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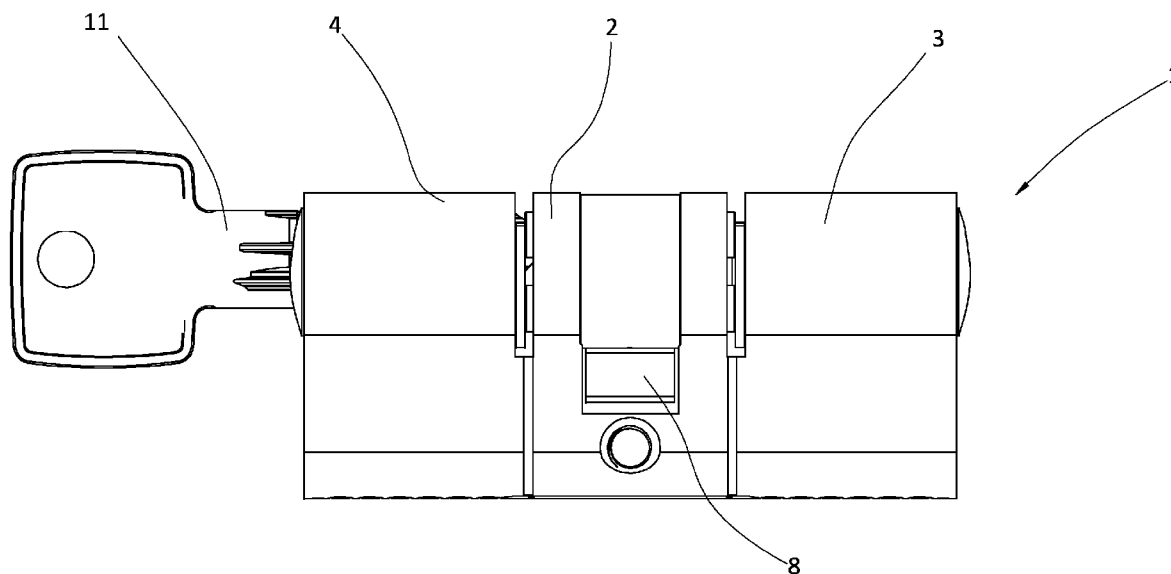


Fig 1

(57) Abstract: The tamper-proof lock cylinder comprises a stator (2, 3, 4) having a cylindrical channel (5), a control cam (6, 7, 8) having a pawl (8) and a cylindrical bushing (6, 7), a right actuating rotor (9, 21) and respectively a left actuating rotor (10, 22) of the control cam (8); the right rotor (9, 21) and respectively the left rotor (10, 22) comprise a right rotor body (9) and respectively a left rotor body (10) positioned in a right side stator portion (3) and respectively in a left side stator portion (4) and a right rotor extension (21) and respectively a left rotor extension (22) engaged in a solidly constrained manner in rotation with the right rotor body (9) and respectively with the left rotor body (10) and positioned in a central stator portion (2); the right rotor extension (21) and respectively the left rotor extension (22) engage and are axially blocked in a right side of the cylindrical bushing (6, 7) and respectively in a left side of the cylindrical bushing (6, 7); inside the cylindrical bushing (6, 7) a cursor (31, 32, 33, 34, 35) is present that is axially slidable between a disconnected position and a solidly constrained connected position of rotation of the cylindrical bushing (6, 7), which is selected between either the right rotor extension (21) or the left rotor extension (22); the stator (2, 3, 4) supports a first breakage sensor

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(42) of a facilitated breakage right section (19) and second breakage sensor (43) of a facilitated breakage left section (20) of the stator; in the central stator portion (2) a first security pin (45) and respectively a second security pin (46) are present that are moveable to solidly constrain in rotation the cylindrical bushing (6, 7) to the right rotor extension (21) and respectively to the left rotor extension (22), a first actuating element (47) of the first security pin (45) controlled by the second breakage sensor (43) and a second actuating element (48) of the second security pin (46) controlled by the first breakage sensor (42).

TAMPER-PROOF LOCK CYLINDER

DESCRIPTION

The present invention relates to a cylinder of a tamper-proof lock.

The cylinder to which reference is made comprises a stator, a cylindrical channel that extends over the entire axis of the stator, a rotatable control cam, a right actuating rotor and respectively a left actuating rotor of the cam positioned in the cylindrical channel.

In a cylinder of this type the stator comprises a central stator portion in which the bushing is positioned, a right side stator portion cooperating with the right rotor to provide a right encryption of the cylinder, a left side stator portion cooperating with the left rotor to provide a left encryption of the cylinder.

A cylinder of such a type can be provided with a suitable tamper-proof system that provides a facilitated breakage right section in the stator and respectively a facilitated breakage left section connecting the right stator portion and respectively the left stator portion to the central stator portion.

The cylinder has a sensor that detects the splitting of the stator at one of the facilitated breakage sections to trigger a blocking element blocking the rotation of the rotor that remains in the cylinder.

These tamper-proof systems can have some drawbacks.

In particular, the blocking element can be arranged in a position that, after splitting of the stator, is not protected.

In this case, after splitting of the stator, the blocking element can be attacked to release rotation

of the cam.

In other cases, after splitting of the stator, zones are exposed that can be easily attacked to break the cylinder for example with a drill bit or with other tools.

The technical task of the present invention is, therefore, to provide a tamper-proof lock which eliminates the decried technical drawbacks of the prior art.

Within the scope of this technical task, one aim of the invention is to realize a cylinder of a tamper-proof lock, the tamper-proof lock being configured to effectively withstand forcing of the cam. The technical task and these and other objects according to the present invention are achieved by making a tamper-proof lock cylinder comprising an axially extended stator, a cylindrical channel extending for the full axis of said stator, a control cam comprising a pawl and a cylindrical bushing positioned rotatably in said cylindrical channel, a right rotor and respectively a left rotor actuating said control cam positioned in said cylindrical channel, said stator comprising a central stator portion in which said cylindrical bushing is positioned, a right side stator portion having, in cooperation with said right rotor, a right encryption of the cylinder, a left side stator portion having, in cooperation with said left rotor, a left encryption of said cylinder, a facilitated breakage right section and respectively a facilitated breakage left section connecting said right stator portion and respectively said left stator portion to said central stator portion; characterised in that:

- said right rotor and respectively said left rotor comprise a right rotor body and respectively a left rotor body positioned in said right side stator portion and respectively in said left side stator portion and a right rotor extension and respectively a left rotor extension engaged in a solidly

constrained manner with said right rotor body and respectively with said left rotor body and positioned in said central stator portion;

- said right rotor extension and respectively said left rotor extension are engaged and are axially blocked in a right side of said cylindrical bushing and respectively in a left side of said cylindrical bushing;

- inside said cylindrical bushing there is a cursor that is axially slidable between a disconnected position and a connected position that is solidly constrained in rotation of said cylindrical bushing selectively to either said right rotor extension or said left rotor extension;

- said stator supports a first breakage sensor of said facilitated breakage right section and a second breakage sensor of said facilitated breakage left section;

- in said central stator portion, a first security pin and respectively a second security pin are present that are movable radially with respect to the axis of said cylindrical channel to solidly constrain in rotation said cylindrical bushing to said right rotor extension and respectively to said left rotor extension, a first actuating element of said first security pin controlled by said second breakage sensor and a second actuating element of said second security pin controlled by said first breakage sensor.

