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## (54) Clutch type cylinder lock

(57) A cylinder lock of the so-called clutch type, comprising a case (2,3), two coaxial plugs (5) which can rotate inside the case and are provided with a key slot (6), pins (10) and complementary pins (11) which are arranged in the plugs (5) and the case (2,3) and can be actuated by the key from a locking position to a position for turning the plugs (5), a bit (14) which is rotatably supported between the plugs (5) and can be coupled to the plugs by means of a coupling element (22), further comprising two coaxial bushes (23) which are accommodated in mutually opposite seats (20) of the plugs (5) and are provided with external teeth (24) by means of which the bushes (23) are rotationally coupled to the plugs (5) but can slide axially in order to engage an opening of the bit (14) and provide a rotary coupling therewith, two mushroom-shaped elements (28) having stems (29) which are guided telescopically one inside the other in contrast with a return spring (33) arranged inside them and the plates (30) guided in the bushes, the bushes having, in the adjacent ends, walls (25) which have passage holes (31) for the stems and, at the opposite ends, internal collars (26) which act as abutment for the plates (30), springs (32) being arranged between the plates (30) and the walls (25) and being adapted to actuate the plates against the internal collars, the collars being provided with recesses (34) which allow the insertion of the mushroom-shaped elements (28) in the bushes (23) so that the stems pass through the holes and the plates abut against the collars.

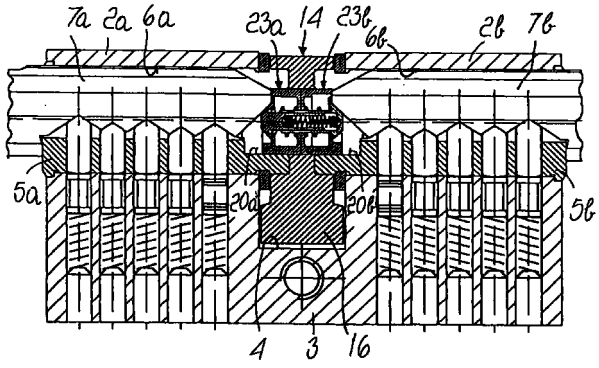


Fig. 3

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## Description

**[0001]** The present invention relates to a cylinder lock of the so-called clutch type which allows to insert a key from one side even when a key is inserted from the opposite side.

**[0002]** A clutch-type cylinder lock comprises a coupling element which provides a rotary coupling between one plug and the bit regardless of whether a second key is present or not in the lock on the opposite side with respect to the one in which the key is inserted.

**[0003]** Such coupling element has turned out to be difficult to manufacture and to assemble, since it composed of a plurality of parts, and its assembly can be performed only with special equipment.

**[0004]** The aim of the present invention is to provide a cylinder lock of the clutch type, provided with a coupling element which has a simplified structure which can be assembled more simply than conventional ones so as to be cheaper to manufacture.

**[0005]** Within the scope of this aim, an object of the present invention is to provide a cylinder lock of the so-called clutch type, comprising a case, two coaxial plugs which can rotate inside said case and are provided with a key slot, pins and complementary pins which are arranged in said plugs and said case and can be actuated by the key from a locking position to a position for turning the plugs, a bit which is rotatably supported between said plugs and can be coupled to said plugs by means of a coupling element, characterized in that said coupling element comprises two coaxial bushes which are accommodated in mutually opposite seats of said plugs and are provided with external teeth by means of which said bushes are rotationally coupled to said plugs but can slide axially in order to engage an opening of the bit and provide a rotary coupling therewith, two mushroom-shaped elements having stems which are guided telescopically one inside the other in contrast with a return spring arranged inside them and the plates guided in said bushes, said bushes having, in the adjacent ends, walls which have passage holes for said stems and, at the opposite ends, internal collars which act as abutment for said plates, springs being arranged between said plates and said walls and being adapted to actuate said plates against said internal collars, said collars being provided with recesses which allow the insertion of said mushroom-shaped elements in said bushes so that said stems pass through said holes and said plates abut against said collars.

**[0006]** Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment of the cylinder lock according to the present invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a longitudinal sectional view of a cylinder lock with the keys removed;

Figure 2 is a view of the lock with one key inserted from one side and arranged on the central plane of the lock;

Figure 3 is a view of the lock with a key inserted from one side and arranged on the central plane of the lock and a second key inserted from the opposite side and co-planar to the first key;

Figure 4 is a view of the lock with a first key inserted from one side and rotated with respect to the central plane and a second key inserted from the opposite side and co-planar with respect to the central plane;

Figure 5 is a longitudinal sectional view of the coupling element of the lock of Figures 1-4;

Figures 6 and 7 are views taken in the directions VI-VI and VII-VII of Figure 5; and finally

Figure 8 is a sectional view, taken along the transverse plane VIII-VIII of Figure 1.

