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(54) **Electronic lock having two modes of operation**

Elektronisches Schloss mit zwei Betriebsarten

Serrure électronique avec deux modes d'opération

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(56) References cited:
US-A1- 2004 061 343
US-A1- 2006 226 663
US-B1- 6 856 221
US-B1- 7 003 993
US-B1- 7 007 527

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Description

Technical Field

[0001] The present invention relates to an electronic lock having two modes of operation.

Background to the Invention

[0002] Some types of locks can be configured to operate in different modes. For instance, in the case of electronic door strikes, these types of locks may be configured to operate in a Power to Open (PTO) mode or a Power to Lock (PTL) mode. Electronic door strikes are used to control access through doors in buildings. In the PTO mode, the lock is biased to a locked state and becomes unlocked when power is applied to the lock. In the PTL mode, the lock is biased to an unlocked state and becomes locked when power is applied to the lock.

[0003] US-A-2006/0226663 discloses a magnetic lock in which its mode of operation can be changed between a PTL mode and a PTO mode.

[0004] US-A-2004/0061343 discloses an electrically-operated door strike in which its mode of operation can be changed between a fail-safe mode and a fail-secure mode.

Summary of the Invention

[0005] The present invention provides an electronic lock having two modes of operation, the electronic lock including: a lock body; a solenoid plunger mounted with the lock body; a spring for biasing the solenoid plunger in a direction with respect to the lock body; and a mode selector mountable within the lock body and oriented in accordance with a desired mode of operation, the mode selector being biased in the same direction as the solenoid plunger by the spring when no power is applied to the solenoid plunger, the mode selector moving into a void within the lock body to lock the electronic lock, the mode selector being operable for switching the mode of operation of the electronic lock, the mode of operation being determined by its orientation with respect to the electronic lock, the mode selector including: first and second bodies of different sizes; the first and second bodies being spaced apart by a resilient member.

[0006] The resilient member may include a helical spring.

[0007] The first and second bodies may be cylindrical.

[0008] The first and second bodies may be right cylindrical.

[0009] The resilient member may be mounted coaxially with either of the first or second bodies.

[0010] The first and second bodies may be of different lengths.

[0011] The resilient member may be mounted to either of the first or second bodies by being inserted into an aperture formed in either of the first or second bodies.

[0012] The first and second bodies may be formed from brass.

[0013] In a power to open mode, the second body is adjacent the solenoid plunger and at least a portion of the first body is located within the void to lock the electronic lock.

[0014] In a power to lock mode, the first body is adjacent the solenoid plunger and at least a portion of the first body moving into the void to lock the electronic lock.

[0015] The electronic lock may be an electronic door strike.

Brief Description of the Drawings

[0016] An embodiment of the present invention will now be described, by way of example only, to the accompanying drawings, in which:

Figure 1 illustrates is an end view of a mode selector for an electronic lock according to an embodiment of the invention;
Figure 2 is a cross section view along the line A-A of figure 1;
Figure 3 is a cut-away view of an electric door strike including the mode selector of figure 1 in the Power to Open mode with no power applied;
Figure 4 is a cut away and exploded view of the lock of figure 3;
Figure 5 is a cross sectional view along the line B-B of figure 3;
Figure 6 shows the lock of figure 3 in the Power to Open mode with power applied;
Figure 7 shows the lock of figure 3 in the Power to Lock mode with no power applied; and
Figure 8 shows the lock of figure 3 in the Power to Lock mode with power applied.

Detailed Description of the Preferred Embodiment

[0017] Referring to figure 1, a mode selector 3 is shown in end view. One end of a first body is shown in the form of brass cylinder 2.

[0018] Referring to figure 2, the mode selector 3 is shown in side cross sectional view. A second body in the form of brass cylinder 2' is shown which is of a different size to cylinder 2 by way of being of a different length.

