keys or burglar's tools. Therefore, the locking wall 3a advantageously defines a defensive barrier for the slot "F" or the cylinder "C" suitable to prevent the introduction of picks, corrosive acids or other tools or substances that can be used to pick a lock.

**[0053]** The open position means a position of the rotor body 3 in which an access window 3b of the rotor body 3 itself is arranged coaxially to the inlet section of the insertion slot. In other words, the access window 3b is circular in shape or otherwise suitable to allow a total superposition which, in the open position, does not prevent the insertion of a key into the slot "F" or cylinder "C". In this way, the key can be inserted into the slot "F" when required.

**[0054]** Preferably, as depicted in the accompanying figures, the access window 3b is made in the form of a circular hole.

**[0055]** Preferably, the access window 3b comprise a protection cap 3c. The protection cap 3c is preferably made in the form of a disc with its own slot suitable to allow a key to be inserted into the slot "F" when the rotor body 3 is in the open position.

**[0056]** The protection cap 3c is preferably rotatable about its own axis of rotation "R". In other words, the protection cap 3c is inserted into the access window 3b and is free to move within it.

**[0057]** Preferably, the rotor body 3 is rotatable between the open position and the closed position with a rotation about its axis of rotation "A" of at least 90°.

**[0058]** Even more preferably, the rotor body 3 is rotatable between the open position and the closed position with a rotation about its axis of rotation "A" of at least 180°.

**[0059]** In the accompanying figures, the rotor body 3 is rotatable between the open and closed position with a rotation of 180°. Thus, the access window 3b and the locking wall 3a are located in opposite circular sectors of the rotor body 3. In other words, the access window 3b and the locking wall 3a are in diametrically opposite portions of the rotor body 3.

**[0060]** The rotation of the rotor body 3 can be either clockwise or anti-clockwise.

**[0061]** The rotor body 3 further comprises a mechanical locking device 4 that can be switched between an unlocking and a locking configuration.

**[0062]** The mechanical locking device 4 is only equipped with mechanical components and has no electronic and/or magnetic components. Thus, barring heavy destructive tampering with the device 1, tools known for electrical or mechanical tampering with locks would be totally ineffective against the device 1 or the mechanical locking device 4.

**[0063]** The unlocking configuration means a configuration of the mechanical locking device 4 in which the rotor body 3 is rotatable between the closed and the open position. In other words, in such an unlocking configuration, one or more components of the mechanical locking device 4 do not interfere with the rotation of the body 3.

**[0064]** The locking configuration means a configuration of the mechanical locking device 4 in which the rotor body 3 is locked at least in the closed position. In other words, in such a locking configuration, one or more components of the mechanical locking device 4 interfere with

and prevent the rotation of the body 3. Preferably, the locking configuration can be defined in both the closed position and the open configuration.

**[0065]** In other words, the mechanical locking device 4 is a suitable mechanism to prevent rotation of the rotor body 3 when such rotation is not required.

**[0066]** The device 1 further comprises an actuating key 5 of the rotor body 3, which may be inserted into an access portion 6 of the mechanical locking device 4 opposite, in use, to the locking wall 3a. The actuating key 5 is configured to switch the mechanical locking device 4 from the locking configuration to the unlocking configuration and vice versa.

**[0067]** Preferably, and as depicted for example in Figures 4A and 4B, the mechanical locking device 4 comprises at least one set of pins and counter-pins 4a. Preferably, the mechanical locking device 4 may comprise at least two sets of pins and counter-pins 4a.

**[0068]** In other words, the mechanical locking device 4 comprises a certain number of pins 4b and a corresponding number of counter-pins 4c.

**[0069]** In the accompanying figures, the set of pins and counter-pins 4a (i.e. each set of pins and counter-pins 4a) comprises four pins 4b and four counter-pins 4c. Other embodiments may involve more, or fewer, pins 4b and counter-pins 4b.

**[0070]** Each pin 4b and counter-pin 4c is translatable along a respective translation axis extending along a respective longitudinal extension axis of the pin.

**[0071]** The longitudinal extension axis (i.e. translation axis "T") extends perpendicular to the axis of rotation "A" of the rotor body 3.

**[0072]** Preferably, each translation axis "T" is parallel to the other translation axes "T".

**[0073]** This translation is realised by inserting the actuating key 5 into the access portion, between a first position adapted to define the unlocking configuration and a second position, different for each pin 4b and the corresponding counter-pin 4c from the first position, adapted to define the locking configuration. In the second position, the pins 4b are at least partially facing the access portion 6. One or more pins 4b (and the corresponding counter-pins 4c) can take the same second position.

**[0074]** In other words, in the second position, the pins 4b and counter-pins 4c are arranged according to predetermined combination positions along their respective translation axes "T". The second positions are therefore customisable by a user during the production or configuration of each device 1.

**[0075]** In other words, the actuating key 5 is made to intercept the pins 4b in the access portion 6 and push the pins 4b against their respective counter-pins 4c during insertion and, once fully inserted, bring all the pins 4b and counter-pins 4c from the second position to the first position.

**[0076]** Preferably, the counter-pins 4c are equipped with elastic return elements (preferably return springs) configured to reposition the counter-pins 4c (and thus the pins 4b) from the second position to the first position once the actuating key 5 is removed from the access portion 6.

**[0077]** Preferably, the mechanical locking device 4 comprises at least one locking box 7 and the stator body 2 comprises at least one shaped guide 8. The shaped guide 8 is defined in a perimeter portion 9 of the stator body 2.

**[0078]** Preferably, and as depicted in the accompanying figures, this perimeter portion 9 of the stator body 2 is made in the form of a ring interposed between the coupling portion 2a and the protective portion 2c.

**[0079]** The locking box 7 has a first end 7a at least partially counter-shaped to the shaped guide 8.

**[0080]** The locking box 7 is switchable, depending on the insertion of the actuating key 5 into the access portion 6, between the first locking configuration and the unlocking configuration.

**[0081]** In the locking configuration, the first end 7a is kept in contact with the shaped guide 8, preventing rotation of the rotor body 3. In other words, in the locking configuration, the first end 7a, i.e. the locking box 7, is prevented from carrying out any type of movement, effectively defining an interfering element meshed to the shaped guide 8. Preferably, the shaped guide 8 has an obtuse angle conformation and the first end 7a has a conformation suitable for meshing into the obtuse angle.

