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(54) **Electronic lock**

Elektronisches Schloss

Serrure électronique

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention generally relates to an electronic lock, and more particularly, to an electronic lock that uses electronic components to control lock and unlock operations of the lock.

2. The Prior Arts

[0002] As technical progress is made, the traditional mechanical lock provided on a building door is turned into a more sophisticated electronic lock that incorporates multiple electronic components operable to control lock and unlock movements of the lock. The addition of an electronic control makes the lock more secure against malicious attempts to break the lock. Some examples of conventional electronic locks are described in Taiwanese Patent Nos. M311736, M297994 and M294542, which are assigned to the same applicant of the present application. However, the electronic locks described in the aforementioned patents include some disadvantages that need improvements. More particularly, one problem of the conventional electronic lock is that the electrical connection to the power supply is usually achieved via component parts that have an excessively high electrical resistance owing to a reduced size of the component parts. As a result, the electrical current generated is substantially weak, which may cause a dysfunction of the lock control mechanism and consequently require cumbersome repair operations. One reason for the above problem is that the electrical connection is usually implemented through metallic wire or spring component parts that may have electrical properties modified by external factors, such as an electrical resistance that gradually increases owing to progressive oxidation. Because a resulting electrical current may be excessively weak, the actuation of the electronic lock cannot be controlled in an accurate manner, which leads to a malfunction of the lock.

[0003] German utility model 20 2007 002273 discloses an electronic lock having the features of the preamble of Claim 1.

SUMMARY OF THE INVENTION

[0004] The present application describes an electronic lock, according to claim 1. In one preferred embodiment of the invention, the electronic lock includes the assembly of a pair of flexible conductive elements and a pair of conductive tubes. An inner radial region of the conductive tube is provided with a substantial conductive surface that is adapted to contact with an outer periphery of the flexible conductive element, which reduces substantially the electrical resistance and increases electrical conduc-

tivity. In addition, a coupling rod and two conductive members may be disposed through each conductive tube to interact with the flexible conductive element for providing a more secure construction. Further, a front rotary plate and a rear rotary plate may also be respectively provided on a contact end of a first and second clutch. The front rotary plate includes a front conductive ring, and the rear rotary plate includes a rear conductive ring radially offset from the front conductive ring. When the first and second clutches engage each other, the electrical contact achieved via the front and rear conductive rings is improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

[0006] FIG. 1 is a perspective view of an electronic lock according to an embodiment of the present invention;

[0007] FIG. 2 is an exploded view of an embodiment of the present invention;

[0008] FIG. 3A is an exploded view of a first clutch according to an embodiment of the present invention;

[0009] FIG. 3B is an exploded view of a first clutch according to another embodiment of the present invention;

[0010] FIG. 4 is an exploded view of a second clutch according to an embodiment of the present invention;

[0011] FIG. 5 is a side view of an electronic lock according to an embodiment of the present invention;

[0012] FIG. 6A is a cross-sectional view of an electronic lock according to an embodiment of the present invention;

[0013] FIG. 6B is a partial cross-sectional view of an electronic lock according to an embodiment of the present invention;

[0014] FIG. 7 is an exploded view of the first and second clutch according to an embodiment of the present invention;

[0015] FIG. 8 is a cross-sectional view of a front rotary plate and a rear rotary plate according to an embodiment of the present invention;

[0016] FIG. 9 is an exploded view of another embodiment of the present invention; and

[0017] FIG. 10 is a cross-sectional view of a part of another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] An embodiment of an electronic lock is illustrated in the perspective view of FIGs. 1 and 2 and the exploded view of FIG. 3A. As shown, the embodiment comprises a lock barrel 10 having an end coupled to a signal receiver 20 and another end coupled to a controller device 30. The lock barrel 10 has a hollow interior 102 defined longitudinally therein and a notch 101 defined in a central portion thereof for mounting a first clutch 11 and a second clutch 12. The first clutch 11 comprises a hollow tube having one end adapted to operatively engage with and disengage from the second clutch 12. A front rotary plate 112 is provided to an outer periphery of the first clutch 11. A cylindrical interior of the first clutch 11 includes a pair of conductive tubes 115, a pair of springs 116, and a pair of probes 117. Each conductive tube 115 is a precisely machined tube having a hollow interior adapted to receive one spring 116. Each spring 116 is made of an electrically conductive metallic material. The body of each spring 116 is mounted tightly against the inner sidewall of each conductive tube 115 so that increased electrical conductivity and reduced electrical resistance can be achieved when electric charges are transmitted through the spring 116 and the conductive tube 115. Each probe 117 is electrically conductive and is disposed at one end of one conductive tube 115 to establish electrical connection. Each probe 117 abuts against one spring 116. Through the resiliency of the spring, each probe 117 is urged in contact with the second clutch 12. When the second clutch 12 is in rotation, the electrical connection between the first clutch 11 and second clutch 12 can thereby be continuously maintained.

[0019] As shown in FIG. 2 and FIG. 4, the first clutch 11 is coupled to the second clutch 12 through the hollow interior 102. The second clutch 12 includes a hollow tube body in which are disposed a motor fixing frame 121 and a leaf spring 122 for fixing a motor 123, an actuator 124 and a spring 126. The actuator 124 is securely fixed to a rotation axis of the motor 123. Further, the actuator 124 is connected to a rear clutch 127 via a torsion spring. An end of the second clutch 12 facing the first clutch 11 is coupled to a rear rotary plate 125. A surface of the rear rotary plate 125 corresponding to the first clutch 11 is electrically conductive. In addition, the rear rotary plate 125 has two conductive tubes 1254 (see the embodiment of Fig. 10) mounted to two openings of the second clutch 12. The conductive tubes 1254 have the same functions as the conductive tubes 115 on the first clutch. Each conductive tube 1254 is a hollow conductive tube adapted to mount over one spring 126 and probe 1261. Once assembled in the conductive tube 1254, an outer radius of the spring 126 abuts against the inner surface of the conductive tube 1254 so as to increase electrical conductivity and reduce electrical resistance. A cam 13 is mounted at the notch 101 of the lock barrel 10 and around

an outer surface of the second clutch 12.

[0020] The signal receiver 20 assembled at an end of the lock barrel 10 includes a front rotary portion 22 in which is disposed a signal receiving circuit 21 adapted to receive signals and alerts. The front rotary portion 22 includes a sleeve 23 disposed around an outer periphery thereof, and a front cover 24 at a front end thereof. An opposite end of the lock barrel 10 is mounted with a controller device 30 mainly comprised of a rear rotary portion 31 provided with a rear cover 32. The controller device 30 is adapted to control and supply power to the motor 123 and the front rotary portion 22. Further, an outer periphery of the rear rotary portion 31 is mounted with a sleeve 33. The assembly and functionality of the signal receiver 20, the controller device 30 and the lock barrel 10 may be similar to a conventional construction.

[0021] FIG. 3B is an exploded view of another embodiment of the present invention. Depending on the different configuration of the door leaf on which the electronic lock is mounted, the lock barrel 10 described above may need a more secure structural configuration, especially with respect to the component parts exposed outward such as the conductive tubes 115, the spring 116 and the probes 117. This embodiment incorporates an additional security device so that the overall structure is more secure. More particularly, one feature the embodiment includes is the addition of a coupling rod 113 that extends perpendicular to the body of the first clutch 11 and passes through its interior where the conductive tubes 115, the springs 116 and the probes 117 are disposed. The coupling rod 113 is formed from two semi-circular bodies, each of which has two opposite end surfaces symmetrically provided with a slot. When the two semi-circular bodies are coupled to each other to form the coupling rod 113, two accommodating spaces are thereby defined to receive a conductive member 114 respectively. After the coupling rod 113 passes through the first clutch 11, the two accommodating spaces and the conductive members 114 divide the interior space of the first clutch 11 into two space volumes. In this embodiment, two sets of the conductive tubes 115, the springs 116 and the probes 117 are provided, thus each set being configured with a shorter length adapted to assemble in each of the two space volumes. More particularly, the two sets of the conductive tubes 115, the springs 116 and the probes 117 are respectively coupled to the conductive members 114 so as to form a flexible electrical connection. The conductive member 114 may have a spherical shape, and its stiffness may be greater than that of the conductive tubes 115, the springs 116 and the probes 117. A safety separator element can thereby be advantageously provided.

