



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**09.01.2019 Bulletin 2019/02**

(51) Int Cl.:  
**E05B 27/00 (2006.01) E05B 19/00 (2006.01)**

(21) Application number: **18181604.2**

(22) Date of filing: **04.07.2018**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
 Designated Extension States:  
**BA ME**  
 Designated Validation States:  
**KH MA MD TN**

(71) Applicant: **Mottura Serrature di Sicurezza S.p.A.**  
**10057 Sant'Ambrogio (Torino) (IT)**

(72) Inventor: **MOTTURA, Sergio**  
**I-10057 Sant'Ambrogio (Torino) (IT)**

(74) Representative: **Frontoni, Stefano Buzzi, Notaro & Antonielli d'Oulx**  
**Corso Vittorio Emanuele II, 6**  
**10123 Torino (IT)**

(30) Priority: **07.07.2017 IT 201700076671**

(54) **SECURITY LOCK**

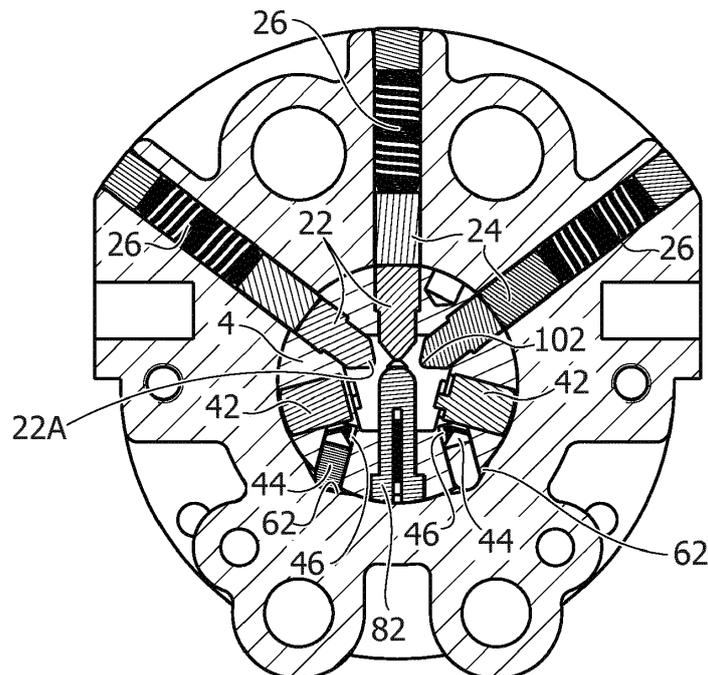
(57) Described herein is a key-operable lock, of the type comprising:

- a stator body (2);
- a rotor body (4) rotatably mounted within said stator body and provided with a passage (6) for insertion of a key for operating the lock; and
- coding means for preventing rotation of said rotor body (4) with respect to said stator body (2) and for enabling, instead, said rotation when an authorised key is inserted

in said passage (6).

The lock is characterized in that the coding means of the lock comprise two main types of pins carried by the rotor body (4), which operate according to different modalities for defining the condition of blocking of the lock, and in that the pins in question are positioned on different points of the rotor body (4) about its ideal axis of rotation.

**FIG. 5**



**Description**Brief description of the drawingsField of the invention

**[0001]** The present invention relates to a key-operable security lock, of the type comprising:

- a stator body;
- a rotor body, rotatably mounted within said stator body and provided with a passage for insertion of a key for operating the lock; and
- coding means for preventing rotation of said rotor body with respect to said stator body and for enabling, instead, said rotation when an authorised key is inserted in said passage.

Purpose and subject of the invention

**[0002]** The object of the present invention is to provide a lock of the type referred to above that will guarantee a high degree of security and reliable operation. A further object of the invention is to achieve the aforesaid purpose with a lock having a relatively simple structure and suited for mass production.

**[0003]** With a view to achieving the aforesaid objects, the lock described herein is characterized in that the aforesaid coding means comprise:

- at least one first pin, which is carried by said rotor body and is able to slide along its own axis, projecting within said passage for insertion of the key;
- at least one second pin, which is carried by said rotor body in a fixed position along its own axis, with the possibility of rotation about said axis, projecting within said passage for insertion of the key;
- at least one third pin, which is carried by said stator body and is able to slide along its own axis, co-operating with said first pin to determine a condition of blocking of the lock in which said first pin or third pin sets itself in a position of interference straddling the interface between said rotor body and said stator body; and
- at least one blocking member, which is carried by said rotor body and is mobile between an operative position where it projects from said rotor member and engages a seat made in said stator body, and a position where said member is entirely contained within said rotor body, in which said second pin has an outer surface configured for co-operating with said blocking member so as to determine the position of said member on the basis of the orientation of said second pin about its own axis.

**[0004]** Preferably, said at least one first pin and said at least one second pin are located in different positions about an ideal central axis of rotation of said rotor body.

**[0005]** Further characteristics and advantages of the invention will emerge from the ensuing description with reference to the annexed drawings, which are provided purely by way of non-limiting example and in which:

- Figure 1 illustrates a preferred embodiment of the lock described herein, according to an axonometric view;
- Figure 2 illustrates according to the same view the lock of Figure 1 in which a covering plate has been removed to render visible further parts of the lock;
- Figure 3 illustrates the lock of Figure 1 from the side opposite to the one illustrated in Figure 1;
- Figure 4 illustrates the lock of Figure 1 according to a view in lateral orthogonal projection;
- Figure 5 is a cross-sectional view of the lock, according to the plane V-V of Figure 4;
- Figure 5A is a cross-sectional view of the lock, according to the same plane of Figure 5, in a condition in which the key for operating the lock is inserted;
- Figure 6 is a cross-sectional view of the lock, according to the plane of section VI-VI of Figure 4;
- Figure 6A is a cross-sectional view of the lock, according to the same plane as that of Figure 6, in a condition in which the key for operating the lock is inserted;
- Figure 7 is a cross-sectional view of the lock, according to the plane VII-VII of Figure 4;
- Figure 7A is a cross-sectional view of the lock, according to the same plane as that of Figure 7, in a condition in which the key for operating the lock is inserted;
- Figure 8 is a cross-sectional view of the lock, according to the plane VIII-VIII of Figure 1;
- Figure 9 is a cross-sectional view of the lock, according to the same plane as that of Figure 8, in a condition in which the key for operating the lock is inserted;
- Figure 10 is a cross-sectional view of the lock, according to the same plane as that of Figure 8, in a condition in which, as in Figure 9, the key for operating the lock is inserted but from the opposite side;
- Figure 11 illustrates an axonometric view of the rotor body of the lock of Figure 1;
- Figure 12 illustrates the rotor body of Figure 11 viewed from beneath;
- Figures 13A and 13B illustrate a key for operating the lock of Figure 1, according to a perspective view and a front view, respectively;
- Figure 14 is a cross-sectional view of a further embodiment of the lock described herein;
- Figure 15 illustrates the lock of Figure 14, with the respective key for operating the lock inserted from the left-hand side;
- Figure 16 illustrates the lock of Figure 14, with the key for operating the lock inserted, in a condition of

- disabling of the key;
- Figure 17 illustrates the lock of Figure 14, with the key for operating the lock inserted from the right-hand side; and
- Figure 18 illustrates a plan view of the active part of the key for operating the lock of Figure 14, according to an embodiment.

#### Detailed description of various embodiments of the invention

**[0006]** In the ensuing description, various specific details are illustrated aimed at providing an in-depth understanding of the embodiments. The embodiments may be obtained without one or more of the specific details, or with other methods, components, or materials, etc. In other cases, known structures, materials, or operations are not illustrated or described in detail so that various aspects of the embodiment will not be obscured.

**[0007]** The references used herein are provided only for convenience and hence do not define the sphere of protection or the scope of the embodiments.

**[0008]** The lock described herein, designated as a whole by the reference number 10, in general comprises:

- a stator body 2;
- a rotor body 4 rotatably mounted within the stator body and provided with a passage 6 for insertion of a key for operating the lock; and
- coding means for preventing rotation of the rotor body 4 with respect to the stator body 2 and for enabling, instead, the above rotation when an authorised key is inserted in the passage 6.

**[0009]** The stator body 2 is generically disk-shaped and is provided at the centre with a through opening 2A, rotatably mounted within which is the rotor body 4.

**[0010]** In the example illustrated, the lock 10 is configured for operating a gear-lock device (not illustrated) and is provided for this purpose with a gear wheel 8, which is directly fitted on the rotor body 4 (see Figure 2) and is designed to engage a corresponding gear wheel of the aforesaid device (not illustrated).

**[0011]** The coding means of the lock comprise two main types of pins carried by the rotor body 4, which operate according to two different modalities for defining the blocking condition of the lock.

**[0012]** The pins in question position themselves on different points of the rotor body 4 about its ideal axis of rotation.

**[0013]** As will become evident in what follows, this type of arrangement of the coding means enables reduction of the overall dimensions of the lock in an axial direction and more in general provision of a sturdier and stronger locking structure.

**[0014]** With reference to the example illustrated (Figures 5 and 6), a first type of pins is represented by pins 22 housed within respective substantially radial holes

made in the aforesaid body, which set the passage 6 made in the rotor body in communication with its outer surface.

**[0015]** The pins 22 are able to slide along their own axis within the aforesaid holes and project with an end thereof into the passage 6, facing the stator body with their opposite end.

**[0016]** The pins 22 are designed to co-operate with pins 24 arranged in the stator body 2 in corresponding positions, within respective holes made in the stator body that give out into the internal opening 2A. Within these holes, the pins 24 are able to slide along their own axis in the same way as the pins 22. Preferably, respective springs 26, housed within the above holes, act on the pins 24, pushing them in the direction of the rotor body 4 and of the pins 22.

**[0017]** Figure 5 represents the blocking condition of the lock, in which the aforesaid holes are aligned with respect to one another and the pins 22 and 24 co-operate for determining a condition of blocking of rotation of the rotor body 4.

**[0018]** In particular, the pins 24 pushed by the springs 26 penetrate into the same holes as those of the pins 22, setting themselves straddling the rotor body 4 and the stator body 2, thus preventing relative rotation thereof.

**[0019]** To disable the above blocking action, the key for operating the lock - illustrated in Figures 13A and 13B - envisages on its own active part 100 indentations 102 that are designed to be engaged by the corresponding ends 22A of the pins 22 and have a pre-set shape and size, such as to position the pins 22 and 24 flush with the interface between the stator body 2 and the rotor body 4.

**[0020]** The other type of pins provided within the rotor body 4 is, instead, constituted by pins 42, which are arranged in the rotor body 4 in fixed positions along their own axis, but with the possibility of turning about it. The modalities of housing of the pins 42 in the rotor body 4 may be different. In various preferred embodiments, as in the one illustrated (Figures 5 and 6), the pins are arranged within respective holes made in the rotor body, which have a depth equal to the height of the pins themselves, in such a way that the ends of the pins facing the stator body 2 are flush with the outer surface of the rotor body 4. In this way, the pins 42 are in effect blocked with respect to any movement along their own axial direction, on one side by the bottom of the hole in which they are received and on the other side by the inner surface of the opening 2A.

**[0021]** The pins 42 are designed to co-operate with respective blocking members 44, which are also housed within the rotor body 4 and arranged alongside the aforesaid pins. Each member 44 is mobile between an operative position where it projects out of the outer surface of the rotor body, engaging a seat 62 made on the inner surface of the stator body 2A, and an inoperative position, in which it is, instead, completely contained within the rotor body.

**[0022]** The outer surface of the pins 42 is configured

for enabling or disabling the aforementioned inoperative position of the member 44 according to the orientation that the pin 42 assumes with respect to its own axis. In particular, the aforesaid lateral surface has in general overall dimensions such as to prevent the member 44 from re-entering totally within the rotor body, thus constraining it in the aforesaid operative position where it is engaged in the seat 62. In a specific position of its outer surface, the pin 42 has, however, a groove 42A, which is, instead, configured for receiving at least part of the member 44 so as to provide in the rotor body a sufficient space for the member 44 to be able to re-enter completely within said body, moving into its inoperative position.

**[0023]** Preferably, the rotor body 4 may envisage springs 46 that act on the member 44, pushing it against the seat 62.

**[0024]** Figure 5 represents the blocking condition in which each member 44 engages the respective seat 62 and is blocked in this position by the respective pin 42 so as to prevent rotation of the rotor body 4.