**[0082]** In the unlocking configuration, the locking box 7 is movable along a movement axis "M", perpendicular to the axis of rotation "A" of the rotor body 3, so that the first end 7a slides freely on the shaped guide 8 allowing rotation of the rotor body 3. In other words, in the unlocking configuration, the first end 7a, i.e. the locking box 7, maintains a reduced pressure contact with the shaped guide 8 and therefore, in the event of rotation of the rotor body 3, is able to make a minimal movement along the movement axis "M" which prevents it from meshing in the shaped guide 8 itself.

**[0083]** Preferably, the locking box 7 is equipped with elastic return means (not shown) configured to keep the locking box 7 itself (i.e. the first end 7a) in contact with the shaped guide 8. In particular, the return means exert a force on the locking box 7 to keep it in contact along the shaped guide 8 so that, in the locking configuration, the first end 7a remains meshed to the shaped guide 8, and in the unlocking configuration the first end 7a is free to slide in the shaped guide 8 preventing meshing of the first end 7a in the shaped guide when rotation of the rotor body 3 takes place. Preferably, the elastic return means are defined in a second end 7d of the locking box 7, opposite the first end 7a.

**[0084]** Preferably, the mechanical locking device 4 comprises a pair of locking boxes 7, arranged laterally with respect to the locking wall 3a. The locking boxes 7 are symmetrical to each other.

**[0085]** As depicted in the accompanying figures, the mechanical locking device 4 comprises both the set of pins and counter-pins 4a (or the sets of pins and counter-

pins 4a) and the locking box 7 (or locking boxes 7).

**[0086]** In this embodiment, the locking box 7 comprises a plurality of seats 7b each adapted to define a translation axis "T" of a respective pin 4b and counter-pin 4c. In the first position (Figure 4B) the counter-pins 4c are contained within their respective seats 7b defining the unlocking configuration. In the second position (Figure 4A), the pins 4b and/or counter-pins 4c are at least partially contained within the seat 7b defining the locking configuration of the rotor body.

**[0087]** Preferably, the locking device 4 itself comprises seats 7c aligned or alignable with the seats 7b. In the first position (Figure 4B), the counter-pins 4c are contained within their respective seats 7b while the pins 4b are contained within their respective seats 7c. In the second position (Figure 4A), the counter-pins 4c are at least partially contained in their respective seats 7b and 7c, while the pins 4a are partially contained in the seats 7c and partially occupy the access portion 6.

**[0088]** When the counter-pins 4c are in the second position (Figure 4A), they prevent movement of the locking box 7. In other words, the translation axis "T" and the movement axis "M" are perpendicular and incident to each other. Thus, the counter-pins 4c define blocks that prevent the movement of the locking box 7 along the movement axis "M", thus keeping the first end 7a meshed to the shaped guide 8.

**[0089]** When the counter-pins 4c are in the first position (Figure 4B) and are therefore fully contained in their respective seat 7b (and the pins 4b are fully contained in their respective seat 7c), they do not impede the movement of the locking box 7. In this way, during a rotation of the rotor body 3, the locking box 7 is free to make a slight movement to release the first end 7a from meshing with the shaped guide 8 so that it can slide against the shaped guide 8 itself.

**[0090]** As depicted in the accompanying figures, the mechanical locking device 4 comprises at least two sets of pins and counter-pins 4a and a pair of locking boxes 7 opposed to each other with respect to the access portion 6 of the mechanical locking device 4. In this embodiment, it is ensured that the locking box 7 can prevent the rotation of the rotor body 3 in both clockwise and anticlockwise directions.

**[0091]** Preferably, the stator body 2 comprises a pair of shaped guides 8 opposite to each other along the perimeter portion 9 of the stator body 2. In this way, the protection device 1, i.e. the rotor body 3, cannot be accidentally moved from the open position to the closed position unless the actuating key 5 is used.

**[0092]** Preferably, the actuating key 5 comprises an engagement portion 5a which can be inserted, in use, into the access portion 6 of the locking device 4. The engagement portion comprises a plurality of supporting elements 5b and slats 5c interposed between the supporting 5b elements.

**[0093]** A possible embodiment of the engagement portion 5a is illustrated in the accompanying figures. However, the shape and profiles of the supporting elements 5b and slats 5c can be customised according to requirements, thus being able to take different shapes that can be coupled to the access portion 6 of the device and the pins 4b.

**[0094]** The slats 5c extend, when the actuating key 5 is inserted into the access portion 6, along an extension axis "L" of the slats 5c perpendicular to the extension axis (i.e. the translation axis "T") of the pins 4b. Each slat 5c has a profile suitable for moving the respective set of pins and counter-pins 4a from the second position to the first position during an insertion of the actuating key 5 into the access portion 6. In other words, each slat 5c has a particular thickness or shape suitable to intercept the respective pin 4b, during the insertion of the engagement portion 5a into the access portion 6, so as to move it back into the seat 7c in order to move the counter-pin 4c into the seat 7b. Therefore, the slats 5c allow for customisable profiles according to the user's needs.

**[0095]** Preferably, the slats 5c are removably replaceable with additional slats 5c as a function of the second position taken by the set of pins and counter-pins 4a. In other words, where required, it is possible to change the locking configuration of the mechanical locking device 4 and modify the slats 5c accordingly. In particular, the slats 5c are removable (only when necessary) from the engagement portion 5a, e.g. by sliding between two supporting elements 5b (as for example depicted in Figure 5B).

**[0096]** Preferably, the actuating key 5 comprises a grip portion 5d configured, in use, to be gripped so as to rotate the rotor body 3 between the closed position and the open position. In other words, once the engagement portion 5a is inserted into the access portion 6, it is possible to use the actuating key 5 to easily move the rotor body 3 to align the access window 3b with the slot "F" of the cylinder "C" or, conversely, to bring the locking wall 3a to be superimposed with the slot "F" of the cylinder "C".

**[0097]** Preferably, at least the grip portion 5d is made of plastic material.

**[0098]** Preferably, the grip portion 5d comprises a meshing tooth 5e adapted to reversibly hook onto the access window 3b when the actuating key 5 is inserted into the access portion 6. The meshing tooth 5e advantageously prevents unintentional disengagement of the actuating key 5 from the access portion 6 during rotation of the rotor body 3 from the closed position to the open position and vice versa.