**[0007]** With reference to the above figures, the reference numeral 1 designates a cylinder lock which is conventionally composed of two identical parts A and B.

**[0008]** The following description is given with reference to a single part, and when it is necessary to distinguish the elements of one pan or the other the corresponding reference numerals will be accompanied by the letter a or b depending on whether the elements belong to part A or pan B, respectively.

**[0009]** The lock comprises a case which is composed of two tubular bodies 2 which are coaxial and are connected by a bridge-like elongated body 3 which has, in a median position, a recess 4 which separates the tubular bodies 2.

**[0010]** Two plugs 5 can rotate in the tubular bodies 2 and are crossed axially by the slot 6 for inserting the key 7. The reference numerals 8 and 9 designate the holes for accommodating the pins 10, the complementary pins 11 and the springs 12 which conventionally form the tumblers for locking the rotation of the plugs when the key is not inserted or allow its rotation when the key is inserted. The opposite ends of the plugs 5 protrude into the recess 4. Rings 13 recessed around said ends fix the plugs axially but allow their rotation.

**[0011]** The bit 14 of the lock is rotatably mounted on the opposite ends of the plugs 5. The bit 14 comprises a ring 15 from which there protrudes a radial tab 16 which is adapted to pass through the recess 4.

**[0012]** Cylindrical seats 17 are formed in the ring 15 on opposite sides, and the adjacent ends of the plugs 5 engage therein; said seats are separated by a partition in which a circular through opening 18 is provided. In the wall that surrounds the opening 18 there is provided a slot 19 (see Figure 8) which is angularly offset with respect to the central plane P of the lock.

**[0013]** The opening 18 is aligned with cylindrical seats 20 having an equal diameter which are formed in the mutually opposite ends of the plugs. The seats 20 also have slots 21 whose cross-section is equal to the

cross-section of the slot 19.

**[0014]** A coupling element, generally designated by the reference numeral 22, is accommodated in the seats 20 of the plugs 5 and passes through the opening 18.

**[0015]** The element 22 is formed (see Figure 4) by two cylindrical bushes 23, 23a, 23b which are as long as, or slightly shorter than, the seats 20 wherein they are guided; the bushes are externally provided with an axial tooth 24 which slidingly engages in the slots 21, so that the bushes are rotationally coupled but can move axially in the seats 20.

**[0016]** The bushes 23 have walls 25 at their adjacent ends and have internal collars 26 at their mutually opposite ends; said collars form shoulders 27.

**[0017]** The bushes 23 accommodate mushroom-shaped elements 28 which are composed of a tubular stem 29 and a plate 30.

**[0018]** The tubular stems 29 are guided through holes 31 of the walls 25, whereas the plates 30 are guided from the inside of the bushes 23.

**[0019]** Springs 32 are interposed between the walls 25 and the plates 30 and keep the plates 30 against the shoulders 27.

**[0020]** The stems 29 are guided telescopically inside each other, and a spring 33 which is less rigid than the springs 32 is accommodated inside said stems.

**[0021]** In order to be able to insert the mushroom-shaped elements 28 in the bushes 23, the portion of the collars 26 that overlaps the cylindrical wall of the bushes 23 is removed, so as to form recesses 34 which are open outward.

**[0022]** The recesses 34 and the holes 31 in the walls 25 have dimensions which are large enough to ensure the inclined insertion of the stems 29 in the holes 31 and of the plates 30 inside the bushes, as shown in dashed lines in figure 4.

**[0023]** When the plates 30 have been inserted in the bushes 23 and straightened inside them, the springs 32 lock the mushroom-shaped elements, pushing the plates 30 against the collars 26. Conveniently, the plates 30 have frustum-shaped central portions 35 which protrude in the opposite direction with respect to the stems and against which, as will become apparent hereinafter, the tip of the key 7 can act by passing through the recesses 34.

**[0024]** The above-described coupling element operates as follows.

**[0025]** When the key is extracted, the complementary pins 11 are inserted in the holes 8 of the plugs 5 and block their rotation. The recesses 34 are orientated so as to allow the key 7 to enter the slot 6 and the teeth 24 are angularly offset with respect to the central plane P (see Figure 8).

