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(54) **Head for the application of threaded caps on containers**

Kopf zum Aufbringen von mit einem Gewinde versehenen Deckeln auf Behälter

Tête pour l'application de capsules filetées sur des conteneurs

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(56) References cited:
EP-A- 1 405 819
WO-A-2006/122670
GB-A- 626 172
US-A- 4 633 646

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Description

[0001] The present invention relates to a head for the application of threaded caps on containers according to the preamble of claim 1 and as known from EP 1 405 819 A.

[0002] Heads of this type are used in automatic machines for closing containers. The supporting body is fixed to the bottom end of a spindle provided with a movement of rotation and translation so that, in use, the member for application of the caps is provided with a movement of screwing.

[0003] The object of the present invention is to provide a head for the application of caps that will be more economically advantageous than heads of a known type.

[0004] According to the present invention, said object is achieved by a head for application of caps having the characteristics forming the subject of Claim 1.

[0005] The characteristics and advantages of the head according to the present invention will emerge clearly in the course of the ensuing detailed description, which is provided purely by way of non-limiting example with reference to the attached drawings and in which:

- Figure 1 is a side view of a head according to the present invention;
- Figure 2 is an axial cross section of the head of Figure 1; and
- Figure 3 is an axial cross section illustrating a variant of the head according to the invention.

[0006] With reference to the drawings, designated by 10 is a head for the application of threaded caps on containers. The head 10 comprises a hollow supporting body 12 having a threaded hole 14 by means of which the hollow body 12 is directly fixed to the bottom end of a spindle 16. The spindle 16 forms part of an automatic machine for application of threaded caps on containers. In operation, the spindle 16 is provided with movements of rotation about a longitudinal axis 18 and of translation along the same longitudinal axis 18. The movements of rotation and translation are co-ordinated to one another so as to obtain a helical movement of the spindle 16. The way in which the movement of roto-translation of the spindle 16 is generated can be considered conventional and lies outside the scope of the present invention.

[0007] The supporting body 12 has a cavity 20 in which a rotary bushing 22 is housed. The rotary bushing 22 is carried by the supporting body 20 by means of a rolling bearing 24 and is free to turn about the longitudinal axis 18. The rotary bushing 22 is axially fixed with respect to the supporting body 12. The rotary bushing 22 has a prismatic guide aligned to the longitudinal axis 18. In the example illustrated, the prismatic guide is formed by an axial cavity 26 of the bushing 22 having a grooved profile 28.

[0008] The head 10 comprises a magnetic clutch 30 including two magnetic rings 32, 34 set facing and coaxial with respect to one another. The first magnetic ring 32 is fixed to an adjustment ring nut 36, which engages an external threading 38 of the supporting body 12. The second magnetic ring 34 is fixed directly to the rotary bushing 22. In the example illustrated, the second magnetic ring 34 is fixed to a radial flange 40 of the rotary bushing 22 by means of screws 42. The adjustment ring nut 36 is mobile in screwing with respect to the supporting body 12 in the direction of the longitudinal axis 18.

[0009] The movement in an axial direction of the adjustment ring nut 36 enables adjustment of the axial width of an air-gap 44 between the two magnetic rings 32, 34. This adjustment enables adjustment of the sliding torque of the magnetic clutch 30. The adjustment ring nut 36 is fixed to the supporting body 12 in the position of adjustment selected by means of a radial screw 46.

[0010] The head 10 moreover comprises a member for gripping the caps 50, which engages the prismatic guide 26, 28 of the rotary bushing 22. The member for gripping the caps 50 comprises a shaft 52 elongated along the longitudinal axis 18. The shaft 52 comprises a bottom section 54 and a top section 56 fixed to one another by means of respective threaded stretches 57. An axial screw 58 is envisaged to provide a safety mechanism against unscrewing between the sections 54 and 56.

[0011] The top section 56 has a grooved profile that engages in a sliding way in a longitudinal direction the grooved profile 28 of the rotary bushing 22. The shaft 52 is rotationally fixed and axially mobile with respect to the rotary bushing 22. A head 60 is fixed to the top end of the section 56 to prevent detachment downwards of the shaft 52 from the rotary bushing 22.