**[0025]** In the light of the foregoing, in order to disable the aforesaid blocking condition, it is necessary to orient the pins 42 so as to set their respective grooves 42A in the direction of the members 44.

**[0026]** For this purpose, the pins 42 have on their ends facing the passage 6 an eccentric finger 42B, which projects into this passage and is designed to be engaged by a track 104 made on the key for operating the lock (Figure 13A).

**[0027]** The track 104 extends in the longitudinal direction of the key and has a profile such as to turn the pin 42 as a result of insertion of the key into the passage, setting it in the correct orientation whereby the aforesaid inoperative position of the member 44 is enabled.

**[0028]** Once the pins 42 are appropriately oriented, the members 44 can fit within the rotor body 4 simply as a result of rotation of the rotor body itself, thanks to the thrust that is exerted against them by the surfaces of the respective seats 62 following upon the above rotation.

**[0029]** It should now be noted that the pins 22 and 42 arranged as illustrated above may be provided in a number of transverse planes of the lock, the purpose being to have available a greater number of coding combinations.

**[0030]** With specific reference to the embodiment illustrated, the aforesaid pins are provided in two different transverse planes, which are represented in Figures 5 and 6, respectively. Preferably, the pins of the different planes are in any case arranged in corresponding positions, the aim being to simplify the overall structure of the lock. Moreover, once again in order to simplify the structure, the corresponding pins 42 of the two different planes are associated to one and the same blocking member 44, which has an elongated shape and is oriented in the axial direction of the lock (see Figures 11 and 12). The operative and inoperative positions of this member are hence controlled in the two planes, and only when the pins 42 of both are oriented in an appropriate way, can

the member move into its inoperative position.

**[0031]** The lock can in any case provide also further planes in which pins of just one of the two types are provided, this according to the specific requirements of application and considering also the overall dimensions available. In this connection, in Figures 11 and 12 it is possible to discern a third pin 42, which is set in a further plane with respect to the pins 42 of the planes illustrated in Figures 5 and 6.

**[0032]** With specific reference now to the key for operating the lock, its active part 100 mentioned above, designed to co-operate with the coding means of the lock, is characterized in having at least one longitudinal stretch with constant section having a polygonal profile with a number of sides equal to the number of positions of the coding means about the axis of rotation of the rotor body 4. In various embodiments, as in the one illustrated, the part 100 has in particular a substantially hexagonal outer profile. On the sides in question the indentations 102 and the tracks 104 mentioned above are provided, which are designed to co-operate with the pins 22 and 42.

**[0033]** In various preferred embodiments, as in the one illustrated, the rotor body 4 further comprises a protective body 82, which is housed within a corresponding seat made in the rotor body and projects within the passage 6 so as to obstruct it (Figures 5, 6, and 8).

**[0034]** The body in question has the function of hindering any possible attempts at effraction made through said passage. It is preferably made of high-strength metal material (for example, hardened steel, special alloys, sintered steel, etc.) in order to be able to withstand also possible actions of effraction carried out using a drill.

**[0035]** In various preferred embodiments, as in the one illustrated, also the body 82, like the coding means referred to above, is set in a given radial position along the circular path mentioned above (Figures 5 and 6).

**[0036]** In various preferred embodiments, as in the one illustrated, the portion of the body 82 that projects within the passage 6, designated by the reference number 82A, preferably has the following dimensions:

- a length approximately corresponding to that of said passage (Figure 8); and/or
- a height equal to at least half the height of said passage (Figures 5 and 6); and/or
- a width approximately equal to or greater than half of a minimum width of said passage (Figures 5 and 6).

**[0037]** To return now to the key for operating the lock, its active part 100 has a groove 106, which extends in a longitudinal direction starting right from the tip of the key and that is prearranged for receiving the portion 82A of the protective body completely inside it. In particular, this groove has a length (measured in the axial direction of the lock) equal to that of the portion 82A and a depth approximately equal to the height of the aforesaid portion.

**[0038]** It should now be noted that in various embodi-

ments, as in the one illustrated, the body 82 has a length slightly smaller than that of the passage 6 in such a way that the part 100 of the key presents at least one portion with full section having the functions of guiding and stiffening the key. Moreover, the body 82 is slidably mounted within the rotor body 4, in the axial direction of the lock, between a first end position and a second end position, one or the other of which is assumed by the aforesaid body following upon insertion of the key into the lock, according to the side from which the key is inserted. These two positions are defined by respective contrast surfaces 52, 54 present within the rotor body 4. In these positions, the body 82 sets itself so as to occupy the outer opening of the passage 6, on the side of the lock opposite to that from which the key is inserted, preventing the presence, between the key inserted and the body, of any gaps or slits in which instruments can be introduced in an attempt to force the lock.

**[0039]** With reference to the key, defined at the end of the groove 106 opposite to the tip is a contrast edge 108 prearranged for engaging the body 82 and pushing it, during insertion of the key, into one of the two end positions referred to above.

**[0040]** In the case where, once again with the use of a burglary tool, the body 82 were, instead, to be pushed even just slightly towards the inside of the passage 6, for example in an attempt to find a hold for the tool, it would in turn push the key at its edge 108, shifting it from the respective operative position and thus bringing back the lock into the blocking condition.

**[0041]** In the light of the foregoing, the body 82 hence provides effective and complete protection in regard to attempts at effraction made through the passage 6.

**[0042]** Figures 9 and 10 illustrate the body 82 in the two end positions referred to above, with reference to insertion of the key from the right-hand side and from the left-hand side, respectively.

**[0043]** It should be noted that the aforesaid end positions of the body 82 also define the axial position of the key within the passage 6.

**[0044]** In various preferred embodiments, as in the one illustrated, slidably mounted within the body 82 is at least one pin 84 - in the embodiment illustrated there are two pins for the reasons that will be clarified in what follows -, which is controlled by a respective spring 86, which is also contained in the body, in a position where the end of the pin 84 opposite to the spring projects out of the body 82, through a corresponding opening 82', to give out on the inside of the passage 6.

**[0045]** The pin 84 is prearranged for co-operating with a pin 22' and with the corresponding pin 24', with respect to which the pin 84 sets itself coaxial (Figures 7 and 8).

**[0046]** The pins 22' and 24' are pins homologous to the pins 22 and 24 referred to above.

**[0047]** However, the pins in question define a particular blocking condition, which cannot be disabled simply by an indentation provided on the key, like the aforesaid indentations 102.

**[0048]** In fact, the pin 22' has a considerably smaller length than the other pins 22 so that for the pin 22' and the pin 24' to be brought flush with the interface between the rotor body and the stator body, as illustrated above for the pins 22 and 24, in order to release the rotor body, the active part of the key must present an appropriate portion projecting from the body itself of the key.

**[0049]** In various preferred embodiments, as in the one illustrated, the above portion is defined by a ring 30 of pre-defined diameter carried by the key.

**[0050]** As will be seen in greater detail in what follows, the ring 30 is free to move transversely with respect to the key so that, during insertion thereof, it is able to undergo self-centring within the corresponding slit of the passage 6, precisely so as not to hinder the key while it is being inserted.

**[0051]** Then, once the key is inserted, the ring 30 is engaged on one side by the pin 84 and on the other by the pins 22' and 24'.

**[0052]** In particular, the pin 84, controlled by the spring 86, acts on the ring 30 by contrast, pushing it until it projects from the key and also pushing the pins 22' and 24'.

**[0053]** The ring 30 must have a pre-set diameter such that, supported by the pin 84, it will set the pins 22' and 24' in a position of non-interference (Figure 7A).

**[0054]** With particular reference now to the modalities of mounting of the ring 30 on the key, preferably it is mounted on a cylindrical pin 31, within the opening 112 made on the side of the active part 100 opposite to the side of this on which the groove 106 is made.

**[0055]** The ring 30 has a considerably larger diameter than the pin 31 and is mobile within the opening 112 in a direction orthogonal to the corresponding side of the part 100.

**[0056]** Preferably, the ring 30 is guided laterally in this movement by the walls of the above opening so as to be in a fixed position in the direction transverse to the longitudinal direction of the key. For this purpose, the opening 112 has a width - measured in the transverse direction - that is slightly larger than the width of the ring. In a similar way, preferably the ring 30 is also limited in its movements in the longitudinal direction by the front and rear walls of the opening 112, within a restricted range sufficient for enabling minor displacements in order to prevent any possible interference between the ring and the surrounding parts during insertion of the key in the lock. The opening 112 hence also has a length - measured in the longitudinal direction of the key - that is slightly larger than the diameter of the ring.

**[0057]** It should be noted that, even though the ring 30 represents a preferred embodiment, it is in any case possible to envisage other elements that are able to operate in the same way. For instance, the key can carry on it a ball housed within a cage-like seat provided on the part 100 of the key, and is mobile, within this seat, as illustrated above for the ring 30.

**[0058]** To return now to the lock, in the case where this

is prearranged for being operated by a key provided with the ring 30 and at the same time the protective body 82 is slidably mounted between the two end positions, as illustrated above, the protective body 82 then envisages two pins 84, which are arranged in two different positions in the axial direction of the lock (Figures 8, 9, and 10).

**[0059]** Each pin is designed to co-operate with the ring 30 and the pins 22' and 24' for one of the two end positions assumed by the body 82. In this connection, reference may be made to Figures 9 and 10, which illustrate, respectively, the active condition of the right-hand pin 84 for the end position of the body 82 reached following upon insertion of the key from the right-hand side, and the active condition of the left-hand pin 84 for the end position of the body 82 reached following upon insertion of the key from the left-hand side.

**[0060]** It may readily be understood that the distance between the two pins 84 will hence be substantially equal to the distance between the aforesaid two end positions of the body 82.

**[0061]** In various preferred embodiments, as in the one illustrated in Figures 14 to 17, the protective body 82 is controlled in one of the two end positions by an elastic element 85. For the reasons that will become evident in what follows, the end position so controlled corresponds to the one for which the protective body 82 comes to face the inner side of the door or window frame on which the lock is mounted.

**[0062]** In various preferred embodiments, as in the one illustrated, the elastic element is set within a housing provided in the rotor body 4, set between the protective body 82 and an inner wall of the rotor body 4. In various preferred embodiments, as in the one illustrated, the aforesaid elastic element is constituted by a helical spring set with its own axis parallel to the axis of rotation of the rotor body. Preferably, the two opposite ends of the spring are contained in respective cup-shaped bodies 87 with flat bottoms, arranged, one engaged to the protective body 82 and the other engaged to the inner wall of the rotor body 4.

**[0063]** Thanks to the elastic element 85, the protective body 82 is able to displace the key previously inserted into the lock into a disabling position whereby the lock is blocked.

**[0064]** In particular, when the key is first inserted in the lock up to its end-of-travel position, the protective body 82 is pushed by the contrast edge 108 of the key into its end position in opposition to the action exerted by the elastic element 85, and the elastic element is thus "charged" (Figure 15). Precisely on account of the presence of the elastic element, during operation of the lock, to keep the key in the end-of-travel position the user will have to exert a constant pressure on the key, against the aforesaid element.

**[0065]** When the key is then released by the user, the elastic element 85 pushes the protective body 82 to bring it back into the opposite end position, and this in turn pushes along with it the key, shifting it from its end-of-

travel position to a position where the lock is disabled (Figure 16). In this connection, Figure 16 shows, in fact, the pins 22 and 24 that are in a condition of blocking of the lock, as a result of the aforesaid displacement of the key.

**[0066]** It should be noted that the amount of the displacement may be minimal provided that it is sufficient to move the encoding indentations provided on the key away from their position of enabling of the lock.

**[0067]** The configuration described has been obtained as security measure for when the key is left inserted in the lock, on the inner side of the door or window frame, to prevent attempts at effraction where the plug is drawn in rotation from the outside with the use of appropriate burglary tools, exploiting the fact that the lock is in the enabled condition guaranteed by the key being inserted.

**[0068]** On the other hand, with reference to Figure 17, it will be noted, instead, that, when the key is inserted from the opposite side, i.e., from the outer side of the door or window frame, the elastic element 85 does not intervene in any way in operation of the lock.

**[0069]** To return to the action exerted by the elastic element 85 on the key, it will be noted that it is countered by the action that the springs 26 exert thereon indirectly, through the pins 22 that are pushed into the indentations 102 of the key, so that the elastic element 85 will necessarily have to be sized so as to be able to overcome the aforesaid action exerted by the springs 26.