**[0099]** Preferably, the stator body 2 comprises a protective plate 10 configured, in the closed position, to prevent access to the cylinder "C" (i.e. the slot "F") via the access window 3b of the rotor body 3. In particular, the access window 3b is of such a size that, even in the closed position, it is superimposed at least partially with the slot "F" of the cylinder "C", i.e. the coupling seat 2b. More specifically, the protection cap 3c (if provided), being rotatable, can be moved to a position where its slot can superimpose (and thus uncover) part of the slot "F" of

the cylinder "C". Advantageously, the protective plate 10 makes it possible to occlude the portion of slot "F" that is potentially exposable from the access window 3b when the rotor body 3 is in the closed position.

**[0100]** Preferably, the protective plate 10 is movable sliding along a movement direction, perpendicular in use to the axis of rotation "A" of the rotor body 3. In other words, the stator body 2, i.e. the coupling portion 2a, is equipped with a guide 10a suitable for this sliding of the protective plate 10. As depicted, for example, in Figure 1, the guide 10a extends between a lower position of coupling portion 2a to the coupling seat 2b. Therefore, the protective plate 10 is movable between this lower position (Figures 6B and 6C) and at least part of the coupling seat 2b (Figure 6A). Preferably, the portion of the guide 10a proximal to the coupling seat 2b is counter-shaped with respect to the portion of the protective plate 10 adapted to protect the portion of the coupling seat 2b potentially exposed by the access window 3b.

**[0101]** In such an embodiment, the rotor body 3 comprises a step 10b having a predetermined thickness which, in the closed position of the rotor body 3, is placed in contact with one end (lower with reference to the accompanying figures or in the configuration of use of the device 1) of the protective plate so as to keep the protective plate 10 at least partially superimposed, in use, with the cylinder "C" (i.e. the slot "F") and which, in the open position of the rotor body 3, is not placed in contact with the protective plate so that it is not superimposed on the cylinder "C". In other words, the step 10b has a conformation such that, during the rotation of the rotor body 3, it is inserted below the lower portion of the protective plate 10 or slides out of it so as to realise the sliding of the protective plate 10 along the guide 10a. Therefore, the step 10b has two curved or inclined ends defining a sliding ramp suitable for sliding the lower portion of the protective plate 10, which is thus able to be lifted and partially superimposed on the coupling seat 2b.

**[0102]** In the of the above, the device 1 is able to overcome the drawbacks of the prior art.

**[0103]** In use, a user wishing to open the lock will use the actuating key 5 to switch the mechanical locking device 4 between the locking configuration and the unlocking configuration and then rotate the rotor body 3 between the closed position and the open position.

**[0104]** In particular, and with reference to the embodiment of the accompanying figures, the insertion of the actuating key 5 in the access portion 6 allows the movement of the sets of pins and counter-pins 4a from the second position to the first position so as to allow the movement of the locking box 7. At this point, using the actuating key 5, it is possible to rotate the rotor body about its axis of rotation "A", bringing the device 1 from the closed position to the open position in which the access window 3b is superimposed with the coupling seat 2b or the slot "F" of the cylinder "C. During this rotation, the protective plate 10 is lowered along its guide 10a, completely releasing the coupling seat 2b. In this open position, a user can safely insert the key into the slot "F" in order to open the lock or door.

**[0105]** Advantageously, the device 1 is able to overcome the drawbacks that have emerged from the prior art.

**[0106]** In the closed position, the device 1 is able to effectively protect the lock (and in particular the cylinder "C").

**[0107]** In particular, the mechanical locking device 4 advantageously prevents unwanted transitions between the closed position and the open position.

**[0108]** In addition, the locking wall 3a prevents access to the cylinder "C".

**[0109]** If the dimensions of the device 1 lead to a condition where, in the closed position, the access window 3b can superimpose the cylinder "C" at least partially, the protective plate 10 advantageously allows the exposable portion of the cylinder "C" to be covered.

**[0110]** In addition, the protective portion 2c is mechanically strong enough to withstand shocks of a certain intensity, thus protecting the rotor body 3.

## Claims

**1.** Protection device (1) for a lock cylinder (C) comprising:

- a stator body (2) comprising a coupling portion (2a) which may be coupled, in a configuration of use of the device (1), to a lock comprising a cylinder (C);
- a rotor body (3) inserted into said stator body (2) and rotatable about an axis of rotation (A) of said rotor body (3), that is parallel, in use, to an insertion axis of a key of said cylinder (C) which may be inserted into an insertion slot (F) defined by said cylinder (C),

  said rotor body (3) being selectively rotatable, in use, between a closed position, wherein a locking wall (3a) of the rotor body (3) completely occludes an inlet section of the insertion slot (F), and an open position, wherein an access window (3b) of the rotor body (3) is coaxially arranged to said inlet section of the insertion slot (F);
  said rotor body (3) further comprising a mechanical locking device (4) which may be switched between an unlocking configuration, wherein the rotor body (3) is rotatable between the closed position and the open position and vice versa, and a locking configuration, wherein the rotor body (3) is locked at least in said closed position;

- an actuating key (5) of the rotor body (3), which may be inserted into an access portion (6) of the

mechanical locking device (4) opposite, in use, to said locking wall (3a), configured to switch the mechanical locking device (4) from the locking configuration to the unlocking configuration and vice versa,
wherein said stator body (2) comprises at least one shaped guide (8) defined in a perimeter portion (9) of the stator body (2), and wherein said mechanical locking device (4) comprises at least one locking box (7) having a first end (7a) at least partially counter-shaped with respect to said shaped guide (8);
said locking box (7) being switchable, according to an insertion of said actuating key (5) into said access portion (6), between the locking configuration wherein said first end (7a) is kept in contact by meshing with said shaped guide (8) preventing the rotor body (3) from rotating, and the unlocking configuration wherein said locking box (7) is movable along a movement axis (M) perpendicular to said axis of rotation (A) of the rotor body (3) so that said first end (7a) slides freely on said shaped guide (8) allowing the rotor body (3) to rotate.

**2.** Protection device (1) according to claim 1, wherein said mechanical locking device (4) comprises at least one set of pins and counter-pins (4a), wherein each pin (4b) and counter-pin (4c) may be translated along a respective translation axis (T) extending along a respective longitudinal extension axis of the pin (4b), depending on an insertion of said actuating key (5) into said access portion (6); said pins (4b) and counter-pins (4c) may be translated between a first position adapted to define said unlocking configuration and a second position, wherein the pins (4b) are at least partially protruding within said access portion (6) that is adapted to define said locking configuration, said second position being different from said first position.