[0022] With reference to FIG. 5 in conjunction with FIGs. 6A and 6B, in operation, the signal receiver 20 drives the controller device 30 to generate and control a power supply to drive the second clutch 12 moving toward the first clutch 11, thereby achieving the safety control mechanism for the overall structure. With the provided

configuration of the conductive tubes 115, springs 116 and the probes 117, the electric current not only passes through the springs 116 and the probes 117, but also flows through the walls of the conductive tubes 115/1254 having higher electrical conductivity and lower electrical resistance. As a result, the relatively weak electric current can thereby be effectively transmitted to control the signal receiver 20 and the controller device 30 in a more efficient manner. The problems of the prior arts induced by an inefficient electrical conductivity in the conventional structure can thereby be solved. It is worth noting that the conductive tubes 115 may also be replaced with multiple copper fingers or other electrically conductive materials abutting against an outer or inner surface of the springs 116. Moreover, if a more secure construction is required, the placement of the coupling rod 113 and the conductive members 114 can work as a safety separator element between the conductive tubes 115, the springs 116 and the probes 117 of relatively weaker constitution. When the structure is applied an external shock, the coupling rod 113 and the conductive members 114 with higher stiffness are able to actively interrupt the electrical connection between the two sets of conductive tubes 115, the springs 116 and the probes 117. Greater safety can therefore be obtained.

[0023] Referring to FIG. 7, another embodiment of the present invention may also provide a modified design for the front rotary plate 112 and the rear rotary plate 125. As described previously, after the first clutch 11 and the second clutch 12 operatively engage with each other, the controller device 30 acts to supply power and output signals to the signal receiver 20 for operating the other structural parts. Power control can hence be used to provide higher security. However, the clutching action is performed via a rotary movement. To ensure that the electrical connection produces the greatest contact power, two rotary plates are used to establish electrical connection. More particularly, the opposing contact surfaces of the front rotary plate 112 and rear rotary plate 125 are configured as two annular surfaces. Moreover, each of the contact surfaces includes a through hole and conductive ring corresponding thereto. As shown, an embedded front conductive ring 1121 is provided to an outer periphery of the front rotary plate 112, and two through holes 1252 are defined on the contact locations of the rear rotary plate 125. The through holes are extensions of the conductive tubes 1254 for passage of the probes 1261. After the rotary engagement is effected, an end of each probe 1261 abuts against the front conductive ring 1121 to establish electrical connection. The rear rotary plate 125 also includes a rear conductive ring 1251 located radially inward from the positions of the through holes 1252. Further, two through holes 1252 are also provided on contact locations of the front rotary plate 112. The through holes 1252 on the front rotary plate 112 are extensions of the conductive tubes 115 for passage of the probes 117. After the rotary engagement is effected, an end of each probe 117 abuts against the rear conduc-

tive ring 1251 to establish electrical connection. Referring to FIG. 8, through the contact realized between the front rotary plate 112 and rear rotary plate 125, power and electric signals can accurately control in a peripheral direction the engagement and disengagement movements during rotation.

[0024] FIGs. 9 and 10 illustrate another embodiment of the present invention. Because the applied control signals may have different characteristics, the electrical and signal connection between the first clutch 11 and second clutch 12 can also be realized through a single annular area engagement. More particularly, the front rotary plate 112 of the first clutch 11 can be mounted at the clutch end via a single conductive tube 115, single spring 116 and single probe 117. In addition, the rear rotary plate 125 of the second clutch 12 can include a single set of rear conductive ring 1251, spring 126 and probe 1261. The rear conductive ring 1251 includes an outward extension 1253 at the end of the conductive tube 1254. The outward extension 1253 is configured to overlap with an end of the conductive tube 1254 and in contact with the probe 1261 to establish electric and signal connection. When the first clutch 11 and second clutch 12 approach each other, the rear conductive ring 1251 is abutted by the probe 117 to also establish electric and signal connection. Another possible function of operation control can thereby provided.

[0025] As described above, the construction provided herein not only can substantially reduce electrical resistance and increase the electrical conductivity, but is also able to provide improved electrical contact during an engagement operation of the clutches.

[0026] While the foregoing is directed to embodiments of the present invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof, and the scope thereof is determined by the claims that follow.

Claims

1. An electronic lock, comprising:

a signal receiver (20) adapted to transmit and receive a control signal, and emit an alert signal;
 a controller device (30) configured to exchange a signal with the signal receiver (20) to control an operation sequence of the electronic lock, wherein the controller device (30) includes a power supply adapted to electrically connect with other component parts of the electronic lock;
 an electronic lock barrel (10) including a first clutch (11), a second clutch (12) and a driving element (123), the driving element (123) being configured to drive the operation of the first and second clutches (11,12), the first and second clutches (11,12) respectively including a first

- contact end (112) and a second contact end (125),
characterized in that each of the first and second clutches (11,12) includes at least one flexible electrically conductive element (116, 117) and one electrically conductive support element (115)
 in the form of a conductive tube (115) or multiple copper fingers or other electrically conductive materials abutting against an outer or inner surface of the flexible conductive element (116,117),
in that the flexible conductive element includes a conductive flexible member (116) and a conductive end (117),
 and **in that** the first contact end (112) and the second contact end (125) are configured to enter in contact with the flexible conductive element (116,117) to establish electrical connection when the first and second clutches (11,12) engage each other.
2. The electronic lock according to claim 1, wherein a coupling rod (113) is disposed through a chosen location of the first (11) and/or second (12) clutch, the coupling rod (113) is formed from two rod bodies on which are provided with two accommodating slots, each accommodating slot includes a conductive material (114), the two coupling rod bodies and the conductive material (114) are respectively coupled to a corresponding flexible conductive element (116, 117) and conductive support element (115) for establishing electrical connection.
 3. The electronic lock according to claim 2, wherein the conductive material (114) in each accommodating slot is electrically conductive and has a higher stiffness than the flexible conductive element (116,117) and the conductive support element (115) for providing a safety separation function.
 4. The electronic lock according to claim 1, wherein the conductive flexible member of the flexible conductive element includes a spring (116).
 5. The electronic lock according to claim 1, wherein the conductive end of the flexible conductive element mainly includes a probe (117) adapted to be coupled to one end of the conductive flexible member (116) and the conductive support element (115).
 6. The electronic lock according to claim 1, wherein the conductive support element (115) is formed from multiple copper fingers and abuts against an outer surface or an inner surface of the conductive flexible member (116).
 7. The electronic lock according to claim 1, wherein the first contact end includes a front rotary plate (112) and the second contact end includes a rear rotary plate (125).
 8. The electronic lock according to claim 7, wherein the front rotary plate (112) includes a front conductive ring (1121) and at least one first through hole (1252) adapted to connect with the conductive end (117) of the first clutch (11).
 9. The electronic lock according to claim 7, wherein the rear rotary plate (125) includes a rear conductive ring (1251) and at least one second through hole (1252) adapted to connect with the conductive end (1261) of the second clutch (12).
 10. The electronic lock according to claim 1, wherein the driving element is one of a motor (123) and an electromagnetic valve for driving forward and rearward movements.
 11. The electronic lock according to claim 8 and claim 9, wherein the front conductive ring (1121) is adapted to separably contact with the second through hole (1252), and the rear conductive ring (1251) is adapted to separably contact with the first through hole (1252).
- Patentansprüche**
1. Elektronisches Schloss, umfassend:
 - einen Signalempfänger (20), der dazu eingerichtet ist, ein Steuerungssignal zu übertragen und zu empfangen sowie ein Alarmsignal auszusenden;
 - eine Steuerungseinrichtung (30), die dazu konfiguriert ist, ein Signal mit dem Signalempfänger (20) auszutauschen, um einen Betriebsablauf des elektronischen Schlosses zu steuern, wobei die Steuerungseinrichtung (30) eine Stromversorgung enthält, die dazu eingerichtet ist, die elektrische Verbindung mit anderen Bauelementen des elektronischen Schlosses herzustellen;
 - einen elektronischen Schließzylinder (10), enthaltend eine erste Kupplung (11), eine zweite Kupplung (12) und ein Antriebselement (123), wobei das Antriebselement (123) dazu konfiguriert ist, den Betrieb der ersten und der zweiten Kupplung (11, 12) anzutreiben, wobei die erste und die zweite Kupplung (11, 12) ein erstes Kontaktende (112) bzw. ein zweites Kontaktende (125) enthalten,
 - dadurch gekennzeichnet, dass** jede der ersten und der zweiten Kupplung (11, 12) mindestens ein flexibles elektrisch leitfähiges Element