Advantageously, the security pin that blocks the rotor that remains in the cylinder after splitting of the stator is in a remote position and is thus difficult to reach from the zone of the cylinder that remains exposed to the attack of the intruder.

Further, the zone of the cylinder that remains exposed to the attack of the intruder does not offer significant attack surfaces so that the action of the intruder is further hindered.

Advantageously, the components of the tamper-proof system of the right rotor are arranged specularly with respect to the components of the tamper-proof system of the left rotor.

In particular the components of the tamper-proof system of the right rotor are the same as the components of the tamper-proof system of the left rotor 7.

Advantageously, in view of the specularity of the tamper-proof system, the cylinder can be mounted with the right side or left side positioned on the attackable side of the door or window, i.e. the outer side of the door or window, thus halving the production codes in the catalogue.

If the length of the right and left side stator portions is equal, the cylinder can be mounted on the door or window regardless of whether the right or left side is positioned on the outer side of the door or window.

If on the other hand the length of the right and left side stator portions is different, the cylinder can be mounted with opposite orientation on two different doors or windows.

Advantageously, the cursor exploits a construction already known in cylinders devoid of a tamper-proof system.

Advantageously, also the single-body stator uses a construction already known in cylinders devoid of a tamper-proof system, except for the provision of facilitated breakage sections.

Other features of the present invention are further defined in the subsequent claims.

Further characteristics and advantages of the invention will more fully emerge from the description of a preferred but not exclusive embodiment of the cylinder of a tamper-proof lock according to the invention, illustrated by way of non-limiting example in the appended drawings, wherein:

figure 1 shows a lateral elevation of the cylinder with the key inserted into the left rotor;

figure 2 shows a frontal view of the cylinder of figure 1;

figure 3 shows a lateral elevation view of the cylinder sectioned along the line R-R of figure 2;

figure 4 shows a top plan view of the cylinder sectioned along the line T-T of figure 3;

figure 5 shows a bottom plan view of the cylinder sectioned along the line U-U of figure 3;

figure 6 shows a frontal view of the cylinder after splitting of the stator at the facilitated breakage left section;

figure 7 shows a lateral elevation view of the cylinder sectioned along the line R-R of figure 6;

figure 8 shows a top plan view of the cylinder sectioned along the line T-T of figure 6;

figure 9 shows a bottom plan view of the cylinder sectioned along the line U-U of figure 6; and

figure 10 shows an exploded perspective view of the cursor extracted from the bushing.

With reference to the figures mentioned, a cylinder of a tamper-proof lock is shown, indicated overall with the reference number 1.

The cylinder 1 comprises a stator 2, 3, 4 extending axially inside which a cylindrical channel 5 is provided that extends along the entire axis of the stator 2, 3, 4.

The stator 2, 3, 4 supports a cam comprising a pawl 8 and a cylindrical bushing 6, 7 positioned coaxially to the cylindrical channel 5 and rotatable around the axis thereof.

The pawl 8 of the control cam 6, 7, 8 drives the bolt of the lock (not shown).

The bushing 6, 7 has a symmetrical construction with respect to the middle plane thereof that is orthogonal to the axis of the cylindrical channel 5.

In the case shown, to permit mounting, the cylindrical bushing 6, 7 comprises an outer

cylindrical element 6 that supports externally the pawl 8, and an inner cylindrical element 7.

The outer cylindrical element 6, the pawl 8, and the inner cylindrical element 7 are reciprocally fixed by a fixing pin 18.

In the cylindrical channel 5 of the stator 2, 3, 4, a right actuating rotor 9, 21 and respectively a left actuating rotor 10, 22 are positioned that rotate the pawl 8.

The rotors 9, 21, and 10, 22 have in a known manner a slot into which to insert a key 11.

The stator 2, 3, 4 comprises a central stator portion 2 wherein the bushing 6, 7 is positioned, a right side stator portion 3 having, in cooperation with the right rotor 9, a right encryption of the cylinder 1, and a left side stator portion 4 having, in cooperation with the left rotor 10, a left encryption of the cylinder 1.

The stator 2, 3, 4 further has a facilitated breakage right section 19 and respectively a facilitated breakage left section 20 connecting the right stator portion 3 and respectively the left stator portion 4 to the central stator portion 2.

Further, the stator 2, 3, 4 supports a first breakage sensor 42 of the facilitated breakage right section 19 of the stator 2, 3, 4 and a second breakage sensor 43 of the facilitated breakage left section 20 of the stator 2, 3, 4.

The right rotor 9, 21 and respectively the left rotor 10, 22 comprise a right rotor body 9 and respectively a left rotor body 10 positioned in the right side stator portion 3 and respectively in the left side stator portion 4, and a right rotor extension 21 and respectively a left rotor extension 22 engaged in a solidly constrained manner in rotation with the right rotor body 9 and respectively with the left rotor body 10 and positioned in the central stator portion 2.

The right encryption comprises a series of pins 12 that are movable in radial channels of the right rotor body 9, communicating with the slot for the key 11 for interacting with the profile of the key 11 and a series of counterpins 13 that are movable in the right side stator portion 3 in contrast to and through the action of suitable springs 14.

The left encryption comprises a series of pins 15 that are movable in radial channels of the left rotor body 10 and communicate with the slot for the key 11 for interacting with the profile of the key 11 itself and a series of counterpins 16 that are movable in the left side stator portion 3 in contrast to and through the action of suitable springs 17.

When the key 11 is inserted into the slot of a rotor 9, 21 and 10, 22, the pins 12, 15 and the counterpins 13, 16 are actuated so that the contact area of the pins 12, 15 and the counterpins 13, 16 is aligned on the surface of the cylindrical channel 5 and rotation of the rotor 9, 21 and 10, 22 can thus occur.

When instead the key 11 is not inserted into the slot of a rotor 9, 21 and 10, 22, the contact area of the pins 12, 15 and the counterpins 13, 16 is offset from the surface of the cylindrical channel 5 and rotation of the rotor 9, 21 and 10, 22 cannot occur.