**[0070]** However, considering that, in the operation of the lock, as has been seen, the user himself must overcome the force of the elastic element 85 to bring the key into its end-of-travel position, it is desirable for the force exerted by the aforesaid element to be limited in order to decrease the resistance opposed to the user and thus increase the convenience of use of the lock. For this purpose, preferably the key has some of the indentations designed to co-operate with the pins 22 (designated in Figure 18 by the reference 102'), which comprise a stretch that has a longitudinal development and a constant depth, along the axis of the key, so as not to move the respective pins 22 during displacement of the key induced by the protective body 82 and consequently not to exert force on the springs 26 associated thereto. Consequently, only some springs 26 will effectively exert an action of contrast on the elastic element 85, and this may hence be prearranged, in the design stage, for exerting a lower elastic force.

**[0071]** It should again be noted that the solution described herein also regards a key blank provided with an active part that has the same characteristics illustrated above with reference to the key for operating the lock, except for the indentations 102 and the tracks 104, which are subsequently obtained at the moment of encoding of the key.

**[0072]** Finally, to return now to the embodiments illustrated previously, it should be noted that the lock described herein may also present the following general characteristics:

- the protective body (82) carries, mounted thereon, at least two pins (84) set at a distance from one another along the axis of rotation of the rotor body (4), which are able to slide along their own axis and are urged by a spring (86) as far as a further pin (22'), which is carried by the above rotor body (4), located on the opposite side of the passage (6) for insertion of the key, wherein in a first of the end positions of the protective body (82) a first of said two pins is prearranged for co-operating with said further pin (22'), whereas in the other end position the other one of said two pins is prearranged for co-operating with said further pin (22');
- preferably, wherein said further pin (22') is in turn designed to co-operate with a further pin (24') carried by the stator body (2) for determining a blocking condition of the lock in which one or the other of said pins (22', 24') sets itself in a position of interference straddling the interface between the rotor body and the stator body; and
- even more preferably, wherein the distance between said two pins (84) in said axial direction is substantially equal to the length of the stretch along which said protective body (82) is mobile between said two end positions.

**[0073]** Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may vary, even significantly, with respect to what has been illustrated herein purely by way of non-limiting example, without thereby departing from the scope of the invention, as defined in the annexed claims.

## Claims

### 1. A key-operable security lock, of the type comprising:

- a stator body (2);
- a rotor body (4) rotatably mounted within said stator body and provided with a passage (6) for insertion of a key for operating the lock; and
- coding means for preventing rotation of said rotor body (4) with respect to said stator body (2) and for enabling, instead, said rotation when an authorised key is inserted in said passage (6);

said lock being **characterized in that** said coding means comprise:

- at least one first pin (22), which is carried by said rotor body (4) and is able to slide along its own axis, projecting within said passage (6) for insertion of the key;
- at least one second pin (42), which is carried by said rotor body (4) in a fixed position along its own axis, with the possibility of rotation about said axis, projecting within said passage (6) for

insertion of the key;

- at least one third pin (24), which is carried by said stator body (2) and is able to slide along its own axis, co-operating with said first pin for determining a condition of blocking of the lock in which said first pin (22) or third pin (24) sets itself in a position of interference straddling the interface between said rotor body and said stator body; and

- at least one blocking member (44), which is carried by said rotor body and is mobile between an operative position where it projects from said rotor member (4) and engages a seat (62) made in said stator body, and a position where said member is entirely contained within said rotor body (4), wherein said second pin (42) has an outer surface configured for co-operating with said blocking member (44) so as to determine the position of said member on the basis of the orientation of said second pin about its own axis.

### 2. The lock according to Claim 1, wherein:

- said at least one first pin (22) and said at least one second pin (42) are located in different positions about an ideal central axis of rotation of said rotor body (4);

- preferably, said rotor body comprises a number of entities of said at least one first pin and/or a number of entities of said at least one second pin, which are all located in different positions about an ideal central axis of rotation of said rotor body (4);

- even more preferably, the first pins and second pins (22, 24) are arranged in succession with respect to one another along different stretches of said rotor body (4); and

- preferably, the number of said third pins (24) is equal to the number of said first pins (22), and said third pins (24) set themselves on said stator body (2) in positions corresponding to those of said first pins (22), about said ideal axis of rotation.

### 3. The lock according to any one of the preceding claims, wherein said rotor body (4) comprises a protective body (82), which projects within said passage for insertion of the key so as to obstruct it, in order to hinder possible attempts at effraction made through said passage, for example by way of a drill.

### 4. The lock according to Claim 3, wherein said at least one first pin (22), said at least one second pin (42), and said protective body (82) are located in different positions about an ideal central axis of rotation of said rotor body (4).

### 5. The lock according to Claim 3 or Claim 4, wherein

the portion (82A) of said protective body projecting within said passage (6) has:

- a length approximately corresponding to that of said passage; and/or
- a height equal at least to half the height of said passage; and/or
- a width approximately equal to or greater than half of a minimum width of said passage.

6. The lock according to Claim 3, wherein said protective body (82) is slidably mounted along said ideal axis of rotation between two opposite end positions, wherein in at least one of said two opposite end positions, a corresponding end of said projecting portion (82A) sets itself so as to occupy the outer opening of said passage (6) that is set facing the side opposite to the side where the key is inserted.

7. The lock according to Claim 3, wherein said protective body (82) is slidably mounted along said ideal axis of rotation between two opposite end positions, and wherein, preferably, mounted within said rotor body (4) is an elastic element (85) prearranged for controlling said protective body (82) in one of said end positions.

8. The lock according to Claim 3, wherein said protective body carries mounted on it at least one pin (84) that is able to slide along its own axis and is urged by a spring (86) towards a further pin (22') carried by said rotor that is located on the opposite side of said passage (6).

9. A key, or blank of said key, designed for operating a lock according to any one of the preceding claims, said key or key blank comprising an active part (100) designed to engage the coding means of said lock, said key or key blank being **characterized in that** said active part has a cross section having a polygonal profile with a number of sides equal to the number of positions of the coding means of said lock about the ideal axis of rotation of said rotor body (4).

10. The key or key blank according to Claim 9, in particular designed to operate a lock according to Claims 3 to 8, wherein on a side thereof said active part (100) has a groove (106) that extends in a longitudinal direction starting from the tip of the key and is designed to receive the portion (82A) of said protective body that projects within said passage (6), enclosing it completely.

11. The key or key blank according to Claim 10, wherein said groove (106) has a depth approximately equal to the height of said projecting portion (82A) of said protective body and the same length.

12. The key or key blank according to Claim 10 or Claim 11, wherein at the end of said groove (106) opposite to the tip of said key, said key defines a contrast edge (108) prearranged for engaging said protective body (82) and pushing it, during insertion of the key, into an end position, where said projecting portion (82A) is preferably set flush with the opening of said passage on the side opposite to the side where the key is inserted.

13. The key or key blank according to any one of Claims 10 to 12, wherein on the side opposite to said groove (106), said active part (100) carries mounted on it an element having a pre-set size (30), which is mobile in a direction orthogonal to said side and is positioned within a slit made on said side that is in communication with said groove (106), wherein said element is designed to co-operate both with said pin or pins carried by said protective body (82) and with said other pin (22'), carried by said rotor body, interfacing with these via said pre-set size.

14. The key or key blank according to any one of Claims 9 to 13, wherein said body has a hexagonal cross section.

15. The key or key blank according to any one of Claims 9 to 14, wherein, on said active part (100), a plurality of indentations (102) are provided, prearranged for being engaged by said at least one first pin (22) of said lock, and wherein a subset of said plurality of indentations (102) each comprises a stretch with longitudinal development and constant depth, prearranged in such a way that, in operation of said key, the indentation of said subset will not displace the respective first pin (22) engaged thereby, during movement of the key along the axis of rotation of the rotor body (4) of said lock.