- (116, 117) und ein elektrisch leitfähiges Stützelement (115) in Form eines leitfähigen Rohres (115) oder mehrerer Kupferfinger oder anderer elektrisch leitfähiger Materialien enthält, das gegen eine Außen- oder Innenfläche des flexiblen leitfähigen Elements (116, 117) stößt, dass das flexible leitfähige Element ein leitfähiges flexibles Bauteil (116) und ein leitfähiges Ende (117) enthält, und dass das erste Kontaktende (112) und das zweite Kontaktende (125) so konfiguriert sind, dass sie in Kontakt mit dem flexiblen leitfähigen Element (116, 117) kommen, um eine elektrische Verbindung herzustellen, wenn die erste und die zweite Kupplung (11, 12) ineinander eingreifen.
2. Elektronisches Schloss gemäß Anspruch 1, wobei eine Kopplungsstange (113) durch eine ausgewählte Stelle der ersten (11) und/oder der zweiten (12) Kupplung verläuft, wobei die Kopplungsstange (113) aus zwei Kopplungsstangenkörpern gebildet wird, auf denen zwei Aufnahmeschlitze vorgesehen sind, wobei jeder Aufnahmeschlitz ein leitfähiges Material (114) enthält, wobei die beiden Kopplungsstangenkörper und das leitfähige Material (114) an ein entsprechendes flexibles leitfähiges Element (116, 117) bzw. an das leitfähige Stützelement (115) gekoppelt sind, um eine elektrische Verbindung herzustellen.
 3. Elektronisches Schloss gemäß Anspruch 2, wobei das leitfähige Material (114) in jedem Aufnahmeschlitz elektrisch leitfähig ist und eine höhere Steifigkeit als das flexible leitfähige Element (116, 117) und das leitfähige Stützelement (115) aufweist, um eine Sicherheitstrennfunktion bereitzustellen.
 4. Elektronisches Schloss gemäß Anspruch 1, wobei das leitfähige flexible Bauteil des flexiblen leitfähigen Elements eine Feder (116) enthält.
 5. Elektronisches Schloss gemäß Anspruch 1, wobei das leitfähige Ende des flexiblen leitfähigen Elements hauptsächlich eine Sonde (117) enthält, die dazu eingerichtet ist, an ein Ende des leitfähigen flexiblen Bauteils (116) und das leitfähige Stützelement (115) gekoppelt zu werden.
 6. Elektronisches Schloss gemäß Anspruch 1, wobei das leitfähige Stützelement (115) aus mehreren Kupferfingern gebildet wird und gegen eine Außenfläche oder eine Innenfläche des leitfähigen flexiblen Bauteils (116) stößt.
 7. Elektronisches Schloss gemäß Anspruch 1, wobei das erste Kontaktende eine vordere rotierende Platte (112) enthält und das zweite Kontaktende eine hintere rotierende Platte (125) enthält.
 8. Elektronisches Schloss gemäß Anspruch 7, wobei die vordere rotierende Platte (112) einen vorderen leitfähigen Ring (1121) und mindestens ein erstes Durchgangsloch (1252) enthält, das dazu eingerichtet ist, die Verbindung mit dem leitfähigen Ende (117) der ersten Kupplung (11) herzustellen.
 9. Elektronisches Schloss gemäß Anspruch 7, wobei die hintere rotierende Platte (125) einen hinteren leitfähigen Ring (1251) und mindestens ein zweites Durchgangsloch (1252) enthält, das dazu eingerichtet ist, die Verbindung mit dem leitfähigen Ende (1261) der zweiten Kupplung (12) herzustellen.
 10. Elektronisches Schloss gemäß Anspruch 1, wobei das Antriebselement eines von einem Motor (123) und einem elektromagnetischen Ventil ist, das dem Antreiben von Bewegungen in Vorwärts- und Rückwärtsrichtung dient.
 11. Elektronisches Schloss gemäß Anspruch 8 und Anspruch 9, wobei der vordere leitfähige Ring (1121) dazu eingerichtet ist, einen trennbaren Kontakt mit dem zweiten Durchgangsloch (1252) herzustellen, und der hintere leitfähige Ring (1251) dazu eingerichtet ist, einen trennbaren Kontakt mit dem ersten Durchgangsloch (1252) herzustellen.
- 30 **Revendications**
1. Une serrure électronique comprenant :
 - un récepteur de signaux (20) adapté de façon à transmettre et recevoir un signal de commande et à émettre un signal d'alerte,
 - un dispositif de commande (30) configuré de façon à échanger un signal avec le récepteur de signaux (20) de façon à commander une séquence d'opérations de la serrure électronique, où le dispositif de commande (30) comprend une alimentation électrique adaptée de façon à se connecter électriquement avec d'autres composants de la serrure électronique,
 - un barillet de serrure électronique (10) comprenant un premier embrayage (11), un deuxième embrayage (12) et un élément d'entraînement (123), l'élément d'entraînement (123) étant configuré de façon à entraîner le fonctionnement des premier et deuxième embrayages (11, 12), les premier et deuxième embrayages (11, 12) comprenant respectivement une première extrémité de contact (112) et une deuxième extrémité de contact (125),
 - caractérisée en ce que** chacun des premier et deuxième embrayages (11, 12) comprend au moins un élément électriquement conducteur souple (116, 117) et un élément de support élec-

- triquement conducteur (115) sous la forme d'un tube conducteur (115) ou de plusieurs doigts de cuivre ou autres matériaux électriquement conducteurs venant en butée contre une surface intérieure ou extérieure de l'élément conducteur souple (116, 117),
- en ce que** l'élément conducteur souple comprend un élément souple conducteur (116) et une extrémité conductrice (117),
- et en ce que** la première extrémité de contact (112) et la deuxième extrémité de contact (125) sont configurées de façon à entrer en contact avec l'élément conducteur souple (116, 117) de façon à établir une connexion électrique lorsque les premier et deuxième embrayages (11, 12) entrent en prise l'un avec l'autre.
2. La serrure électronique selon la Revendication 1, où une tige d'accouplement (113) est disposée au travers d'un emplacement choisi sur le premier (11) et/ou le deuxième embrayage (12), la tige d'accouplement (113) est formée à partir de deux corps de tige sur lesquels se trouvent deux fentes de logement, chaque fente de logement contenant un matériau conducteur (114), les deux corps de tige d'accouplement et le matériau conducteur (114) étant respectivement couplés à un élément conducteur souple correspondant (116, 117) et à un élément de support conducteur (115) de façon à établir une connexion électrique.
 3. La serrure électronique selon la Revendication 2, où le matériau conducteur (114) dans chaque fente de logement est électriquement conducteur et possède une rigidité plus élevée que l'élément conducteur souple (116, 117) et l'élément de support conducteur (115) de façon à remplir une fonction de séparation de sécurité.
 4. La serrure électronique selon la Revendication 1, où l'élément souple conducteur de l'élément conducteur souple comprend un ressort (116).
 5. La serrure électronique selon la Revendication 1, où l'extrémité conductrice de l'élément conducteur souple comprend principalement une sonde (117) adaptée de façon à être couplée à une extrémité de l'élément souple conducteur (116) et de l'élément de support conducteur (115).
 6. La serrure électronique selon la Revendication 1, où l'élément de support conducteur (115) est formé à partir de plusieurs doigts de cuivre et vient en butée contre une surface extérieure ou une surface intérieure de l'élément souple conducteur (116).
 7. La serrure électronique selon la Revendication 1, où la première extrémité de contact comprend une plaque rotative avant (112) et la deuxième extrémité de contact comprend une plaque rotative arrière (125).
 8. La serrure électronique selon la Revendication 7, où la plaque rotative avant (112) comprend une bague conductrice avant (1121) et au moins un premier trou traversant (1252) adapté de façon à se connecter à l'extrémité conductrice (117) du premier embrayage (11).
 9. La serrure électronique selon la Revendication 7, où la plaque rotative arrière (125) comprend une bague conductrice arrière (1251) et au moins un deuxième trou traversant (1252) adapté de façon à se connecter à l'extrémité conductrice (1261) du deuxième embrayage (12).
 10. La serrure électronique selon la Revendication 1, où l'élément d'entraînement est un élément parmi un moteur (123) ou une soupape électromagnétique destiné à effectuer des mouvements vers l'avant et vers l'arrière.
 11. La serrure électronique selon la Revendication 8 ou 9, où la bague conductrice avant (1121) est adaptée de façon à entrer en contact de manière séparable avec le deuxième trou traversant (1252) et la bague conductrice arrière (1251) est adaptée de façon à entrer en contact de manière séparable avec le premier trou traversant (1252).