[0012] A helical spring 62 is set coaxially with respect to the shaft 52 and tends to push the shaft 52 downwards. A first end of the spring 62 rests against the bottom front end of the rotary bushing 22. The opposite end of the spring 62 rests against a radial shoulder of the shaft 52. The shaft 52 can displace upwards with respect to the rotary bushing 22 against the action of the spring 62.

[0013] Fixed to the bottom end of the shaft 52 is an applicator element 64 having a seat 66 designed to receive and withhold the caps to be applied to the containers (not illustrated). The applicator element 64 bears an elastic ring 68 that pushes radially inwards retention balls 70 designed to press against the outer surface of a cap (not illustrated) housed in the seat 66. The applicator element 64 comprises an extractor 72 that engages in a freely sliding way axial grooves 74 of the applicator element 64. The extractor 72 has a portion 76 that is designed to expel from the seat 66 the caps possibly not applied to the containers on account of the absence of a container.

[0014] In operation, the head 10 is fixed to the bottom end of the spindle 16, which imparts upon to the head 10 a helical movement along the axis 18. In a first step, the head 10 carries out picking-up of a cap, which is inserted with slight forcing into the seat 66 of the applicator ele-

ment 64. The cap is withheld in the seat 66 with slight interference by the retention balls 70. The expeller 72 is displaced upwards when a cap is present in the seat 76.

[0015] In a subsequent step, the cap held in the seat 66 is rested on the threaded neck of a container, such as, for example, a bottle or the like. The helical movement of the head 10 screws the cap to the container. The magnetic clutch 30 determines the maximum screwing torque. The magnetic rings 32, 34 are rotationally fixed with respect to one another until the torque applied to the shaft 52 is less than the torque of calibration of the magnetic clutch 30. If the torque on the shaft 52 exceeds the calibration value, the magnetic rings 32, 34 slide with respect to one another, preventing a transmission of torque to the shaft 52 higher than the value set. During application of the caps, the shaft 52 can move upwards with respect to the rotary bushing 22, compressing the spring 62. During the movement of screwing, the spring 62 applies an axial force on the cap.

[0016] The shaft 52 is sufficiently long as to allow an axial travel of length L of the shaft 52 with respect to a flange 78. The flange 78 has a fork-shaped seat 80, through which the shaft 52 extends. The expeller 72 of the applicator element 64 engages the bottom surface of the flange 78 for expulsion of the cap. The flange 78 is fixed with respect to the rotary carousel bearing the spindles 16 and has a seat 80 for each head 10.

[0017] In the case where the container were not present, the cap remains within the seat 66 of the applicator element 64. Any cap that has possibly remained in the seat 66 is unloaded by the extractor element 76, which is pushed downwards by the flange 78. This solution is simple and reliable and prevents having to check whether the applicator element 64 is free from caps, given that the unloading of any caps that may have remained in the applicator member 64 occurs automatically.

[0018] Figure 3 illustrates a variant of the head 10 according to the present invention. The elements corresponding to the ones described previously are designated by the same reference numbers.

[0019] In this variant, the shaft 52 is formed by a single piece, instead of by two sections axially fixed to one another as described previously. Formed on the shaft 52 is a threaded stretch 84, on which a ring nut 86 engages, which functions as rest for the bottom end of the spring 62. The ring nut 86 can be displaced axially with respect to the shaft 52 for varying the pre-loading of the spring 62. There may be provided a radial screw 88 to prevent deviation of the ring nut 86. In this variant, the top end of the spring 62 rests against a support 90 applied to the bottom end of the bushing 22.

[0020] The head 10 according to the present invention is more compact and inexpensive as compared to the heads with magnetic clutch of a known type. In particular, the fact of envisaging a rotary bushing 22 and a shaft 52 that is rotationally fixed and axially mobile with respect to the bushing 22 enables reduction of the radial dimension of the support 12.

[0021] Of course, without prejudice to the principle of the invention, the details of construction and the embodiments may vary widely with respect to what is described and illustrated herein, without thereby departing from the scope of the present invention as defined by the ensuing claims.