Each rotor body 9, 10 and the corresponding rotor extension 21, 22 are joined together by frontal enmeshing toothing 23, 24 that makes the rotor body 9, 10 and the rotor extension 21, 22 solid in rotation.

The right rotor extension 21 and respectively the left rotor extension 22 engage with a right side of the bushing 6, 7 and respectively with a left side of the bushing 6, 7.

The right rotor extension 21 and the left rotor extension 22 have an axially hollow cylinder shape

and are arranged symmetrically with respect to the middle plane of the bushing 6, 7 orthogonal to the axis of the cylindrical channel 5.

In particular the right rotor extension 21 and respectively the left rotor extension 22 have the outer cylindrical surface joined to the inner cylindrical surface of the bushing 6, 7, and in particular to the inner cylindrical surface of the inner cylindrical element 7.

Each rotor extension 21, 22 is blocked axially in the bushing 6, 7.

In particular, each rotor extension 21, 22 has an outer perimeter channel 25, 26 in which a corresponding axial block elastic ring 27, 28 is positioned that is engaged in an inner perimeter channel 29, 30 of the inner cylindrical element 7 of the bushing 6, 7.

Inside the bushing 6, 7 there is a cursor 31, 32, 33, 34, 35 that is axially slidable between a disconnected position and a connected position of bushing 6, 7 solidly constrained in rotation selectively with either the right rotor extension 21 and the left rotor extension 22.

The cursor 31, 32, 33, 34, 35 comprises a pin 31 on which a right ring 32 and a left ring 33 are fitted centrally that are freely rotatable, and at the ends a fixed right ring 34 and a fixed left ring 35 are fitted that block the axial position on the pin 31 of the rotatable rings 32, 33.

All the rings 32, 33, 34, 35 have the same outer diameter so as to define overall an outer cylindrical surface of the cursor 31, 32, 33, 34, 35 guided by the inner cylindrical surface of the right and left rotor extensions 21, 22.

The right rotatable ring 32 is permanently solidly constrained in rotation to the right rotor extension 21 and can be made solidly constrained in rotation to the bushing 6, 7.

For this purpose, the right rotatable ring 32 has at least one outer radial protrusion 37 that is

slidably engaged in a permanent manner in a corresponding axial guide 38 present on the right rotor extension 21 and slidingly engageable in an axial guide 39 present in the bushing 6, 7 and in particular in the inner cylindrical element 7 of the bushing 6, 7. Only when the outer radial protrusion 37 of the right rotatable ring 32 is engaged both with the axial guide 38 present on the right rotor extension 21 and with the axial guide 39 present in the bushing 6, 7, are the right rotor extension 21 and the control cam 6, 7 solidly constrained in rotation.

Similarly, the left rotatable ring 33 is permanently solidly constrained in rotation with the right rotor extension 22 and can be made solidly constrained to the bushing 6, 7.

For this purpose, the left rotatable ring 33 has at least one outer radial protrusion 40 permanently and slidingly engaged in a corresponding axial guide 41 present on the left rotor extension 22 and slidingly engageable in the axial guide 39 present in the bushing 6, 7 alternatively to the radial protrusion 37 of the right rotatable ring 32. Only when the outer radial protrusion 40 of the left rotatable ring 33 is engaged both with the axial guide 41 present on the left rotor extension 22 and with the axial guide 39 present in the bushing 6, 7, are the left rotor extension 22 and the control cam 6, 7 solidly constrained in rotation.

In the illustrated solution both the right rotatable ring 32 and the left rotatable ring 33 have, for example, two diametrically aligned radial protrusions 37 and 40 respectively.

In the central stator portion 2 a first security pin 45 and respectively a second security pin 46 are present that are movable radially with respect to the axis of the cylindrical channel 5 of the stator 2, 3, 4 to solidly constrain in rotation the bushing 6, 7 to the right rotor extension 21 and respectively to the left rotor extension 22.

In particular the bushing 6, 7 and the right rotor extension 21 have aligned holes 49, 50, when the pins 12 are coaxial with the counterpins 13, along the radial movement direction of the first security pin 45 to insert the first security pin 45.

Similarly, the bushing 6, 7 and said left rotor extension 22 have aligned holes 51, 52, when the pins 15 are coaxial with the counterpins 16, along the radial movement direction of the second security pin 46 to insert the second security pin 46.

In the central stator portion 2 a first actuating element 47 of the first security pin 45 that is controlled by the second breakage sensor 43 and a second actuating element 48 of the second security pin 46 controlled by the first breakage sensor 42 are moreover present.

The first actuating element 47 and the second actuating element 48 are arranged symmetrically in the central stator portion 2 with respect to the middle plane of the bushing 6, 7.

The first actuating element 47 and the first security pin 45 are housed slidingly in a first secondary channel 57 of the central stator portion 2 that extends radially with the respect to the axis of the cylindrical channel 5 between a first end that opens in the cylindrical channel 5 and a second end that opens on an outer surface of the central stator portion 2.

The first actuating element 47 comprises a sliding rod 53 in contrast to and through the action of an elastic element 54.

The rod 53 comprises a support head 55 of the first security pin 45 and a coupling tail 56 for the second sensor 43.

The elastic element 54 as illustrated can be a helical spring fitted to the rod 53 and interposed between a rear shoulder of the head 55 of the rod 53 and an inner shoulder 58 of the secondary

channel 57.

Similarly, the second actuating element 48 and the second security pin 46 are housed slidably in a second secondary channel 59 of the central stator portion 2 that extends radially with respect to the axis of the cylindrical channel 5 between a first end that opens in the cylindrical channel 5 and a second end that opens on an outer surface of the central stator portion 2.

The second actuating element 48 has a similar structure to the first actuating element 47 and accordingly comprises a slidable rod 60 that is slidable in contrast to and through the action of an elastic element 61. The rod 60 comprises a support head 62 of the second security pin 46 and a coupling tail 63 for the first sensor 42. The elastic element 61 as illustrated can be a helical spring fitted to the rod 60 and interposed between a rear shoulder of the head 62 of the rod 60 and an inner shoulder 64 of the secondary channel 59.

In one embodiment of the invention each actuating element 47, 48 and the corresponding security pin 45, 46 are structurally independent magnetic interaction elements, for example an element that is at least partially made of ferromagnetic material and an element that is at least partially made of permanent magnetic material.

Alternatively, each actuating element 47, 48 and the corresponding security pin 45, 46 are connected in a single piece by a facilitated breakage section.

The first sensor 42 comprises a wire spring coupled with the second actuating element 48 and with the right side stator portion 3.

The first sensor 42 retains the second actuating element 48 in the standby position with the elastic element 61 loaded and ready to trip if the first sensor 42 uncouples from the second

actuating element 48.

