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(54) **Lock with anti-torque security device**

Schloss mit Gegendrehmomentsicherheitsvorrichtung

Serrure avec dispositif de sécurité anti-couple

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## Description

**[0001]** The present invention relates to a lock, particularly for a motor vehicle door.

**[0002]** In more detail, this lock comprises:

- a fixed bush that defines a cylindrical cavity in which a cylinder rotates about the axis of the cavity, and
- a bolt operating member controlled by a nose that protrudes from the distal end of the said cylinder, passing through a central opening defined by an annular flange located at the distal end of the said bush.

**[0003]** It is an object of the present invention to provide a lock of the type indicated above capable of offering good resistance to attempts to break in by exerting torsional forces on the rotating cylinder.

**[0004]** This object is achieved with a lock of the type indicated in claim 1 which follows.

**[0005]** According to the invention, the interference existing in a circumferential direction between these teeth reduces or preferably eliminates the possibility of the cylinder being rotated about the axis of the cavity of the bush, when the cylinder, as normally happens in break-ins, is forced axially inwards. This interference therefore makes impossible to forcibly turn the cylinder, when acting from the outside, and thus to move the bolt operating member without authorization.

**[0006]** Advantageously, the lock to which the anti-torque security device of the present invention is fitted may also have other security devices, e.g. of the type in which, during attempted break-ins, a component is expelled in a radial direction in such a way as to break the continuity of the mechanism for transmitting movement from the proximal end of the cylinder to the bolt. In this case the level of security of the lock is greatly enhanced. It is nonetheless obvious that the anti-torque security device of the present invention can also be used as a single security device for a lock.

**[0007]** Other advantages and features of the present invention will become clear in the course of the following detailed description provided by way of non-limiting example with reference to the accompanying drawings, in which:

Figure 1 is an exploded perspective view of the main components of a lock of the invention,

Figure 2 is a view in longitudinal section of the lock from Figure 1 in the normal operating configuration,

Figure 3 is a perspective view of one particular component of the lock from the previous figures,

Figure 4 is a perspective view of another particular component of the lock from the previous figures,

Figure 5 is a view in longitudinal section of the lock from the previous figures during the first phase of an attempted break-in,

Figure 6 is a view in longitudinal section of the lock from the previous figures during a subsequent phase

in an attempted break-in,

Figure 7 is an end view of the lock in the configuration illustrated in Figure 6, and

Figure 8 is a view in longitudinal section of the lock from the previous figures during a still later stage in an attempted break-in.

**[0008]** A lock, particularly for a motor vehicle door, comprises (Figs. 1 and 2) a fixed bush 10 with a sleeve 11 attached to its distal end like an extension. The bush 10 defines internally a cylindrical cavity 12 about whose axis 14 there rotates a cylinder 16 which is fitted with a restoring spring 18 and has a first weakened cross section 20 and a second weakened section 22 close to its proximal and distal ends respectively. Around a circumferential section of the proximal portion of the bush 10 is a slot 24 able to house cylinder 16 retention means in the form of an inverted U-shaped spring 26. The spring 26 prevents, in normal operation of the lock, translational movement of the cylinder 16 in an axial direction, once the cylinder has been inserted into the cavity 12.

**[0009]** The cylinder 16 is able to turn about the axis 14 when the appropriate key is inserted into the keyway. These characteristics of operation and the associated structural features are well known to those skilled in the art and have no significant influence on the present invention, so are not described in detail.

**[0010]** The lock also includes an operating member 28 for operating a bolt (which in itself is conventional and not illustrated in the figures), which member 28 is controlled by a nose 30 that protrudes from the distal end of the cylinder 16 and passes through a central opening defined by an annular flange 32 located at the distal end of the bush 10. The operating member 28 is also acted upon by springs 34 which react against a fixed surface of the sleeve 11.

**[0011]** There protrude from the facing surfaces of the distal end of the cylinder 16 and of the annular flange 32 (Figs. 3 and 4) respective pluralities of circumferentially spaced teeth 36, 38. The teeth 36, 38 of each plurality are staggered with respect to those 38, 36 of the other plurality - as will be described in more detail later - in such a way that movement of the cylinder 16 towards the distal end of the bush 10 causes, due to the interlocking of the teeth 36, 38, the formation of a continuous annular structure.

