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(54) **CYLINDER FOR A LOCK**

ZYLINDER FÜR EIN SCHLOSS

CYLINDRE DESTINÉ À UNE SERRURE

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Description

[0001] The present invention relates to a set of double control cylinders for a lock in which at least one electro-mechanical control device is provided for the operating cam of the lock.

[0002] As is well known, the control device is capable of connecting and disconnecting a corresponding handle to and from the cam of the cylinder to enable and disable opening of the lock.

[0003] The electromechanical control device is generally associated with an external handle of the door and can be actuated by means of a personal electronic card capable of interacting with an electronic controller of the electromechanical device incorporated in the handle, to which it sends a signal for activating the connection for an established time between the handle and the cam.

[0004] A known cylinder of this type displays little versatility of construction, depending on the thickness of the door.

[0005] In short, for different door thicknesses it is generally necessary to provide cylinders of different length and dedicated electromechanical or mechanical control devices. This obviously has negative repercussions on purchasing and stock management. Moreover, a known cylinder of this type has a predefined arrangement of the control devices, which is generally not modifiable and it thus possible neither to exchange the position of the control device applied on the external side of the door and the one applied on the inside, nor to exchange a electromechanical control device with a mechanical one on the same side of the door.

[0006] What is more, the known electromechanical devices can have the drawback of an excessively complicated construction, which requires a large number of components difficult to assemble.

[0007] This complication in regard to assembly is largely a result of the need to provide miniaturised components able to be accommodated in the cylinder of the lock.

[0008] Sometimes, because of their excessively complicated nature, the known electromechanical devices have shown a limited operating reliability and a limited lifespan.

[0009] DE102010018243 discloses a cylinder for a lock according to preamble of claim 1.

[0010] The technical task that the present invention sets itself is thus to realise a set of double control cylinders for a lock which enables the aforesaid drawbacks of the prior art to be overcome. Within the scope of this technical task, one object of the invention is to realise a set of double control cylinders for a lock that has a high flexibility in use, so that it can also be used for different door thicknesses without there being any need to replace all its components.

[0011] Another object of the invention is to realise a set of double control cylinders for a lock having an arrangement of control devices that is simple to modify.

[0012] Another object of the invention is to realise a

set of double control cylinders for a lock having high operating reliability and an extremely solid construction which can assure correct operation for an extended period of use.

[0013] The technical task, as well as these and other objects, according to the present invention, are achieved by realising a set of double control cylinders for a lock as defined by claim 1.

[0014] Other features of the present invention are defined, moreover, in the subsequent claims.

[0015] Additional features and advantages of the invention will be more apparent from the description of a preferred, but not exclusive embodiment of the electromechanical control device for an operating cam of a lock for a cylinder according to the invention, illustrated by way of non-restrictive example in the appended drawings, in which:

figure 1 shows an exploded view of the electromechanical device;

figure 2 shows the cylinder incorporating the electromechanical device of figure 1, sectioned along the vertical medium plane of the cylinder, with the connection element in the retracted disconnected position;

figure 2a shows a part of the cylinder incorporating the electromechanical device of figure 1, sectioned along the horizontal medium plane of the cylinder, with the connection element in the retracted disconnected position;

figure 3 shows the cylinder incorporating the electromechanical device of figure 1, sectioned along the vertical medium plane of the cylinder, with the connection element in the partially extended position for seeking the angular connection position;

figure 3a shows a part of the cylinder incorporating the electromechanical device of figure 1, sectioned along the horizontal medium plane of the cylinder, with the connection element in the partially extended position for seeking the angular connection position;

figure 4 shows the cylinder incorporating the electromechanical device of figure 1, sectioned along the vertical medium plane of the cylinder, with the connection element in the completely extended connection position;

figure 4a shows part of the cylinder incorporating the electromechanical device of figure 1, sectioned along the horizontal medium plane of the cylinder, with the connection element in the completely extended connection position;

figure 5 shows the cylinder incorporating the electromechanical device of figure 1, sectioned along the vertical medium plane of the cylinder, with the connection element still in the completely extended connection position when the slider has reached the end of the stroke opposite the one in figure 4;

figure 5a shows part of the cylinder incorporating the electromechanical device of figure 1, sectioned

along the vertical medium plane of the cylinder, with the connection element still in the completely extended connection position when the slider has reached the end of the stroke opposite the one in figure 4; figures 6a to 6e schematically show various types of cylinders the present invention can be applied to.

[0016] With reference to the figures, there is illustrated a cylinder 3 for a lock, having at least a first electromechanical control device 1 for an operating cam 2 of the lock. The cylinder 3 has a stator 4, to which the cam 2 is rotatably associated about an axis L, which extends in the longitudinal direction of the cylinder 3.

[0017] The stator 4 has a cylindrical cavity 5 which extends in the direction of the axis L and in which a cylindrical bush 6 is coaxially housed so as to be rotatable on itself. The cylindrical cavity 5 extends from the first longitudinal end 55 to at least the rotation housing of the cam 2 of the statoric body 4 in the case of a single control cylinder that does not form part of the invention (figures 6a and 6b), and between the first longitudinal end 55 and the second longitudinal end 56 of the statoric body 4 in the case of a double control cylinder (illustrated in figures 1-8, 6c, 6d, 6e).

[0018] The cylindrical bush 6 is fixedly associated with the cam 2.

[0019] In particular the bush 6, couples with the inner surface of the cylindrical cavity 5 of the statoric body 4.

[0020] The cam 2 comprises a cylindrical hollow body 22 that couples with the external cylindrical surface of the bush 6 and a protrusion 51 which extends radially outside cylindrical hollow body 22 to operate the lock.

[0021] The cylindrical hollow body 22 of the cam 2 has a shorter length than the bush 6 and is positioned coaxially in a crack 52 of the same length as the cylindrical cavity 5 of the statoric body 4.

[0022] The crack 52 extends through the entire cylindrical cavity 5 of the statoric body 4 in the transversal direction and also extends through the statoric body 4 to enable the passage of the external radial protrusion 51 of the cylindrical hollow body 22. The walls delimiting the crack 52 thus block the axial position of the cam 2 and, consequently, the axial position of the bush 6 fixed to the cam 2.

[0023] The cylinder can be single or double depending on whether a single control or double control is envisaged for the cam 2.

[0024] In a single control cylinder, the cam 2 is accessible from only one half-part of the cylinder defined between the medium plane S of the cam 2 orthogonal to the axis L and a longitudinal end 55, 56 of the stator 4.

[0025] In a double control cylinder, the cam 2 is accessible from each half-part of the cylinder defined between the medium plane S of the cam 2 orthogonal to the axis L and a corresponding longitudinal end 55, 56 of the stator 4.

[0026] We shall now make reference, purely by way of illustration, to figures 1 to 8, where we illustrate a double

cylinder comprising the first electromechanical control device 1 and a second control device 40 of a mechanical type, which can, however, also be of an electromechanical type.

[0027] The first electromechanical control device 1 comprises a shaft 7 fixed to a first handle 8, while the second electromechanical control device 40 comprises a shaft 53 fixed to a second handle 41.

[0028] The shaft 7 is configured to be longitudinally engageable by the first end 55 or second end 56 of the statoric body 4 in the cylindrical cavity 5 for a stretch that does not exceed the medium plane S of the cam 2.

[0029] The shaft 53 is in turn configured to be longitudinally engageable by the first end 55 or in the second end 56 of the statoric body 4 in the cylindrical cavity 5 for a stretch that does not exceed the medium plane S of the cam 2.

[0030] The first electromechanical control device 1 further comprises an element 9 for connecting the first handle 8 to the cam 2.

[0031] The connection element 9 is known in the technical field with the term "clutch pin".

[0032] The connection element 9 is engageable in at least a first housing 54 provided in the bush 6 so as to be integrally connected to the bush 6 during the rotation thereof. The first engagement housing 54 extends from the side of the medium plane S of the cam 2 facing the first end 55 of the statoric body 4.

[0033] The bush 6 also has a second engagement housing 57, which extends from the side of the medium plane S of the cam 2 facing the second end 56 of the statoric body 4.

[0034] The connection element 9 has a shape coupling that of the first engagement housing 54 and of the second engagement housing 57.

[0035] The first engagement housing 54 has a distance from the first end 55 of the cylindrical cavity 5 that is equal to the distance of the second engagement housing 57 from the second end 56 of the cylindrical cavity 5.

[0036] Finally, the bush 6 has notches 62, 63 at either end for taking up the rotation from a terminal end 65 of the shaft 53 of the mechanical control device 40.

[0037] The notches 62, 63 have a shape coupling that of the apical part of the shaft 53, and lie in the same plane, which is oriented as a diametral plane of the bush 6. In this particular case, the notches 62, 63 are fashioned at both terminal ends 58. Advantageously, the bush 6 is made in a piece that is distinct and separate from the cam 2 it is associated with.