**3.** Protection device (1) according to claim 2, wherein said locking box (7) comprises a plurality of seats (7b) each adapted to define a translation axis (T) of a respective pin (4b) and counter-pin (4c), wherein in said first position the counter-pins (4b) are contained within respective seats (7b) defining the unlocking configuration, and wherein in said second position the counter-pins (4c) are partially contained within said seat (7b) defining the locking configuration of the rotor body (3).

**4.** Protection device (1) according to claim 3, comprising at least two sets of pins and counter-pins (4a) and a pair of locking boxes (7) opposite to each other with respect to said access portion (6) of the mechanical locking device (4).

**5.** Protection device (1) according to one or more of the preceding claims, wherein said stator body (2) comprises a pair of shaped guides (8) opposite to each other along said perimeter portion (9) of the stator body (2).

**6.** Protection device (1) according to claim 2, wherein said actuating key (5) comprises an engagement portion (5a) which may be inserted, in use, into said access portion (6) of the mechanical locking device (4); said engagement portion (5a) comprising a plurality of supporting elements (5b) and slats (5c) interposed between said supporting elements (5b), said slats (5c) extending, when said actuating key (5) is inserted into said access portion (6), along an extension axis (L) of the slats (5c) perpendicular to said extension axis of the pins (4b) and each having a profile adapted to move the respective set of pins and counter-pins (4a) from the second position to the first position while the actuating key is being inserted (5) into the access portion (6).

**7.** Protection device (1) according to claim 6, wherein said slats (5c) may be removably replaced by further slats (5c) depending on the second position taken by each pin (4b) and respective counter-pin (4c) of said at least one set of pins and counter-pins (4a).

**8.** Protection device (1) according to one or more of the preceding claims, wherein said actuating key (5) comprises an engagement portion (5a) which may be inserted, in use, into said access portion (6) of the mechanical locking device (4) and a grip portion (5d) configured, in use, to be gripped so as to rotate said rotor body (3) between said closed position and said open position.

**9.** Protection device (1) according to claim 8, wherein said grip portion (5d) comprises a meshing tooth (5e) adapted to reversibly hook onto said access window (3b) when said engagement portion (5a) is inserted into said access portion (6).

**10.** Protection device (1) according to one or more of the preceding claims, wherein said access window (3b) of the rotor body (3) comprises a protection cap (3c).

**11.** Protection device (1) according to one or more of the preceding claims, wherein said stator body (2) comprises a protective plate (10) configured, in said closed position, to prevent access to said cylinder via the access window (3b) of the rotor body (3).

**12.** Protection device (1) according to claim 11, wherein said protective plate (10) is movable sliding along a movement direction, perpendicular in use to said axis of rotation of said rotor body (3), and wherein said rotor body (3) comprises a step (10b) having a pre-

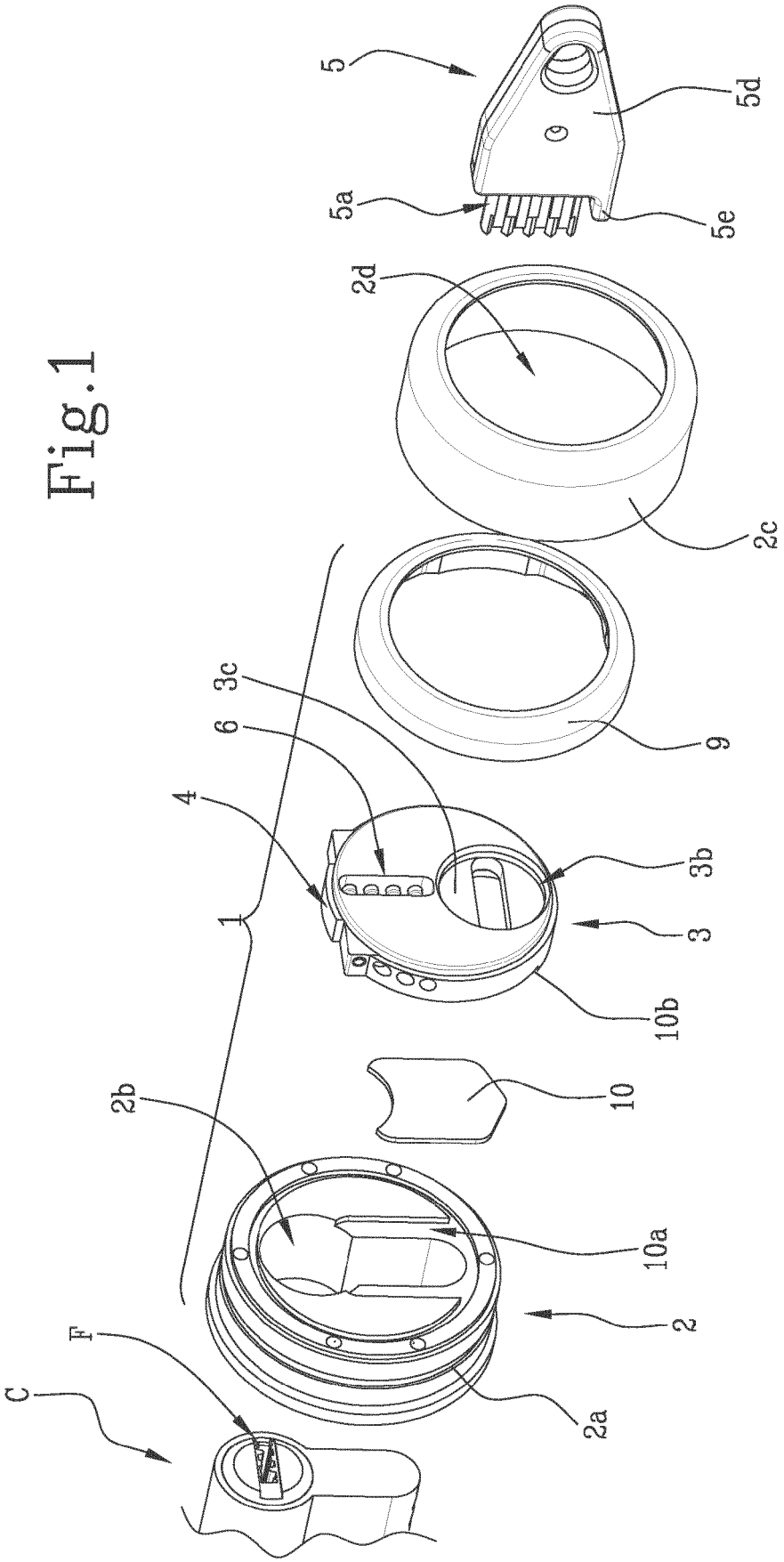
determined thickness which, in said closed position, is placed in contact with an end of said protective plate (10) so as to maintain said protective plate (10) at least partially superimposed, in use, on said cylinder (C) and which, in said open position, is not placed in contact with said protective plate (10) so that said protective plate (10) is not superimposed on said cylinder (C).