[0019] The cylinders 2, 2' are spaced apart by a resilient member in the form of metal helical spring 1. Spring 1 is mounted coaxially of the cylinders 2, 2' and is inserted into apertures formed in either of the first and second cylinders. A small amount of adhesive is used to affix each end of spring 1 into the apertures.

[0020] Spring 1 is resilient. If the spring is elastically deformed, then it will return to its original shape as shown in figure 2.

[0021] Referring to figure 3, an electronic lock of the type known as an electric door strike is shown including a lock body 11 and a face plate 8. Mode selector 3 is

shown lying in a cylindrical aperture in lock body and is biased against solenoid plunger 7 by way of spring 4 which operates as the solenoid return spring. Keeper 6 is pivotally mounted in the lock in a conventional manner

[0022] In use, the lock is mounted in a door frame and controls access through the door. The latch of the door is retained in a recess behind the keeper 6. If the keeper is free to move, then the latch is free to be released from the aperture behind the keeper and the lock is said to be unlocked. In this state, the door may be pushed open and the keeper pivots to release the latch. If the keeper is not free to move then the lock is said to be locked. When the lock is locked, the door may only be opened by withdrawing the latch by use of a key or interior door handle.

[0023] Referring to figure 4, mode selector 3 may be removed from the lock by unscrewing end cap 5. The lock is switched between PTO and PTL modes by removing the mode selector, changing its orientation, and re-inserting mode selector 3 back into the lock and refitting end cap 5.

[0024] Referring also now to figures 6 to 8, the operation of the various modes of the lock will now be explained.

[0025] In figures 3 and 6, the lock is shown in the Power to Open (PTO) mode. It is important to note the orientation of the mode selector 3. The longer cylinder 2 is shown to the left, and the shorter cylinder 2' is to the right. That is to say, the mode selector has been inserted into the lock with the shorter cylinder 2' being inserted first as shown in figure 4.

[0026] In figure 3, no power is being supplied to solenoid 7. Spring 4 biases the mode selector and solenoid to the right. It can be seen that a portion of the longer cylinder 2 extends into void 9 provided in lock body. This obstructs movement of keeper 6 and thus the lock is locked.

[0027] The obstruction of the keeper 6 by cylinder 2 is illustrated in Figure 5. It can be seen that the diameter of the cylinders 2, 2' is greater than the width of curved slot 10. Thus, the keeper is obstructed. However, the diameter of spring 1 is less than the width of slot 10. Thus, if neither of cylinders 2 or 2' extend into void 9, then the keeper is unobstructed. As the keeper moves, spring 1 is loosely received in slot 10.

[0028] Referring to figure 6, power is now being supplied to solenoid 7 and it has moved the mode selector to the left against the force of spring 4. Note that spring 4 has been compressed. It can be seen that no part of either of cylinders 2 or 2' extend into void 9. Thus, the keeper is not obstructed from moving pivotally and the lock is open.

[0029] In figures 7 and 8, the lock is shown in the Power to Lock (PTL) mode. The orientation of the mode selector has been changed when compared with figures 3 and 6. The longer cylinder 2 is shown to the right, and the shorter cylinder 2' is to the left. That is to say, the mode selector has been inserted into the lock with the longer cylinder 2 being inserted first.

[0030] In figure 7, no power is supplied to solenoid. Spring 4 biases the mode selector and solenoid to the left. It can be seen that no part of either of cylinders 2 or 2' extend into void 9. Thus, the keeper is not obstructed from moving pivotally and the lock is open.

[0031] Referring to figure 8, power is now being supplied to solenoid 7 and it has moved the mode selector 3 to the left against the force of spring 4. Note that spring 4 has been compressed. It can be seen that a portion of cylinder 2 extends into void 9 provided in lock body. This obstructs movement of keeper 6 and thus the lock is locked.

[0032] Whenever the lock is in the locked state, it is due to cylinder 2 of mode selector 3 extending across the boundary between the lock body 1 and the void 9. When cylinder 2 extends into the void 9 the lock is said to be locked. Sometimes in use, the cylinder 2 may experience a high load such as if an attempt is made to force open the lock by a person striking a blow to the door or lock. This may cause some small local deformation of spring 1. However, spring 1 is resilient and returns to its original shape thus ensuring correct alignment of the two cylinders 2 and 2'.