**[0026]** By inserting a key 7a in the slot 6a of the plug 5a, the bush 23a partially engages the opening 18 of the bit 14, whereas the bush 23b is pushed out of the opening 18 and is inserted in the seat 20b of the plug 5b (see Figure 2).

**[0027]** In this situation, the plug 5a is rotationally associated by the bush 23a with the bit 14 by means of the tooth 24a, which is partially inserted in the slot 21a of the seat 20a and is partially inserted in the slot 19 of the bit. In this situation, since the bush 23s is completely external to the opening 18, it is possible to turn the key and therefore the bit.

**[0028]** If the key 7a is now left inserted in the slot 6a in the position in which the pins 10 are aligned with the complementary pins 11 (i.e., co-planar with respect to the plane P) and a second key 7b is inserted in the plug 5b (see Figure 3), the thrust of the key 7b on the plate 30b, since the spring 32b is more rigid than the spring 33, causes the movement of the bush 23b toward the bit and its insertion in the opening 18, thus providing a rotary coupling with the bit by means of the engagement of the tooth 24b in the slot 19.

**[0029]** If the key 7a left in the channel 6a is instead turned, i.e., angularly offset with respect to the plane P (see Figure 4), the opening 18 of the bit cannot be engaged directly by the bush 23b, because the tooth 24b cannot enter the slot 19. In this situation, when the key 7b is inserted, the tip of the key produces the axial movement of the plate 30b within the bush 23b and the compression of the spring 32b, which accordingly allows to place the contact points of the pins 8 and of the complementary pins 11 in the plane of the rotation seat of the plug 5b.

**[0030]** At this point, the key 7b can fully enter the plug 5b and it is possible to turn the plug 5b until the tooth 24b is aligned with the slot 19. Once alignment has been achieved, since the spring 32b has been preloaded by the plate 30b, it pushes the bush 23b into the opening 18, providing a rotary coupling which allows the rotation of the bit.

**[0031]** If there is no key in the plug 5a, the insertion of the bush 23b is accompanied by the simultaneous expulsion of the bush 23a from the bit 14 by means of the spring 33, which keeps the bushes 23a, 23b spaced in the position in which the bush 23a abuts against the bottom of the seat 20a.

**[0032]** From the above description it is evident that the fundamental prerogative of the coupling element 22 resides in that its assembly requires no additional components, such as elastic rings or the like, which are troublesome to assemble and for which it is necessary to form seating grooves or shoulders.

**[0033]** The disclosures in Italian Patent Application No. BO98A000677 from which this application claims priority are incorporated herein by reference.

**[0034]** Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. A cylinder lock of the so-called clutch type, comprising a case, two coaxial plugs which can rotate inside said case and are provided with a key slot, pins and complementary pins which are arranged in said plugs and said case and can be actuated by the key from a locking position to a position for turning the plugs, a bit which is rotatably supported between said plugs and can be coupled to said plugs by means of a coupling element, characterized in that said coupling element comprises two coaxial bushes which are accommodated in mutually opposite seats of said plugs and are provided with external teeth by means of which said bushes are rotationally coupled to said plugs but can slide axially in order to engage an opening of the bit and provide a rotary coupling therewith, two mushroom-shaped elements having stems which are guided telescopically one inside the other in contrast with a return spring arranged inside them and the plates guided in said bushes, said bushes having, in the adjacent ends, walls which have passage holes for said stems and, at the opposite ends, internal collars which act as abutment for said plates, springs being arranged between said plates and said walls and being adapted to actuate said plates against said internal collars, said collars being provided with recesses which allow the insertion of said mushroom-shaped elements in said bushes so that said stems pass through said holes and said plates abut against said collars.

2. The lock according to claim 1, characterized in that said recesses are angularly offset with respect to said teeth.

3. The lock according to claim 1, characterized in that said plates have a frustum-shaped central portion which is engaged by the key through said recesses.