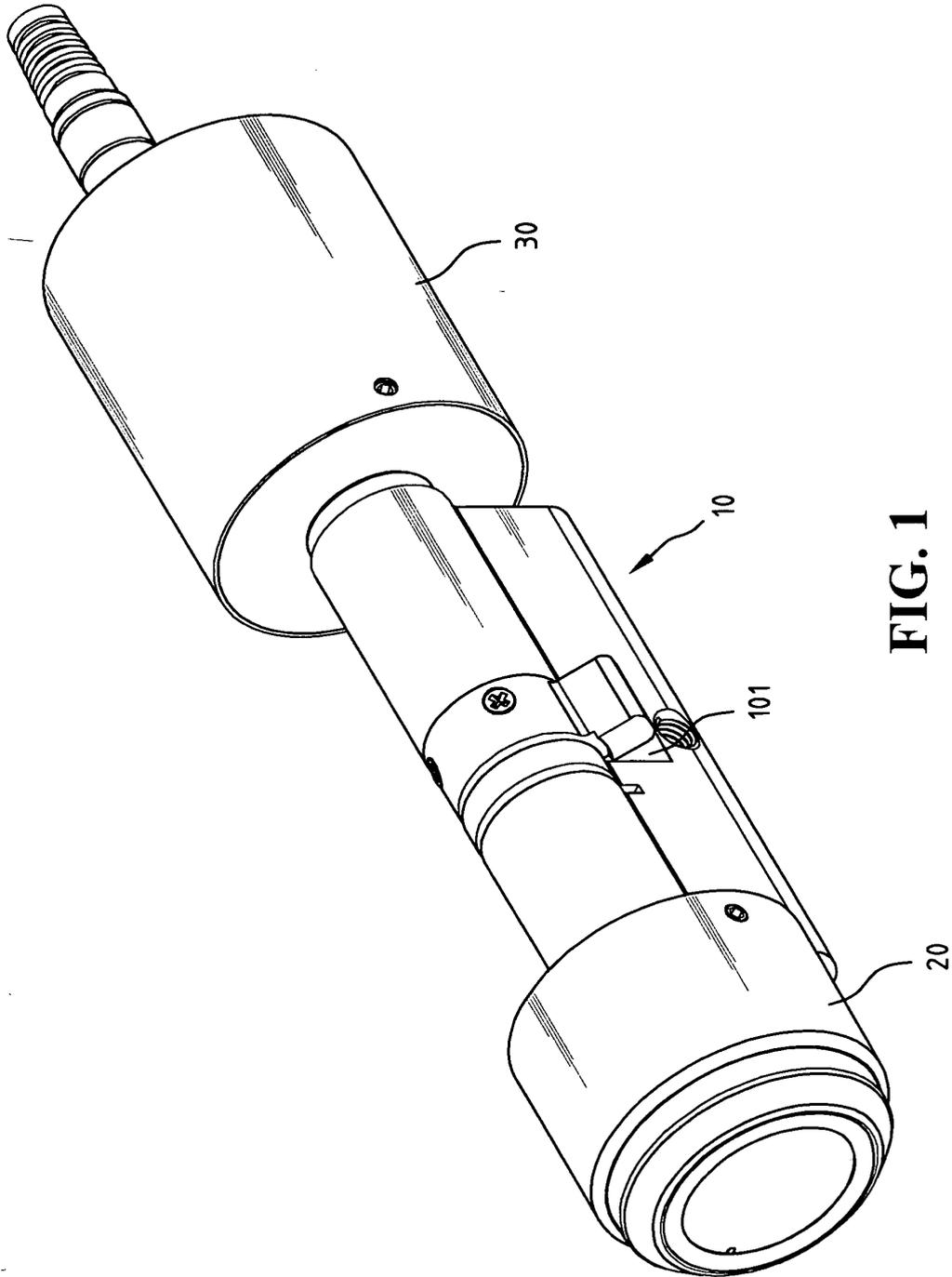


FIG. 1

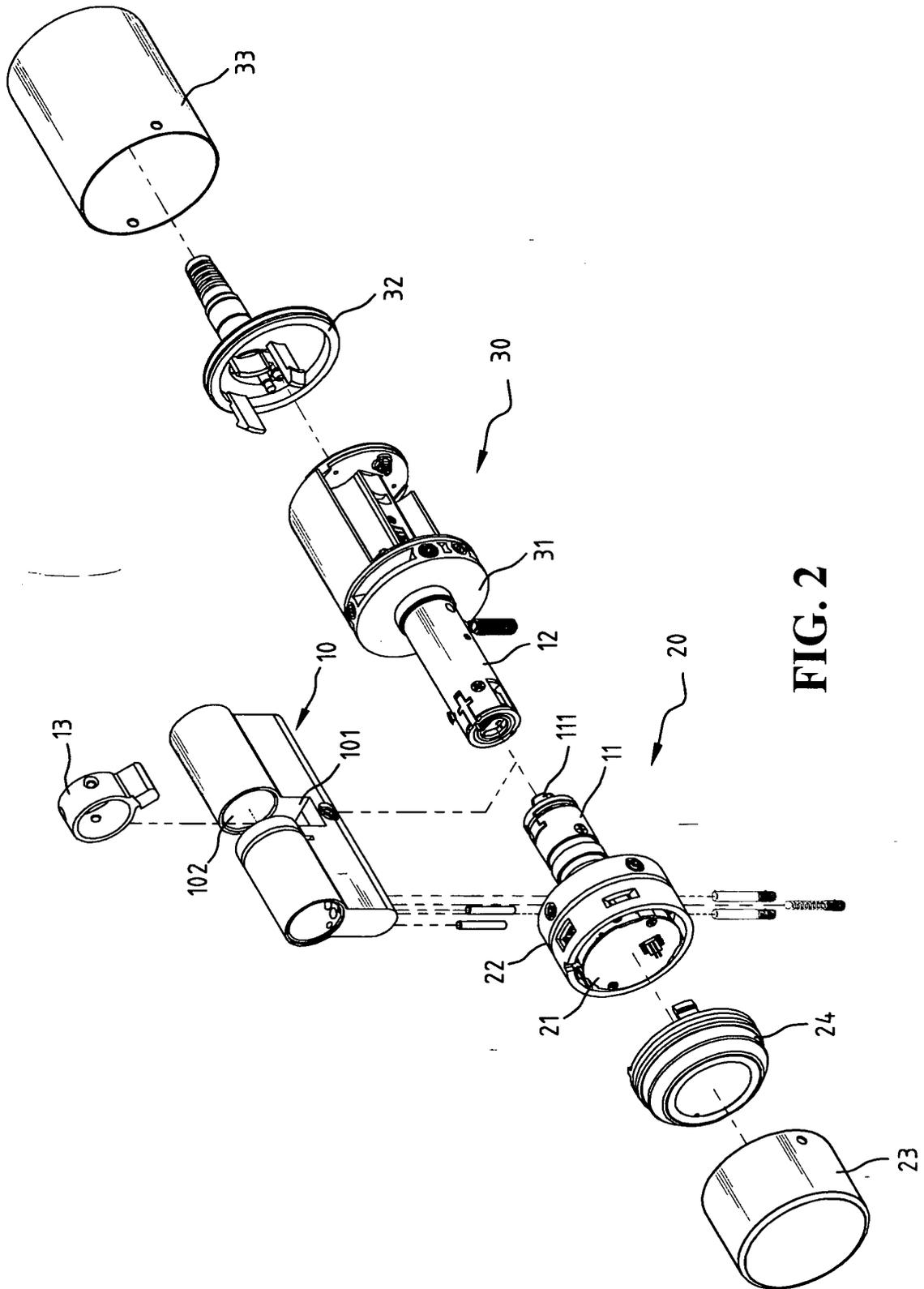


FIG. 2

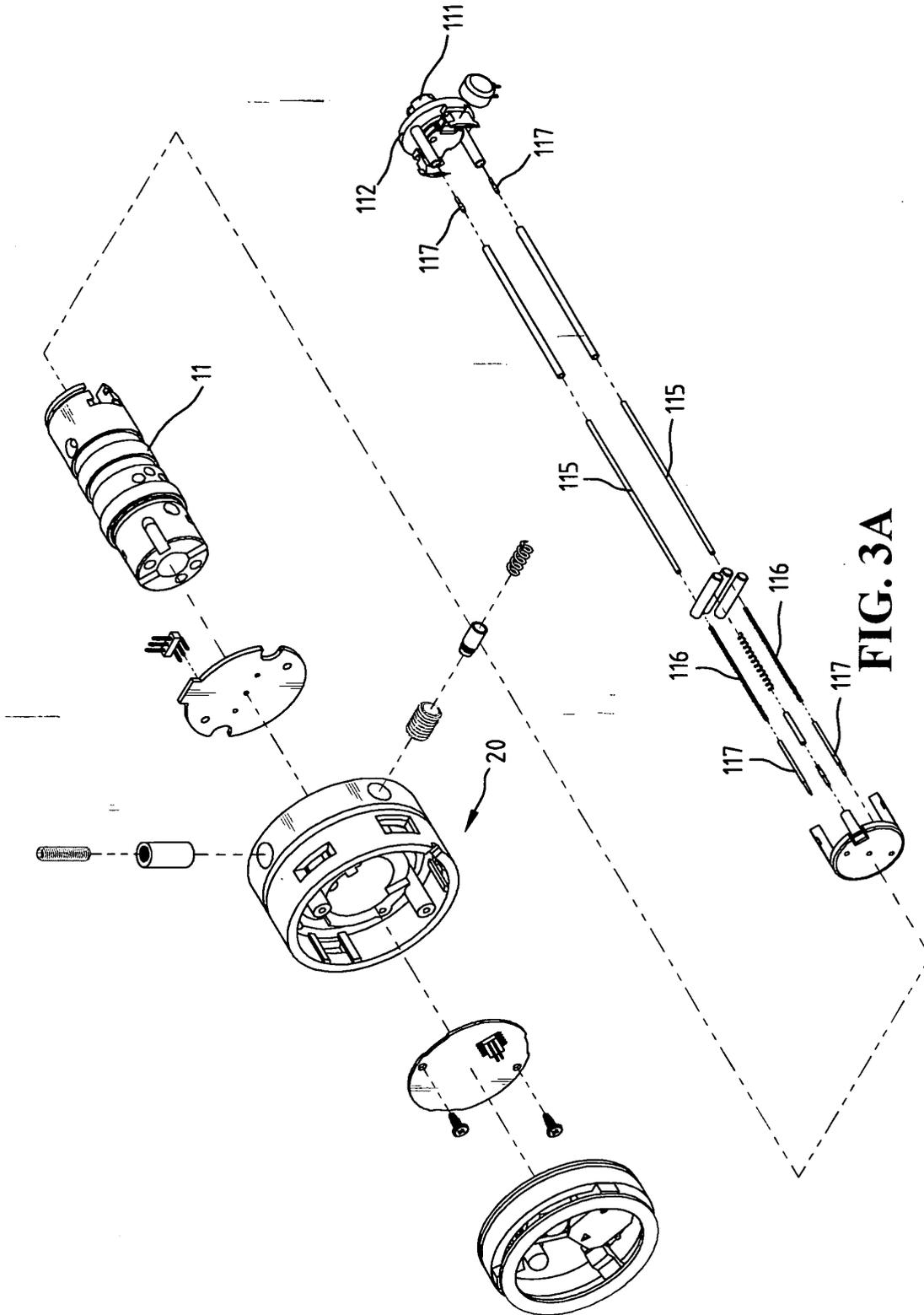