When the first sensor 42 uncouples from the second actuating element 48, the second actuating element 48 drags the second security pin 46 until it is introduced in the aligned holes 51, 52 of the bushing 6, 7 and of the left rotor extension 22.

Also the second sensor 43 comprises a wire spring coupled with the first actuating element 47 and with the left side stator portion 4.

The second sensor 43 retains the first actuating element 47 in the standby position with the elastic element 54 loaded and ready to trip if the second sensor 43 uncouples from the first actuating element 47.

When the second sensor 43 uncouples from the first actuating element 47, the first actuating element 47 drags the first security pin 45 until it is introduced in the aligned holes 49, 50 of the bushing 6, 7 and of the right rotor extension 21.

The operation of the cylinder of the tamper-proof lock is briefly as follows:

When the intruder forces the left stator portion 4, this detaches from the rest of the stator body 2, 3, 4, together with the left rotor body 10.

Through the effect of the detachment of the left stator portion 4 from the central stator portion 2, the second sensor 43 automatically frees the first actuating element 47 that through the now unopposed action of the elastic element 54 moves, dragging the first security pin 45 into the aligned holes 49, 50 of the bushing 6, 7 and of the right rotor extension 21.

The first security pin 47 in this position makes the bushing 6, 7 and the right rotor extension 21 solidly constrained in rotation.

In the absence of a key 11 inserted into the right rotor body 9, the contact area of the pins 12 and the counterpins 13 of the right encryption of the cylinder 1 is offset from the surface of the cylindrical channel 5 and the rotation of the pawl 8 is blocked.

Similarly, when the intruder forces the right stator portion 3 it detaches from the rest of the stator body 2, 3, 4, together with the right rotor body 9.

Through the effect of the detachment of the right stator portion 3 from the central stator portion 2, the first sensor 42 automatically frees the second actuating element 48 that through the now unopposed action of the elastic element 61 moves, dragging the second security pin 46 to the aligned holes 51, 52 of the bushing 6, 7 and of the left rotor extension 22.

The first security pin 47 in this position makes the bushing 6, 7 and the left rotor extension 22 solid in rotation.

In the absence of a key 11 inserted into the left rotor body 10, the contact area of the pins 15 and the counterpins 16 of the left encryption of the cylinder 1 is offset from the surface of the cylindrical channel 5 and the rotation of the pawl 8 is blocked.

The tamper-proof lock cylinder as conceived herein is susceptible of numerous modifications and variants, all falling within the scope of the inventive concept; furthermore, all the details are replaceable by technically equivalent elements.

In practice the materials used, as well as the dimensions, can be any according to the needs and the state of the art.

CLAIMS

1. A tamper-proof lock cylinder (1) comprising an axially extended stator (2, 3, 4), a cylindrical channel (5) extending for the full axis of said stator (2, 3, 4), a control cam (6, 7, 8) comprising a cylindrical bushing (6, 7) positioned rotatably in said cylindrical channel (5) and a pawl (8) supported by said cylindrical bushing (6, 7), a right rotor (9, 21) and respectively a left rotor (10, 22) actuating said control cam (6, 7, 8) positioned in said cylindrical channel (5), said stator (2, 3, 4) comprising a central stator portion (2) in which said cylindrical bushing (6, 7) is positioned, a right side stator portion (3) having, in cooperation with said right rotor (9, 21), a right encryption of the cylinder (1), a left side stator portion (4) having, in cooperation with said left rotor (10, 22), a left encryption of said cylinder (1), a facilitated breakage right section (19) and respectively a facilitated breakage left section (20) connecting said right stator portion (3) and respectively said left stator portion (4) to said central stator portion (2); characterised in that:
 - said right rotor (9, 21) and respectively said left rotor (10, 22) comprise a right rotor body (9) and respectively a left rotor body (10), positioned in said right side stator portion (3) and respectively said left side stator portion (4), and a right rotor extension (21) and respectively a left rotor extension (22), solidly constrained in rotation with said right rotor body (9) and respectively said left rotor body (10), and positioned in said central stator portion (2);
 - said right rotor extension (21) and respectively said left rotor extension (22) are engaged and axially blocked into a right side of said cylindrical bushing (6, 7) and respectively a

left side of said cylindrical bushing (6, 7);

- inside said cylindrical bushing (6, 7) there is a slide (31, 32, 33, 34, 35) axially slidable between a disconnected positioned and a connected position solidly constrained in rotation of said cylindrical bushing (6, 7) selectively with either said right rotor extension (21) or said left rotor extension (22);

- said stator (2, 3, 4) supports a first breakage sensor (42) of said facilitated breakage right section (19) and a second breakage sensor (43) of said facilitated breakage left section (20);

- said central stator portion (2) has a first security pin (45) and respectively a second security pin (46) radially slidable relative to the axis of said cylindrical channel (5) to solidly constrain said cylindrical bushing (6, 7) in rotation with said right rotor extension (21) and respectively said left rotor extension (22), a first actuating element (47) of said first security pin (45) controlled by said second breakage sensor (43) and a second actuating element (48) of said second security pin (46) controlled by said first breakage sensor (42).

2. The tamper-proof lock cylinder according to claim 1, characterised in that said cylindrical bushing (6, 7) has a symmetrical construction relative to its centre plane orthogonal to said axis of said cylindrical channel (5), in that said right rotor extension (21) and said left rotor extension (22) are equal and arranged symmetrically relative to said centre plane of said cylindrical bushing (6, 7).
3. The tamper-proof lock cylinder according to the preceding claim, characterised in that said

first actuating element (47) and said second actuating element (48) are equal and arranged symmetrically relative to said centre plane, and in that said first security pin (45) and said second security pin (46) are equal and arranged symmetrically relative to said centre plane of said cylindrical bushing (6, 7).