[0038] Means are thus provided to make the bush 6 and the cam 2 rotationally integral. In this regard, the bush 6 exteriorly has at least one axial groove 58 in which a corresponding axial rib 59, present within the cylindrical hollow body 22 of the cam 2, is engaged. In particular, there are two diametrically opposed axial grooves 58. Naturally, as an alternative, the ribs 59 can be provided on the bush 6 and the grooves 58 on the hollow body 22.

[0039] Means are likewise provided to prevent the

bush 6 from slipping out axially from the hollow body 22 of the cam 2, comprising one or more punching points 61 in the hollow body 22 of the cam 2 in an external circumferential perimeter groove 60 of the bush 6.

[0040] The first electromechanical control device 1 comprises translational operating means for translating the connection element 9 along the shaft 7 so it engages in the first housing 54.

[0041] The translational operating means for translating the connection element 9 along the shaft 7 comprise a control rod 10 drivable by means of a motor 29 so as to rotate about its own axis, which is oriented in the direction of the axis L.

[0042] The translational operating means for translating the connection element 9 along the shaft 7 further comprise means for converting a rotation of the control rod 10 into a reversible translation of the connection element 9 from a position in which the first handle 8 and the cam 2 are disconnected to a position in which they are connected.

[0043] The motor 29 is fixed on the same side of the flange 19 from which the shaft 7 extends, while provided on the opposite side of the flange 19 there is the handle 8, which has a shell-like configuration for enclosing within it the electronic controller (not shown) and the power supply unit of the electromechanical device 1.

[0044] In particular, in order to be fixed to the flange 19, the handle 8 has a thread 30 engageable with a counter-thread 31 present on the flange 19 itself.

[0045] The control rod 10 has a lateral cylindrical exterior surface 26.

[0046] The connection element 9 is rotationally integral with the shaft 7, but translatable in the direction of the axis of the shaft 7.

[0047] The connection element 9 has an axially hollow cylindrical longitudinal body which extends on an axis oriented in the direction of the axis of the shaft 7.

[0048] More precisely, the hollow body of the connection element 9 has a base 32 closing off one end of the axial cavity 20, a lateral cylindrical exterior surface 13 and a lateral cylindrical interior surface 21 which delimits the axial cavity 20.

[0049] The small shaft 28 of the motor 29 to which the control rod 10 is keyed extends coaxially inside the axial cavity 20 of the connection element 9.

[0050] The shaft 7 has a longitudinal body having an axial cavity 11 for guiding the translation of the connection element 9 between the disconnected position, in which the connection element 9 is completely retracted within the axial cavity 11 of the shaft 7, and the connected position, in which the connection element 9 extends beyond the end 12 of the shaft 7 opposite the one fitted with the flange 19 for coupling to the handle 8.

[0051] The hollow body of the shaft 7 has, more precisely, a first exterior lateral cylindrical surface 15 couplable with the interior lateral cylindrical surface of the cylindrical housing 5, a second exterior lateral cylindrical surface 16 that is coaxial with, but has a smaller diameter

than, the first exterior lateral cylindrical surface 15 and is couplable with the interior lateral cylindrical surface of the cylindrical bush 6, and an interior lateral cylindrical surface 14 that is coaxial with the first and second exterior surfaces 15 and 16 and couples with the exterior lateral cylindrical surface 13 of the connection element 9.

[0052] The first exterior lateral cylindrical surface 15 of the shaft 7 has a perimeter groove 37 which extends in a plane orthogonal to the axis of the shaft 7 and is intended to accommodate a grub screw 38 insertable into a seat 39 of the stator 4 so as to constrain the shaft 7 to the stator 4 axially but not rotationally.

[0053] The body of the connection element 9 has, along an external cylindrical generatrix thereof, at least one tapered radial projecting element 17 engaged in a corresponding radial recess 18 provided along an internal cylindrical generatrix of the shaft 7.

[0054] In particular, two diametrically opposed radial projecting elements 17 are provided.

[0055] The radial projecting elements 17 have a function as keys, since they lend the connection element 9 a special shape couplable with a counter profile 42 specifically provided in the cylindrical bush 6 only when the connection element 9 coaxially inserted into the cylindrical housing 5 is angularly oriented in such a way that its shape fits the counter profile 42.

[0056] The transformation means comprise a slider 23 translatable along the control rod 10, a spherical element 24 for translatable operating the slider 23, constrained to the control rod 10 rollably along a helical track 25 which extends around the lateral cylindrical surface 26 of the control rod 10 in such a way that a rotation of the control rod 10 is transformed into a translation of the slider 23, and an elastic operating element 27 for translating the connection element 9, fixed to the slider 23 and to the connection element 9 so as to selectively exert an elastic thrust or traction force on the connection element 9 in the direction of the axis of the shaft 7 by virtue of the rotational operation of the control rod 10.

[0057] The control rod 10 is keyed to the small shaft 28 of the motor 29, so that it is also positioned coaxially within the axial cavity 20 of the connection element 9.

[0058] The slider 23 also has an axially hollow longitudinal body having an exterior lateral surface and an interior lateral cylindrical surface coupling with the exterior lateral cylindrical surface 26 of the control rod 10.

[0059] Finally, the body of the slider 23 has a transverse through hole 45, where the spherical element 24 is positioned.

[0060] The hole 45 has a dimension in the axial direction of the body of the slider 23 that is substantially equal to the diameter of the spherical element 24, so that the spherical element 24 is accommodated in such a way as to be integrally rollable and translatable with the slider 23 in the axial direction of the slider 23 itself.

[0061] The helical track 25 is obtained from a groove in the exterior lateral cylindrical surface 26 of the control rod 10 and in turn has a semi-circular shaped cross sec-

tion with a diameter that is substantially equal to the diameter of the spherical element 24.

[0062] A first half-part of the spherical element 24 is thus accommodated in the helical track 25, while the second half-part of the spherical element 24 is accommodated in the hole 45.

[0063] The opposite ends of the helical track 25, which are in different axial positions relative to the control rod 10, have a hemispherical housing couplable with the spherical element 24.

[0064] The elastic element 27 comprises a helical spring 33 coaxially positioned in the cavity 20 of the connection element 9, and in particular fitted over the slider 23. The helical spring 33 has a first terminal end 34 proximal to the base 32 and a second terminal end 36 distal to the base 32.

[0065] The spring 33 is active not only for the translational actuation of the connection element 9, but also for retaining the spherical element 24 in the hole 45.

[0066] The first terminal end 34 of the spring 33 is fixed to the base 32 of the connection element 9, while the second terminal end 36 of the spring 33 is fixed to the body of the slider 23 on the external side of the hole 45 so as to retain the spherical element 24 inside it.

[0067] A salient feature of the device consists in its telescopic construction having a single axis L, which represents the axis of the handle 8, about which the handle 8 is rotatable on itself, the axis of the shaft 7, about which the shaft 7 is rotatable on itself, the axis of the control rod 10, about which the control rod 10 is rotatable on itself, the axis of the slider 23 along which the slider 23 itself is translatable, and the axis of the connection element 9, along which the connection element 9 itself is translatable.

[0068] In particular, the axis L also coincides with the axis of the small shaft 28 of the motor 29.

[0069] In the case illustrated, the cylinder is double and envisages, for the operation of the cam 2, in addition to the electromechanical device 1, a completely mechanical device 40 having a handle 41 permanently connected and rotationally integral with the rotor 22.

[0070] In this case, the cylinder can alternatively comprise two electromechanical devices applied in mirror-like fashion to the cylinder so as to operate the cam 2 both from the internal and external side of the door.

[0071] The operation of the electromechanical device 1 is briefly as follows.

[0072] Let us assume that the shaft 7 is initially coaxially positioned in the cylindrical housing 5 of the stator 4 with the connection element 9 in the disconnected position.

[0073] Let us further assume that the initial angular position of the handle 8 is such as to dispose the profile of the connection element 9 in a position that is angularly offset from the counter profile 42.

[0074] The user places his or her personal electronic card close to the handle 8, so that the card interacts with the electronic controller incorporated in the handle 8, trig-

gering a request to generate a signal to actuate the motor 29.

[0075] The electronic controller generates a signal for timed actuation of the motor 29, whereby the motor 29 receives a command to perform a rotation and, after a preset time, a counter rotation.

[0076] The rotation must be of an entity such as to cause the spherical element 24 to move from one end of the helical track 25 to the other.

[0077] Initially (fig. 2), the spherical element 24 is positioned at the end of the helical track 25, adjacent to the motor 29, and consequently the slider 23 is located in a position shifted toward the end 46 of the control rod 10 adjacent to the motor 29. The motor 29 actuates the rotation of its small shaft 28, which in turn draws the control rod 10 into rotation on itself.

[0078] During the rotation of the control rod 10, the slider 23 cannot rotate, since it is fixed by means of the spring 33 to the connection element 9, which cannot rotate because its radial protrusions 17 are engaged in the radial recesses 18 of the shaft 7.