FIG. 3A

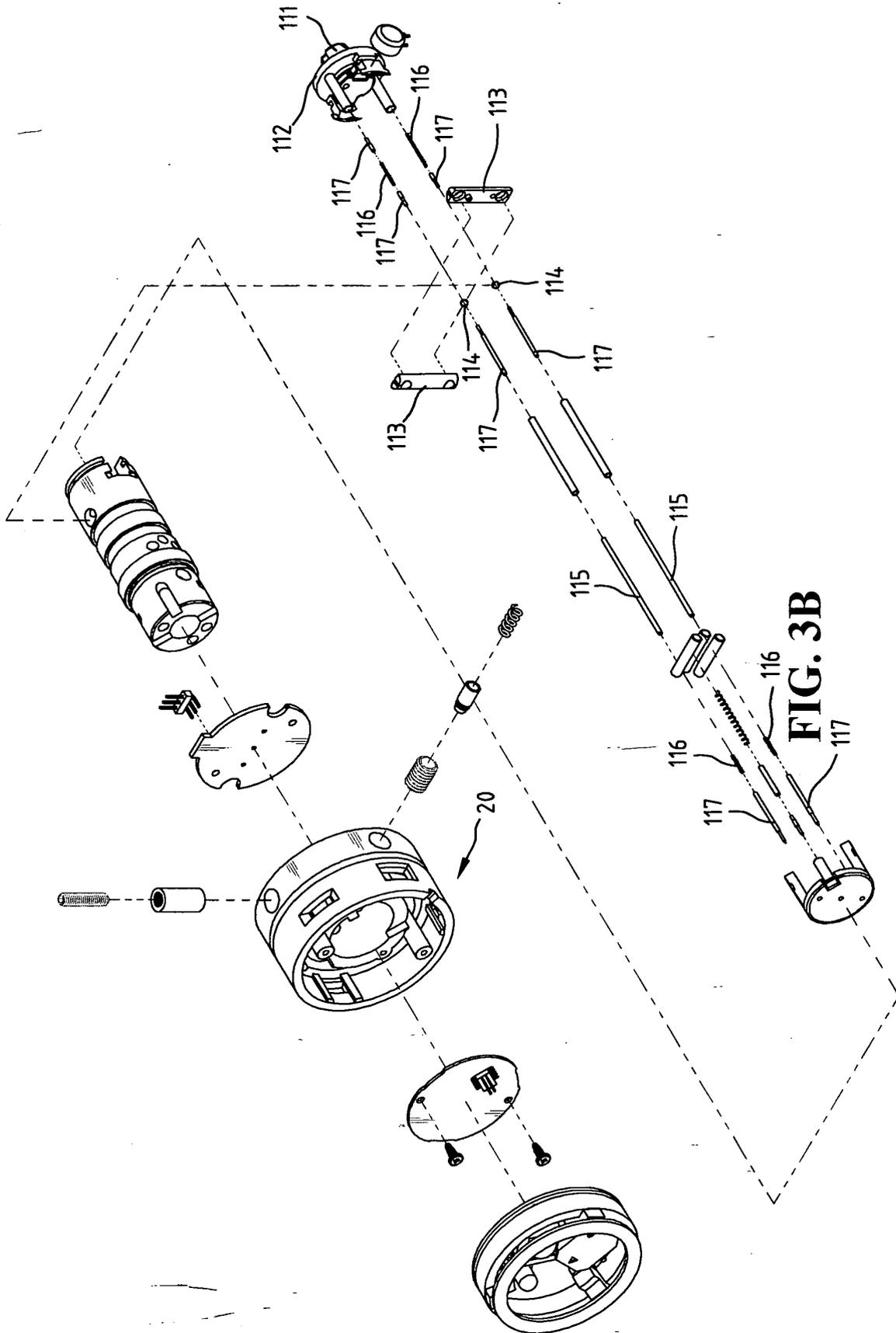


FIG. 3B

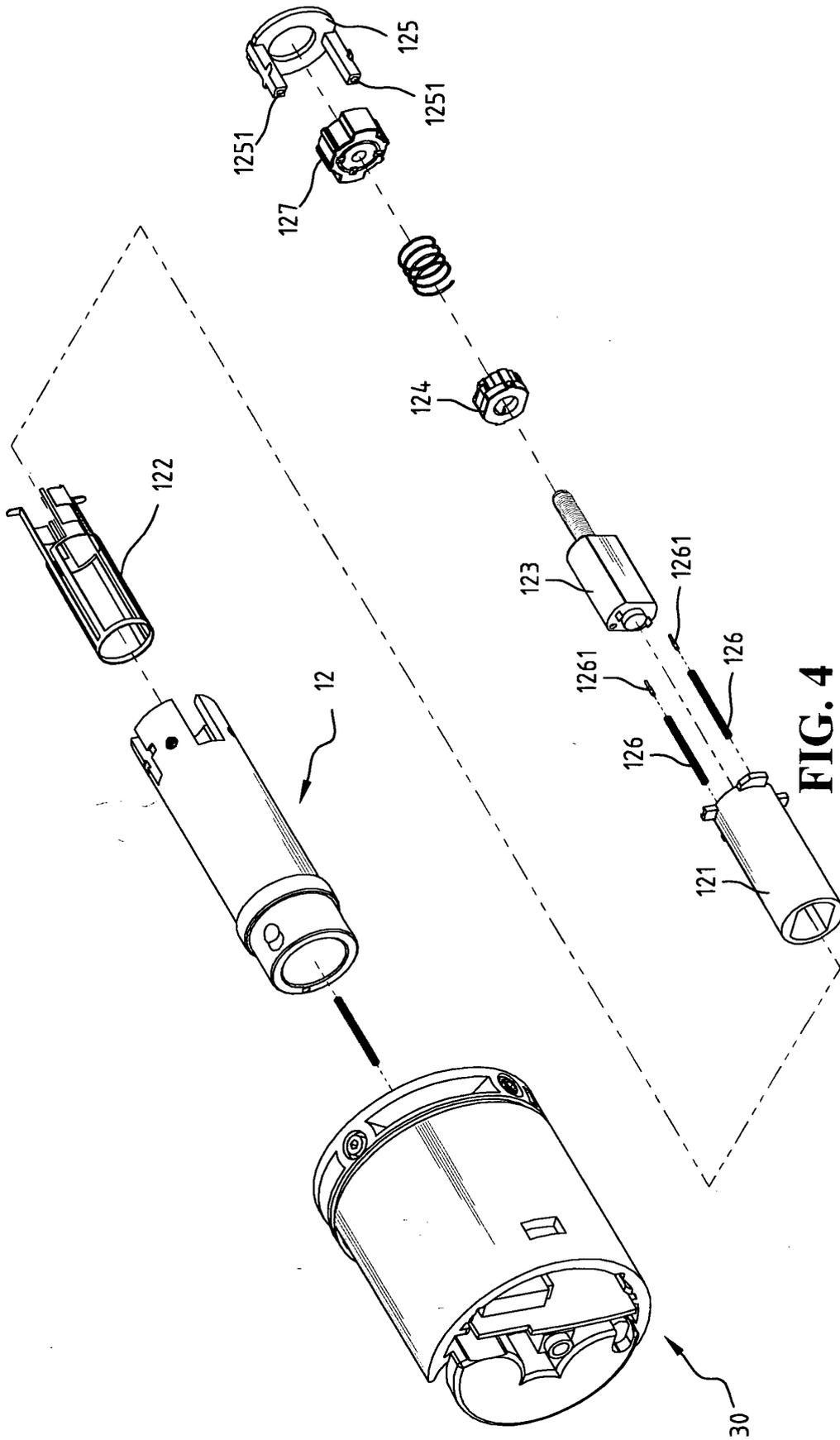


FIG. 4

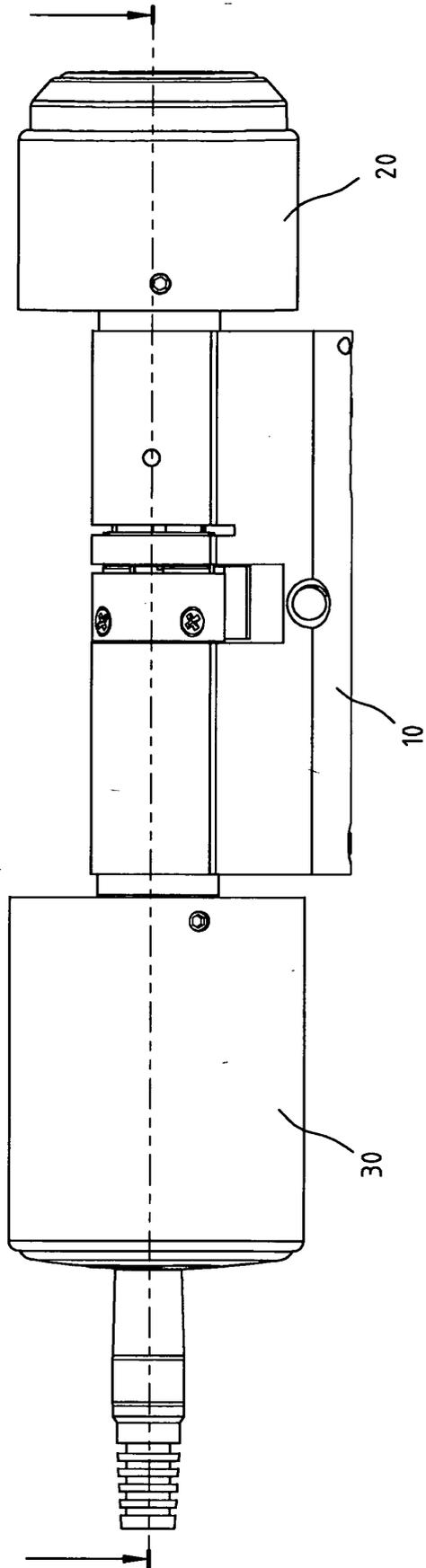