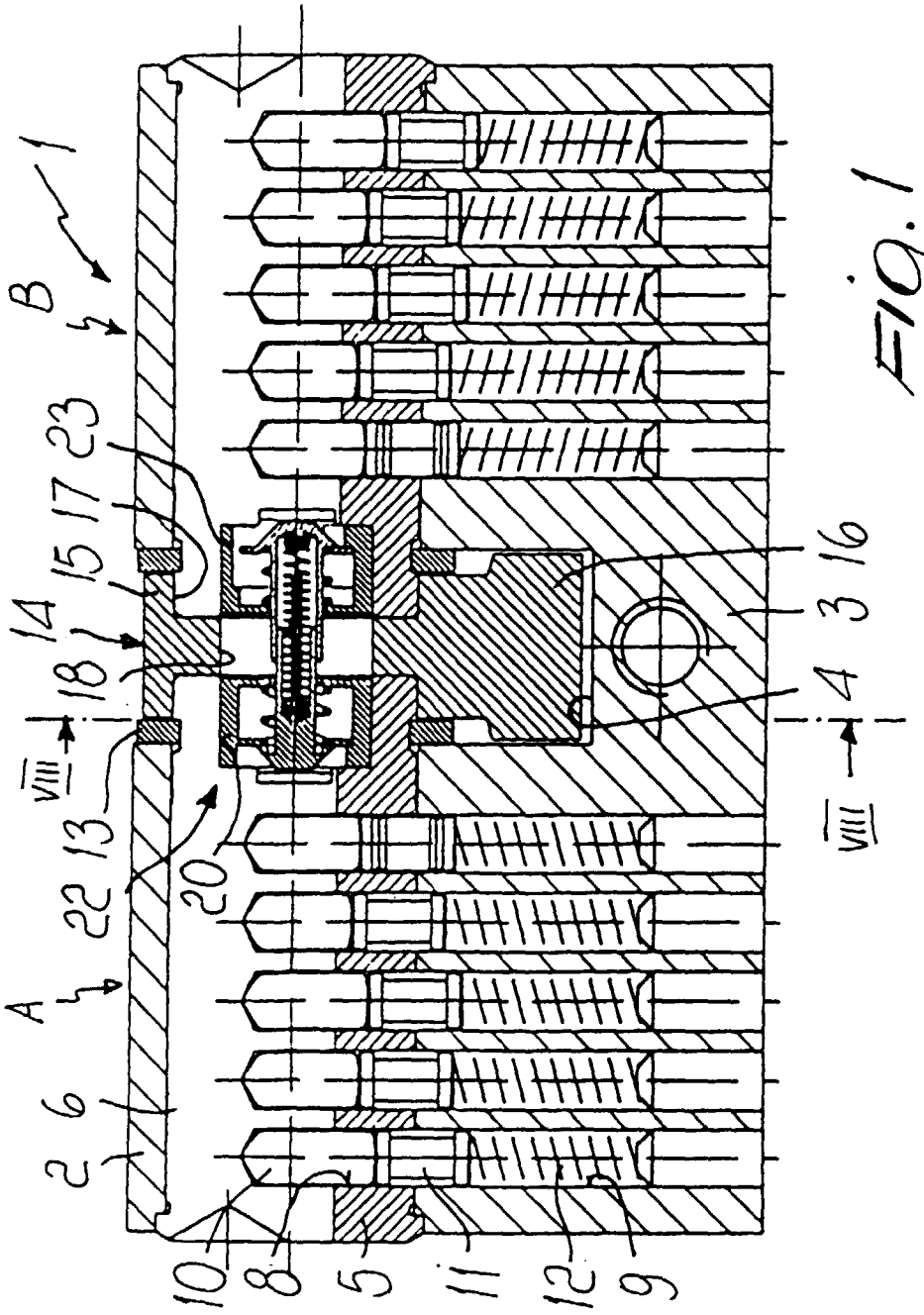


Fig. 1

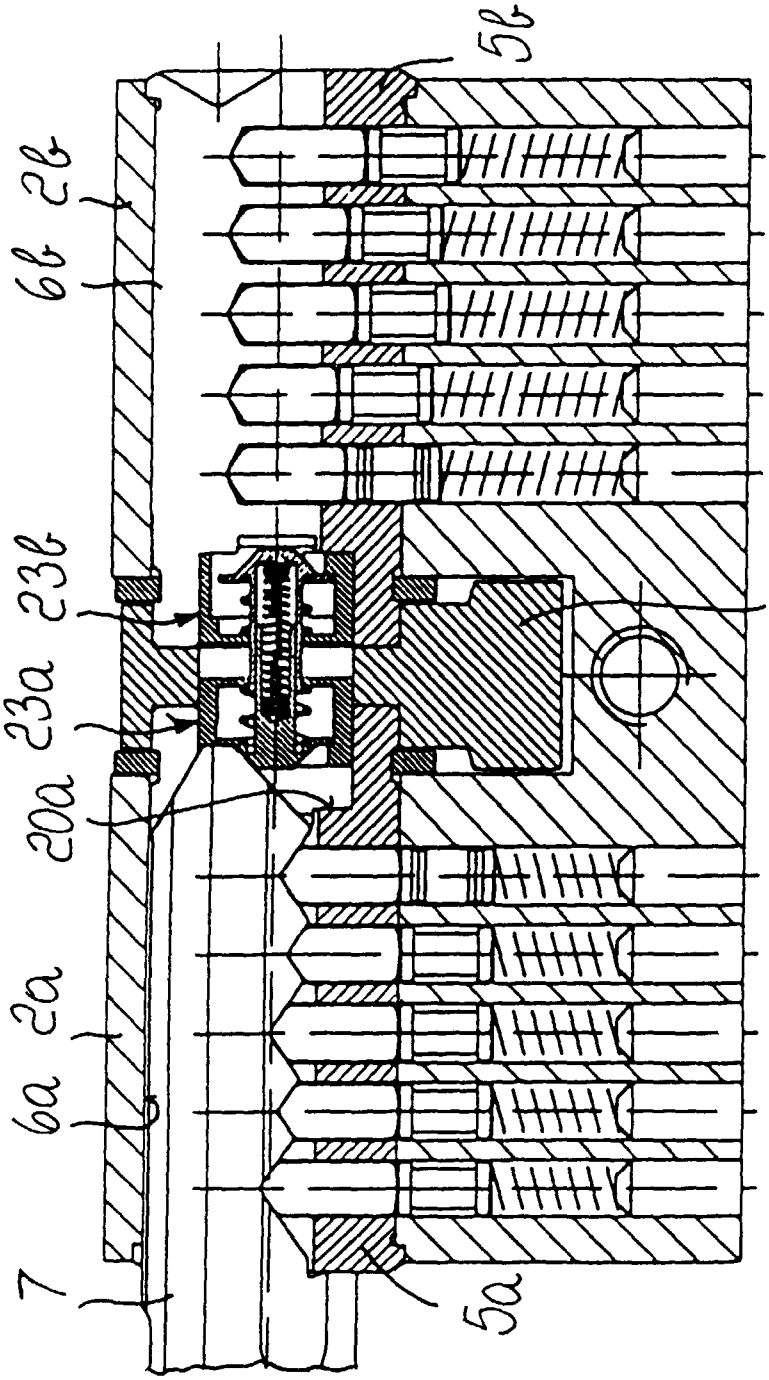


Fig. 2

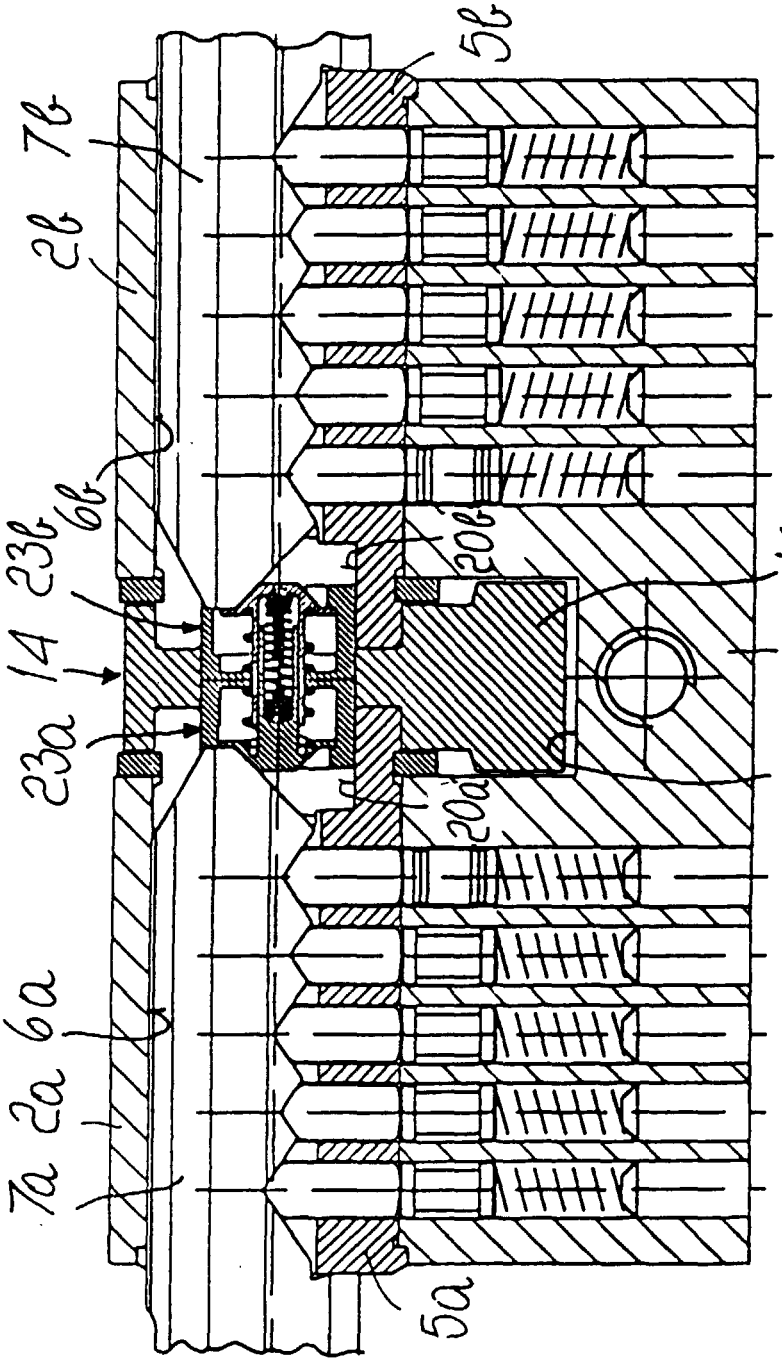


Fig. 3

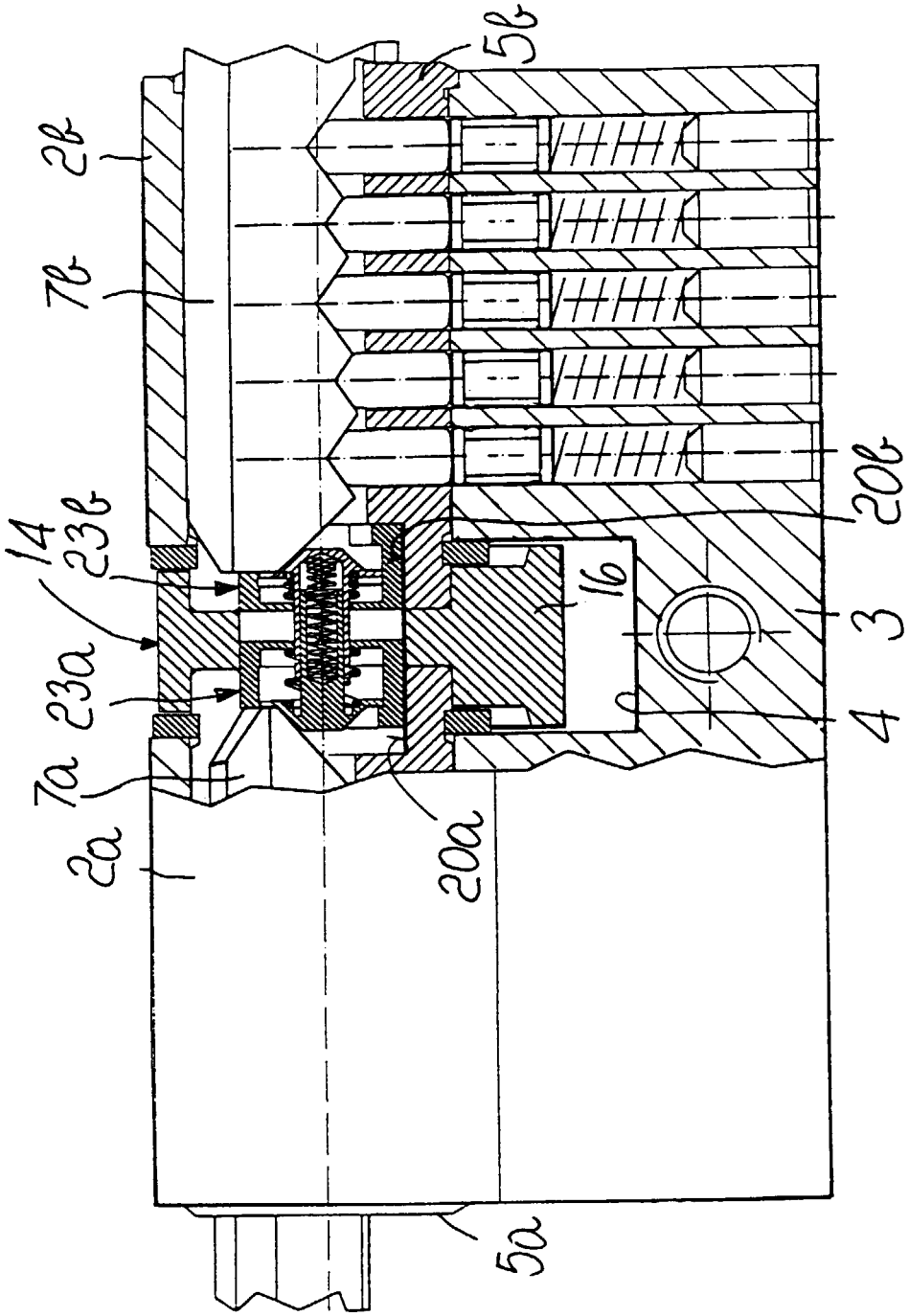