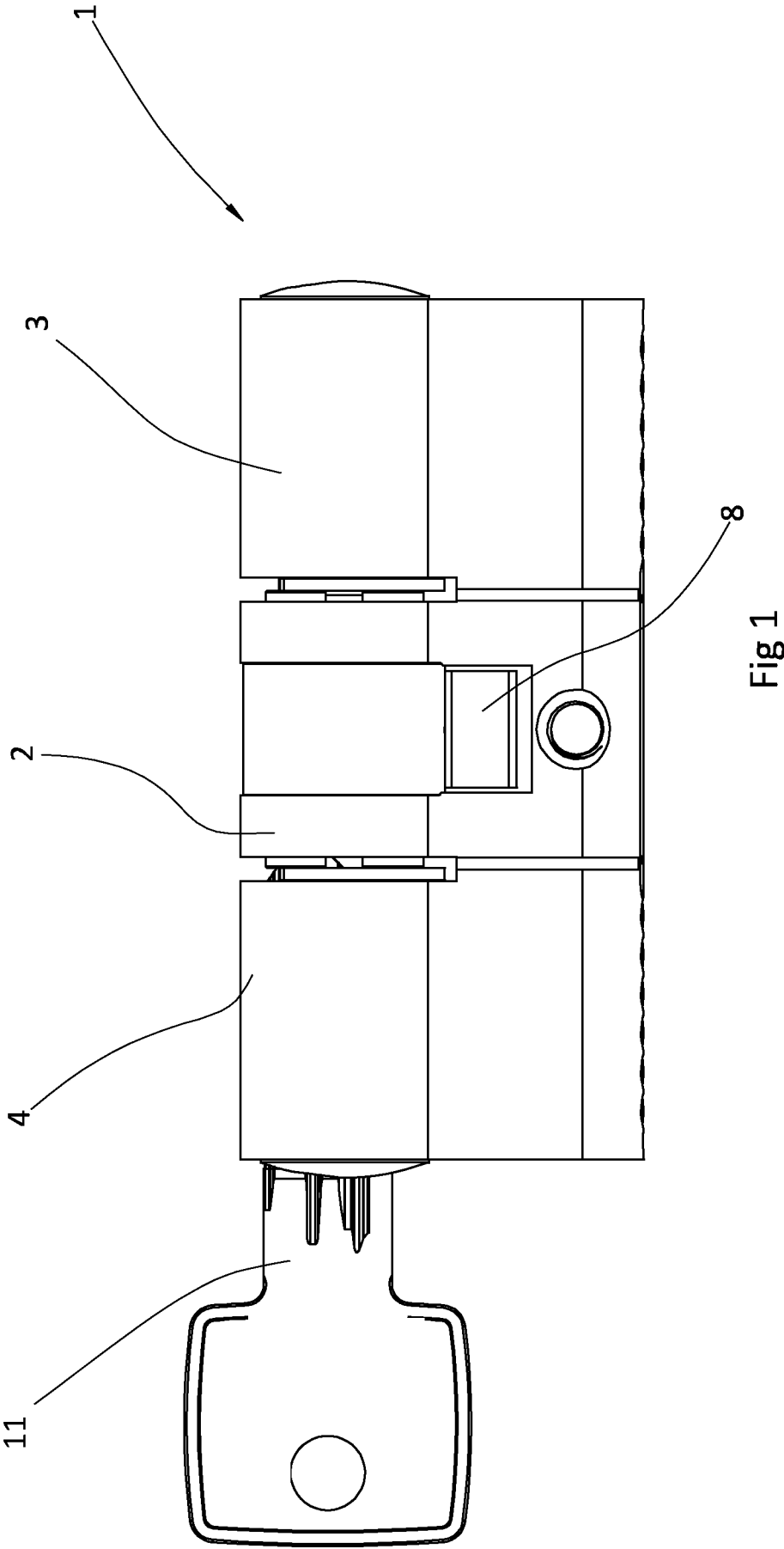
4. The tamper-proof cylinder according to any one of the preceding claims, characterised in that said slide (31, 32, 33, 34, 35) comprises an axial pin (31) to which a right ring (32) and a left ring (33) are keyed in an axial blocked position and in free rotation, said right ring (32) having at least one outer radial protrusion (37) engaged in an axial guide (38) afforded in said right rotor extension (21) and engageable in an axial guide (39) afforded in said cylindrical bushing (6, 7) so that said cylindrical bushing (6, 7) is solidly constrained in rotation with said right rotor extension (21), said left ring (33) having at least one outer radial protrusion (40) engaged in an axial guide (41) afforded in said left rotor extension (22) and engageable in said axial guide (39) afforded in said cylindrical bushing (6, 7) as an alternative to said outer radial protrusion (37) of said right ring (32) so that said cylindrical bushing (6, 7) is solidly constrained in rotation with said left rotor extension (22).
5. The tamper-proof lock cylinder according to any one of the preceding claims, characterised in that, when said stator body (2, 3, 4) is broken at one facilitated breakage section (19, 20), a security pin (46, 47) snaps into the corresponding aligned holes (49, 50, 51, 52) to block the rotation of said control cam (8).
6. The tamper-proof lock cylinder according to any one of the preceding claims, characterised

in that each rotor extension (21, 22) has an outer surface of conjugate shape with an inner surface of said cylindrical bushing (6, 7), and an inner surface of conjugated shape with an outer surface of said slide (31, 32, 33, 34, 35).

7. The tamper-proof lock cylinder according to any one of the preceding claims, characterised in that each encryption comprises alignable pins (12, 15) and counterpins (13, 16), in that, when the pins (12) and counterpins (13) of said right encryption are aligned, said cylindrical bushing (6, 7) and said right rotor extension (21) have first holes (49, 50) aligned as seatings for said first security pin (45), said first holes (49, 50) being aligned with a first secondary channel (57) of said central stator portion (2) along which said first actuating element (47) and said first security pin (45) slide, and in that, when the pins (15) and counterpins (16) of said left encryption are aligned, said cylindrical bushing (6, 7) and said left rotor extension (22) have second holes (51, 52) aligned as seating for said second security pin (46), said second holes (49, 50) being aligned with a second secondary channel (59) of said central stator portion (2) along which said second actuating element (48) and said second security pin (46) slide.
8. The tamper-proof lock cylinder according to the preceding claim, characterised in that said secondary channels (57, 59) are arranged symmetrically relative to said centre plane of said cylindrical bushing (6, 7) and have a first end which leads into said cylindrical channel (5) and a second end which leads onto an outer surface of said central stator portion (2).
9. The tamper-proof lock cylinder according to any one of the preceding claims, characterised in that said cylindrical bushing (6, 7) and said right rotor extension (21) are connected with

the interposition of at least one circlip (27) preventing axial extraction, and in that said cylindrical bushing (6, 7) and said left rotor extension (22) are connected with the interposition of at least one circlip (28) preventing axial extraction.

10. The tamper-proof lock cylinder according to any one of the preceding claims, characterised in that each actuating element (47, 48) comprises a rod (53, 60) sliding in contrast and by the action of an elastic element (54, 61).
11. The tamper-proof lock cylinder according to the preceding claim, characterised in that each rod (53, 60) comprises a head (55, 62) pushing against the corresponding security pin (45, 46) and a tail engaging with the corresponding breakage sensor (42, 43).
12. The tamper-proof lock cylinder according to the preceding claim, characterised in that said head (55, 62) of said rod (53, 60) is connected as a single piece with the corresponding security pin (45, 46) by means of a facilitated breakage section.
13. The tamper-proof lock cylinder according to claim 11, characterised in that said head (55, 62) of said rod (53, 60) and the corresponding security pin (45, 46) are magnetic.
14. The tamper-proof lock cylinder according to the preceding claim, characterised in that each breakage sensor (42, 43) comprises a wire spring.
15. The tamper-proof lock cylinder according to the preceding claim, characterised in that each wire spring is engaged with a corresponding side stator portion (3, 4) and with a corresponding actuating element (47, 48) and retains a corresponding actuating element (47, 48) in the standby position in which said elastic element (42, 43) is loaded and ready to trip.