**13.** Protection device (1) according to one or more of the preceding claims wherein said stator body (2) further comprises a protective portion (2c) configured to define, when mounted with said coupling portion, a containment volume for said rotor body (3).

**14.** Protection device (1) according to claim 12, wherein said protective portion (2c) defines a perimeter protection for said rotor body (3).

**15.** Protection device (1) according to one or more of the preceding claims, wherein said rotor body (3) is rotatable between said open position and said closed position with a rotation of at least 90°, preferably of 180°.

Fig.1



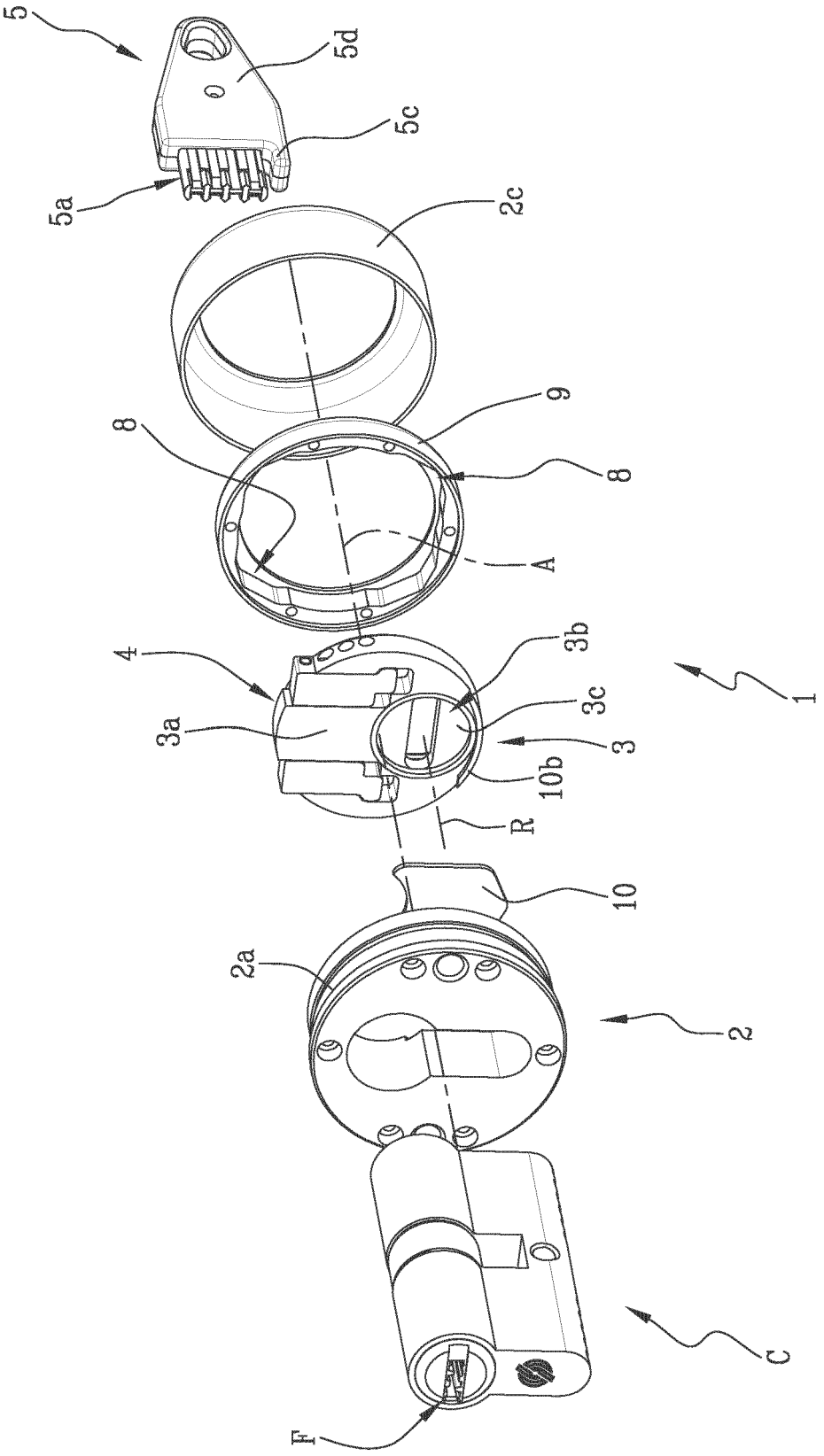



Fig.2

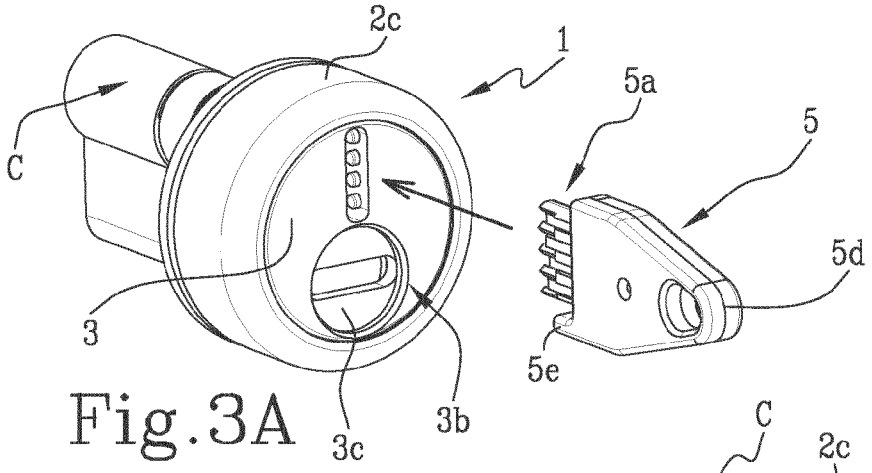



Fig.3A

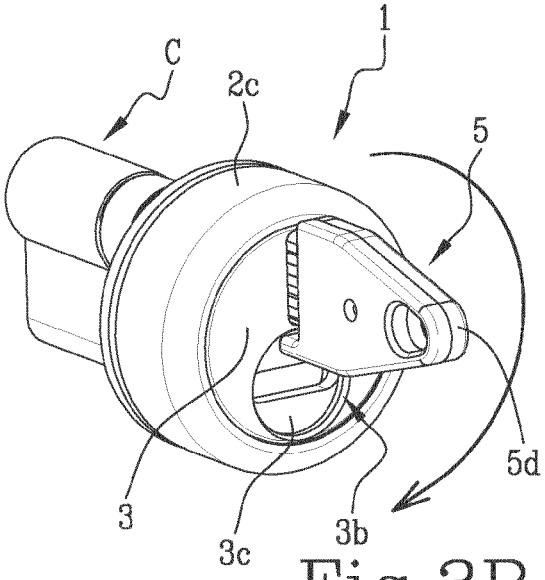



Fig.3B

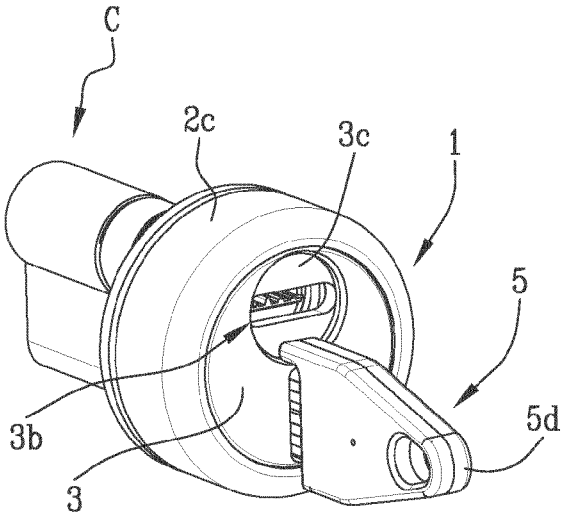



Fig.3C

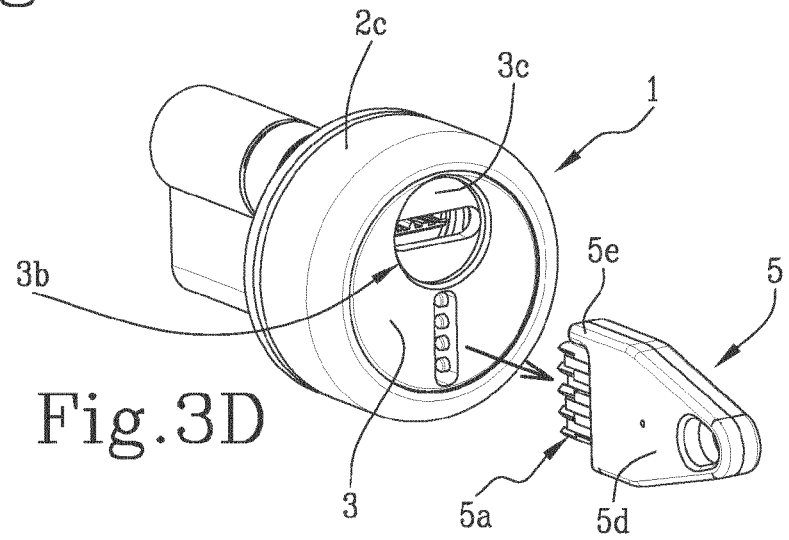
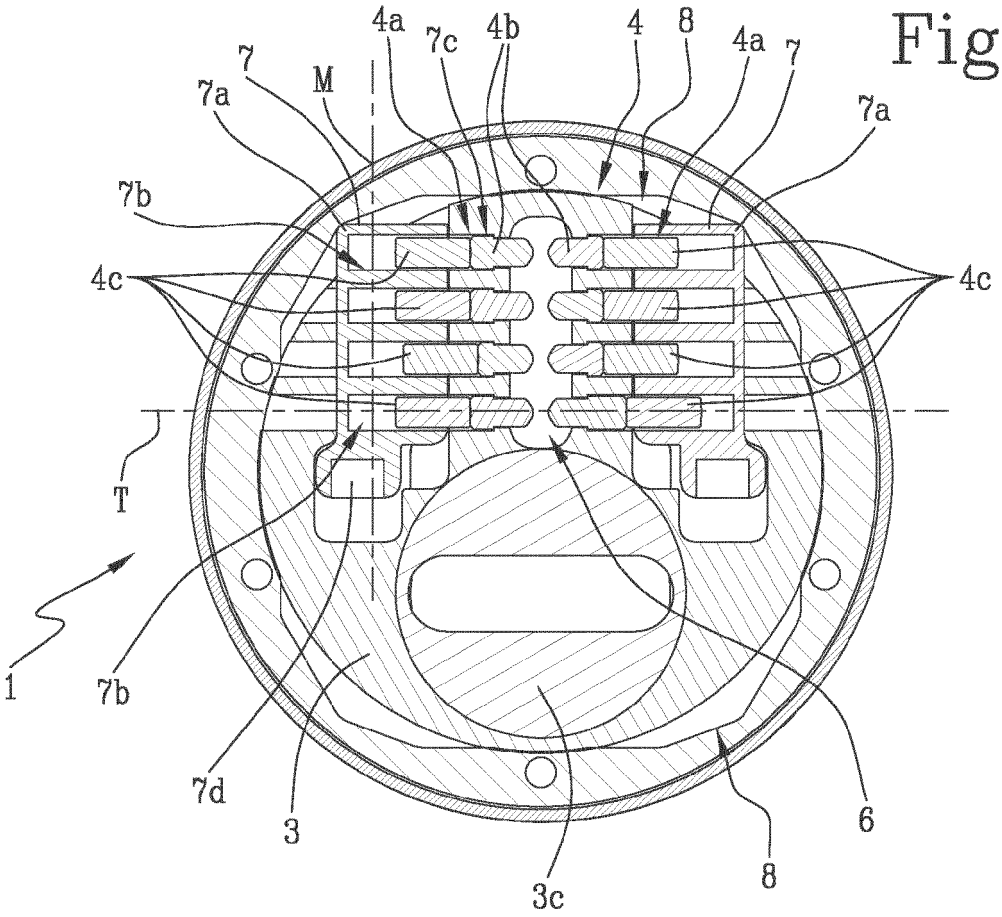