[0079] As a result of the rotation of the control rod 10, the spherical element 24, constrained by the helical spring 33 to remain partly within the helical track 25 and partly in the hole 45 of the slider 23, rolls along the helical track 25 and simultaneously, with the part inserted in the hole 45, acts upon the slider 23, which, having a sole degree of translational freedom, can only be drawn in translation, in opposition to the helical spring 33, toward the end of the control rod 10 adjacent to the base 32 of the connection element 9.

[0080] The movement of the slider 23 is transmitted by means of the helical spring 33 to the connection element 9, which completes a first translation stroke that ends when it is intercepted by the counter profile 42. In this first phase, in fact, the connection element 9 is angularly offset from the counter profile 42 and is therefore not able to engage with it.

[0081] The translation of the slider 23 also continues after the connection element 9 has met the counter profile 42, and in particular until the spherical element 24 reaches the other end of the helical track 25 (fig. 3). During this further stroke, the spring 33 is loaded under compression. The end of the rotation of the motor 29 is determined by the insertion of the spherical element 24 in the hemispherical housing adjacent to the base 32 of the connection element 9. On completion of this stroke, the spring 33 is subjected to a slight elastic torsion that has the effect of dampening the stop of the motor 29.

[0082] When the user turns the handle 8, the latter transmits the rotation to the shaft 7, which in turn transmits it to the connection element 9. The connection element 9 rotates on itself, seeking the angular connection position, which is reached when its profile fits the counter profile 42. In this angular position the connection element 9, as a result of the stretching of the spring 33, undergoes a further translation, whereby it is inserted into the counter profile 42 to achieve the connection of the handle 8

to the cam 2. In this condition, therefore, the cam 2 is rotationally integral with the handle 8 (fig. 4). As can be seen in figure 4, in this case the connection element 9 engages the first engagement housing 54 and, in part, the second engagement housing 57 as well, but it is obviously possible, through specific design choices, to provide for the connection element 9 to be engaged only in the first engagement housing 54.

[0083] In order to connect the handle 8 to the cam 2, the user must naturally turn the handle 8 before the maximum preset time for starting the counter rotation of the control rod 10, which will bring the connection element 9 back into the initial disconnected position.

[0084] As a result of this counter rotation of the control rod 10, the slider 23, drawn by the spherical element 24, will undergo a translation opposite to the previous one and the spring 33, now working under traction, will draw the connection element 9, which is retracted into the shaft 7.

[0085] The retraction of the connection element 9 due to friction can be delayed relative to arrival of the slider 23 at the initial position, as shown in figure 5. This causes an extension of the spring 33, which is loaded by traction and generates the necessary force to pull the connection element back 9 toward the disconnection position. The end of the counter rotation of the motor 29 is determined by the engagement of the spherical element 24 in the hemispherical housing opposite the base 32 of the connection element 9. On completion of this stroke, the spring 33 is once again subjected to a slight elastic torsion, which once again has the effect of dampening the stop of the motor 29.

[0086] It should be noted that the disengagement of the connection element 9 from the counter profile 42 is facilitated by the tapered configuration of the radial protrusions 17, which limits the contact surface and hence the friction that is created between the connection element 9 and shaft 7 during the retraction of the former into the latter.

[0087] The construction of the cylinder is particularly advantageous from several points of view.

[0088] The cylinder now described has a first electromechanical control device 1 and a second mechanical control device 40 for the cam 2.

[0089] The first electromechanical control device 1, with the associated handle 8, is applied on the outside of the door, while the second mechanical control device 40 with the associated handle 41 is applied on the external side of the door.

[0090] The same identical electromechanical control device 1 can be applied on the external side of the door in place of the mechanical control device 40, and, analogously, the same identical mechanical control device 40 can be applied on the external side of the door in place of the electromechanical control device 1.

[0091] This interchangeability and reversibility of the control devices is made possible by - among other things - the special configuration of the bush 6, which enables

the engagement both of the shaft 7 and of the shaft 53 for the transmission of rotation to the cam 2 in the same manner from both ends of the cylindrical cavity 5 of the statoric body 4.

[0092] The invention also solves the problem of adapting the cylinder to doors of different thickness.

[0093] In the case of a single control cylinder, that does not form part of the invention, it is sufficient to provide for a set of cylinders having a statoric body 4 of different lengths and adapting the length of their bush 6 so that the same distance of the first engagement housing 54 from the first end 55 of the cylindrical cavity 5 of the statoric body 4 is maintained for all the cylinders.

[0094] In the case of a double control cylinder, it is sufficient to provide for a set of cylinders with a statoric body 4 of different lengths and adapt the length of the bush 6 so as to maintain, for all the cylinders, the same distance of the first engagement housing 54 thereof from the first end 55 of the cylindrical cavity 5 of the statoric body 4 thereof, and the same distance of the second engagement housing 57 thereof from the second end 56 of the cylindrical cavity 5 of the statoric body 4 thereof. Furthermore, for all cylinders, the distance of the first engagement housing 54 from the first end 55 of the cylindrical cavity 5 of the statoric body 4 must be designed in such a way as to be equal to the distance of the second engagement housing 57 from the second end 56 of the cylindrical cavity 5 of the statoric body 4.

[0095] All the possible configurations of single and double control cylinders according to the present invention are schematically shown in Figures 6a to 6e.

[0096] In particular, figure 6a shows a single control cylinder on the right side having a preset distance A between the housing 54 and the end 55 of the cylindrical cavity 5 of the statoric body 4; figure 6b shows a single control cylinder on the left side having the same preset distance A as the cylinder of figure 6a between the housing 54 and the end 55 of the cylindrical cavity 5 of the statoric body 4; figure 6c shows a double control cylinder having the same preset distance A as the cylinder of figure 6a between the housing 54 and the end 55 of the cylindrical cavity 5 of the statoric body 4, and between the housing 57 and the end 56 of the cylindrical cavity 5 of the statoric body 4, and the same distance from the medium plane S of the cam 2 of the ends 55 and 56 of the cylindrical cavity 5 of the statoric body 4; figure 6d shows a double control cylinder having the same preset distance A as the cylinder of figure 6a between the housing 54 and the end 55 of the cylindrical cavity 5 of the statoric body 4, and between the housing 57 and the end 56 of the cylindrical cavity 5 of the statoric body 4, and a distance of the end 55 from the medium plane S of the cam 2 that is increased by an entity P compared to the distance of the end 56 from the medium plane S of the cam 2; and figure 6e shows a double control cylinder having the same preset distance A as the cylinder of figure 6a between the housing 54 and the end 55 of the cylindrical cavity 5 of the statoric body 4, and between

the housing 57 and the end 56 of the cylindrical cavity 5 of the statoric body 4, and a distance equal to P+A of the ends 55, 56 from the medium plane S of the cam 2.

[0097] In this manner it is possible to use the same identical electromechanical control device 1 and the same identical mechanical control device 40 for any of the cylinders illustrated in figures 6a to 6e, that is to say, for any door thickness. Accordingly, purchasing and stock management logistics are considerably simplified. Even the same identical cam 2 can be universally adopted for any cylinder length.

[0098] Preferably, as it is possible to interchange the control devices of the operating cam of the lock, for the sake of security it is advisable to provide specific assent means to enable the removal of at least the electromechanical control device 1 from the statoric body 4, activatable by an electronic controller integrated in the first handle 8, upon a request sent by an electronic card in the possession of a user.

[0099] The assent means, not shown, can comprise, for example, a locking element inaccessible to the user, and which can be switched between a locking position and a release position of the grub screw 38 that prevents axial slipping of the shaft 7 from the statoric body 4 of the cylinder.

[0100] The set of double control cylinders for a lock thus conceived is susceptible of numerous modifications and variants, all falling within the scope of the invention as defined by the appended claims.

[0101] In practical terms, the materials used, as well as the dimensions and proportions, can be any whatsoever according to need and the state of the art.

Claims

1. Set of double control cylinders for a lock, each cylinder for a lock comprising:

- a statoric body (4) longitudinally having a cylindrical cavity (5) which extends along an axis (L) from a first longitudinal end (55) to a second longitudinal end (56) of the statoric body (4);
- an operating cam (2) of the lock rotatable about said axis (L);
- a cylindrical bush (6) positioned coaxially in said cylindrical cavity (5) and rotatable on itself integrally with said cam (2);
- at least a first electromechanical control device (1) for said cam (2) associated with a first handle (8), said first control device (1) comprising: a shaft (7) configured to be longitudinally engageable by said first end (55) in said cylindrical cavity (5) for a stretch that does not exceed the medium plane (S) of the cam (2) orthogonal to said axis (L); a connection element (9) for connecting said first handle to said cam (2), engageable in at least a first housing (54) provided in said bush

(6) on the side of said medium plane (S) facing said first end (55); and translational operating means for translating said connection element (9) along said shaft (7) for its engagement in at least said first housing (54); said bush (6) has having a second engagement housing (57) that extends from the side of said medium plane (S) facing said second end (56) of said cylindrical cavity (5) of said statoric body (4), said second engagement housing (57) having a distance from said second end (56) equal to the distance of said first engagement housing (54) from said first end (55), said first and second engagement housing (54, 57) having the same shape coupling with that of said connection element (9);

characterised in that all said cylinders have a statoric body (4) of different length and a bush (6) of different length adapted to provide, for all said cylinders, a same distance between said second engagement housing (57) and said second end (56) equal to the same distance between said first engagement housing (54) and said first end (55).