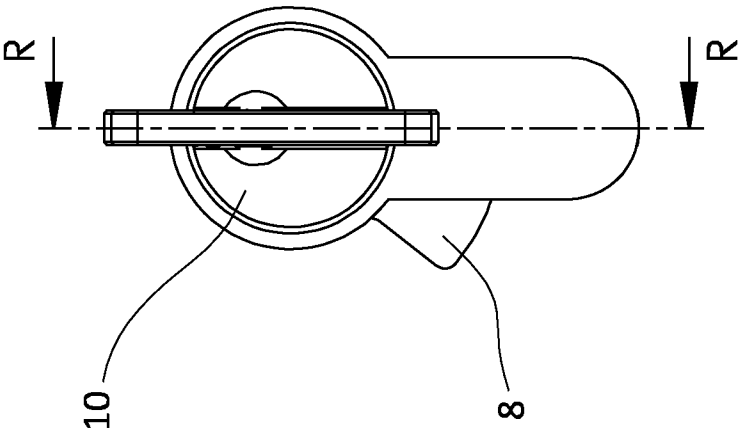


Fig 2

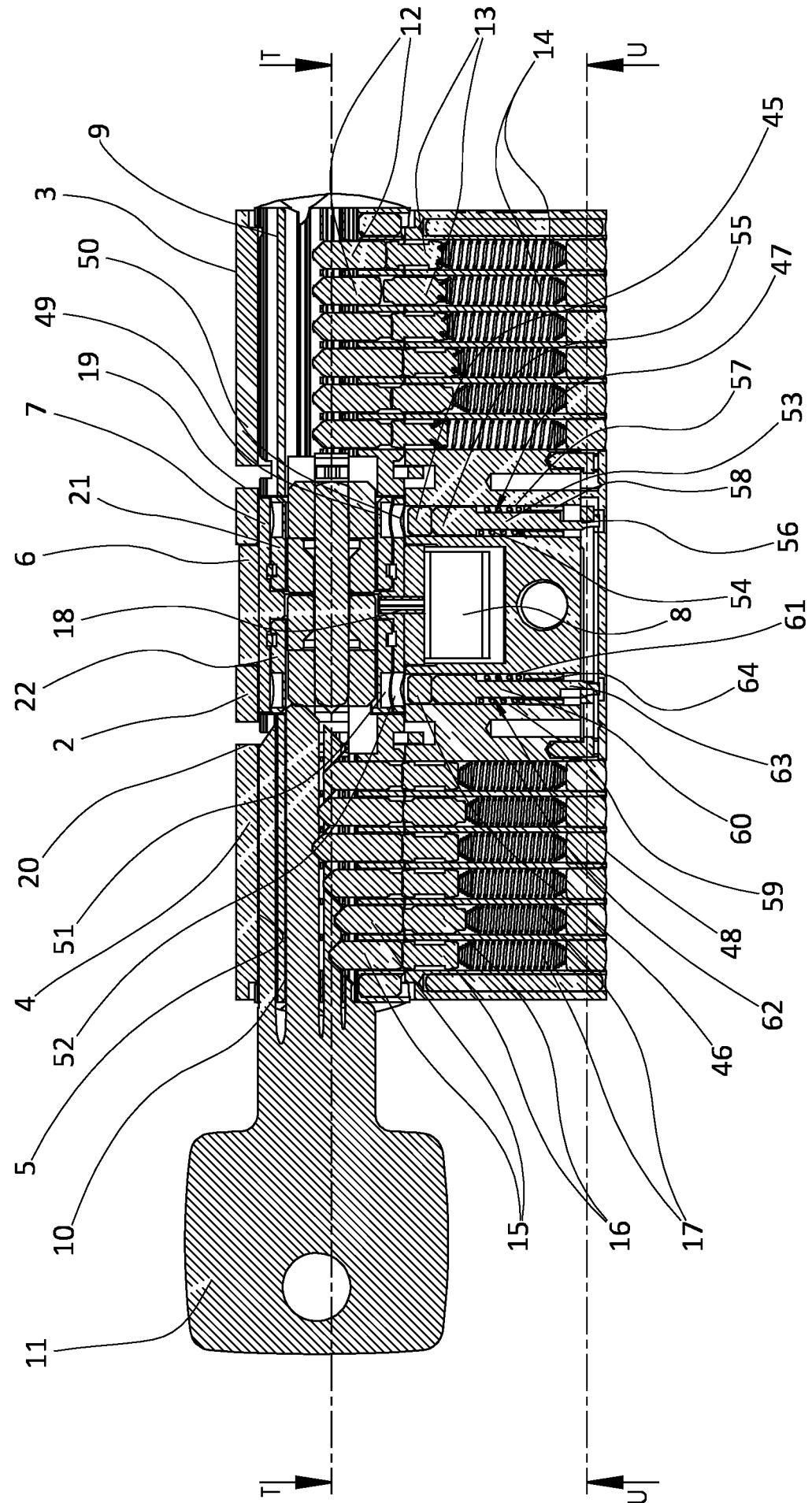


Fig 3