Fig.3D

Fig.4A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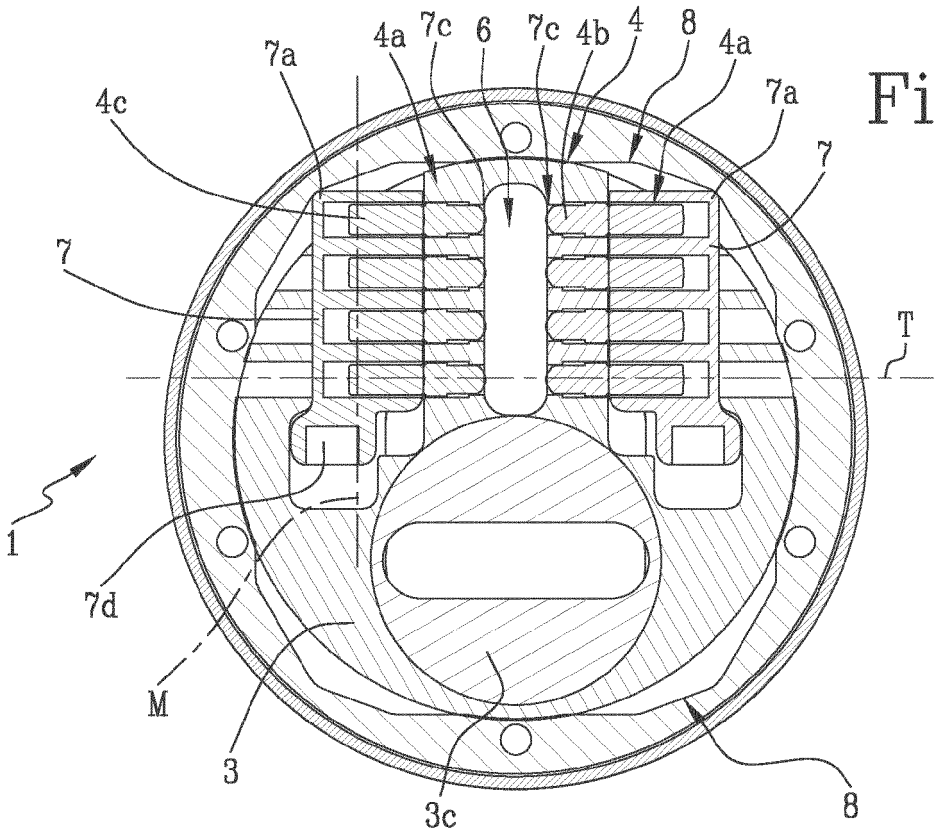
7c
4b
4
8
4a
7
7
M
7a
7a
7b
4c
4c
T
1
7b
7d
3
3c
8
6