**[0012]** The nose 30 of the cylinder 16 has, at its distal end, an enlarged portion 40 which is followed by, when proceeding towards the proximal end, a portion 42 whose cross section is smaller than that of the enlarged portion 40 and therefore recessed compared with the latter. In outline, the portion 40 is of polygonal, in particular rectangular section and is engaged in a slot 44 of complementary shape formed in a plate 46 integral with the operating member 28, so as to transmit a torque.

**[0013]** During normal operation of the lock (Fig. 2), the teeth 36, 38 on the adjacent surfaces of the distal end of the cylinder 16 and of the annular flange 32 are axially

disengaged. This means that when the key is inserted into the keyway, the cylinder 16 can turn freely and control, owing to the engagement existing between the enlarged portion 40 on the distal end of the nose 30 and the slot 44, the movement of the bolt operating member 28.

**[0014]** When a thief attempts to break in, the weakened first section 20 of the cylinder 16 is broken first of all (Fig. 5), causing detachment of the proximal part 48 which then has to be extracted to allow access to the remaining part. The thief, typically plying his trade with a tool such as a screwdriver or the like, will then push the remaining part of the cylinder 16 into the bush 10. This movement (Figs. 6 and 7) has the effect of causing the teeth 36, 38 protruding from the adjacent surfaces of the distal end of the cylinder 16 and of the annular flange 32 to interlock with each other and form a continuous annular structure. The same movement also causes the enlarged portion 40 on the distal end of the nose 30 to pass out of the slot 44 in the plate 46, which slot now receives the narrower-sectioned portion 42 of the distal end of the nose 30, causing the longitudinal axes of the nose 30 and of the slot 44 to come apart as the operating member 28 is moved by the action of the springs 34 (see Fig. 1).

**[0015]** Since the teeth 36, 38 are now engaged with each other and have formed a continuous annular structure, further efforts by the thief to turn the cylinder 16 inside the bush 10 are in vain and result at the most in breaking (Fig. 8) the second weakened section 22 of the cylinder 16, causing another part 50 of it to come away. At this point, the thief, frustrated in its efforts to turn the remaining distal portion 52 of the cylinder 16 inside the bush 10, may try to move it translationally backwards to overcome the existing engagement between the two series of teeth 36, 38 and allow it to be rotated. This possibility is however prevented by the fact that the nose 30 and in particular its enlarged portion 40 are no longer coaxial with the slot 44, so that the portion 40 abuts against the plate 46 via its radially extending surface 54 which is turned towards this plate 46.

**[0016]** The distal portion 52 of the cylinder 16 still inside the bush 10 is therefore irreversibly locked inside it and cannot be returned to its original position in which it turns freely.

**[0017]** Clearly, without affecting the principle of the invention, the details of construction and the embodiments can be altered considerably from those described purely by way of example, without thereby departing from its scope. In particular, the portion of narrower cross section 42 of the nose 30 of the cylinder 16 could be circular so that no torque can be transmitted once it is in the slot 44 of the plate 46 integral with the operating member 28 following an attempted break-in. This detail further enhances the locks' security because, even in the hypothetical event that the thief manages to turn the cylinder 16 by overcoming the resistance presented by the interlocking of the teeth 36, 38, the circular-section portion 42 of the nose 30 would rotate idly inside the slot 44 and

could not therefore produce any movement in the operating member 28.

## 5 Claims

1. Lock, particularly for a motor vehicle door, comprising:

- a fixed bush (10) that defines a cylindrical cavity (12) in which a cylinder (16) rotates about the axis (14) of the cavity (12), and
- a bolt operating member (28) controlled by a nose (30) that protrudes from the distal end of the said cylinder (16), passing through a central opening defined by an annular flange (32) located at the distal end of the said bush (10),

the said lock being **characterized in that** at least one respective axially extending tooth (36, 38) protrudes from the facing surfaces of the distal end of the cylinder (16) and of the annular flange (32), the said teeth (36, 38) being able to interfere with each other and thus prevent, when a thief causes the detachment of the proximal part (48) of the cylinder (16), that the remaining part of the cylinder (16) rotates when the remaining part of said cylinder (16) is pushed towards the distal end of the bush (10).