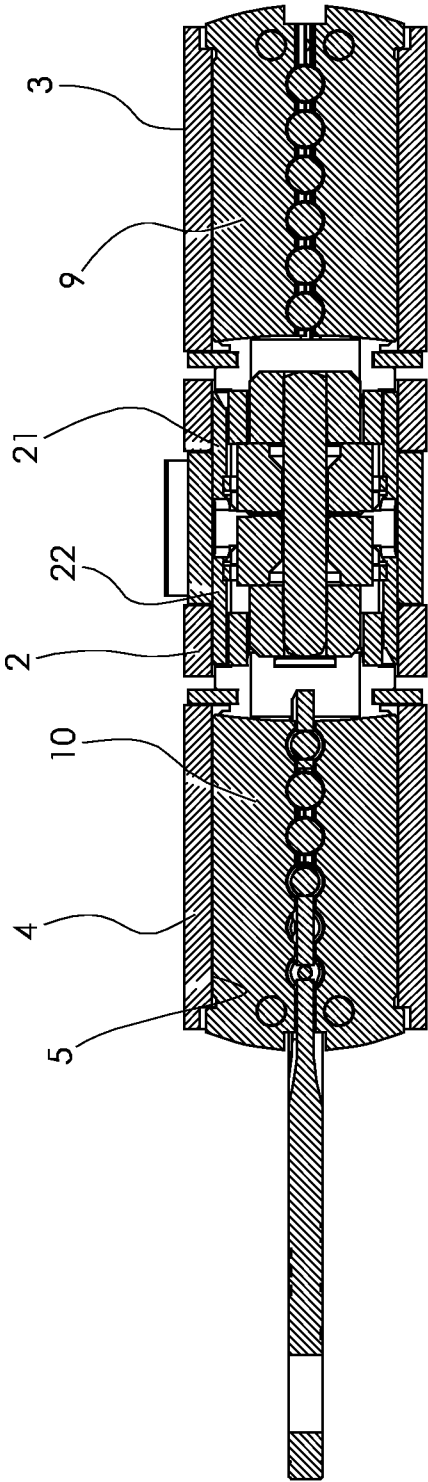


Fig 4

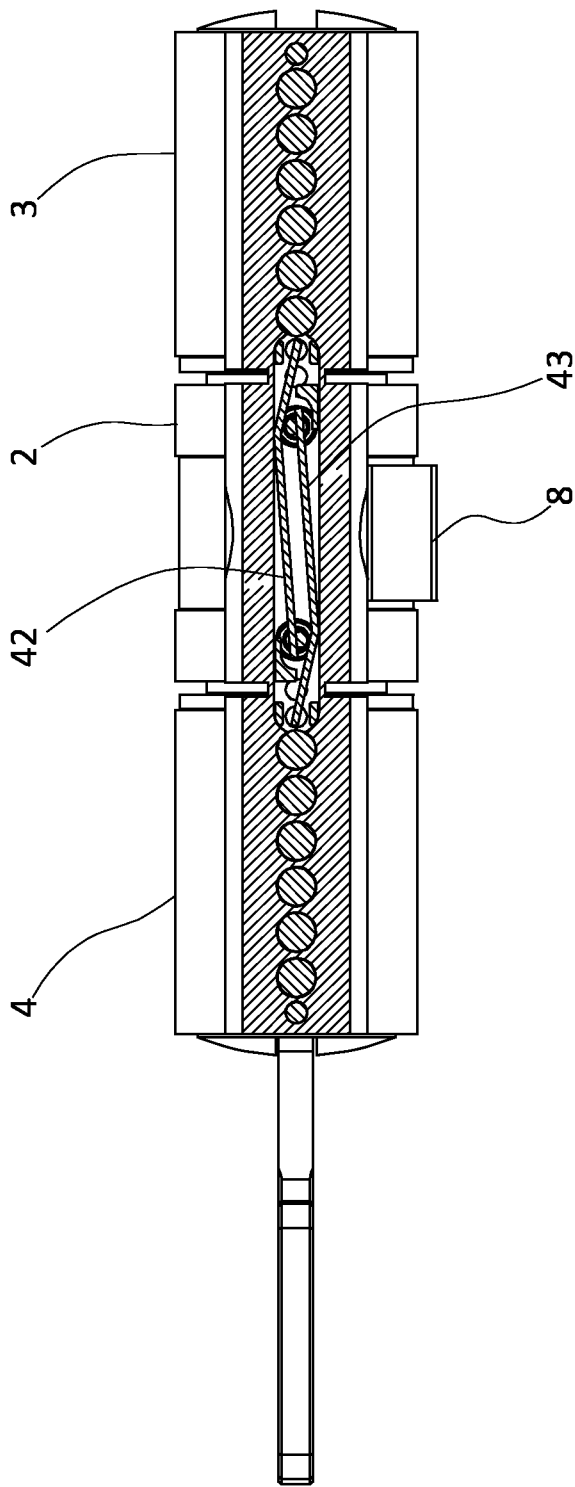
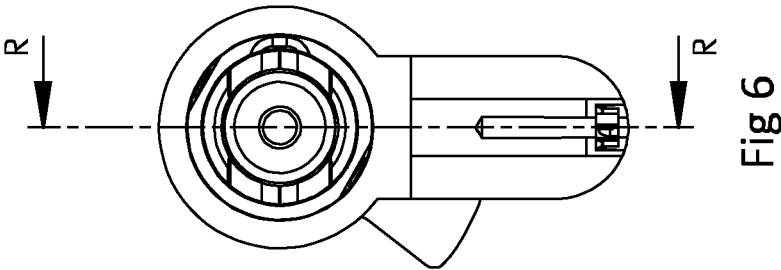