Fig. 4

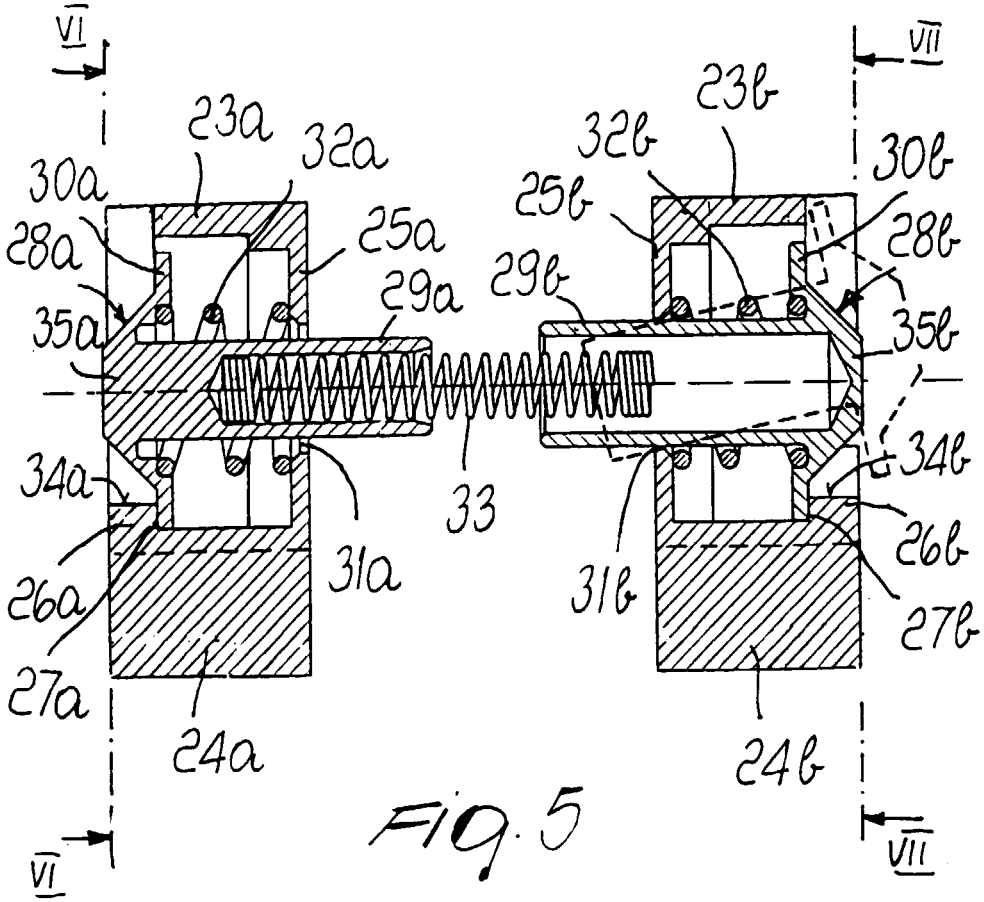


FIG. 5

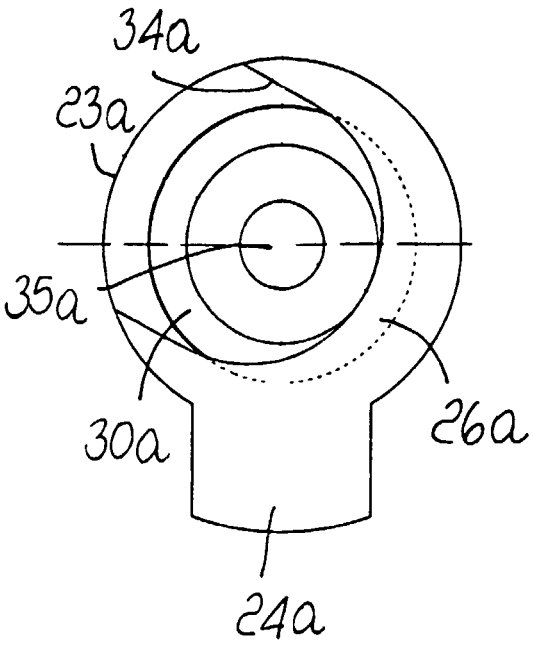


FIG. 6

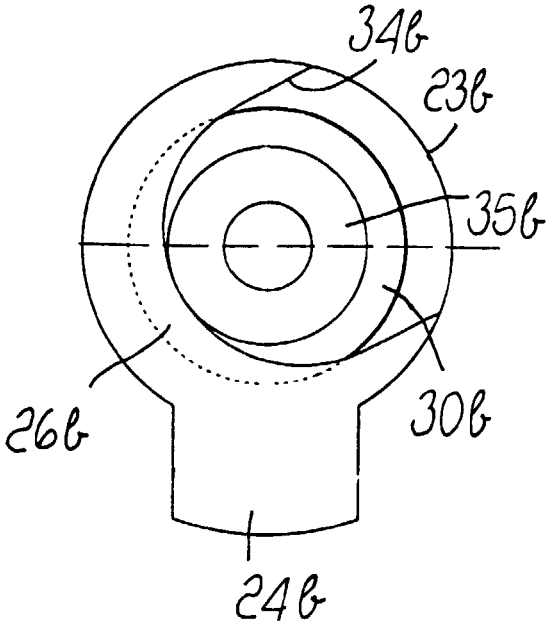


FIG. 7