[0033] Any reference to prior art contained herein is not to be taken as an admission that the information is common general knowledge, unless otherwise indicated.

[0034] Finally, it is to be appreciated that various alterations or additions may be made to the parts previously described without departing from the scope of the present invention as defined by the appended claims.

Claims

1. An electronic lock having two modes of operation, the electronic lock including:

   a lock body (10);
   a solenoid plunger (7) mounted within the lock body;
   a spring (4) for biasing the solenoid plunger (7) in a direction with respect to the lock body (10); and
   a mode selector (3) mountable within the lock body and oriented in accordance with a desired mode of operation, the mode selector (3) being biased in the same direction as the solenoid plunger (7) by the spring (4) when no power is applied to the solenoid plunger (7), the mode selector (3) moving into a void (9) within the lock body (10) to lock the electronic lock, the mode selector (3) being operable for switching the mode of operation of the electronic lock in accordance with its orientation within the lock body (10), the mode selector (3) including first and second bodies (2, 2') of different sizes;the first and second bodies (2, 2') being spaced apart

by a resilient member (1).

2. An electronic lock according to claim 1 wherein the resilient member (1) includes a helical spring.

3. An electronic lock according to claim 1 or 2 wherein the first and second bodies (2, 2') are cylindrical.

4. An electronic lock according to claim 3 wherein the first and second bodies (2, 2') are right cylindrical.

5. An electronic lock according to claim 3 wherein the resilient member (1) is mounted coaxially with either of the first or second bodies (2, 2').

6. An electronic lock according to any preceding claim wherein the first and second bodies (2, 2') are of different lengths.

7. An electronic lock according to any preceding claim wherein the resilient member (1) is mounted to either of the first or second bodies (2, 2') by being inserted into an aperture formed in either of the first or second bodies (2, 2').

8. An electronic lock according to any preceding claim wherein the first and second bodies (2, 2') are formed from brass.

9. An electronic lock according to any preceding claim wherein the second body (2') is adjacent the solenoid plunger (7) in a power to open mode, at least a portion of the first body (2) being located within the void (9) to lock the electronic lock.

10. An electronic lock according to any one of claims 1 to 8, wherein the first body (2) is adjacent the solenoid plunger (7) in a power to lock mode, at least a portion of the first body moving into the void (9) to lock the electronic lock.

11. An electronic lock according to any preceding claim wherein the electronic lock is an electronic door strike.

Patentansprüche

1. Elektronisches Schloss, das zwei Betriebsarten hat, wobei das elektronische Schloss Folgendes umfasst:

einen Schlosskörper (10);
einen Tauchanker (7), der innerhalb des Schlosskörpers installiert ist;
eine Feder (4) zum Vorspannen des Tauchankers (7) in einer Richtung gegenüber dem Schlosskörper (10), und
einen Moduswahlschalter (3), der innerhalb des Schlosskörpers installierbar ist und gemäß einem gewünschten Betriebsmodus ausgerichtet ist, wobei der Moduswahlschalter (3) in derselben Richtung wie der Tauchanker (7) durch die Feder (4) vorgespannt ist, wenn auf den Tauchanker (7) keine Energie einwirkt, wobei sich der Moduswahlschalter (3) in einen Hohlraum (9) innerhalb des Schlosskörpers (10) bewegt, um das elektronische Schloss zu verriegeln, wobei der Moduswahlschalter (3) zum Schalten der Betriebsart des elektronischen Schlosses gemäß seiner Ausrichtung innerhalb des Schlosskörpers (10) betrieben werden kann, wobei der Moduswahlschalter (3) erste und zweite Körper (2, 2') von unterschiedlicher Größe umfasst, wobei der erste und zweite Körper (2, 2') durch ein elastisches Element (1) mit Abstand voneinander angeordnet sind.