Claims

1. A head for the application of threaded caps on containers, comprising:

   - a hollow supporting body (12);
   - a member for gripping the caps (50); and
   - a magnetic clutch (30) set between the supporting body (12) and the member for gripping the caps (50), wherein the magnetic clutch (30) comprises a first magnetic ring (32) and a second magnetic ring (34), said rings (32, 34) being rotatable with respect to one another about a longitudinal axis (18), the first ring (32) being rotationally fixed with respect to the supporting body, and the second ring (34) being rotationally fixed with respect to the member for gripping the caps (50);

   further comprising a rotary bushing (22) rotatably mounted within the supporting body (12) about said longitudinal axis (18) and being axially fixed with respect to the supporting body (12), and said second magnetic ring (34) being fixed to said rotary bushing (22), **characterized in that** the rotary bushing (22) has a prismatic guide (26, 28) aligned to said longitudinal axis (18), and wherein the member for gripping the caps (50) comprises a shaft (52) that is elongated along said longitudinal axis (18) and engages said prismatic guide (26, 28), said shaft (52) being rotationally fixed and axially mobile with respect to the rotary bushing (22).

2. The head according to Claim 1, **characterized in that** it comprises a helical spring in compression (62) set coaxially with respect to said shaft (52) and set between the rotary bushing (22) and the shaft (52).

3. The head according to Claim 1, **characterized in that** said shaft (52) bears at its bottom end an applicator element (64) having a seat (66) for retention of the caps, said applicator element (64) being provided with an axially mobile expeller (72).

4. The head according to Claim 3, **characterized in that** the shaft (52) is axially mobile in a seat (80) of an axially fixed flange (78), said expeller (72) cooperating with a bottom edge of said flange (78).

5. The head according to Claim 1, **characterized in**

that the first magnetic ring (32) is fixed to an adjustment ring nut (36) that is mobile in screwing with respect to the supporting body (12).

6. The head according to Claim 2, **characterized in that** said shaft (52) comprises a top section (56) and a bottom section (54) fixed to one another by means of a threaded connection (57, 58), the top section (56) being engaged with said prismatic guide (26, 28) and the bottom section (54) having a shoulder for resting of the bottom end of said spring (62).

7. The head according to Claim 2, **characterized in that** said shaft (52) has a threaded stretch (84), applied on which is a ring nut (86), resting on which is the bottom end of said spring (62), said ring nut (86) being mobile with respect to the shaft (52) to adjust pre-loading of the spring (62).

8. The head according to Claim 1, **characterized in that** said rotary bushing (22) has a cylindrical cavity (26) having a grooved profile (28).

Patentansprüche

1. Ein Kopf für die Anwendung von mit Gewinde versehenen Deckeln auf Behälter, aufweisend:

    - einen hohlen tragenden Körper (12);
    - ein Bauteil zum Greifen der Deckel (50); und
    - eine magnetische Kupplung (30), angeordnet zwischen dem tragenden Körper (12) und dem Bauteil zum Greifen der Deckel (50), wobei die magnetische Kupplung (30) einen ersten magnetischen Ring (32) und einen zweiten magnetischen Ring (34) aufweist, wobei die Ringe (32, 34) zueinander um eine longitudinale Achse (18) rotierbar sind, wobei der erste Ring (32) bezüglich des tragenden Körpers drehfixiert ist, und wobei der zweite Ring (34) bezüglich des Bauteils zum Greifen der Deckel (50) drehfixiert ist;

    weiter aufweisend eine umlaufende Buchse (22), die innerhalb des tragenden Körpers (12) um die longitudinale Achse (18) herum rotierbar montiert ist, und die axial bezüglich des tragenden Körpers (12) fixiert ist und wobei der zweite magnetische Ring (34) an die umlaufende Buchse (22) befestigt ist, **dadurch gekennzeichnet, dass** die umlaufende Buchse (22) eine prismatische Führung (26, 28) hat, die mit der longitudinalen Achse (18) ausgerichtet ist und wobei das Bauteil zum Greifen der Deckel (50) einen Schaft (52) aufweist, der entlang der longitudinale Achse (18) länglich ist, und der in Eingriff mit der prismatischen Führung (26, 28) ist, wobei der Schaft (52) drehfixiert und axial beweglich ist bezüglich der umlaufenden Buchse (22).

2. Der Kopf gemäß Anspruch 1, **dadurch gekennzeichnet, dass** er eine Schraubenfeder aufweist, die komprimiert ist (62), und koaxial bezüglich des Schafts (52) angeordnet ist, und die zwischen der umlaufenden Buchse (22) und dem Schaft (52) angeordnet ist.