2. Lock according to Claim 1, **characterized in that** respective pluralities of circumferentially spaced teeth (36, 38) protrude from the adjacent surfaces of the distal end of the cylinder (16) and of the annular flange (32), the teeth (36, 38) of each plurality being staggered with respect to those (38, 36) of the other plurality in such a way that movement of the remaining part of the cylinder (16) towards the distal end of the bush (10) causes, due to the interlocking of the said teeth (36, 38), the formation of a continuous annular structure.

3. Lock according to any one of the preceding claims, **characterized in that** the said cylinder (16) has a first weakened cross section (20) and a second weakened cross section (22) near its proximal and distal ends, respectively.

4. Lock according to any one of the preceding claims, **characterized in that** the said nose (30) has, at its distal end, an enlarged portion (40) which in outline is of polygonal section, and is engaged, in the normal condition of operation, in a slot (44) of complementary shape formed in a plate (46) integral with the operating member (28), so as to transmit a torque.

5. Lock according to Claim 4, **characterized in that** the said nose (30) has, immediately after the said enlarged portion (40) when proceeding towards the

proximal end, a circular-section portion (42) that is recessed compared with the enlarged portion (40), the said recessed portion (42) being able, when the cylinder (16) is pushed towards the distal end of the bush (10), to enter the said slot (44), in which it can turn freely without transmitting any torque.

## Patentansprüche

1. Schloss, insbesondere für eine Kraftfahrzeugtür, enthaltend:

- eine feststehende Buchse (10), die einen zylindrischen Hohlraum (12) definiert, in dem sich ein Zylinder (16) um die Achse (14) des Hohlraumes (12) dreht, und
- ein Bolzenbetätigungselement (28), das von einer Nase (30) gesteuert wird, die am distalen Ende des Zylinders (16) hervorragt und eine zentrale Öffnung durchläuft, die von einem ringförmigen Flansch (32) gebildet ist, der sich am distalen Ende der Buchse (10) befindet,

wobei das Schloss **dadurch gekennzeichnet ist, dass** wenigstens ein jeweiliger sich axial erstreckender Zahn (36, 38) von den zugewandten Oberflächen des distalen Endes des Zylinders (16) und des ringförmigen Flansches (32) hervorsteht, wobei diese Zähne (36, 38) in der Lage sind, miteinander in Eingriff zu gelangen, und somit verhindern, dass, wenn ein Dieb das Lösen des proximalen Teils (48) des Zylinders (16) bewirkt, sich der übrige Teil des Zylinders (16) dreht, wenn der übrige Teil des Zylinders (16) zum distalen Ende der Buchse (10) geschoben wird.

2. Schloss nach Anspruch 1, **dadurch gekennzeichnet, dass** jeweilige Vielzahlen von in Umfangsrichtung beabstandeten Zähnen (36, 38) von den benachbarten Oberflächen des distalen Endes des Zylinders (16) und vom ringförmigen Flansch (32) hervorragen, wobei die Zähne (36, 38) jeder Vielzahl im Bezug auf jene (38, 36) der anderen Vielzahl derart gestaffelt sind, dass die Bewegung des übrigen Teils des Zylinders (16) zum distalen Ende der Buchse (10) infolge des Ineinandergreifens der Zähne (36, 38) die Ausbildung einer kontinuierlichen ringförmigen Struktur bewirkt.
3. Schloss nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Zylinder (16) einen ersten geschwächten Querschnitt (20) und einen zweiten geschwächten Querschnitt (22) in der Nähe seines proximalen bzw. distalen Endes hat.
4. Schloss nach einem der vorhergehenden Ansprüche

che, **dadurch gekennzeichnet, dass** die Nase (30) an ihrem distalen Ende einen vergrößerten Abschnitt (40) aufweist, dessen Umriss einen polygonalen Querschnitt hat, und der im normalen Betätigungszustand in einen Schlitz (44) komplementärer Form in einer Platte (46) eingreift, die integraler Bestandteil des Betätigungselementes (28) ist, so dass ein Drehmoment übertragen wird.