FIG. 1

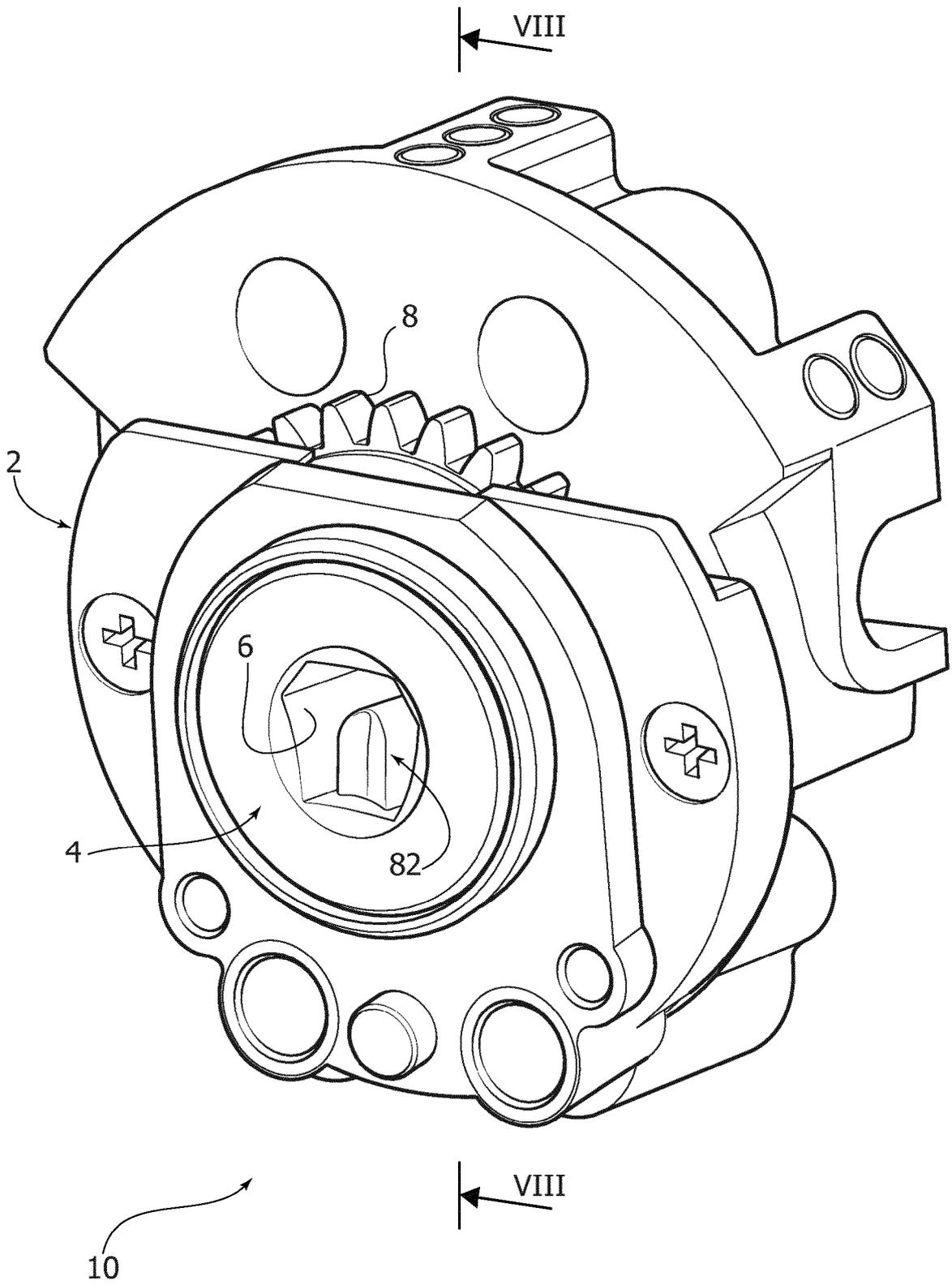


FIG. 2

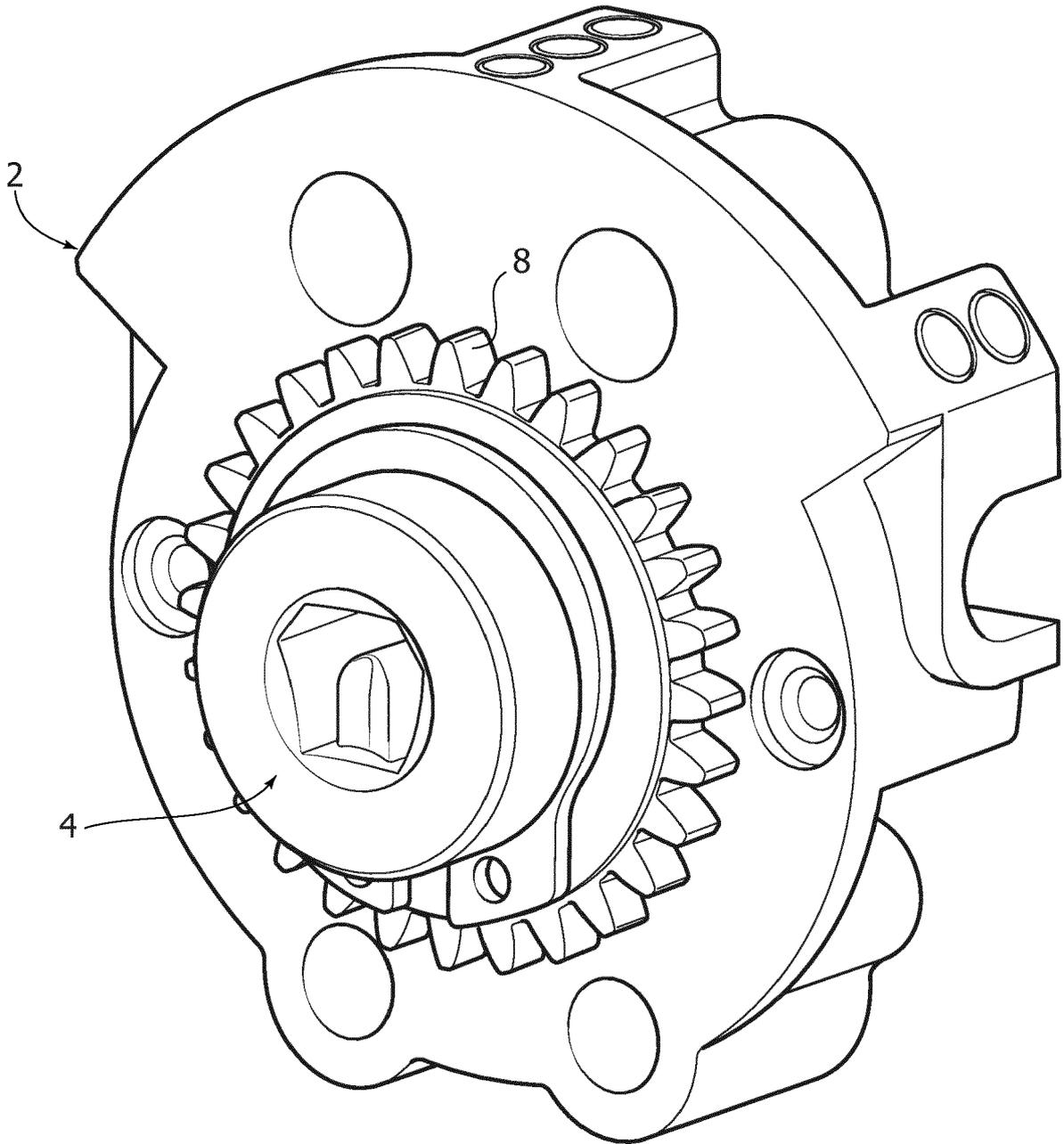


FIG. 3

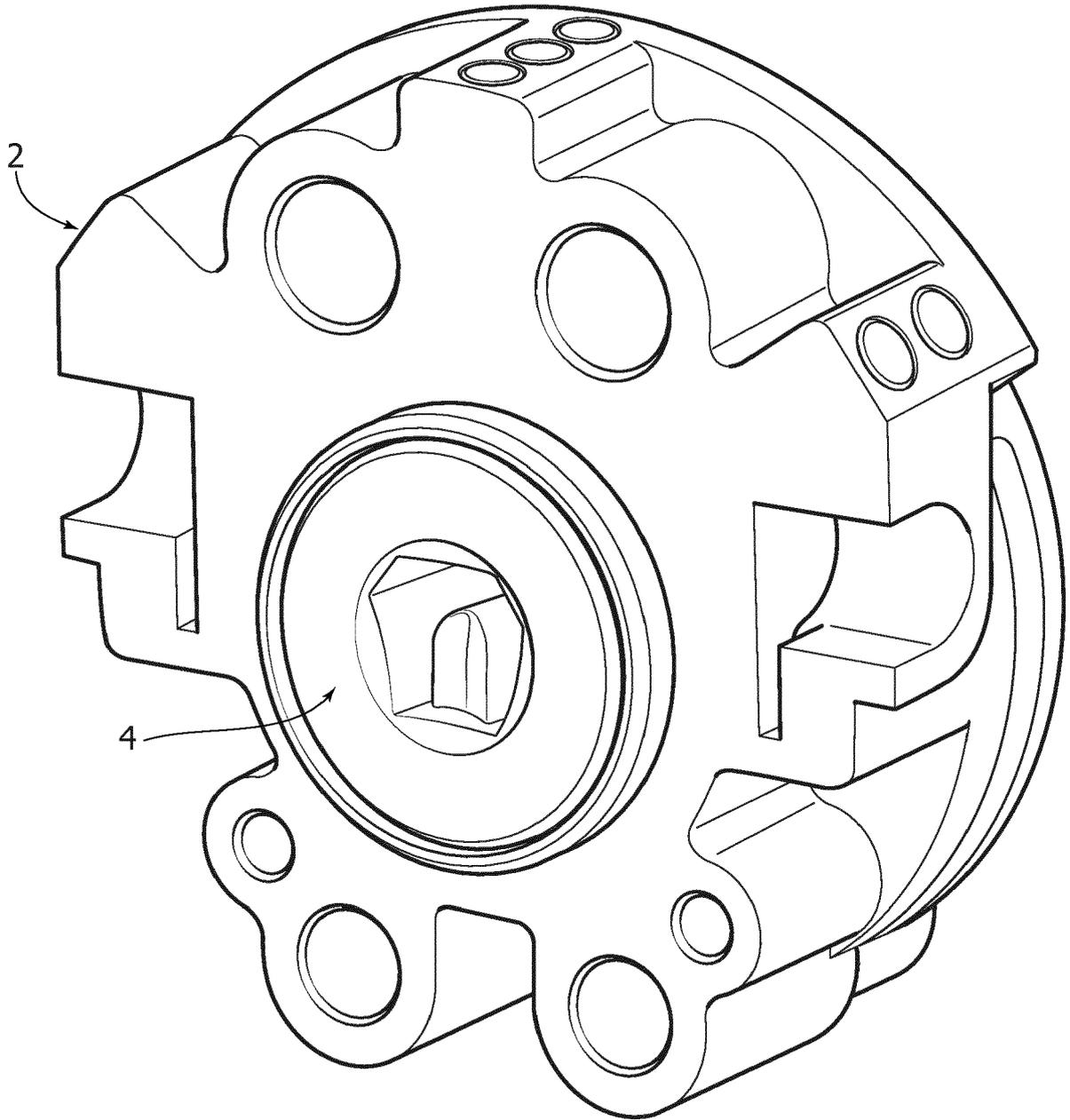


FIG. 4

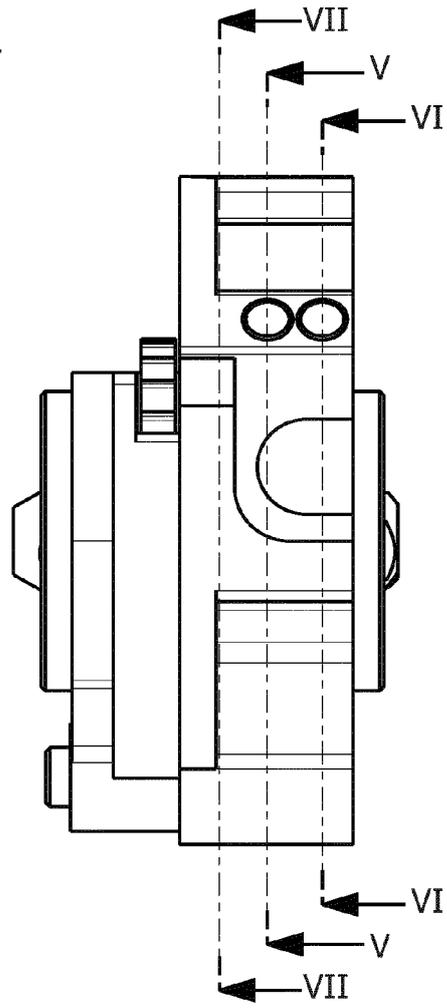


FIG. 5

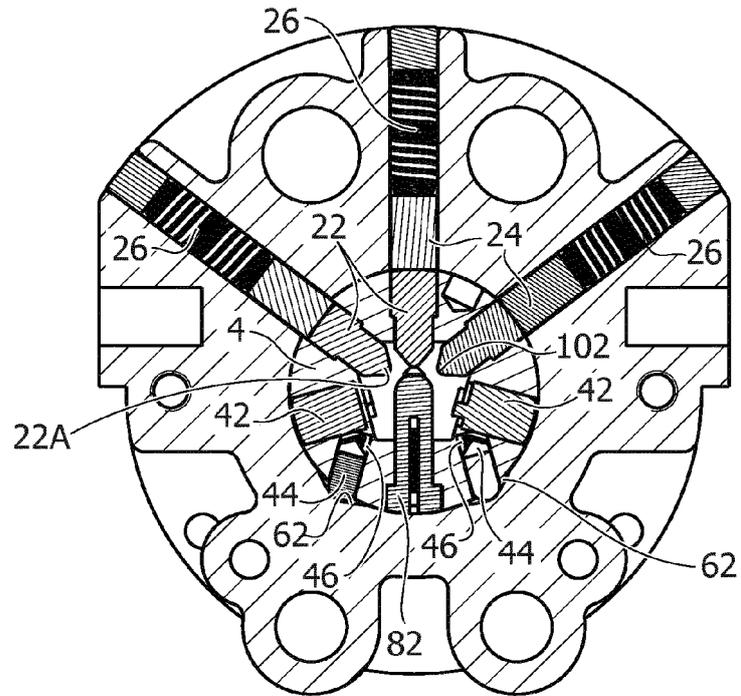


FIG. 5A

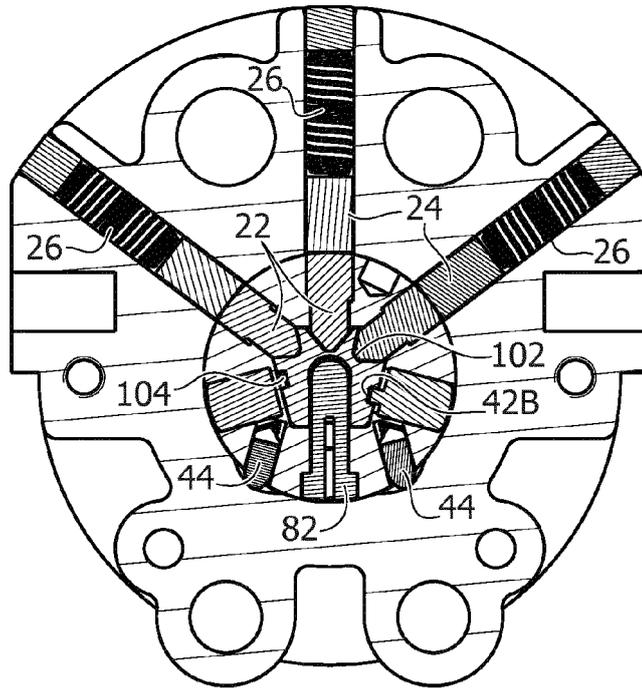


FIG. 6

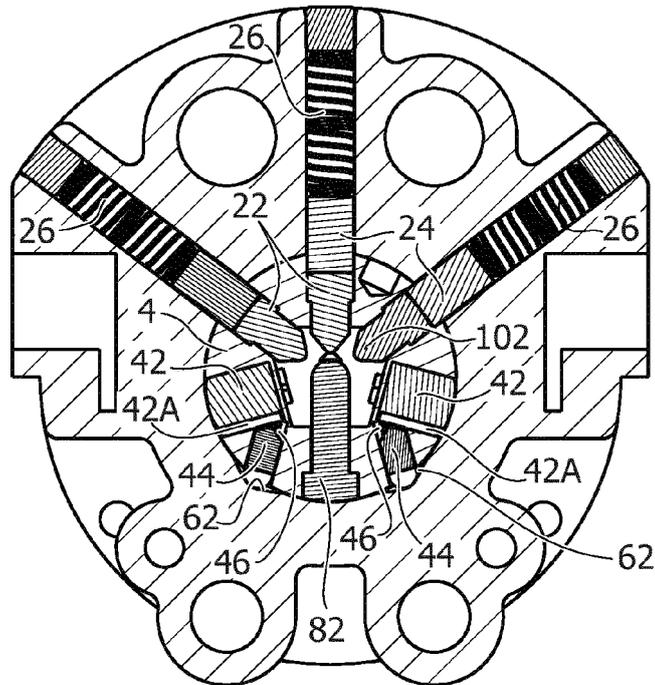


FIG. 6A

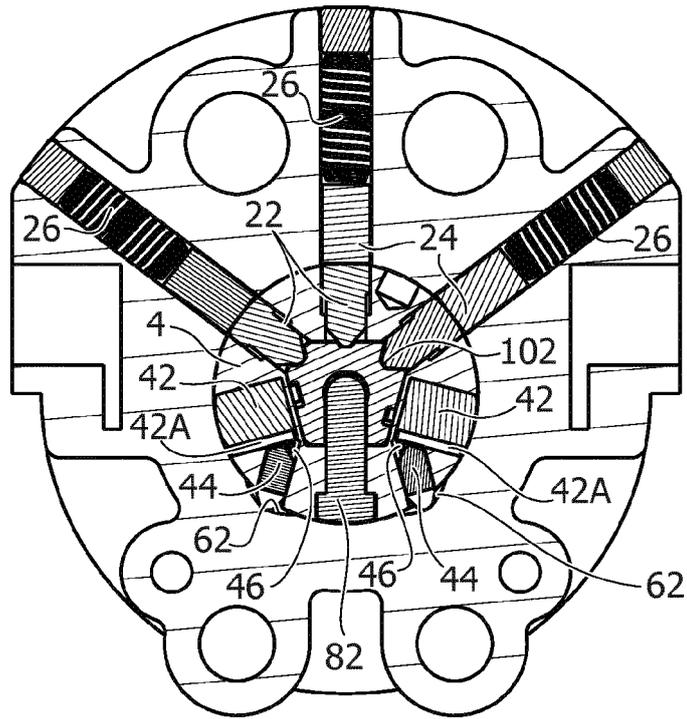


FIG. 7

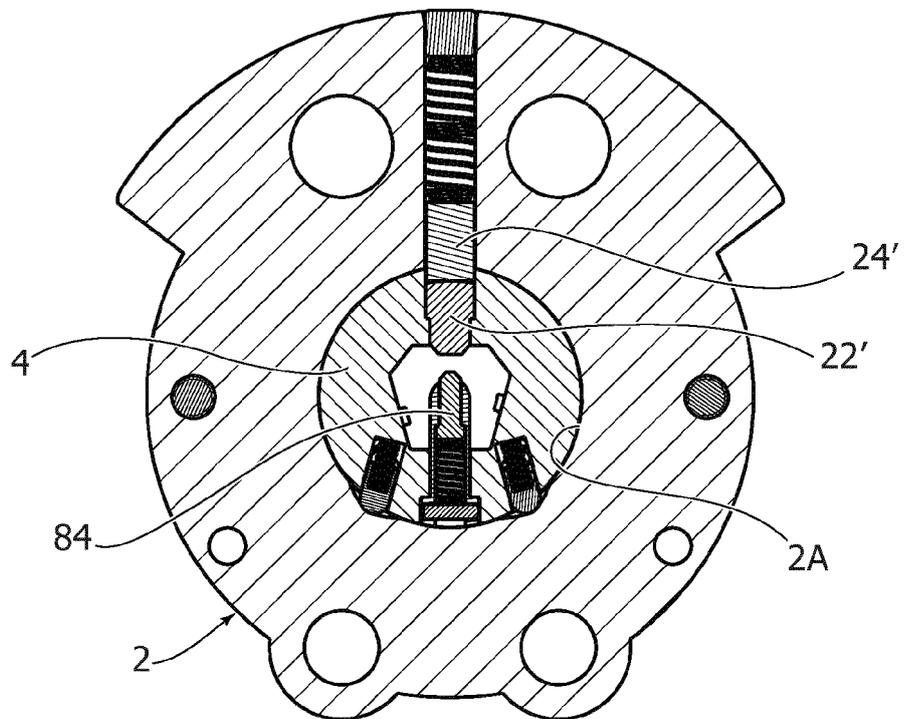


FIG. 7A

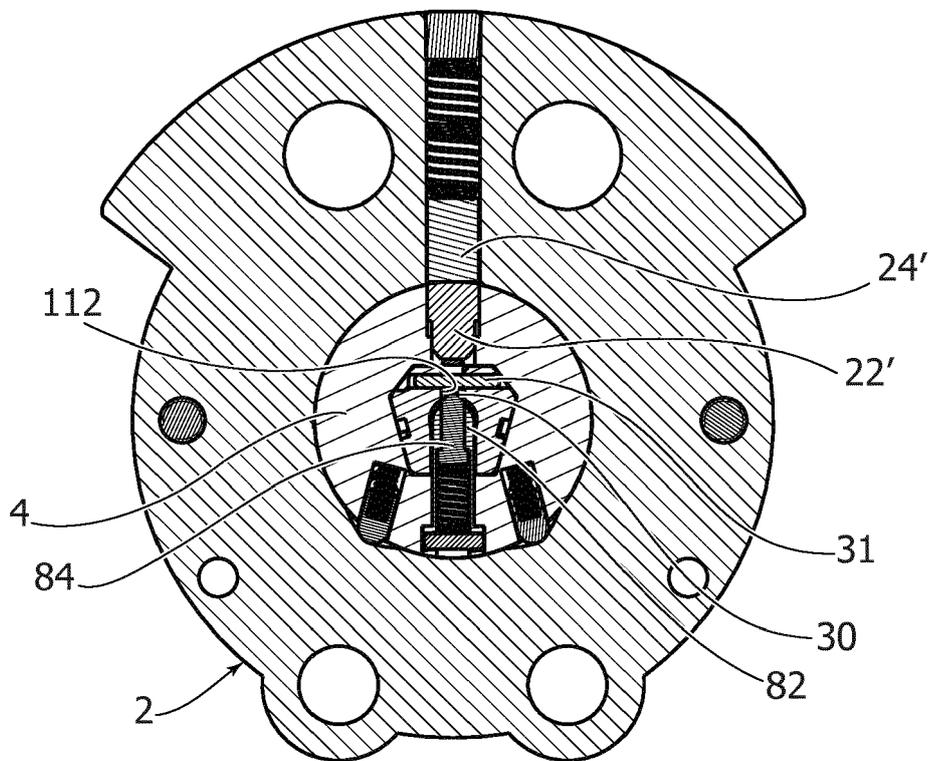


FIG. 8

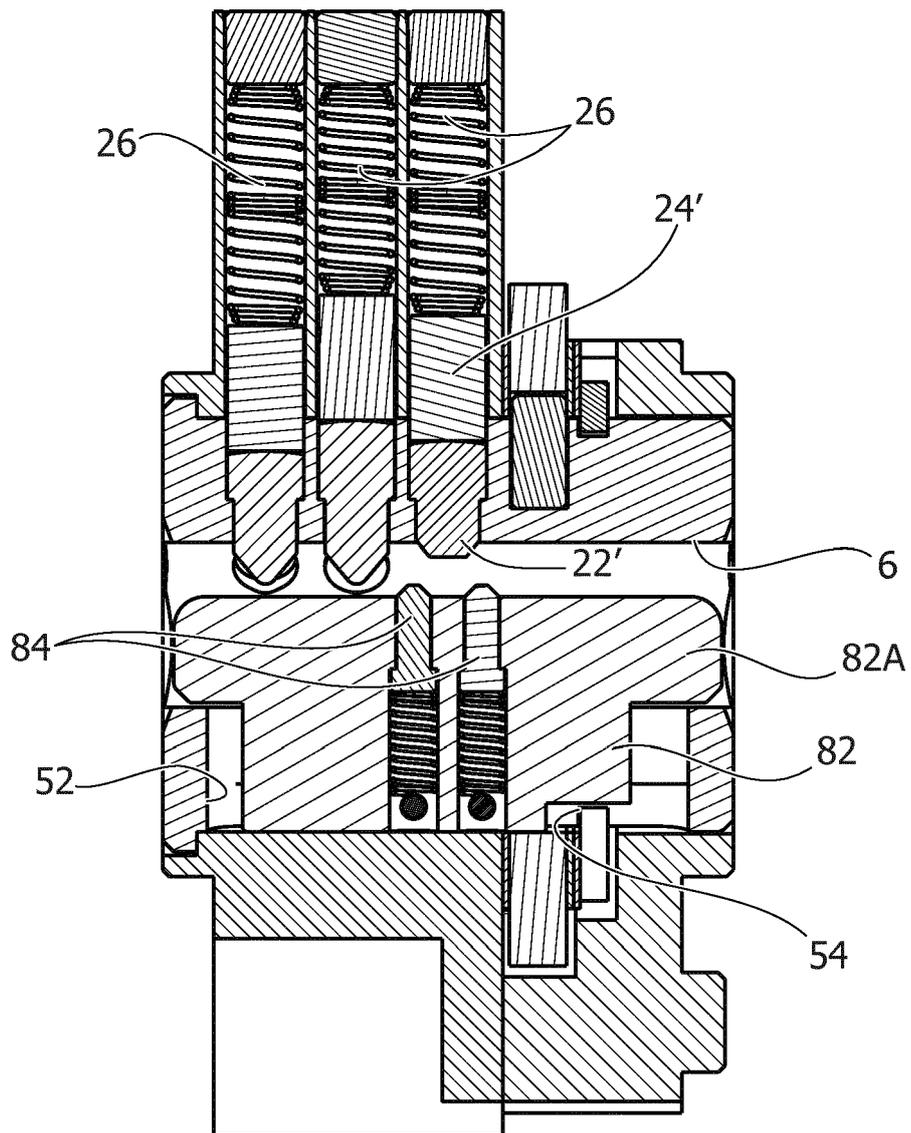


FIG. 9

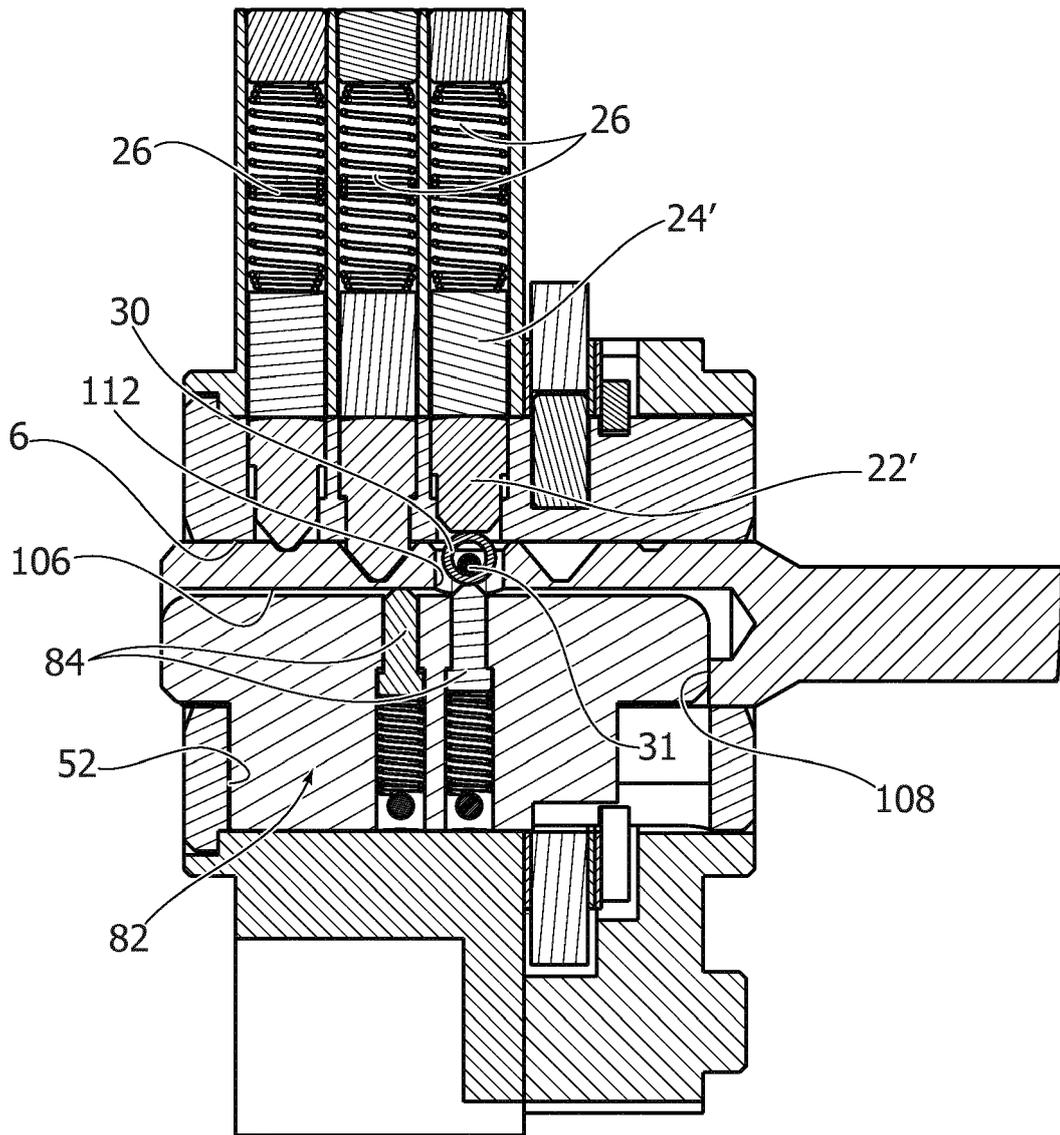


FIG. 10

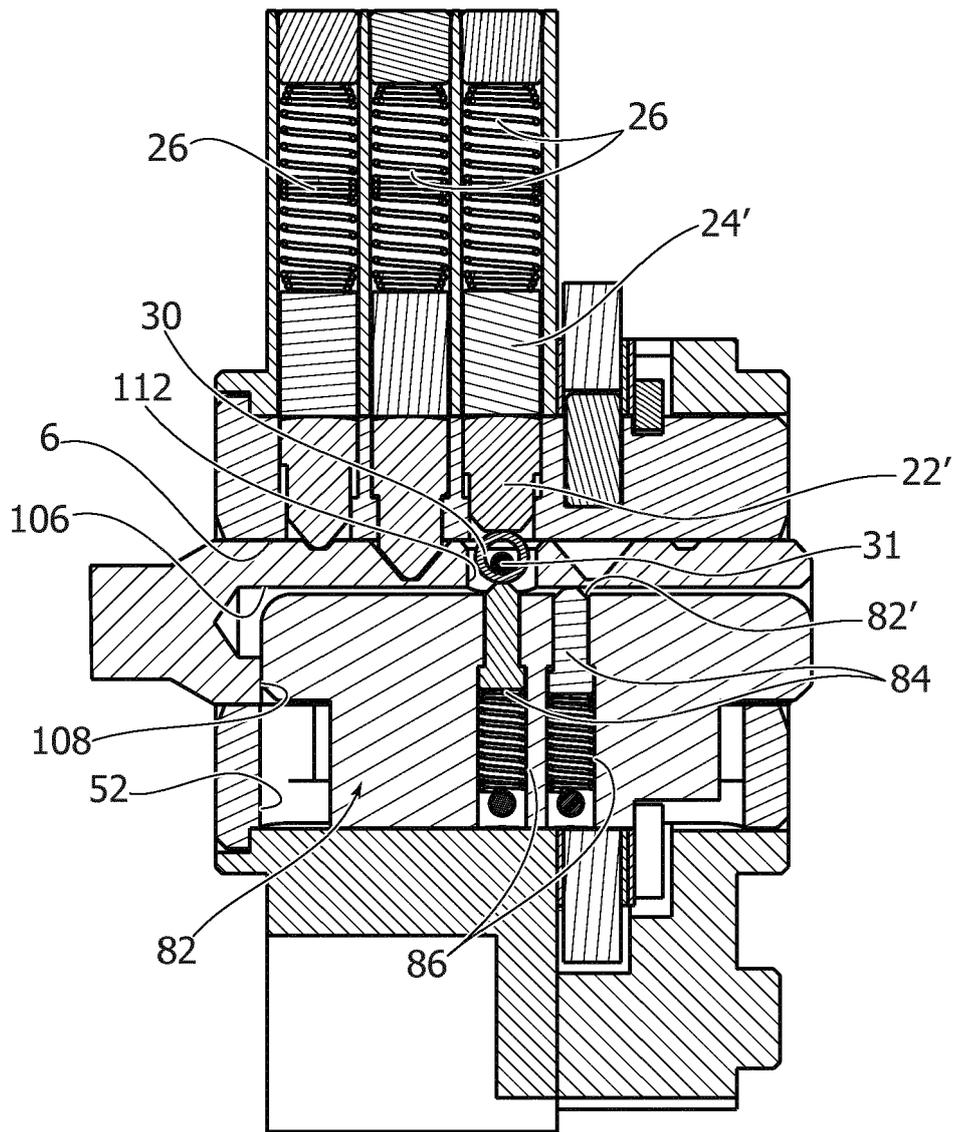


FIG. 11

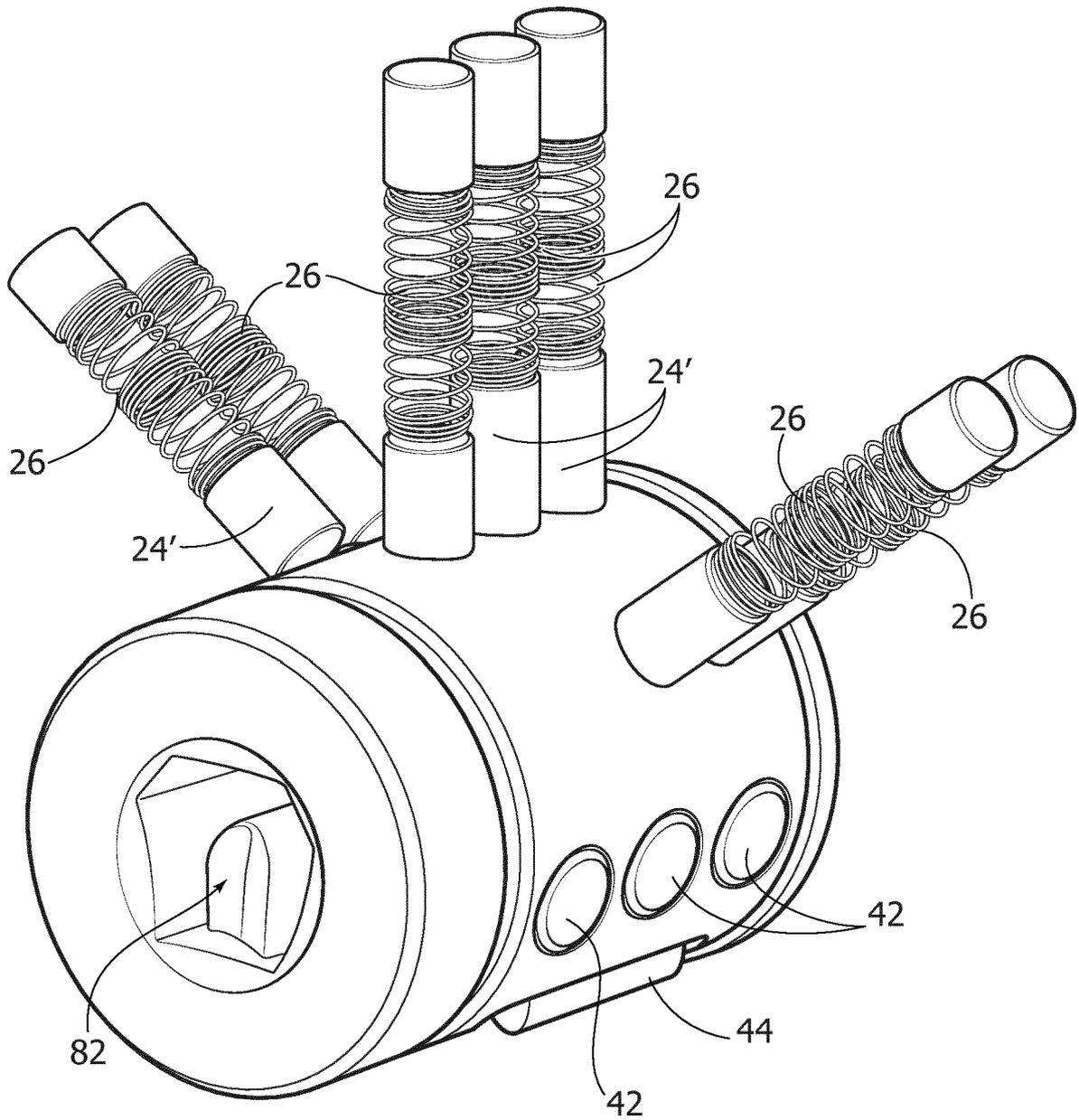


FIG. 12

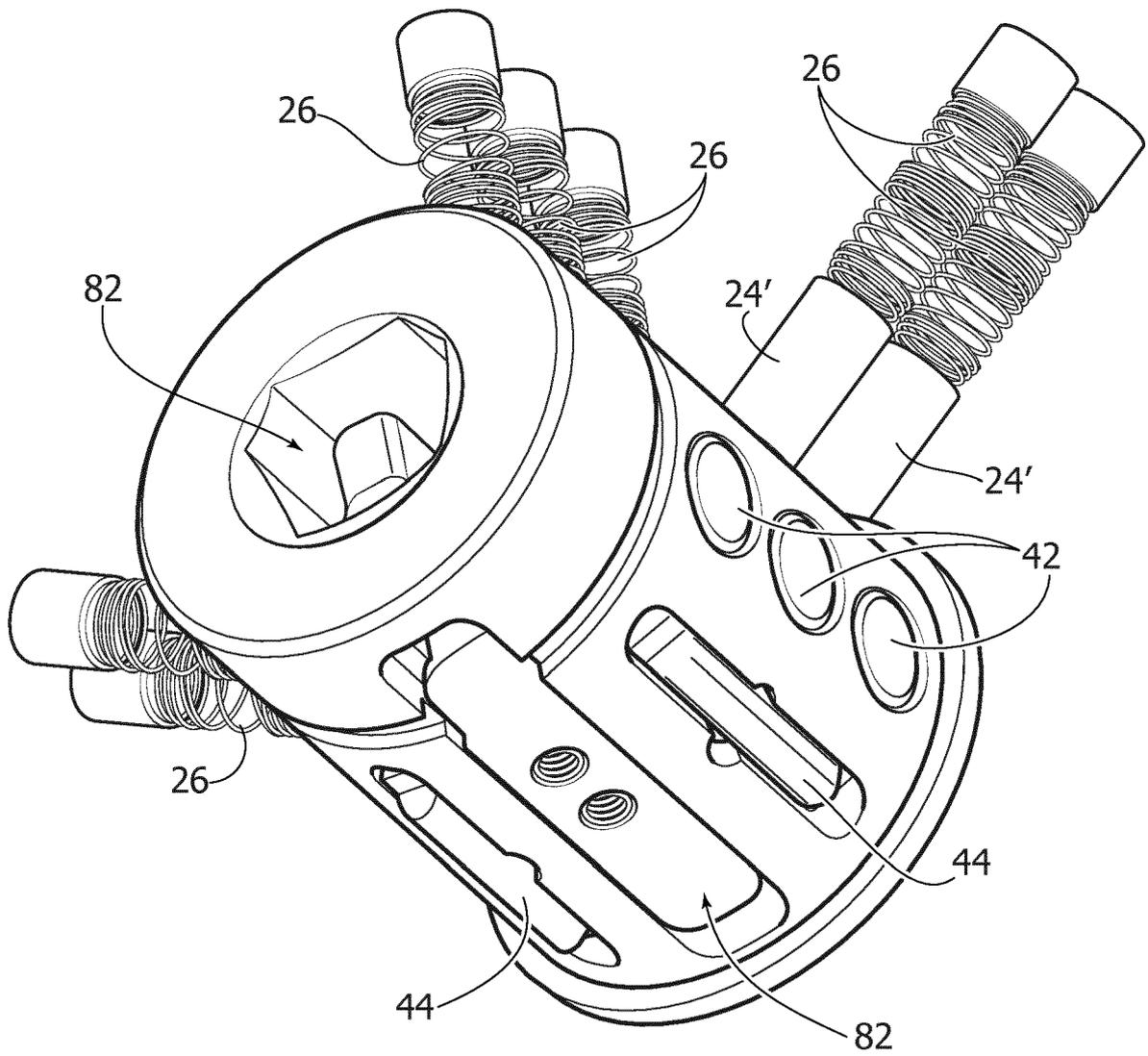


FIG. 13A

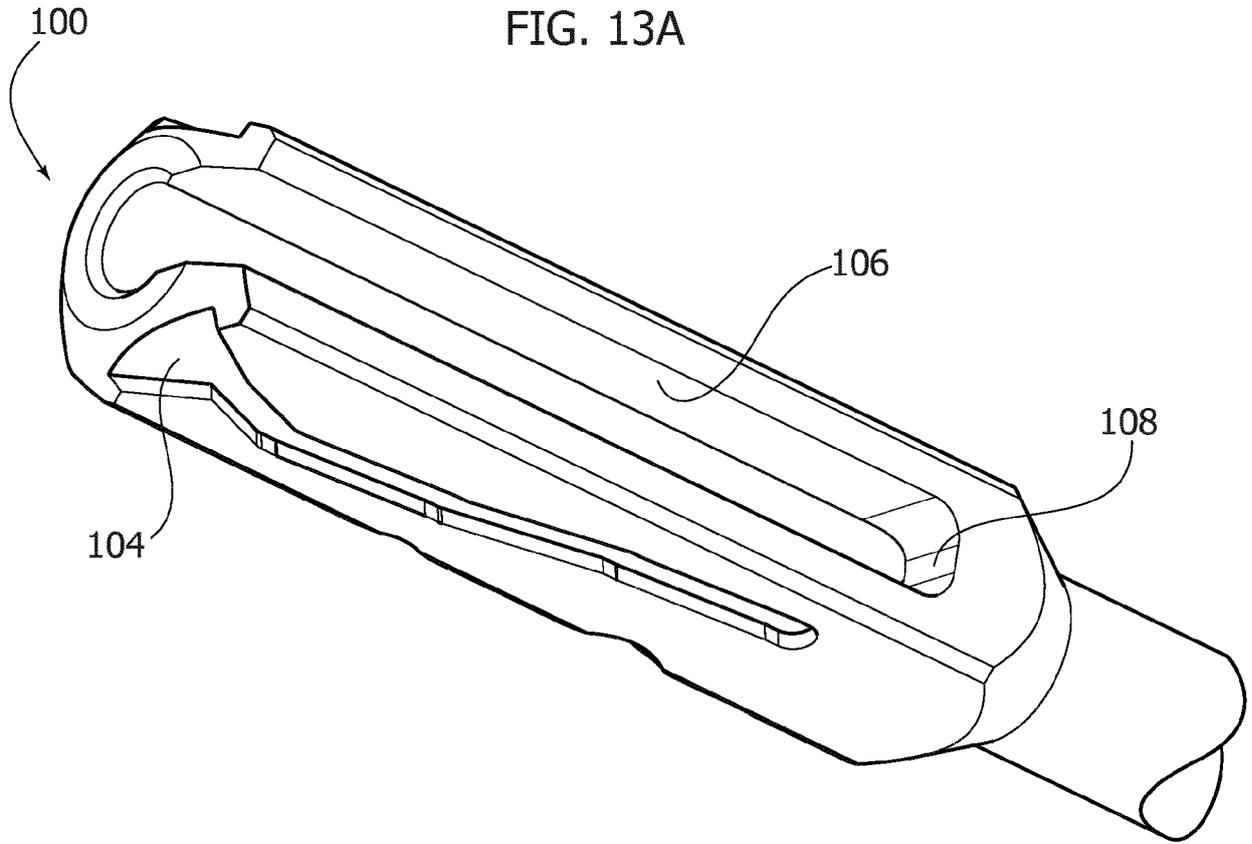