2. Elektronisches Schloss nach Anspruch 1, wobei das elastische Element (1) eine Schraubenfeder umfasst.

3. Elektronisches Schloss nach Anspruch 1 oder 2, wobei der erste und zweite Körper (2, 2') zylindrisch sind.

4. Elektronisches Schloss nach Anspruch 3, wobei der erste und zweite Körper (2, 2') gerade zylindrisch sind.

5. Elektronisches Schloss nach Anspruch 3, wobei das elastische Element (1) koaxial zum ersten oder zweiten Körper (2, 2') installiert ist.

6. Elektronisches Schloss nach einem der vorherigen Ansprüche, wobei der erste und zweite Körper (2, 2') unterschiedliche Länge haben.

7. Elektronisches Schloss nach einem der vorherigen Ansprüche, wobei das elastische Element (1) entweder am ersten oder zweiten Körper (2, 2') durch Einführen in eine Öffnung befestigt wird, die im ersten oder zweiten Körper (2, 2') gebildet ist.

8. Elektronisches Schloss nach einem der vorherigen Ansprüche, wobei der erste und zweite Körper (2, 2') aus Messing hergestellt sind.

9. Elektronisches Schloss nach einem der vorherigen Ansprüche, wobei der zweite Körper (2') in einem Betriebsmodus 'Energie zum Öffnen' an den Tauchanker (7) grenzt, wobei zumindest ein Teil des ersten Körpers (2) sich innerhalb des Hohlraums (9) befindet, um das elektronische Schloss zu verriegeln.

10. Elektronisches Schloss nach einem der vorherigen Ansprüche 1 bis 8, wobei der erste Körper (2) an den Tauchanker (7) in einem Betriebsmodus 'Energie zum Verriegeln' grenzt, wobei zumindest ein Teil des ersten Körpers sich in den Hohlraum (9) zum Verriegeln des elektronischen Schlosses bewegt.

11. Elektronisches Schloss nach einem der vorherigen Ansprüche, wobei das elektronische Schloss ein elektronischer Türöffner ist.

Revendications

1. Serrure électronique ayant deux modes de fonctionnement, la serrure électronique comprenant :

un corps (10) de serrure ;
un piston de solénoïde (7) monté à l'intérieur du corps de serrure ;
un ressort (4) pour pousser le piston de solénoïde (7) dans une direction par rapport au corps (10) de serrure ; et
un sélecteur (3) de mode pouvant être monté à l'intérieur du corps de serrure et orienté conformément à un mode de fonctionnement souhaité, le sélecteur (3) de mode étant poussé dans la même direction que le piston de solénoïde (7) par le ressort (4) quand aucun courant n'est appliqué sur le piston de solénoïde (7), le sélecteur (3) de mode se mouvant dans un vide (9) à l'intérieur du corps (10) de serrure pour verrouiller la serrure électronique, le secteur (3) de mode pouvant être actionné pour changer le mode de fonctionnement de la serrure électronique conformément à son orientation à l'intérieur du corps (10) de serrure, le sélecteur (3) de mode comprenant des premier et deuxième corps (2, 2') de tailles différentes, les premier et deuxième corps (2, 2') étant espacés l'un de l'autre par un organe élastique (1).

2. Serrure électronique selon la revendication 1, dans laquelle l'organe élastique (1) comprend un ressort à boudin.

3. Serrure électronique selon la revendication 1 ou 2, dans laquelle les premier et deuxième corps (2, 2') sont cylindriques.

4. Serrure électronique selon la revendication 3, dans laquelle les premier et deuxième corps (2, 2') sont cylindriques droits.

5. Serrure électronique selon la revendication 3, dans laquelle l'organe élastique (1) est monté coaxialement à l'un ou l'autre des premier ou deuxième corps (2, 2').

6. Serrure électronique selon une quelconque revendication précédente, dans laquelle les premier et deuxième corps (2, 2') ont des longueurs différentes.