3. Der Kopf gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Schaft (52) an seinem unteren Ende ein Applikatorelement (64) trägt, das einen Sitz (66) zum Aufbewahren der Deckel hat, wobei das Applikatorelement (64) mit einem axial beweglichen Laufrad (72) versehen ist.

4. Der Kopf gemäß Anspruch 3, **dadurch gekennzeichnet, dass** der Schaft (52) axial beweglich in einem Sitz (80) von einem axial fixierten Flansch (78) ist, wobei das Laufrad (72) mit einer unteren Kante von dem Flansch (78) zusammenwirkt.

5. Der Kopf gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der erste magnetische Ring (32) an einer Einstellringmutter (36) befestigt ist, welche beweglich beim Schrauben bezüglich des tragenden Körpers (12) ist.

6. Der Kopf gemäß Anspruch 2, **dadurch gekennzeichnet, dass** der Schaft (52) einen oberen Abschnitt (56) und einen unteren Abschnitt (54) aufweist, die aneinander durch eine Gewindeverbindung (57,58) befestigt sind, wobei der obere Abschnitt (56) mit der prismatischen Führung (26, 28) in Eingriff ist, und wobei der untere Abschnitt (54) eine Schulter hat zum Ruhen des unteren Endes von der Feder (62).

7. Der Kopf gemäß Anspruch 2, **dadurch gekennzeichnet, dass** der Schaft (52) ein mit Gewinde versehenes Stück (84) hat, an welches eine Ringmutter (86) angewandt ist, auf welcher das untere Ende von der Feder (62) ruht, wobei die Ringmutter (86) beweglich bezüglich des Schafts (52) ist, um ein Vorspannen von der Feder (62) einzustellen.

8. Der Kopf gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die umlaufende Buchse (22) eine zylindrische Kavität (26) hat, die ein gerilltes Profil (28) hat.

Revendications

1. Tête pour l'application de capsules filetées sur des conteneurs, comprenant :

    - un corps de support creux (12) ;

- un élément pour saisir les capsules (50) ; et
- un accouplement magnétique (30) placé entre le corps de support (12) et l'élément pour saisir les capsules (50), dans laquelle l'accouplement magnétique (30) comprend un premier anneau magnétique (32) et un second anneau magnétique (34), lesdits anneaux (32, 34) pouvant tourner l'un par rapport à l'autre autour d'un axe longitudinal (18), le premier anneau (32) étant fixé à rotation par rapport au corps de support, et le second anneau (34) étant fixé à rotation par rapport à l'élément pour saisir les capsules (50) ;

comprenant en outre une douille rotative (22) montée de manière rotative à l'intérieur du corps de support (12) autour dudit axe longitudinal (18) et étant axialement fixe par rapport au corps de support (12), et ledit second anneau magnétique (34) étant fixé sur ladite douille rotative (22), **caractérisée en ce que** la douille rotative (22) a un guide prismatique (26, 28) aligné par rapport audit axe longitudinal (18), et dans laquelle l'élément pour saisir les capsules (50) comprend un arbre (52) qui est allongé le long dudit axe longitudinal (18) et met en prise ledit guide prismatique (26, 28), ledit arbre (52) étant fixe en rotation et axialement mobile par rapport à la douille rotative (22).

2. Tête selon la revendication 1, **caractérisée en ce qu'**elle comprend un ressort hélicoïdal en compression (62) placé de manière coaxiale par rapport audit arbre (52) et placé entre la douille rotative (22) et l'arbre (52).

3. Tête selon la revendication 1, **caractérisée en ce que** ledit arbre (52) supporte au niveau de son extrémité inférieure, un élément formant applicateur (64) ayant un siège (66) pour la retenue des capsules, ledit élément formant applicateur (64) étant pourvu d'un expulseur axialement mobile (72).

4. Tête selon la revendication 3, **caractérisée en ce que** l'arbre (52) est axialement mobile dans un siège (80) d'une bride (78) axialement fixe, ledit expulseur (72) coopérant avec un bord inférieur de ladite bride (78).

5. Tête selon la revendication 1, **caractérisée en ce que** le premier anneau magnétique (32) est fixé sur un écrou annulaire d'ajustement (36) qui est mobile lors du vissage par rapport au corps de support (12).

6. Tête selon la revendication 2, **caractérisée en ce que** ledit arbre (52) comprend une section supérieure (56) et une section inférieure (54) fixée l'une par rapport à l'autre au moyen d'un raccordement fileté (57, 58), la section supérieure (56) étant mise en prise avec ledit guide prismatique (26, 28) et la section inférieure (54) ayant un épaulement pour le repos de l'extrémité inférieure dudit ressort (62).