5. Schloss nach Anspruch 4, **dadurch gekennzeichnet, dass** die Nase (30) unmittelbar hinter dem vergrößerten Abschnitt (40), wenn man zum proximalen Ende fortschreitet, einen Abschnitt (40) mit kreisförmigem Querschnitt (42) hat, der im Vergleich mit dem vergrößerten Abschnitt (40) ausgenommen ist, wobei der ausgenommene Abschnitt (42) in der Lage ist, wenn der Zylinder (16) zum distalen Ende der Buchse (10) geschoben wird, in den Schlitz (44) einzutreten, in dem er sich frei drehen kann, ohne ein Drehmoment zu übertragen.

## Revendications

1. Verrou, destiné en particulier à une portière de véhicule à moteur, comprenant :

- une douille fixe (10) qui définit une cavité cylindrique (12) dans laquelle un cylindre (16) tourne autour de l'axe (14) de la cavité (12), et
- un élément d'actionnement de pêne (28) commandé par un nez (30) qui fait saillie à partir de l'extrémité distale dudit cylindre (16), en passant à travers une ouverture centrale définie par une bride annulaire (32) située au niveau de l'extrémité distale de ladite douille (10),

ledit verrou étant **caractérisé en ce que** au moins une dent respective qui s'étend de manière axiale (36, 38) fait saillie à partir des surfaces de l'extrémité distale du cylindre (16) et de la bride annulaire (32) qui se font face, lesdites dents (36, 38) pouvant interférer les unes avec les autres et empêcher ainsi, quand un voleur provoque le détachement de la partie proximale (48) du cylindre (16), que la partie restante du cylindre (16) ne tourne lorsque la partie restante dudit cylindre (16) est poussée vers l'extrémité distale de la douille (10).

2. Verrou selon la revendication 1, **caractérisé en ce que** des pluralités respectives de dents espacées de manière circonférentielle (36, 38) font saillie à partir des surfaces adjacentes de l'extrémité distale du cylindre (16) et de la bride annulaire (32), les dents (36, 38) de chaque pluralité étant décalées par rapport à celles (38, 36) de l'autre pluralité de telle manière qu'un déplacement de la partie restante du cylindre (16) vers l'extrémité distale de la douille (10)

provoque la formation d'une structure annulaire continue, en raison du verrouillage desdites dents (36, 38).

3. Verrou selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit cylindre (16) présente une première section transversale affaiblie (20) et une seconde section transversale affaiblie (22) à proximité de ses extrémités proximale et distale, respectivement. 5  
10
  
4. Verrou selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit nez (30) présente, au niveau de son extrémité distale, une partie élargie (40) dont le profil présente une section polygonale, et est mis en prise, dans une condition normale de fonctionnement, avec une fente (44) de forme complémentaire formée dans une plaque (46) formée d'une pièce avec l'élément d'actionnement (28), de manière à transmettre un couple. 15  
20
  
5. Verrou selon la revendication 4, **caractérisé en ce que** ledit nez (30) présente, immédiatement après la dite partie élargie (40) en allant vers l'extrémité proximale, une partie de section circulaire (42) qui est en retrait par rapport à la partie élargie (40), ladite partie en retrait (42) pouvant, lorsque le cylindre (16) est poussé vers l'extrémité distale de la douille (10), pénétrer dans ladite fente (44), dans laquelle elle peut tourner librement sans transmettre aucun couple. 25  
30