7. Serrure électronique selon une quelconque revendication précédente, dans laquelle l'organe élastique (1) est monté sur l'un ou l'autre des premier ou deuxième corps (2, 2') en étant inséré dans une ouverture formée dans l'un ou l'autre des premier ou deuxième corps (2, 2').

8. Serrure électronique selon une quelconque revendication précédente, dans laquelle les premier et deuxième corps (2, 2') sont fabriqués en laiton.

9. Serrure électronique selon une quelconque revendication précédente, dans laquelle le deuxième corps (2') est adjacent au piston de solénoïde (7) dans un mode courant d'ouverture, au moins une partie du premier corps (2) étant située à l'intérieur du vide (9) pour verrouiller la serrure électronique.

10. Serrure électronique selon l'une quelconque des revendications 1 à 8, dans laquelle le premier corps (2) est adjacent au piston de solénoïde (7) dans un mode courant de verrouillage, au moins une partie du premier corps se mouvant dans le vide (9) pour verrouiller la serrure électronique.

11. Serrure électronique selon une quelconque revendication précédente, la serrure électronique étant une gâche de porte électronique.

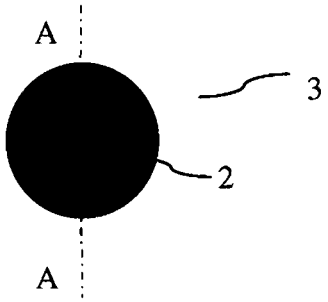


Figure 1

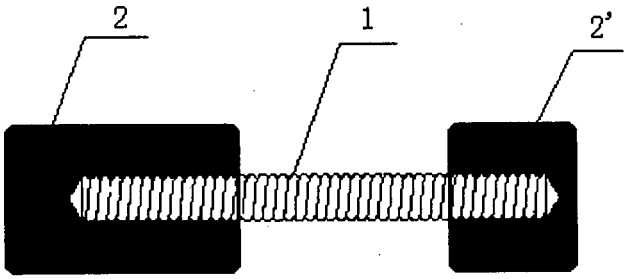


Figure 2

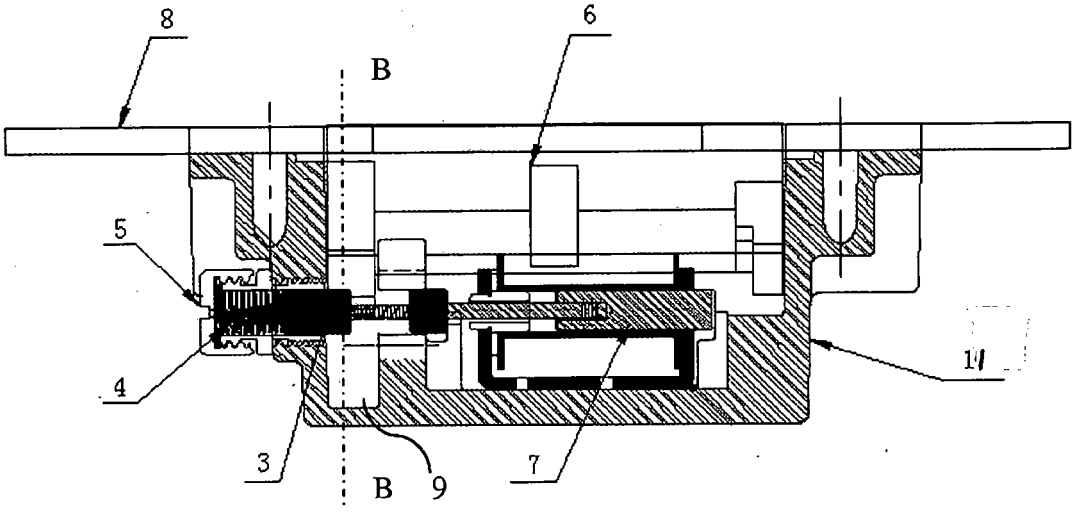


Figure 3

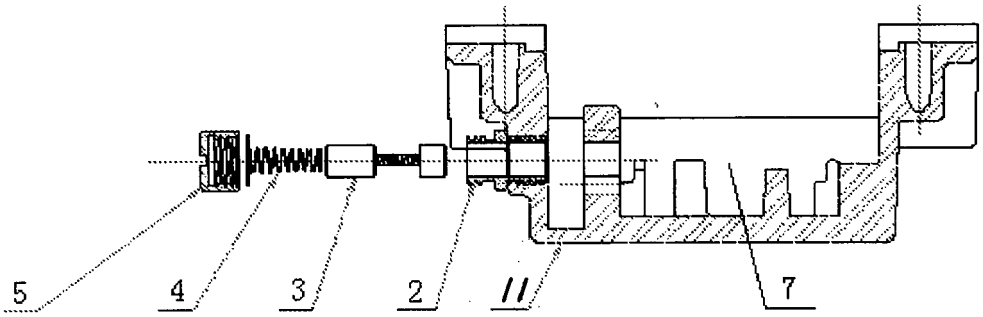


Figure 4

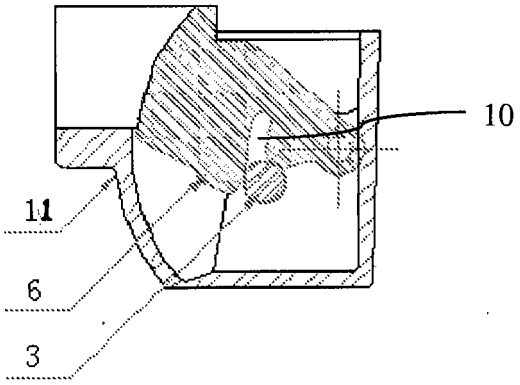


Figure 5

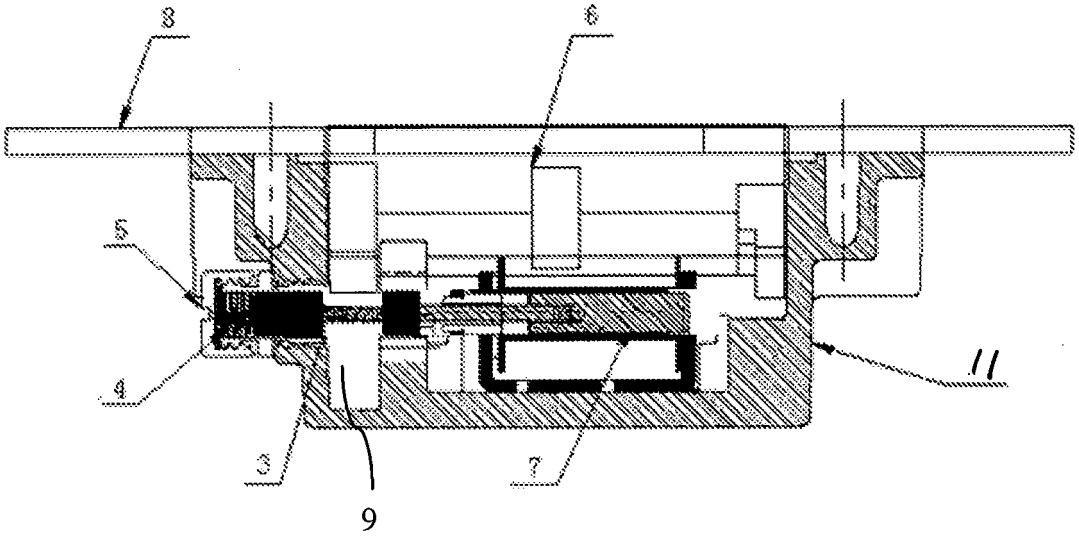


Figure 6

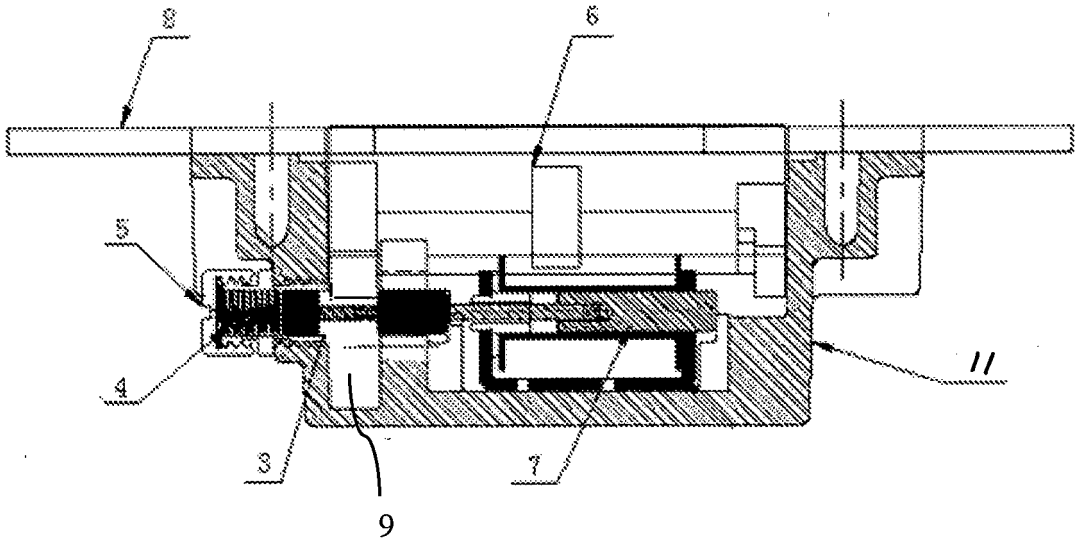


Figure 7

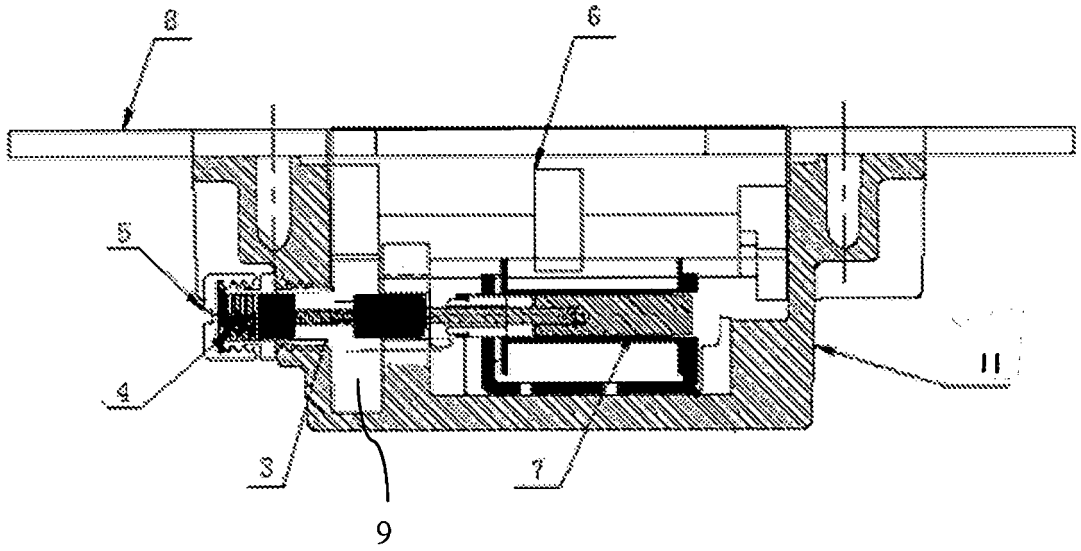


Figure 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20060226663 A **[0003]**
- US 20040061343 A **[0004]**