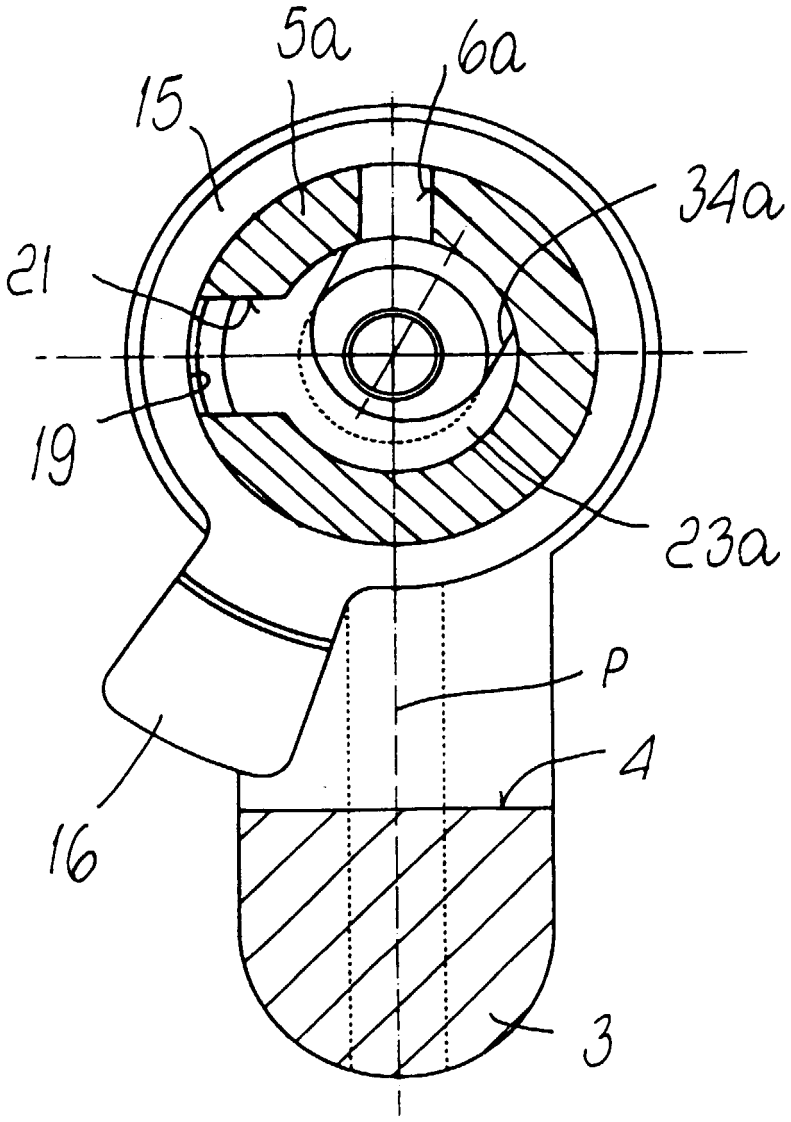


FIG. 8

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Application Number
EP 99 12 3103

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
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TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E05B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| MUNICH | 14 March 2000 | Vacca, R |

CATEGORY OF CITED DOCUMENTS

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 12 3103

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