2. Set of double control cylinders for a lock according to the preceding claim, characterised in that a second control device is provided for said cam (2) associated with a second handle (8).
3. Set of double control cylinders for a lock according to any preceding claim, characterised in that said first and second end (55, 56) have the same distance from said medium plane (S).
4. Set of double control cylinders for a lock according to any claim 1 and 2, characterised in that said first and second end (55, 56) have a different distance from said medium plane (S).
5. Set of double control cylinders for a lock according to any one of the preceding claims, characterised in that said cam (2) comprises a cylindrical hollow body (22) coupling with the external cylindrical surface of said bush (6) and a protrusion (51) which extends radially outside said cylindrical hollow body for operating the lock.
6. Set of double control cylinders for a lock according to the preceding claim, characterised in that said bush (6) is formed by a piece that is distinct and separate from said cam (2), and **in that** means are provided for making said cam (2) and said bush (6) rotationally integral, and axial anti-slippage means to prevent said bush (6) from slipping out of said cylindrical hollow body (22) of said cam (2).
7. Set of double control cylinders for a lock according to any one of the preceding claims, characterised

in that said bush (6) has notches (62, 63) at either end for taking up the rotation of a shaft (53) of a mechanical control device (40) for said cam (2).

8. Set of double control cylinders for a lock according to any one of claims 6 to 8, **characterised in that** the cylindrical hollow body (22) of the cam (2) has a shorter length than said bush (6) and is positioned coaxially in a crack (52) of the same length as the cylindrical longitudinal cavity (5) of said statoric body (4). 5 10
9. Set of double control cylinders for a lock according to any one of the preceding claims, **characterised in that** it has assent means for enabling the removal of said first electromechanical control device (1) from said statoric body (4), activatable by an electronic controller integrated in said first handle (8) upon a request sent by an electronic card in the possession of a user. 15 20
10. Set of double control cylinders for a lock according to any one of the preceding claims, **characterised in that** said translational operating means comprise a motorised control rod (10) rotatable about its own axis, a slider (23) translatably engaged along the control rod (10), a spherical element (24) for translatably operating the slider (23), constrained to said control rod (10) rollably along a helical track (25) which extends around a lateral cylindrical surface (26) of said control rod (10) so that a rotation of the control rod (10) is transformed into a translation of the slider (23), and an elastic translational operating element of said connection element (9), fixed to said slider (23) and to said connection element (9) so as to selectively exert an elastic thrust or traction force on the connection element (9) in the direction of the axis of the shaft (7) due to the rotational operation of the control rod (10). 25 30 35

Patentansprüche

1. Satz von Doppelsteuerzylindern für ein Schloss, wobei ein jeder Zylinder für ein Schloss umfasst: 45
 - einen Statorkörper (4) in Längsrichtung mit einem zylindrischen Hohlraum (5), der sich entlang einer Achse (L) von einem ersten Längsende (55) zu einem zweiten Längsende (56) des Statorkörpers (4) erstreckt;
 - einen Betätigungsnocken (2) des Schlosses, der um die Achse (L) drehbar ist;
 - eine zylindrische Buchse (6), die koaxial in dem zylindrischen Hohlraum (5) positioniert ist und auf sich selbst einstückig mit dem Nocken (2) drehbar ist;
 - mindestens eine erste elektromechanische

Steuervorrichtung (1) für den Nocken (2), die mit einem ersten Griff (8) assoziiert ist, wobei die erste Steuervorrichtung (1) umfasst: eine Welle (7), die so konfiguriert ist, dass sie in Längsrichtung durch das erste Ende (55) in dem zylindrischen Hohlraum (5) für eine Strecke, die die Mittelebene (S) des Nockens (2) orthogonal zu der Achse (L) nicht überschreitet, eingreifbar ist; ein Verbindungselement (9) zum Verbinden des ersten Griffs mit dem Nocken (2), das in mindestens ein erstes Gehäuse (54) eingreifbar ist, das in der Buchse (6) auf der dem ersten Ende (55) zugewandten Seite der Mittelebene (S) bereitgestellt ist; und translatorische Betätigungsmittel zur Translation des Verbindungselements (9) entlang der Welle (7) für dessen Eingriff in mindestens das erste Gehäuse (54) ;

wobei die Buchse (6) ein zweites Eingriffsgehäuse (57) aufweist, das sich von der Seite der Mittelebene (S) erstreckt, die dem zweiten Ende (56) des zylindrischen Hohlraums (5) des Statorkörpers (4) zugewandt ist, wobei der zweite Eingriffsgehäuse (57) einen Abstand von dem zweiten Ende (56) gleich dem Abstand des ersten Eingriffsgehäuses (54) von dem ersten Ende (55) aufweist, wobei das erste und das zweite Eingriffsgehäuse (54, 57) die gleiche Kupplungsform wie die des Verbindungselements (9) aufweisen;

dadurch gekennzeichnet, dass alle Zylinder einen Statorkörper (4) unterschiedlicher Länge und eine Buchse (6) unterschiedlicher Länge aufweisen, die dafür ausgelegt ist, um für alle Zylinder einen gleichen Abstand zwischen dem zweiten Eingriffsgehäuse (57) und dem zweiten Ende (56) gleich dem gleichen Abstand zwischen dem ersten Eingriffsgehäuse (54) und dem ersten Ende (55) bereitzustellen.

2. Satz von Doppelsteuerzylindern für ein Schloss nach dem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** eine zweite Steuervorrichtung für den Nocken (2) bereitgestellt ist, die mit einem zweiten Griff (8) assoziiert ist. 40
3. Satz von Doppelsteuerzylindern für ein Schloss nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das erste und das zweite Ende (55, 56) den gleichen Abstand von der Mittelebene (S) aufweisen. 50
4. Satz von Doppelsteuerzylindern für ein Schloss nach einem der Ansprüche 1 und 2, **dadurch gekennzeichnet, dass** das erste und das zweite Ende (55, 56) einen unterschiedlichen Abstand von der Mittelebene (S) aufweisen. 55
5. Satz von Doppelsteuerzylindern für ein Schloss

nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Nocken (2) einen zylindrischen Hohlkörper (22), der mit der zylindrischen Außenfläche der Buchse (6) gekoppelt ist, und einen Vorsprung (51), der sich radial außerhalb des zylindrischen Hohlkörpers zum Betätigen des Schlosses erstreckt, umfasst.

6. Satz von Doppelsteuerzylindern für ein Schloss nach dem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** die Buchse (6) aus einem vom Nocken (2) getrennten und separaten Stück besteht und dadurch, dass Mittel, um den Nocken (2) und die Buchse (6) drehfest zu machen und axiale Antirutschmittel, um zu verhindern, dass die Buchse (6) aus dem zylindrischen Hohlkörper (22) des Nockens (2) herausrutscht, bereitgestellt sind.

7. Satz von Doppelsteuerzylindern für ein Schloss nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Buchse (6) an beiden Enden Kerben (62, 63) aufweist, um die Drehung einer Welle (53) einer mechanischen Steuervorrichtung (40) für den Nocken (2) aufzunehmen.

8. Satz von Doppelsteuerzylindern für ein Schloss nach einem der Ansprüche 6 bis 8, **dadurch gekennzeichnet, dass** der zylindrische Hohlkörper (22) des Nockens (2) eine kürzere Länge als die Buchse (6) aufweist und koaxial in einem Spalt (52) der gleichen Länge wie der zylindrische Längshohlraum (5) des Statorkörpers (4) positioniert ist.

9. Satz von Doppelsteuerzylindern für ein Schloss nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** er Zustimmungsmittel zum Ermöglichen der Entfernung der ersten elektromechanischen Steuervorrichtung (1) von dem Statorkörper (4) aufweist, die durch eine in den ersten Griff (8) integrierte elektronische Steuerung auf eine Anforderung hin, die von einer elektronischen Karte im Besitz eines Benutzers gesendet wird, aktivierbar sind.

10. Satz von Doppelsteuerzylindern für ein Schloss nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die translatorischen Betätigungsmittel eine motorisierte Steuerstange (10), die um ihre eigene Achse drehbar ist, einen Schieber (23), der entlang der Steuerstange (10) translatorisch eingegriffen ist, ein kugelförmiges Element (24) zum translatorischen Betätigen des Schiebers (23), das entlang einer schraubenförmigen Bahn (25) rollbar an der Steuerstange (10) festgespannt ist, die sich um eine zylindrische Seitenfläche (26) der Steuerstange (10) erstreckt, so dass eine Drehung der Steuerstange (10) in eine Translation des Schiebers (23) umgewandelt wird, und ein elas-

tisches translatorisches Betätigungselement des Verbindungselements (9), das an dem Schieber (23) und dem Verbindungselement (9) befestigt ist, um aufgrund der Drehbetätigung der Steuerstange (10) wahlweise eine elastische Schub- oder Zugkraft auf das Verbindungselement (9) in Richtung der Achse der Welle (7) auszuüben, umfassen.