Fig 5



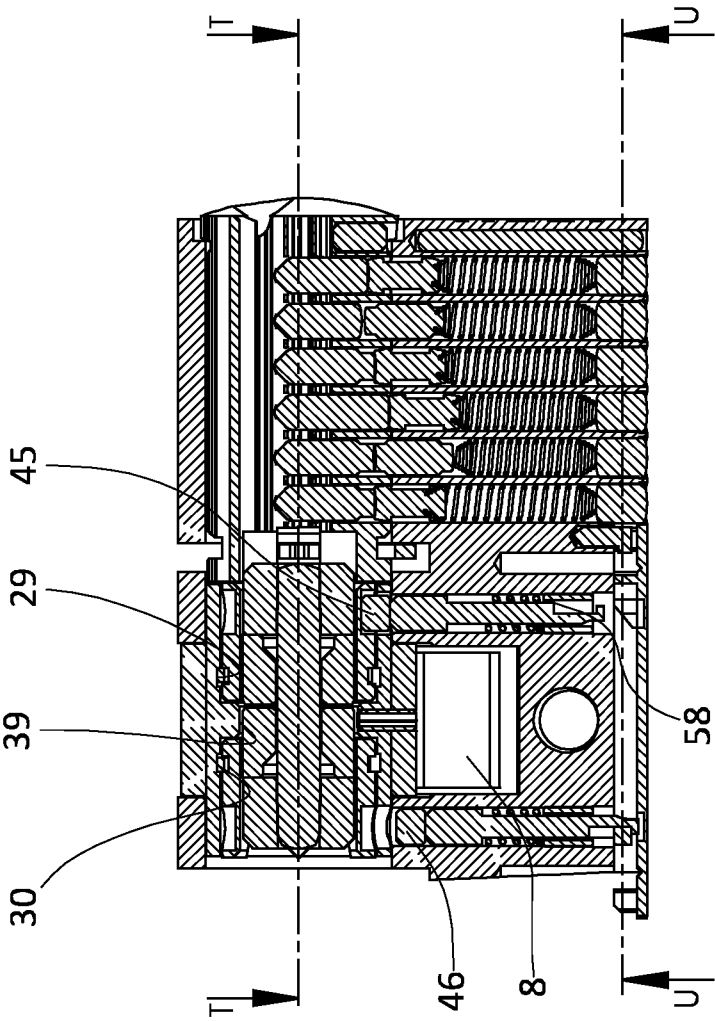


Fig 7

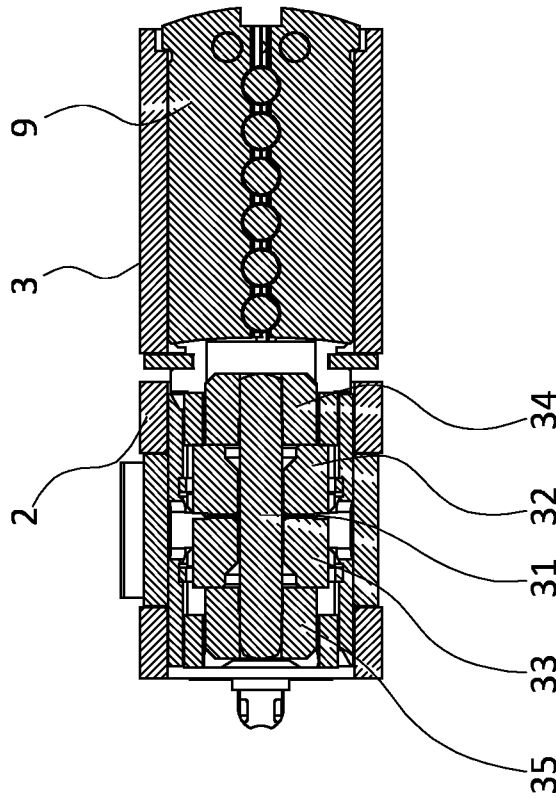


Fig 8

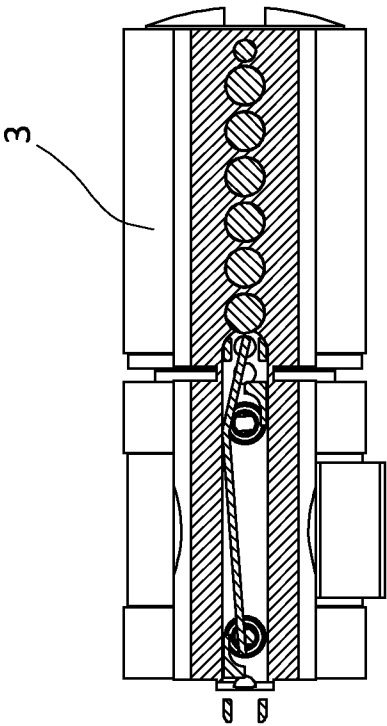


Fig 9

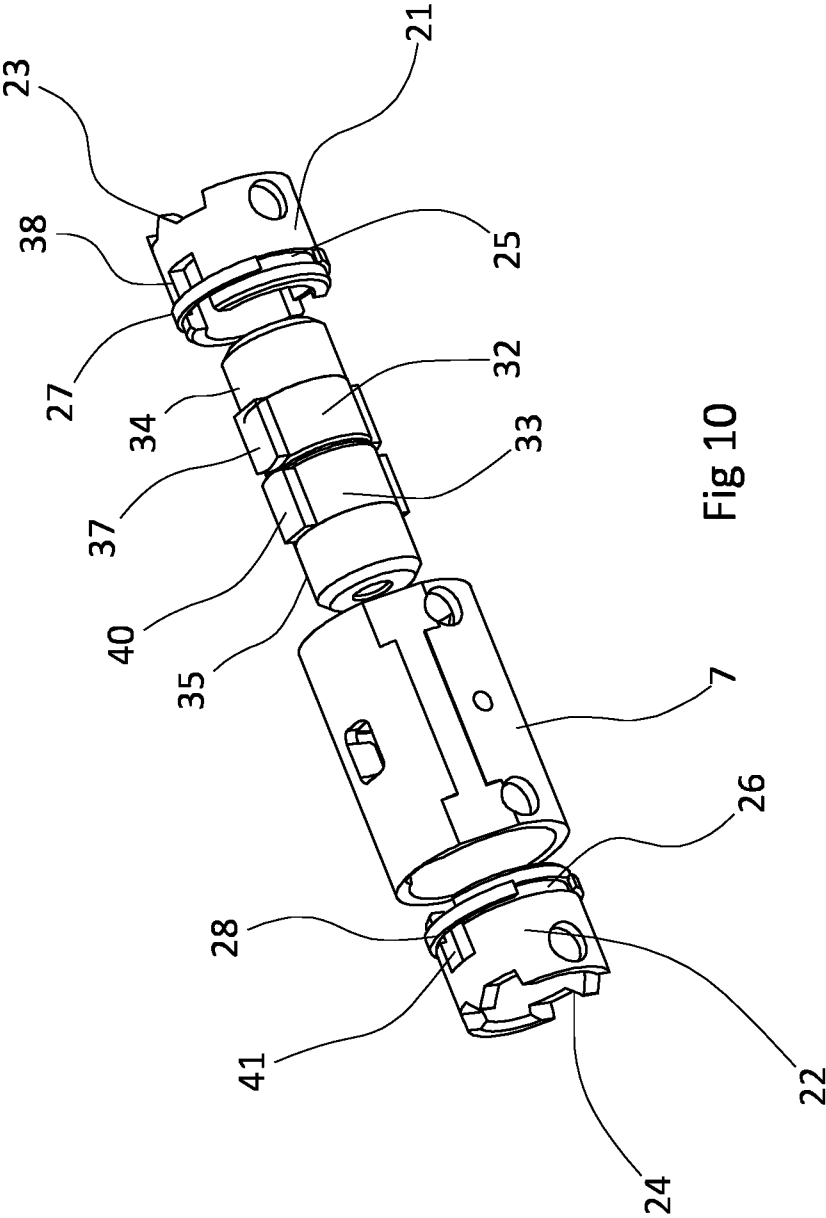


Fig 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/060160

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05B9/10
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2013/312467 A1 (LIU TIEN-KAO [TW]) 28 November 2013 (2013-11-28) Column 1, lines 46-48; column 4, line 43 - column 7, line 38; figures 4-14 -----	1-15
A	GB 2 545 389 A (BANHAM PATENT LOCKS LTD [GB]) 21 June 2017 (2017-06-21) Page 1, line 32; page 8, line 31 - page 17, line 2; figures 2-9 -----	1-15
A	GB 2 549 193 A (K I J SECURITY LOCKS LTD [GB]) 11 October 2017 (2017-10-11) page 1, line 17 - page 5, line 14; figures 1-6 -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

8 May 2019

Date of mailing of the international search report

14/05/2019

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Authorized officer

Goddar, Claudia

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2019/060160

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013312467	A1	28-11-2013	NONE
GB 2545389	A	21-06-2017	NONE
GB 2549193	A	11-10-2017	NONE