FIG. 5

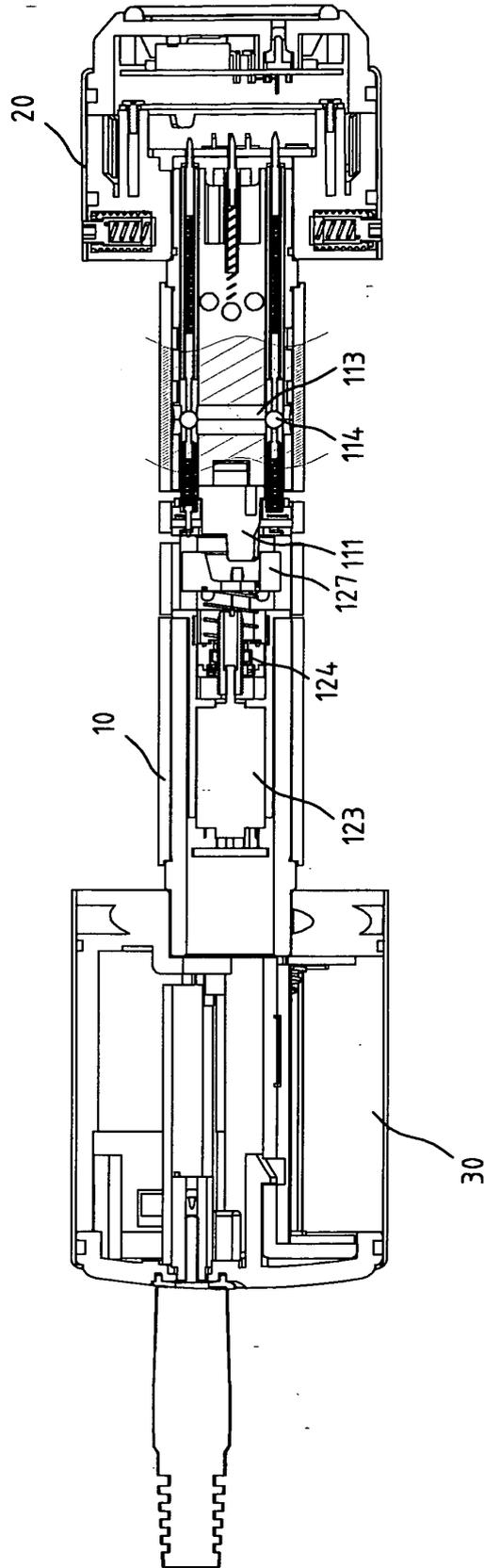


FIG. 6A

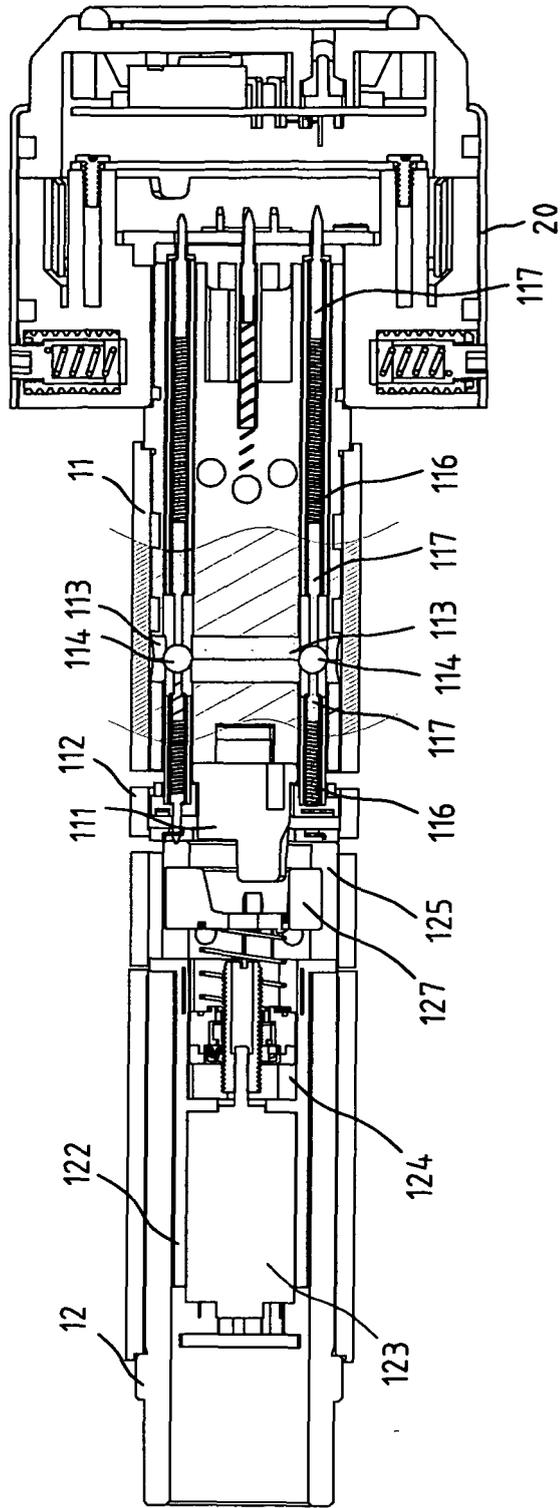


FIG. 6B