10 Revendications

1. Ensemble de cylindres à double commande pour serrure, chaque cylindre pour serrure comprenant :

- un corps statorique (4) comportant longitudinalement une cavité cylindrique (5) se prolongeant le long d'un axe (L) d'une première extrémité longitudinale (55) à une seconde extrémité longitudinale (56) du corps statorique (4) ;

- une came d'actionnement (2) de la serrure pouvant tourner autour dudit axe (L) ;

- une douille cylindrique (6) positionnée coaxialement dans ladite cavité cylindrique (5) et pouvant tourner sur elle-même de manière solidaire avec ladite came (2) ;

- au moins un premier dispositif de commande électromécanique (1) pour ladite came (2) associé à une première poignée (8), ledit premier dispositif de commande (1) comprenant : un arbre (7) configuré pour pouvoir se mettre en prise longitudinalement avec ladite première extrémité (55) dans ladite cavité cylindrique (5) sur une portion qui ne dépasse pas le plan médian (S) de la came (2) orthogonal audit axe (L) ; un élément de raccordement (9) servant à raccorder ladite première poignée à ladite came (2), pouvant se mettre en prise dans au moins un premier logement (54) prévu dans ladite douille (6) sur le côté dudit plan médian (S) faisant face à ladite première extrémité (55) ; et des moyens d'actionnement en translation servant à translater ledit élément de raccordement (9) le long dudit arbre (7) pour son engagement dans au moins ledit premier logement (54) ;

ladite douille (6) comportant un second logement d'engagement (57) se prolongeant à partir du côté dudit plan médian (S) faisant face à ladite seconde extrémité (56) de ladite cavité cylindrique (5) dudit corps statorique (4), ledit second logement d'engagement (57) ayant une distance, depuis ladite seconde extrémité (56), égale à la distance dudit premier logement d'engagement (54) à partir de ladite première extrémité (55), lesdits premier et second logements d'engagement (54, 57) ayant le même couplage de forme avec celui dudit élément de raccordement (9) ;

caractérisé en ce que tous lesdits cylindres ont un

- corps statorique (4) de longueur différente et une douille (6) de longueur différente adaptée pour fournir, à tous lesdits cylindres, une même distance entre ledit second logement d'engagement (57) et ladite seconde extrémité (56) égale à la même distance entre ledit premier logement d'engagement (54) et ladite première extrémité (55).
2. Ensemble de cylindres à double commande pour serrure selon la revendication précédente, **caractérisé en ce qu'un** second dispositif de commande est prévu pour ladite came (2) associé à une seconde poignée (8).
 3. Ensemble de cylindres à double commande pour serrure selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite première et ladite seconde extrémité (55, 56) possèdent la même distance par rapport audit plan médian (S).
 4. Ensemble de cylindres à double commande pour serrure selon l'une quelconque des revendications 1 et 2, **caractérisé en ce que** lesdites première et seconde extrémités (55, 56) possèdent une distance différente dudit plan médian (S).
 5. Ensemble de cylindres à double commande pour serrure selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite came (2) comprend un corps creux cylindrique (22) s'accouplant à la surface cylindrique externe de ladite douille (6) et une saillie (51) se prolongeant radialement à l'extérieur dudit corps creux cylindrique pour actionner la serrure.
 6. Ensemble de cylindres à double commande pour serrure selon la revendication précédente, **caractérisé en ce que** ladite douille (6) est formée par une pièce étant distincte et séparée de ladite came (2), et **en ce que** des moyens sont prévus pour rendre ladite came (2) et ladite douille (6) solidaires en rotation, et des moyens antiglisement axiaux pour empêcher ladite douille (6) de glisser hors dudit corps creux cylindrique (22) de ladite came (2).
 7. Ensemble de cylindres à double commande pour serrure selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite douille (6) comporte à chaque extrémité des encoches (62, 63) pour reprendre la rotation d'un arbre (53) d'un dispositif de commande mécanique (40) de ladite came (2).
 8. Ensemble de cylindres à double commande pour serrure selon l'une quelconque des revendications 6 à 8, **caractérisé en ce que** le corps creux cylindrique (22) de la came (2) a une longueur plus courte que ladite douille (6) et est positionné coaxialement dans une fente (52) de même longueur que la cavité longitudinale cylindrique (5) dudit corps statorique (4).
 9. Ensemble de cylindres à double commande pour serrure selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comporte des moyens d'autorisation pour permettre le retrait dudit premier dispositif de commande électromécanique (1) dudit corps statorique (4), pouvant être activés par un contrôleur électronique intégré dans ladite première poignée (8) suite à une demande envoyée par une carte électronique en possession d'un utilisateur.
 10. Ensemble de cylindres à double commande pour serrure selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits moyens d'actionnement en translation comprennent une tige de commande (10) motorisée pouvant tourner autour de son propre axe, un coulisseau (23) mis en prise en translation le long de la tige de commande (10), un élément sphérique (24) servant à actionner en translation le coulisseau (23), fixé à ladite tige de commande (10) de manière à pouvoir rouler le long d'une piste hélicoïdale (25) se prolongeant autour d'une surface cylindrique latérale (26) de ladite tige de commande (10) de sorte qu'une rotation de la tige de commande (10) est transformée en une translation du coulisseau (23), et un élément élastique d'actionnement en translation dudit élément de raccordement (9), fixé audit coulisseau (23) et audit élément de raccordement (9) de manière à exercer sélectivement une force de poussée ou de traction élastique sur l'élément de raccordement (9) dans la direction de l'axe de l'arbre (7) en raison du fonctionnement en rotation de la tige de commande (10).