FIG. 13B

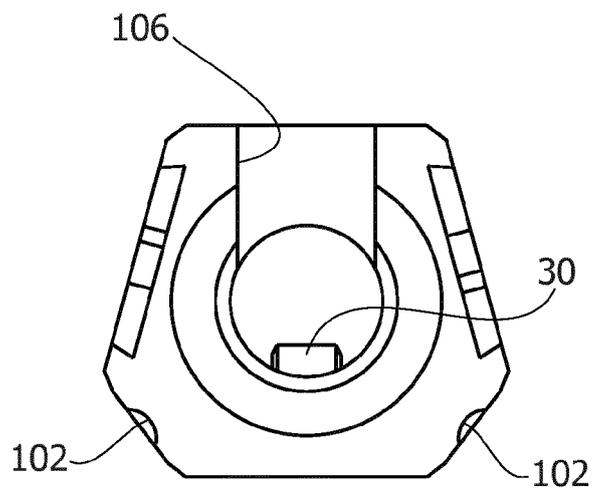


FIG. 14

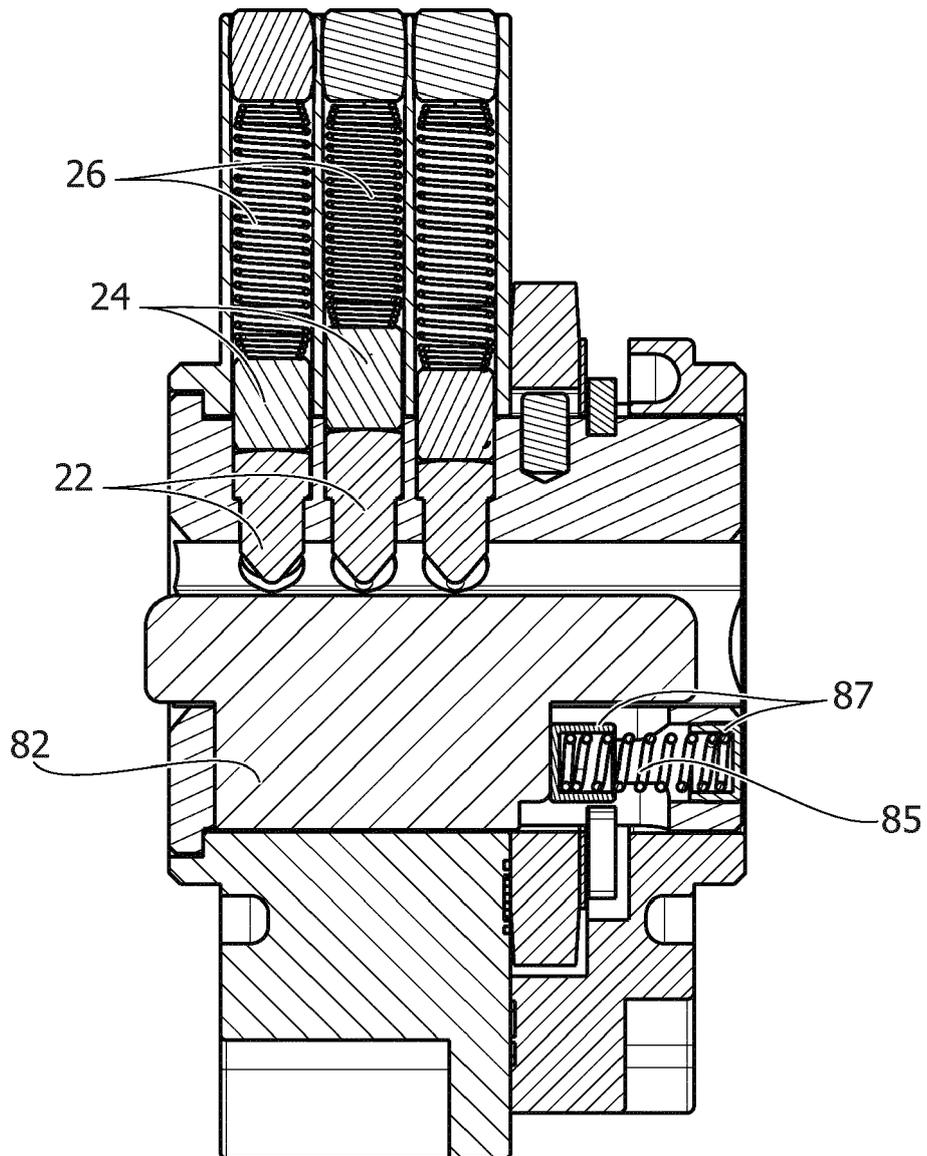


FIG. 15

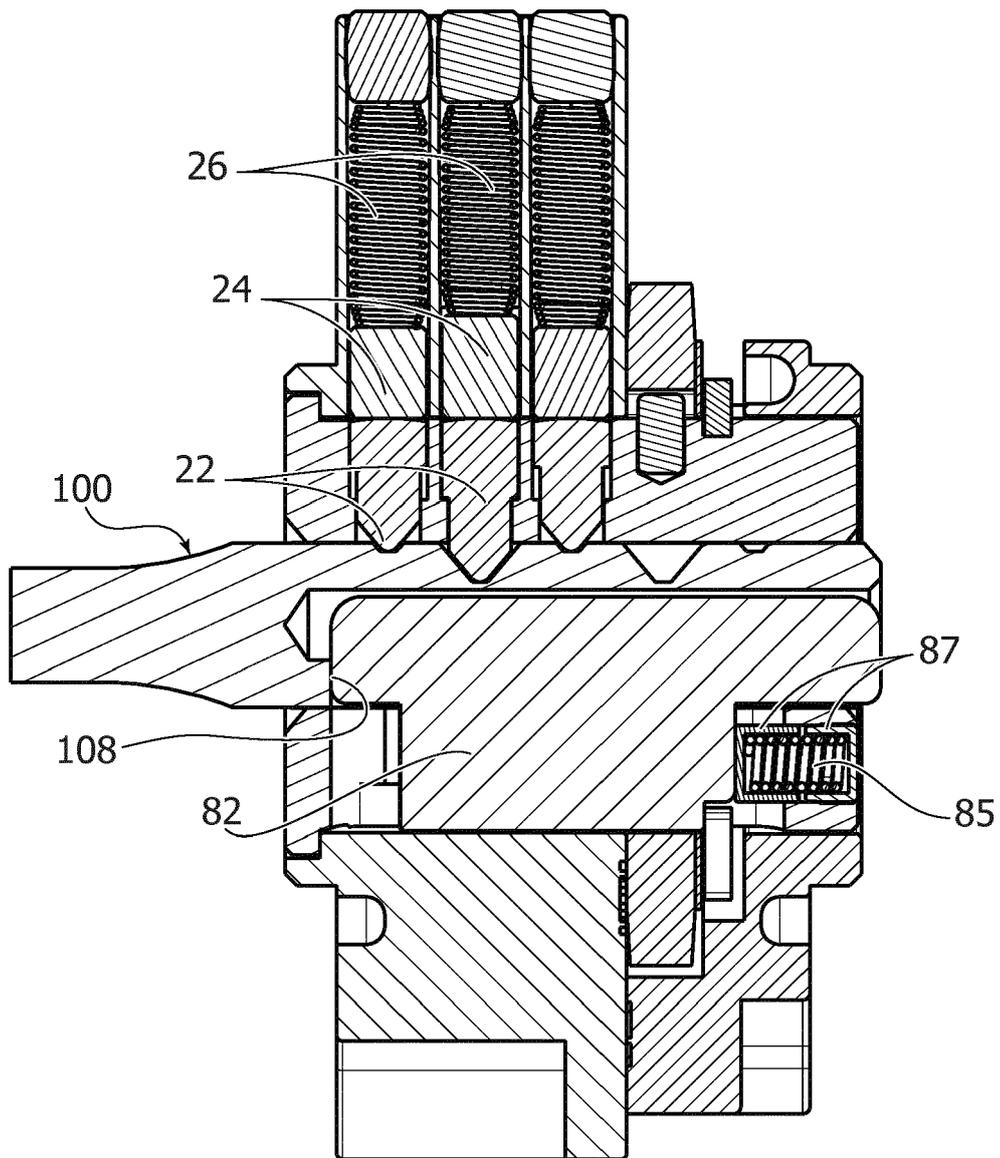


FIG. 16

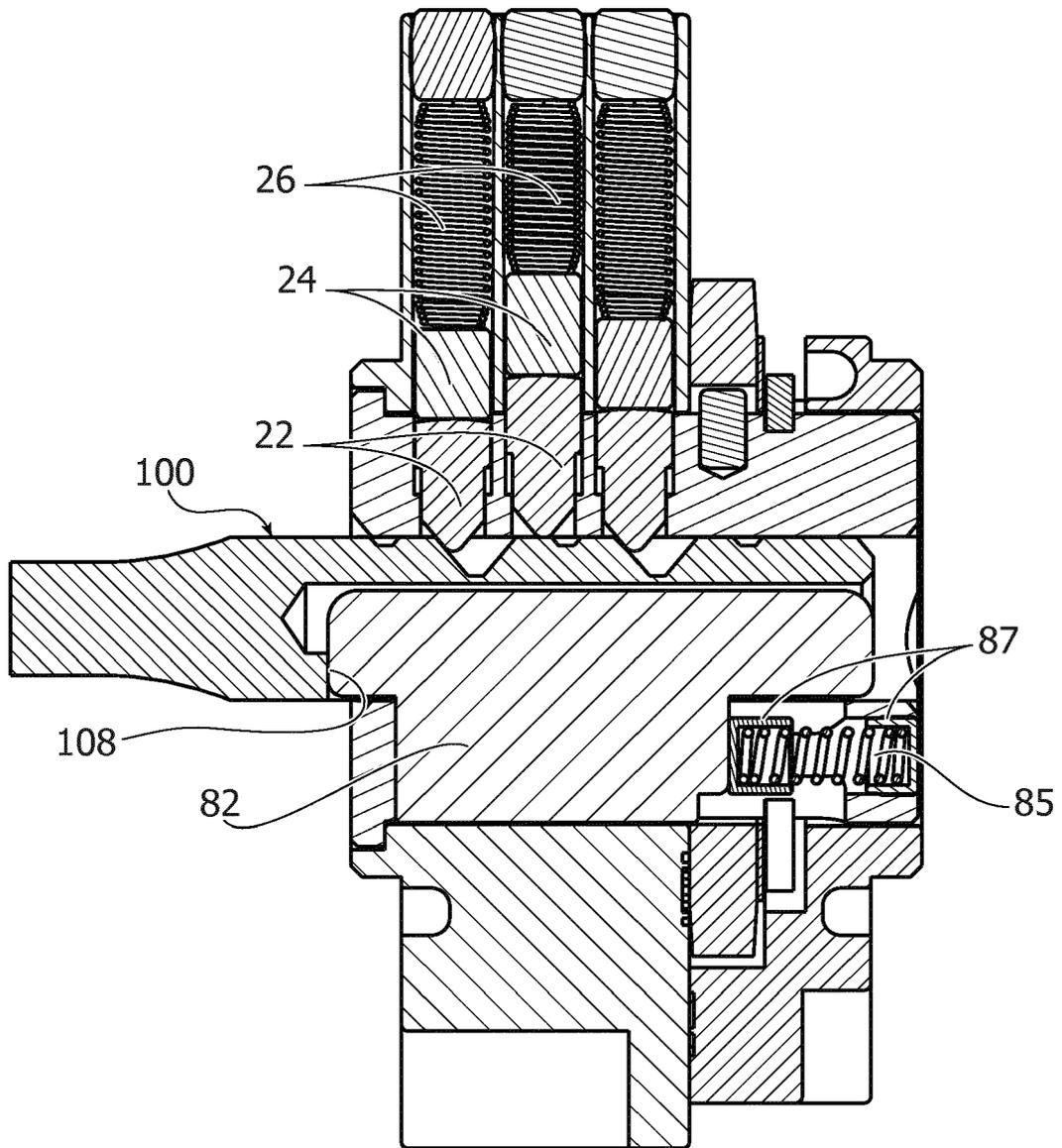


FIG. 17

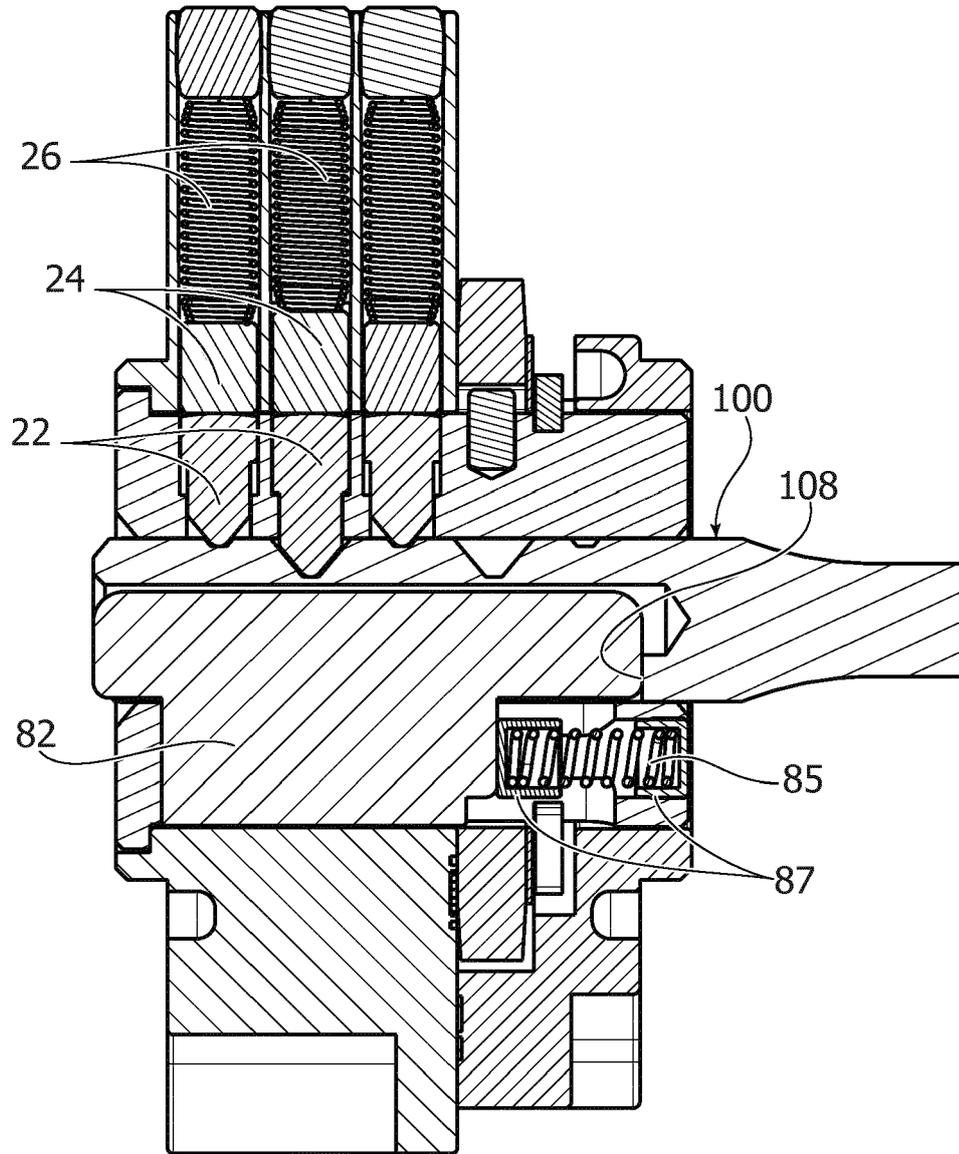
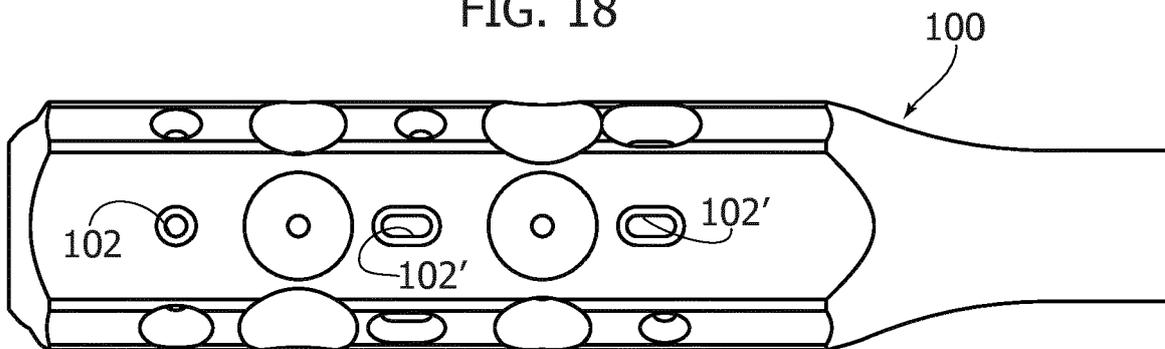


FIG. 18





EUROPEAN SEARCH REPORT

Application Number  
EP 18 18 1604

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 019 601 A1 (MOTTURA SERRATURE DI SICUREZZA [IT]) 19 July 2000 (2000-07-19)	1-5,9-14	INV. E05B27/00 E05B19/00
A	* the whole document *	6-8,15	
A	WO 2006/092779 A2 (HAMAFTEACH HAMISTOVEV LTD [IL]; WEINBERGER YOAV [IL]) 8 September 2006 (2006-09-08) * page 17, line 30 - page 18, line 10; figures 10A, B *	3-5,9,10,13	
A	US 2009/266123 A1 (MUELLER ULRICH [DE] ET AL) 29 October 2009 (2009-10-29) * paragraph [0032]; figure 3 *	9,10,14,15	