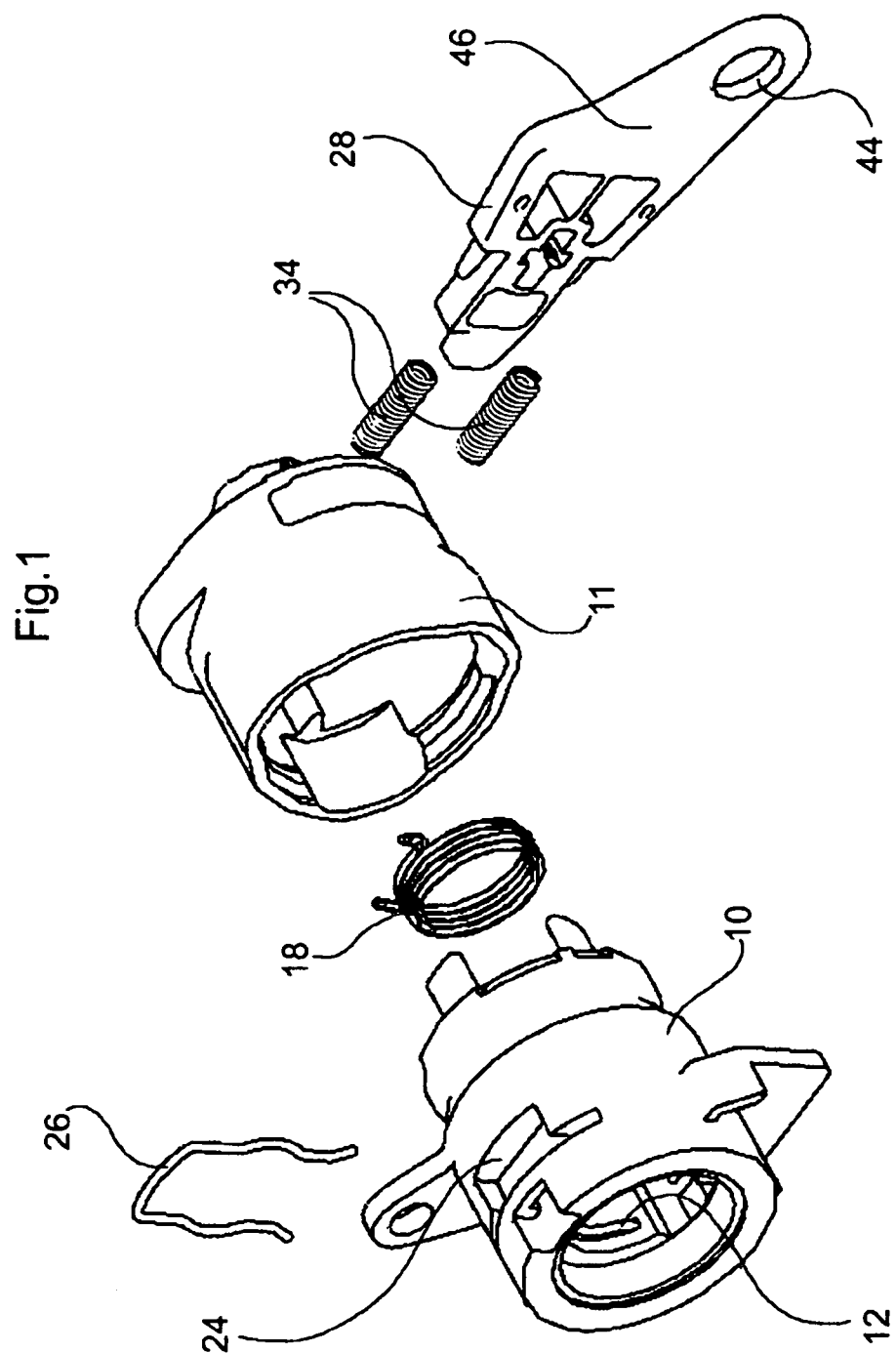
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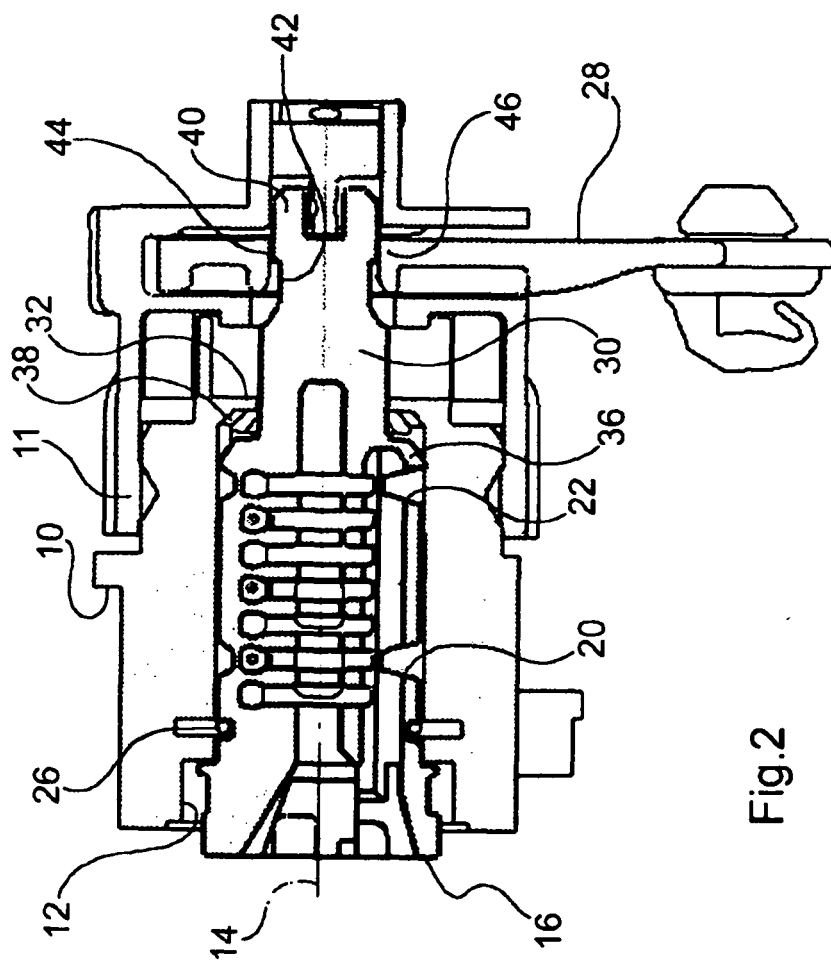