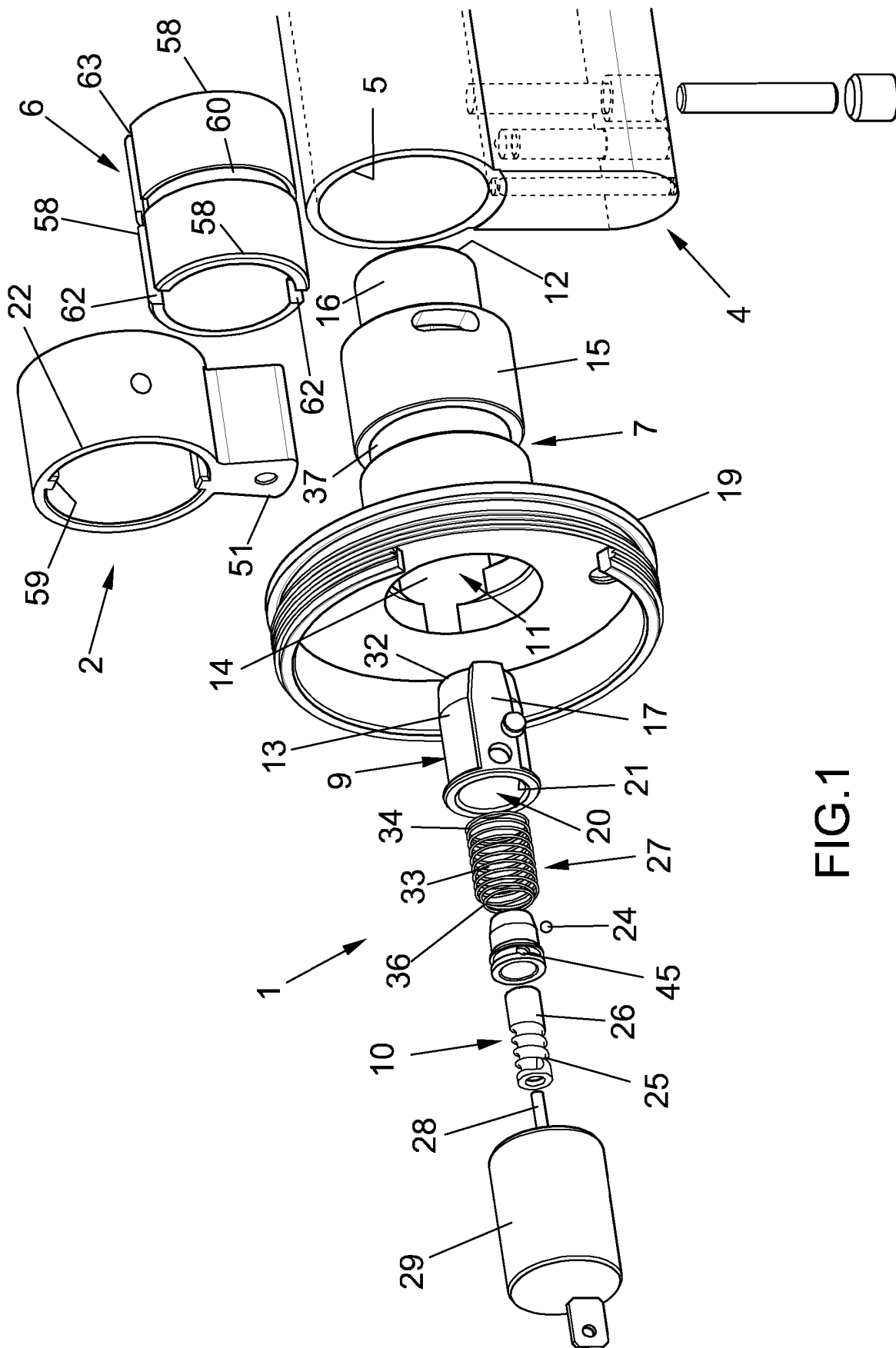


FIG.1

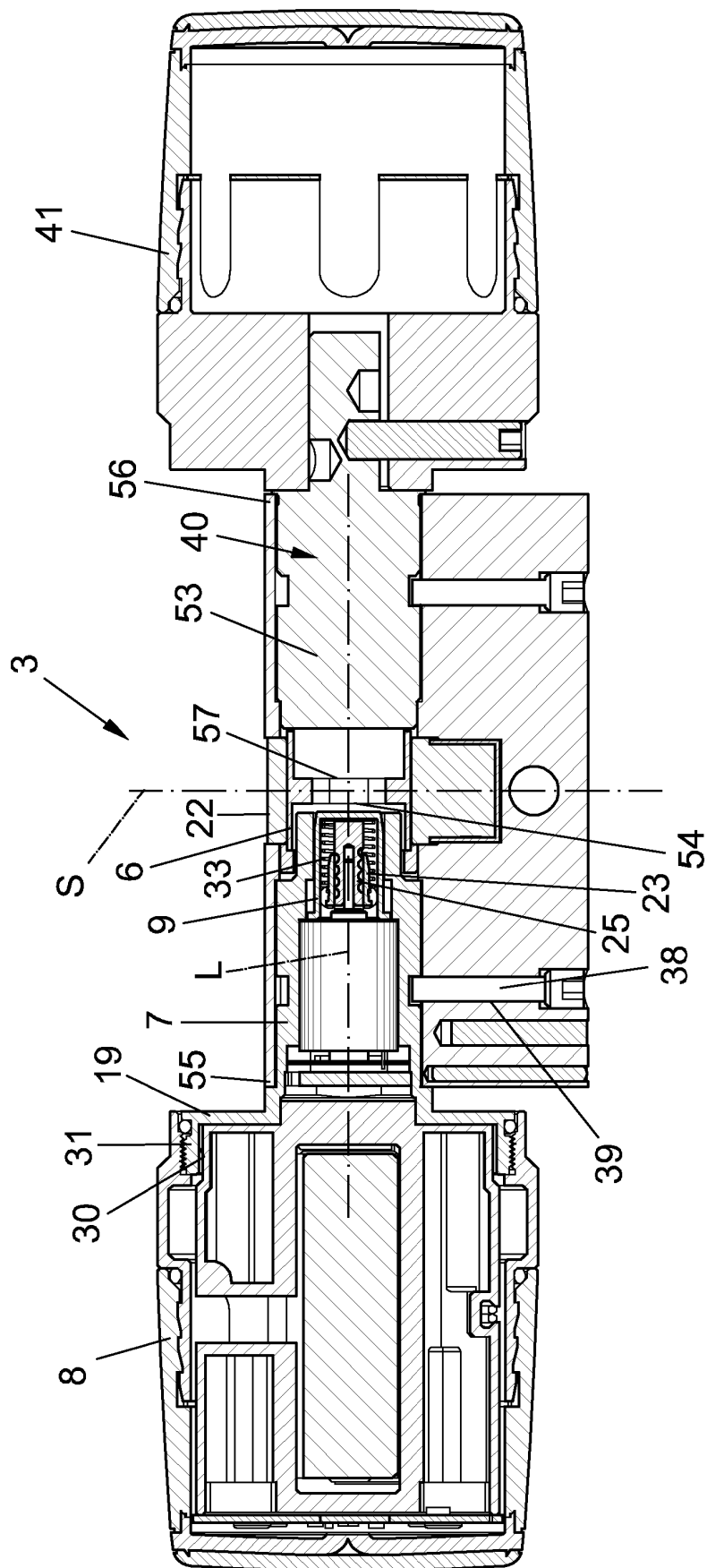


FIG.2

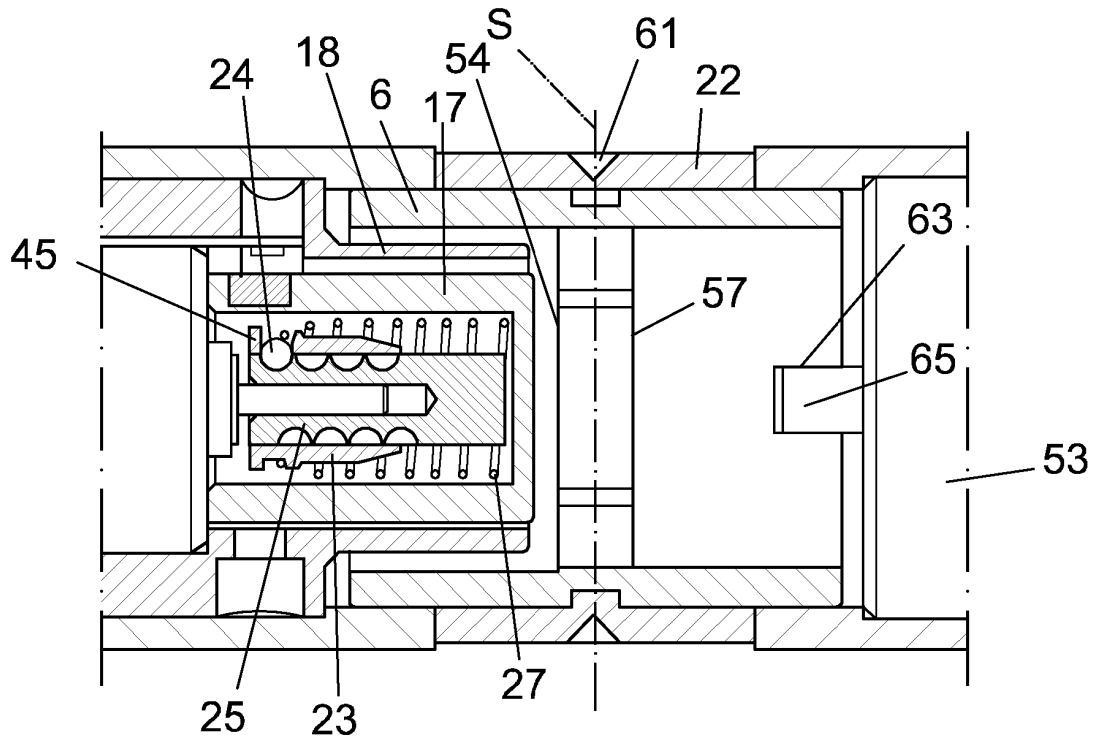


FIG. 2A