Fig.4B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3c
8

Fig.5A

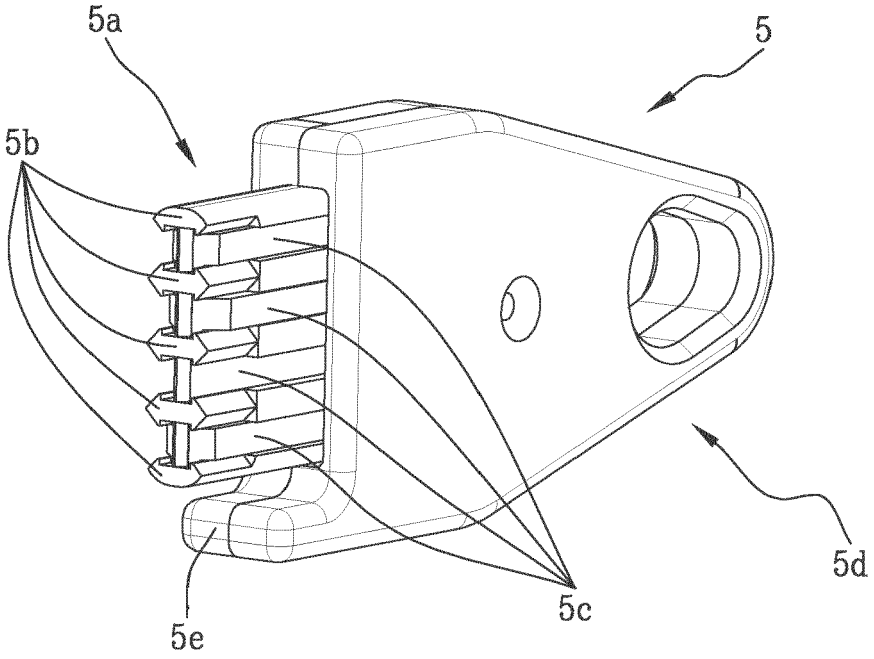



Fig.5B

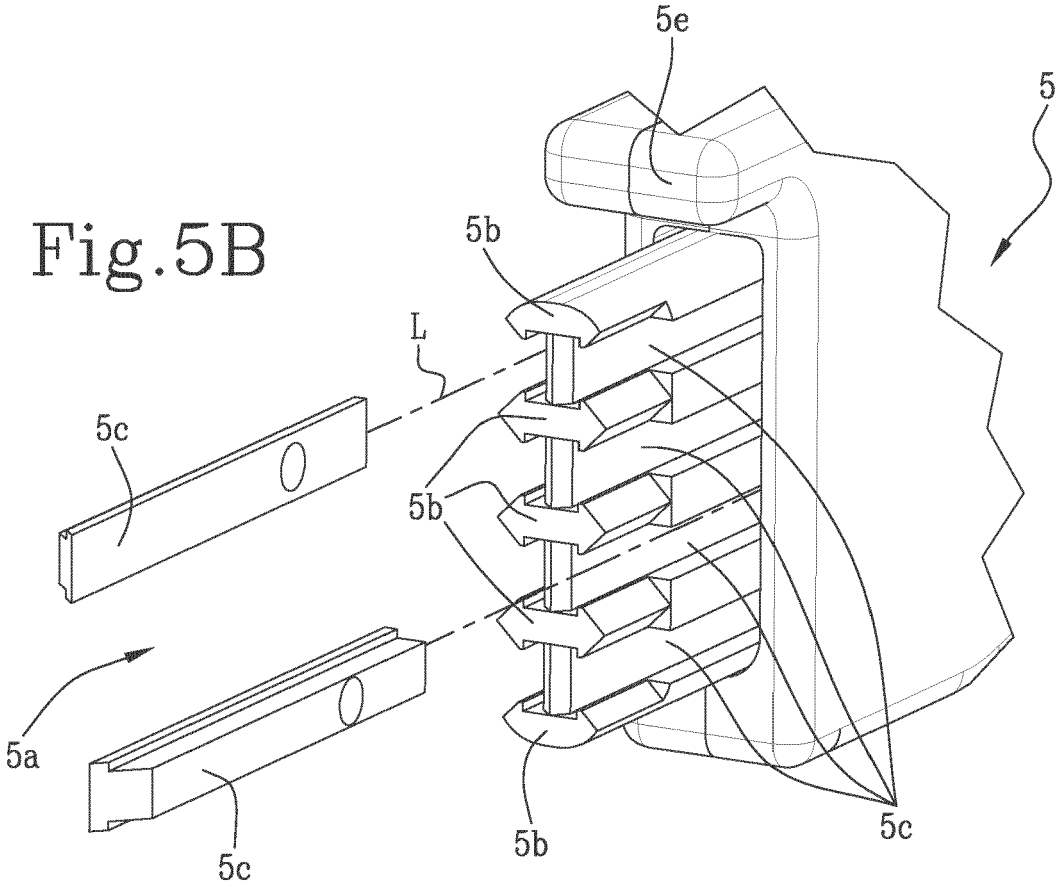


Fig.6A

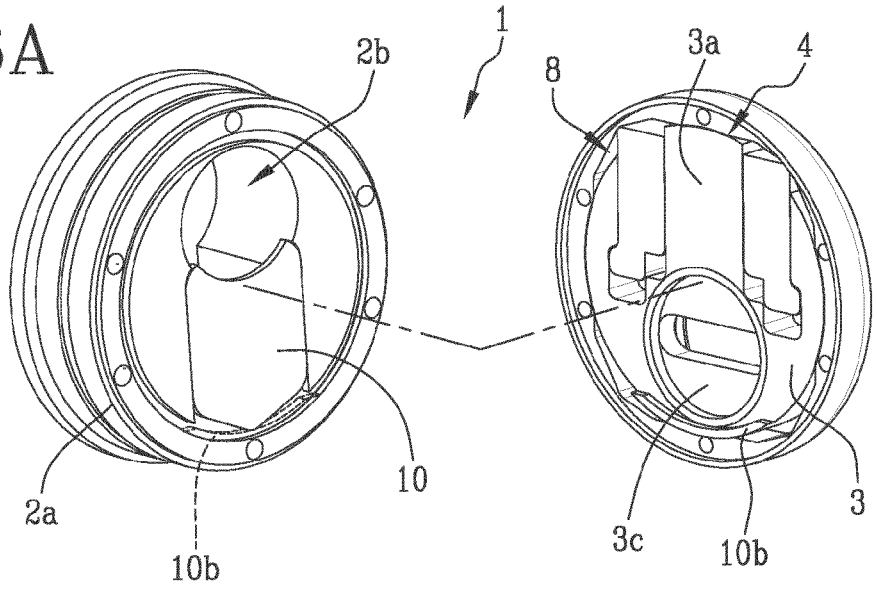



Fig.6B

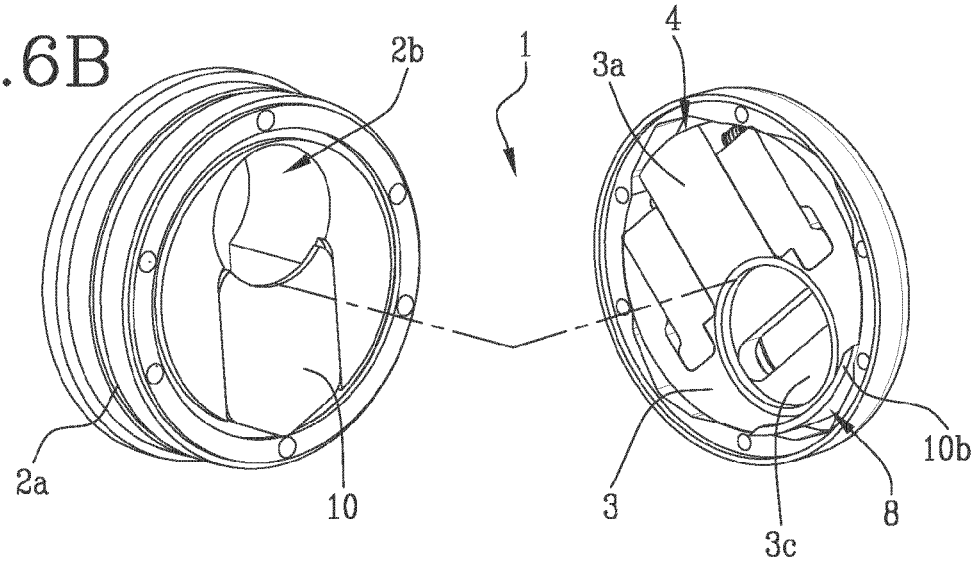
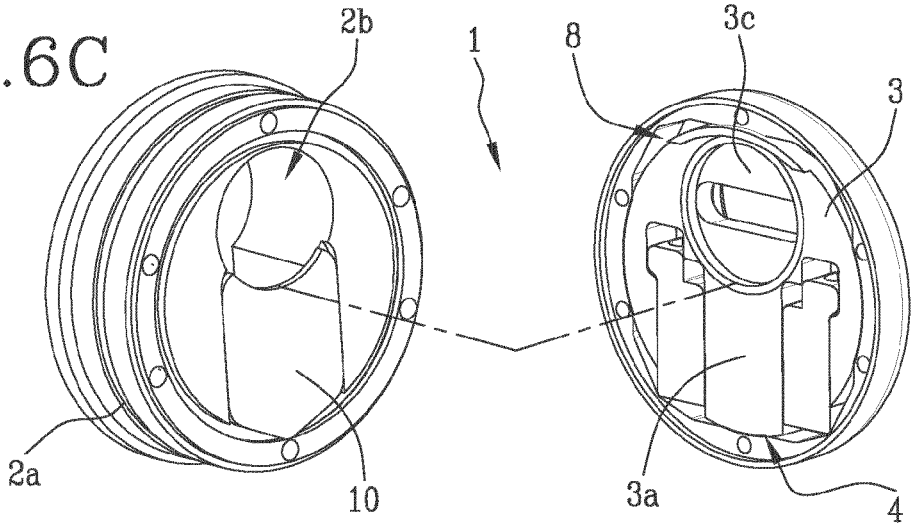



Fig.6C



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# EUROPEAN SEARCH REPORT

Application Number
EP 24 17 4499

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| | | | E05B |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 9 September 2024 | Geerts, Arnold |

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09-09-2024

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