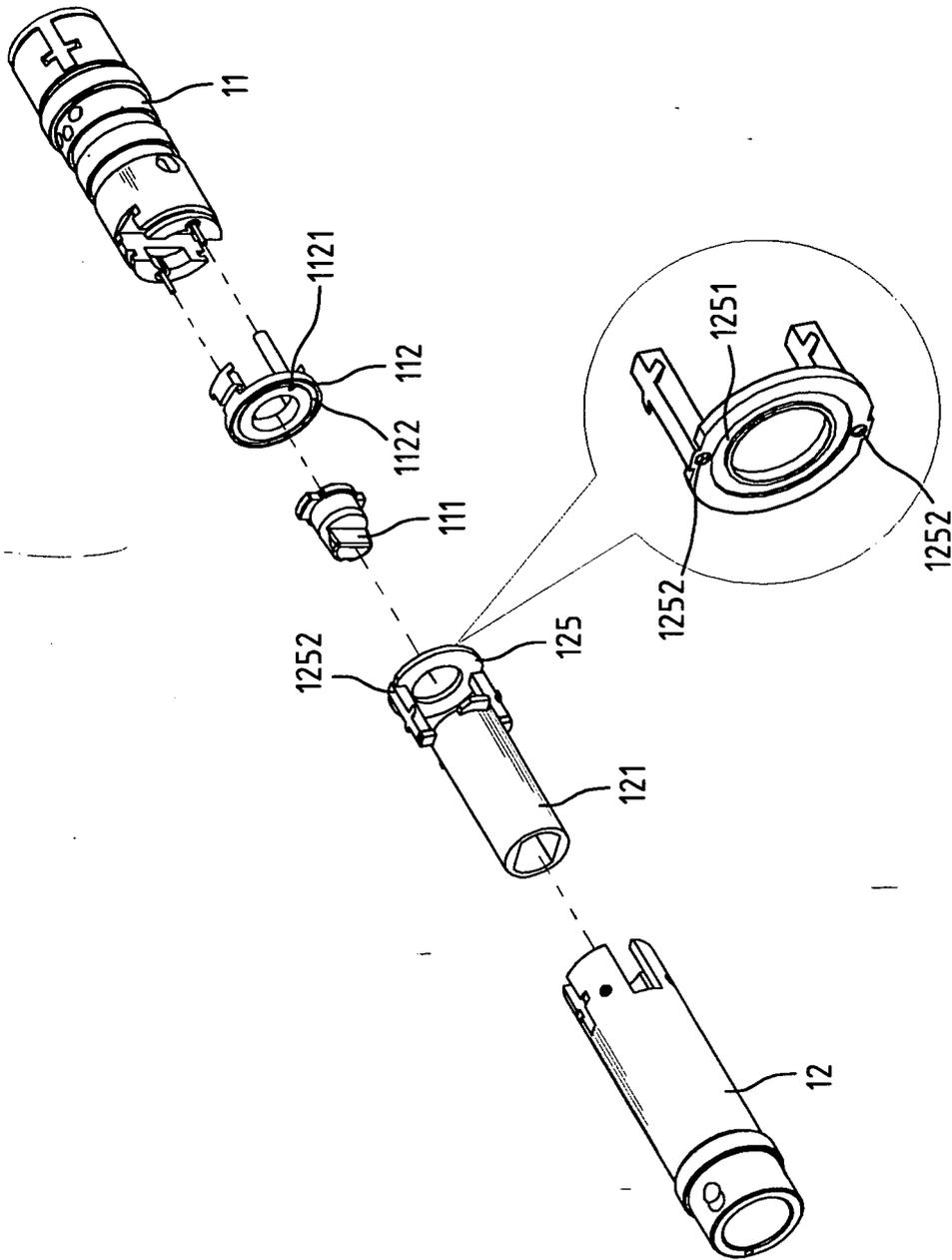


FIG. 7

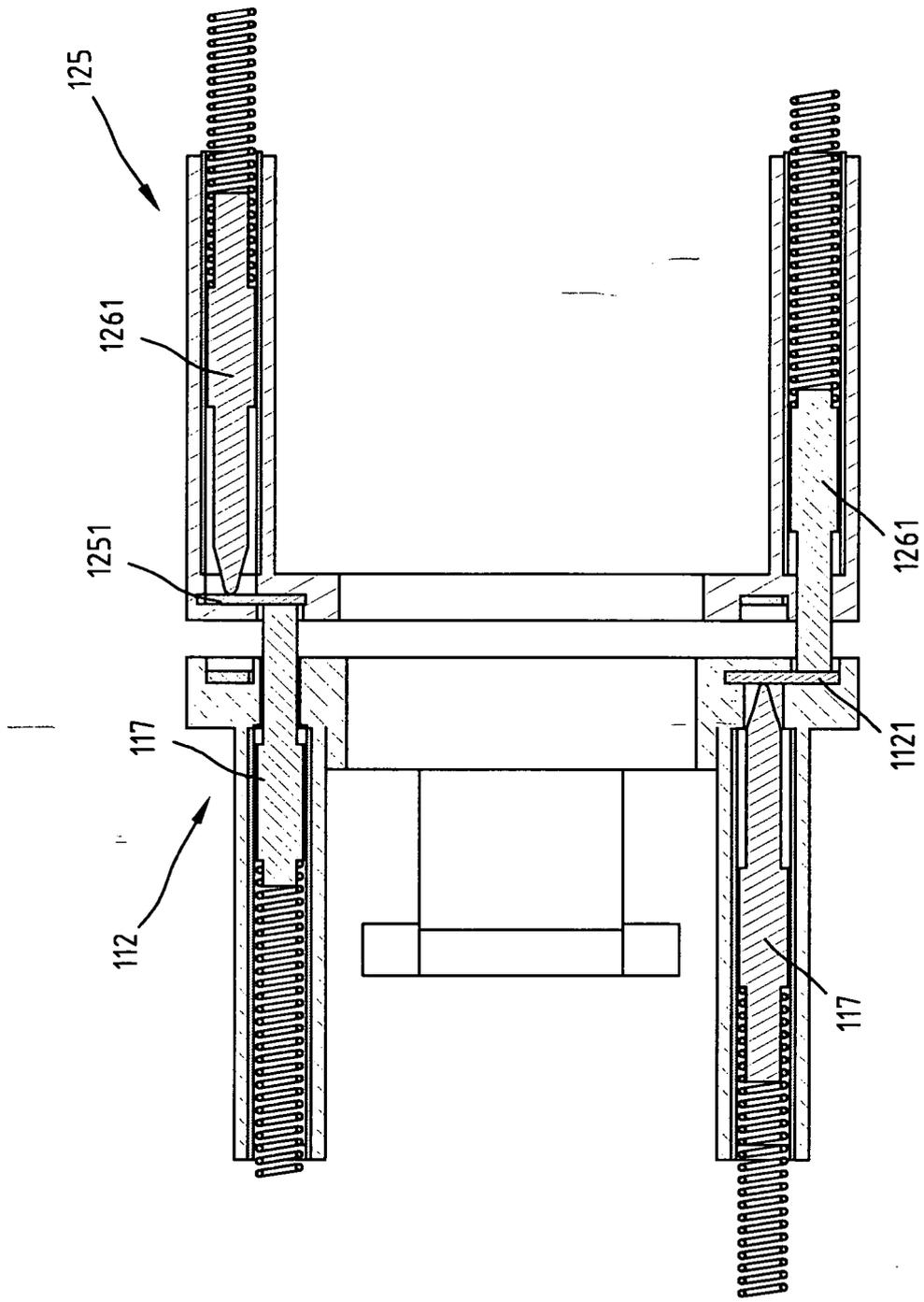


FIG. 8

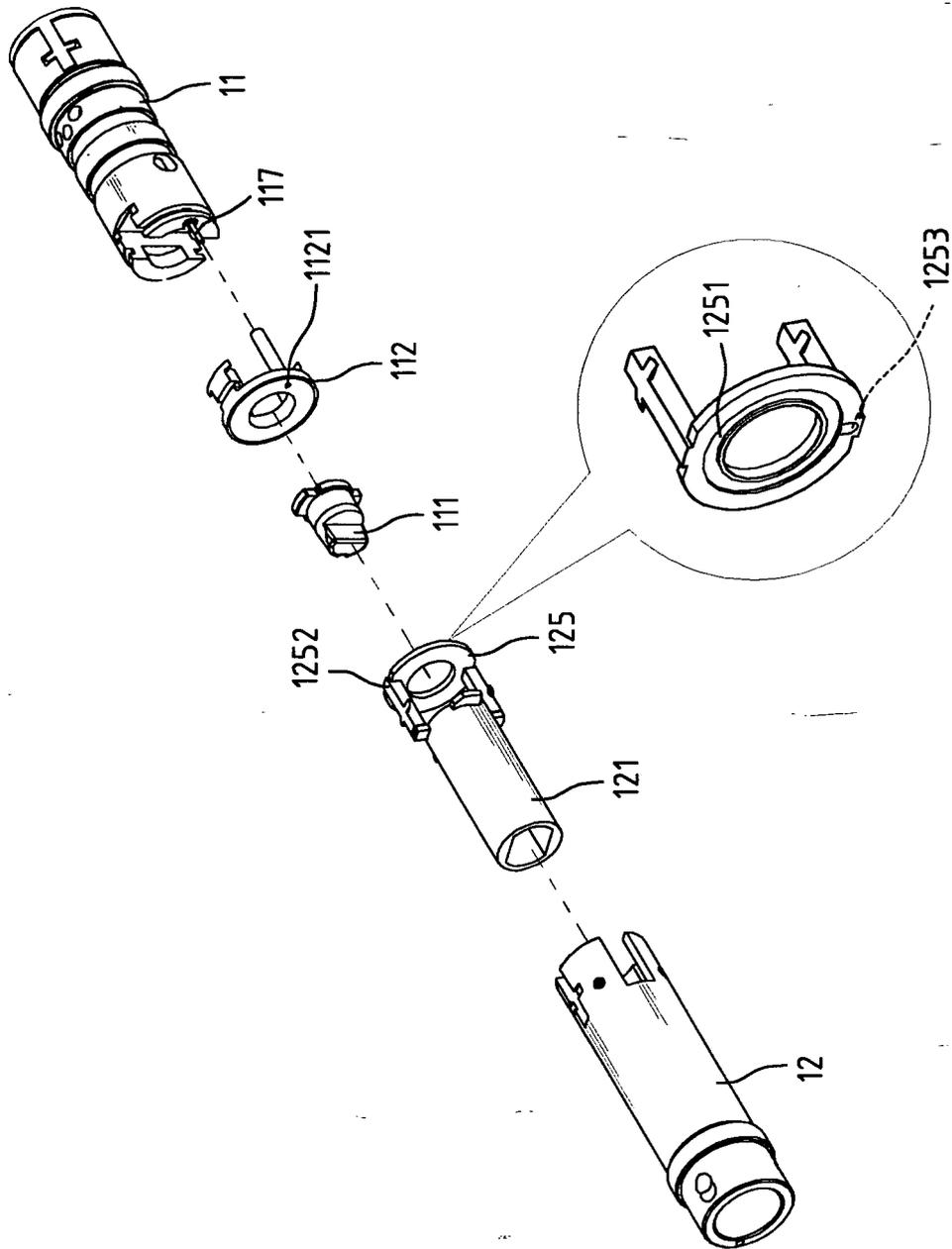


FIG. 9