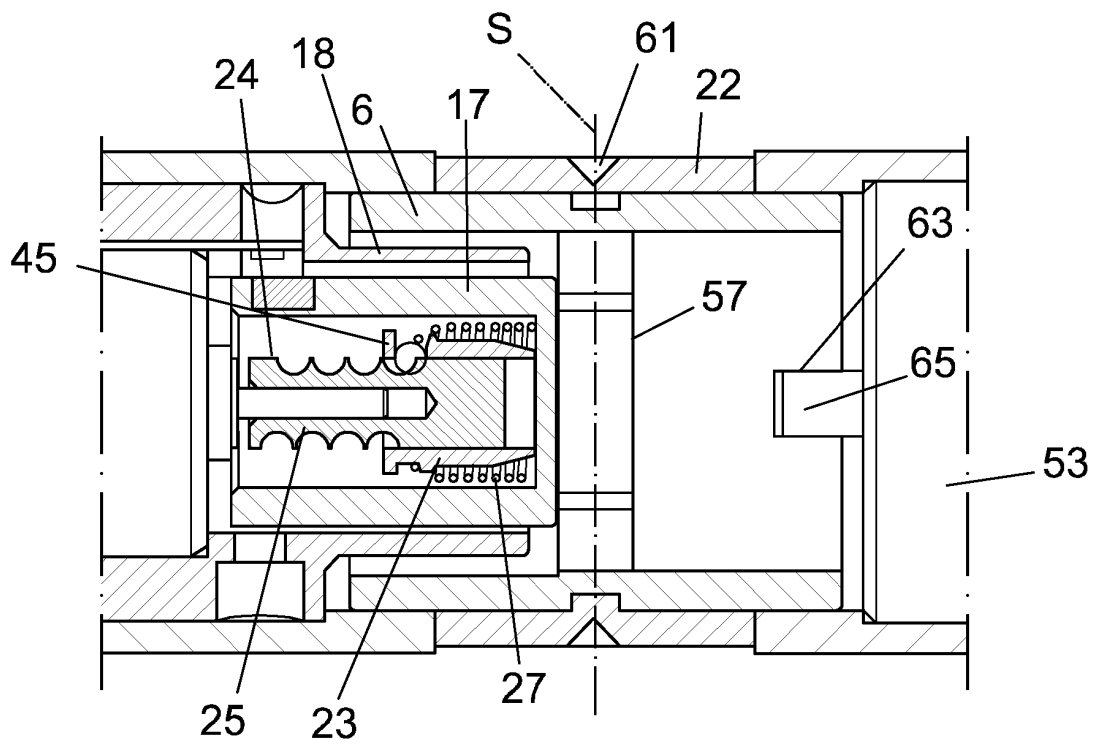


FIG. 3A

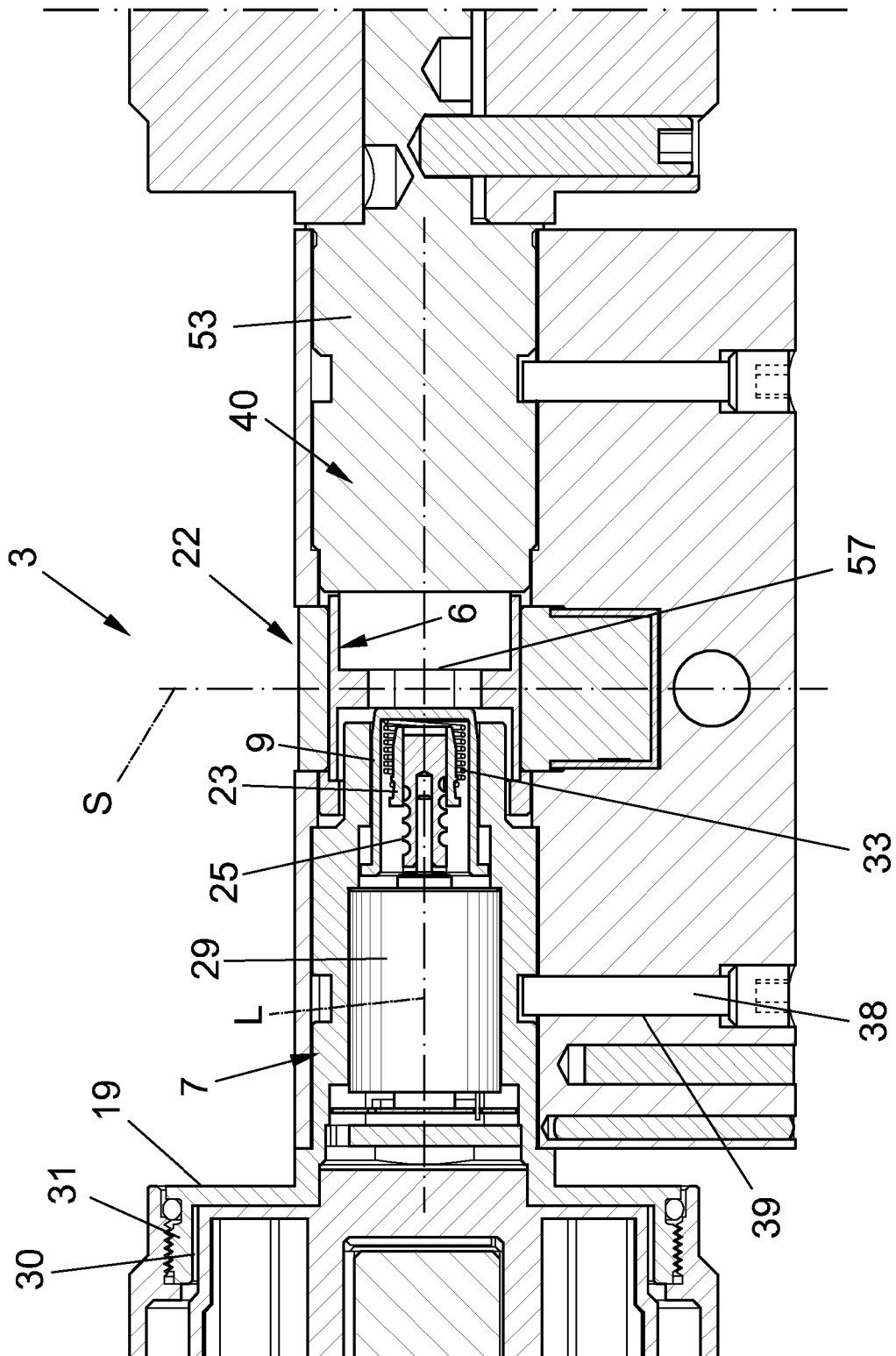


FIG.3

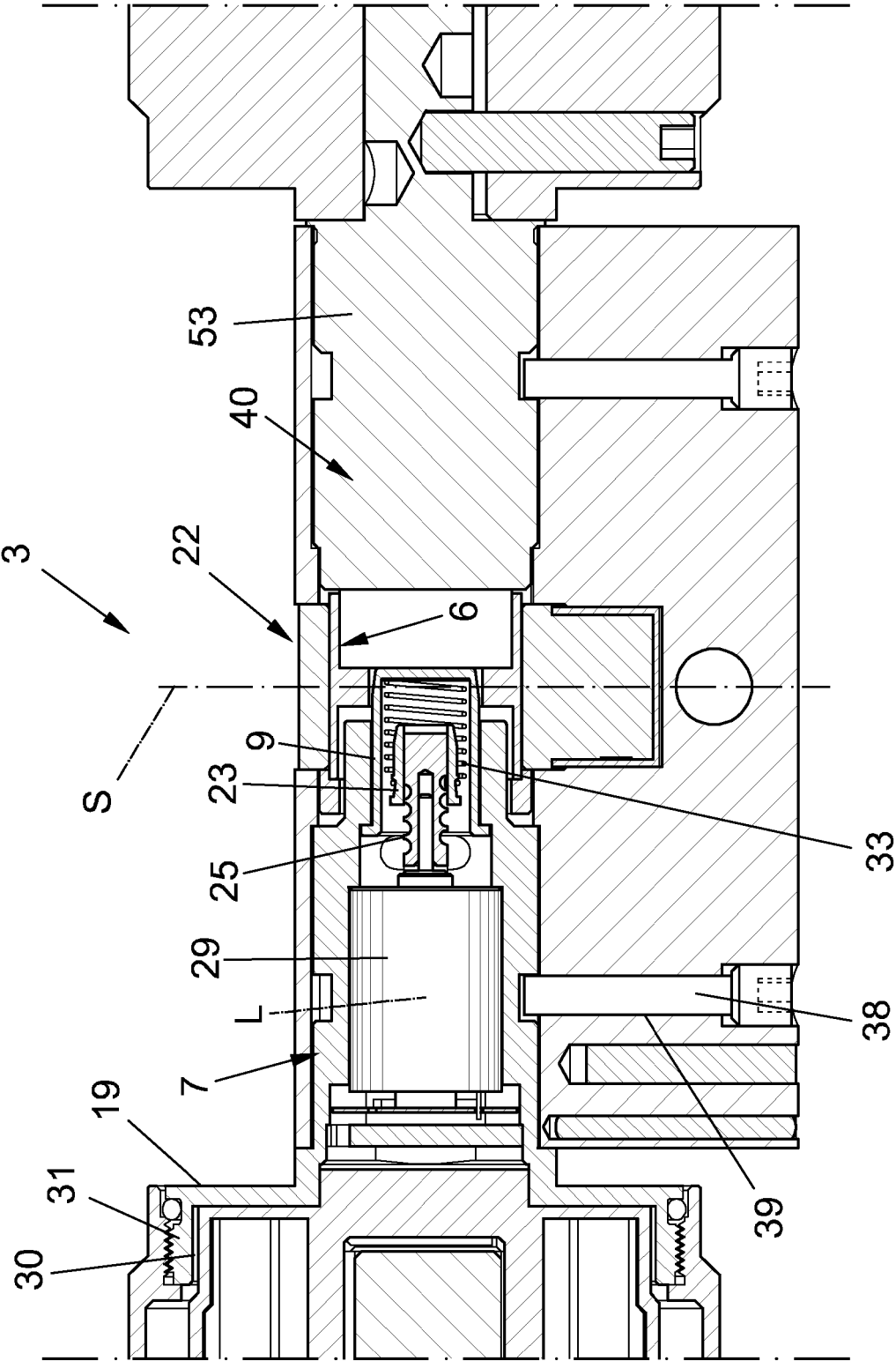


FIG.4