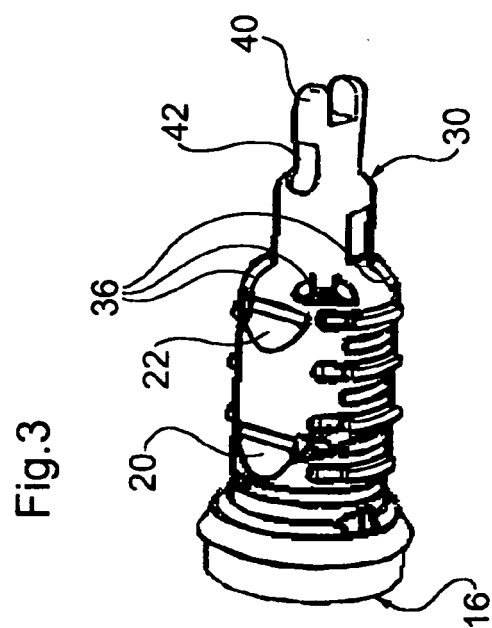
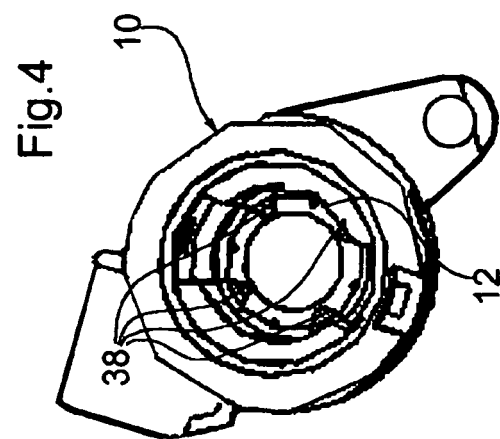
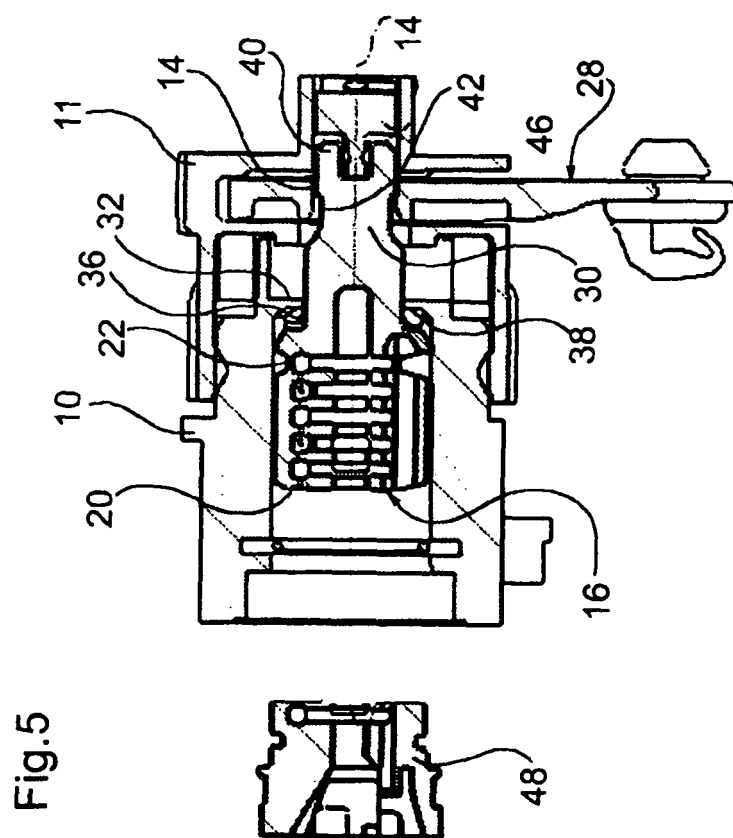