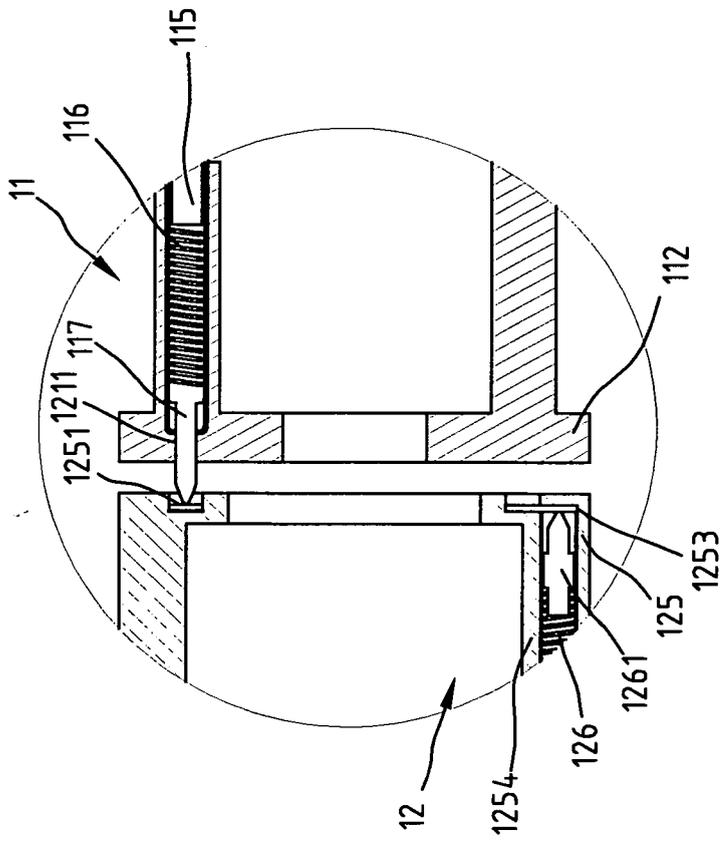


FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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