A	EP 1 013 856 A1 (TIEFENTHAL SCHLISS SYSTEME GM [DE]) 28 June 2000 (2000-06-28) * paragraph [0009] - paragraph [0014]; figures 1-4 *	1,2,9,10	
A	US 2007/137272 A1 (FIELD BRANDON S [US] ET AL) 21 June 2007 (2007-06-21) * paragraph [0036] - paragraph [0038]; figure 4 *	3-8,12	TECHNICAL FIELDS SEARCHED (IPC) E05B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 November 2018	Examiner Koster, Michael
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

EPO FORM 1503 03.02 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 18 18 1604

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-11-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1019601	A1	19-07-2000	AT 264978 T 15-05-2004
			AT 277252 T 15-10-2004
			AU 729331 B2 01-02-2001
			BR 9906485 A 26-09-2000
			CA 2298781 A1 16-12-1999
			CN 1274401 A 22-11-2000
			CZ 20000302 A3 11-07-2001
			CZ 20022575 A3 12-02-2003
			DE 69916570 T2 30-09-2004
			DE 69920530 T2 03-02-2005
			DK 1019601 T3 02-08-2004
			DK 1236849 T3 01-11-2004
			EP 1019601 A1 19-07-2000
			EP 1236849 A1 04-09-2002
			ES 2217756 T3 01-11-2004
			ES 2225675 T3 16-03-2005
			IL 134376 A 19-02-2004
			IT T0980491 A1 06-12-1999
			JP 3350525 B2 25-11-2002
			JP 2002517649 A 18-06-2002
			NO 20000472 A 05-04-2000
			PL 338444 A1 06-11-2000
			PT 1019601 E 31-08-2004
			PT 1236849 E 30-11-2004
			RU 2175704 C1 10-11-2001
			TR 200000335 T1 21-08-2000
			UA 65578 C2 15-04-2004
			US 6490898 B1 10-12-2002
			WO 9964703 A1 16-12-1999
			WO 2006092779
BR P10609054 A2 17-02-2010			
CA 2599790 A1 08-09-2006			
CN 101160218 A 09-04-2008			
EP 1858713 A2 28-11-2007			
JP 2008531889 A 14-08-2008			
US 2009113965 A1 07-05-2009			
WO 2006092779 A2 08-09-2006			
US 2009266123	A1	29-10-2009	AT 458886 T 15-03-2010
			CN 101305146 A 12-11-2008
			DE 102005042618 A1 08-03-2007
			EP 1922461 A1 21-05-2008
			US 2009266123 A1 29-10-2009
			WO 2007028483 A1 15-03-2007

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

55

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 18 1604

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-11-2018

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP 1013856	A1	28-06-2000	DE 19859714 C1 EP 1013856 A1	29-06-2000 28-06-2000
-----				
US 2007137272	A1	21-06-2007	US 2007137272 A1 WO 2007062113 A2	21-06-2007 31-05-2007
-----				

15

20

25

30

35

40

45

50

EPO FORM P0459

55

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82