Fig.2





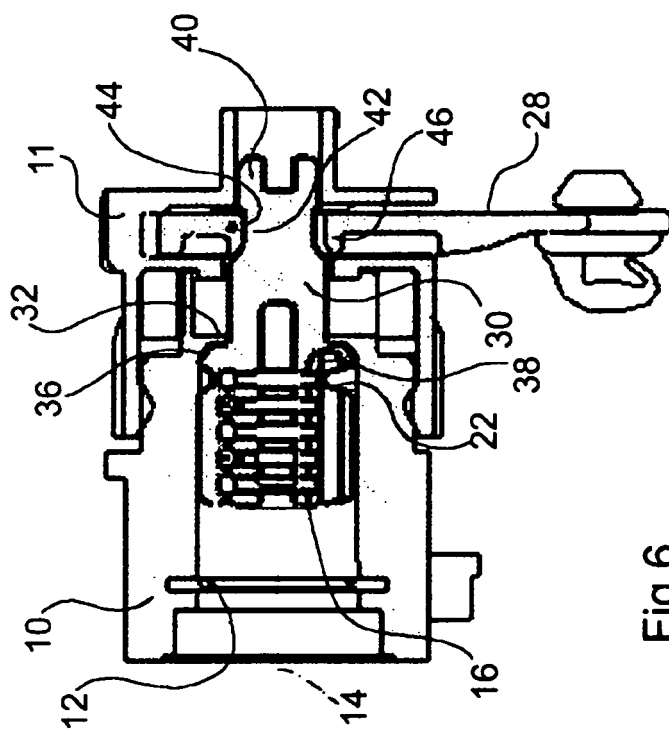


Fig. 6

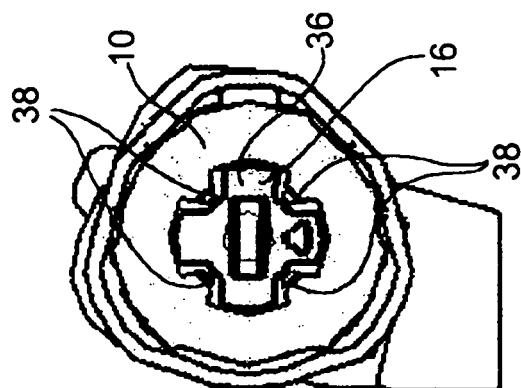


Fig. 7