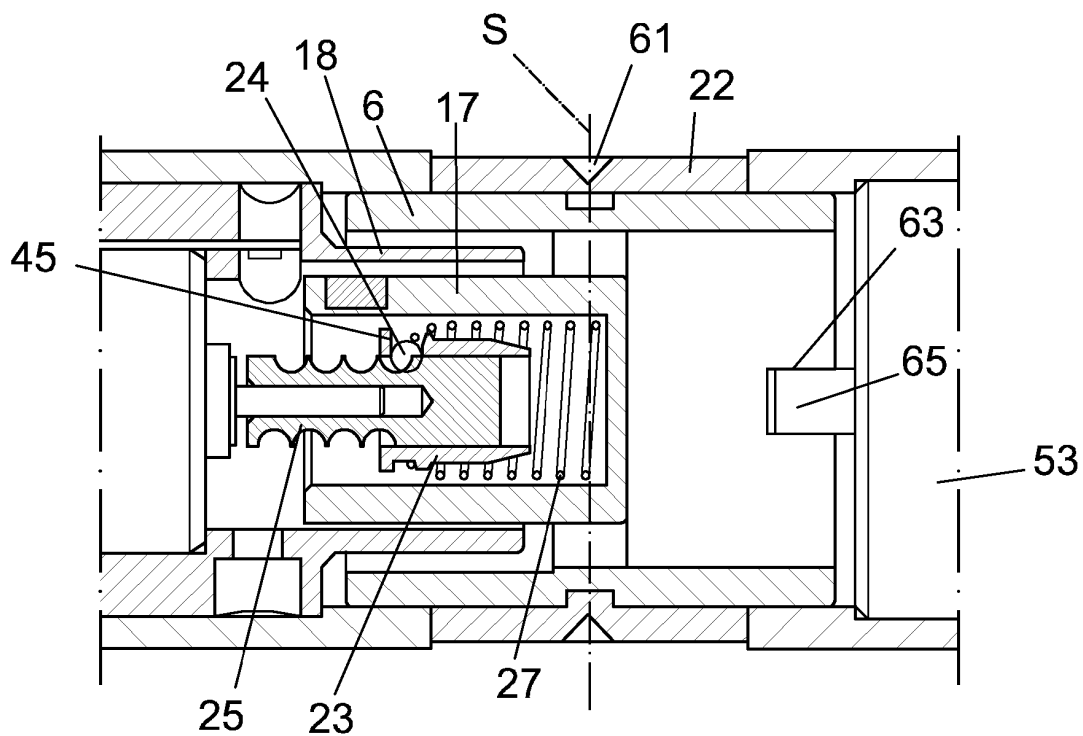


FIG. 4A

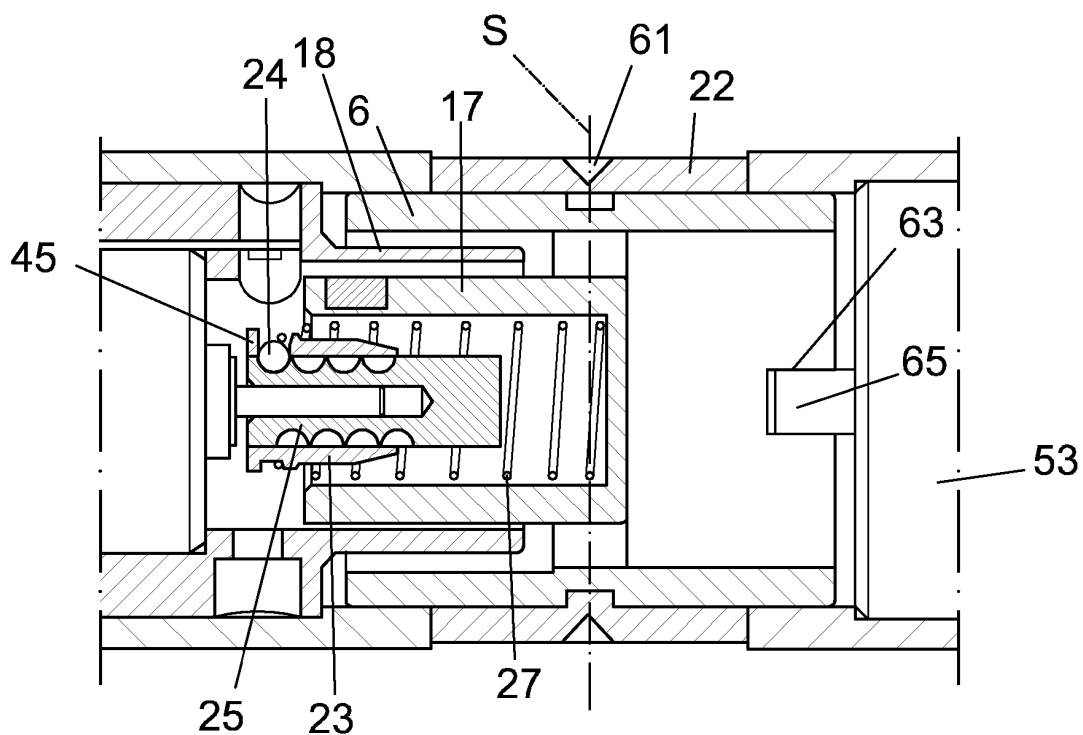


FIG. 5A

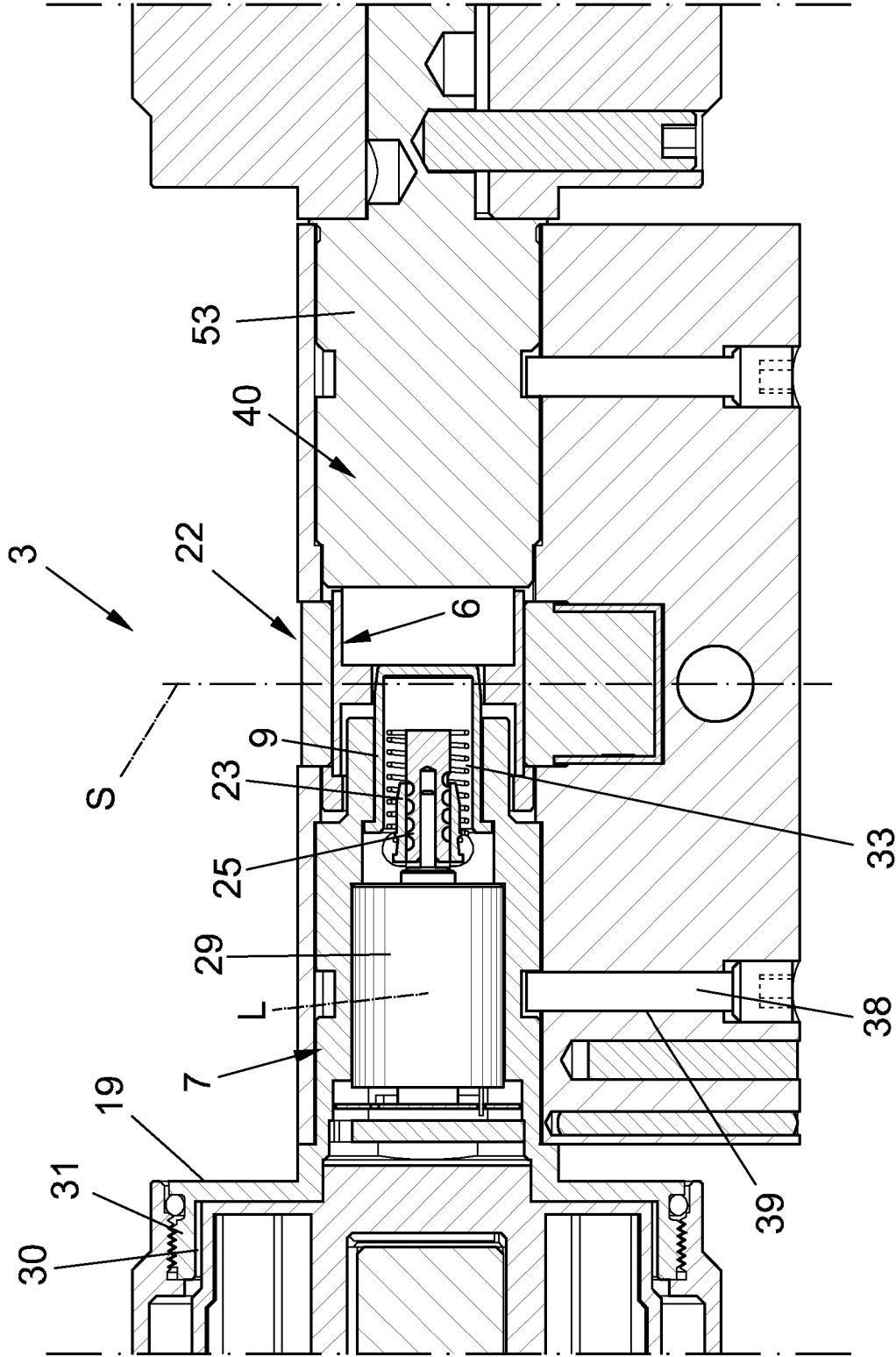


FIG.5