7. Tête selon la revendication 2, **caractérisée en ce que** ledit arbre (52) a une extension filetée (84) sur laquelle est appliqué un écrou annulaire (86) sur lequel repose l'extrémité inférieure dudit ressort (62), ledit écrou annulaire (86) étant mobile par rapport à l'arbre (52) afin d'ajuster le préchargement du ressort (62).

8. Tête selon la revendication 1, **caractérisée en ce que** ladite douille rotative (22) a une cavité cylindrique (26) ayant un profil rainuré (28).

FIG. 1

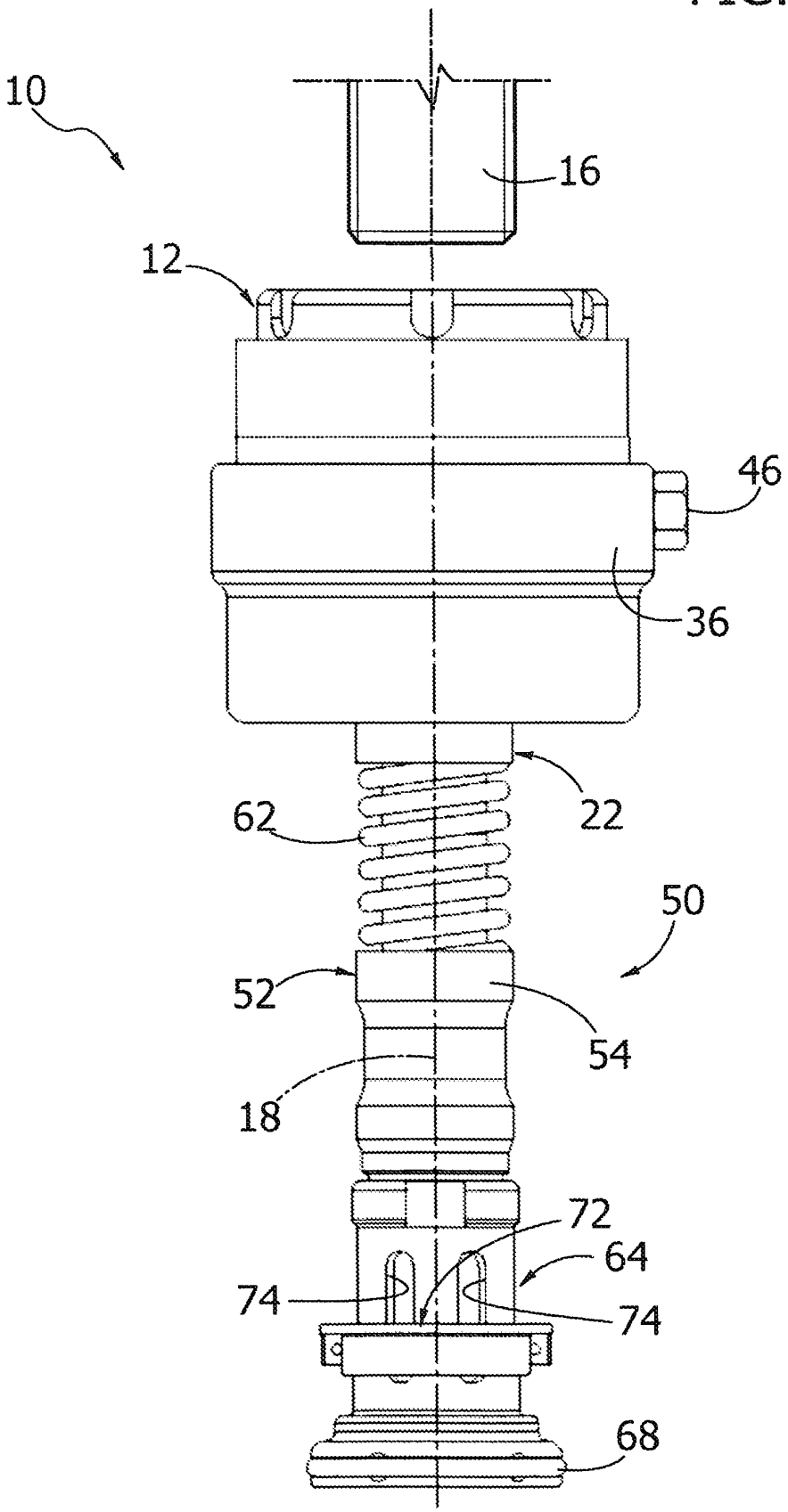


FIG. 2

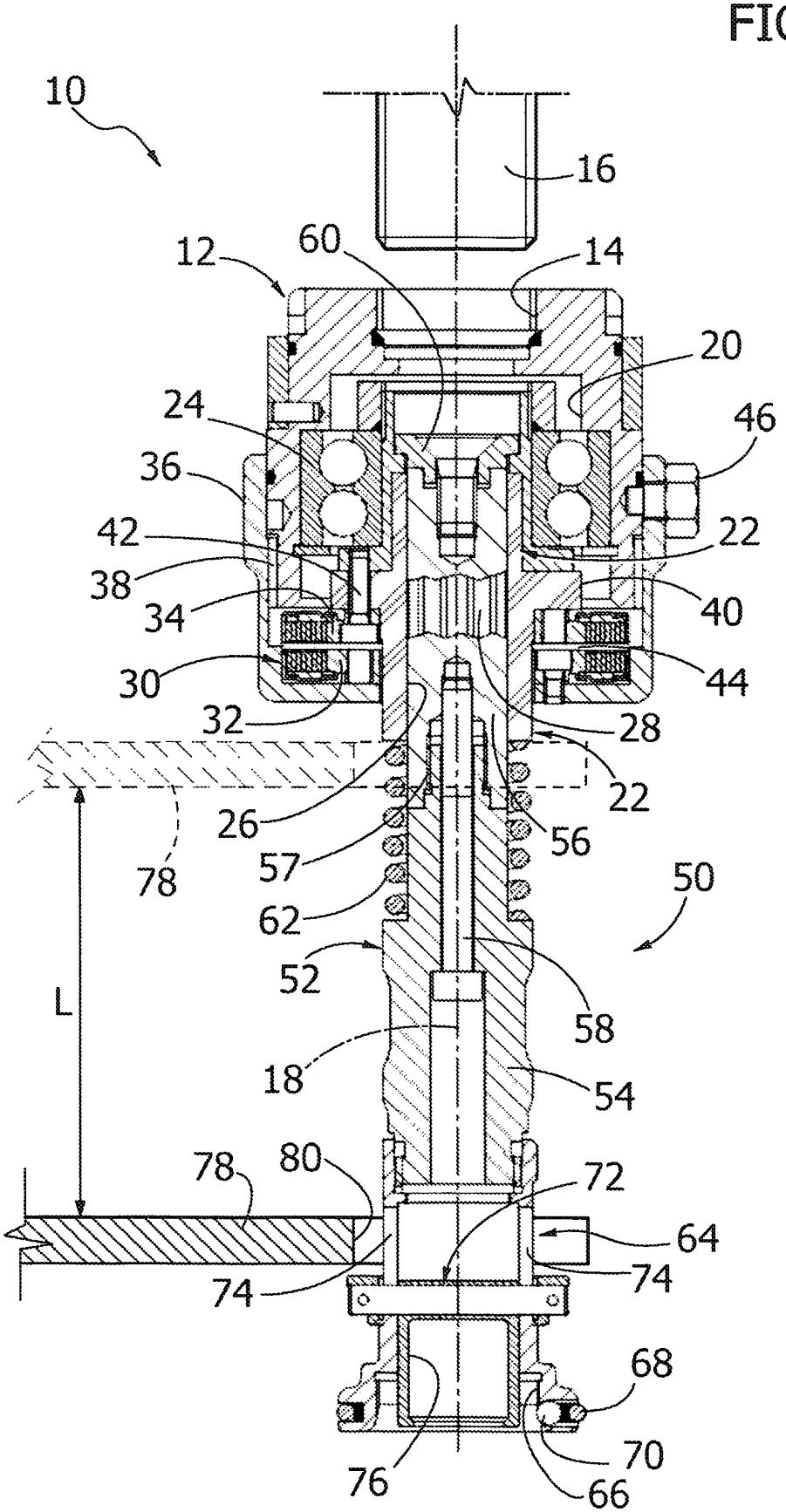
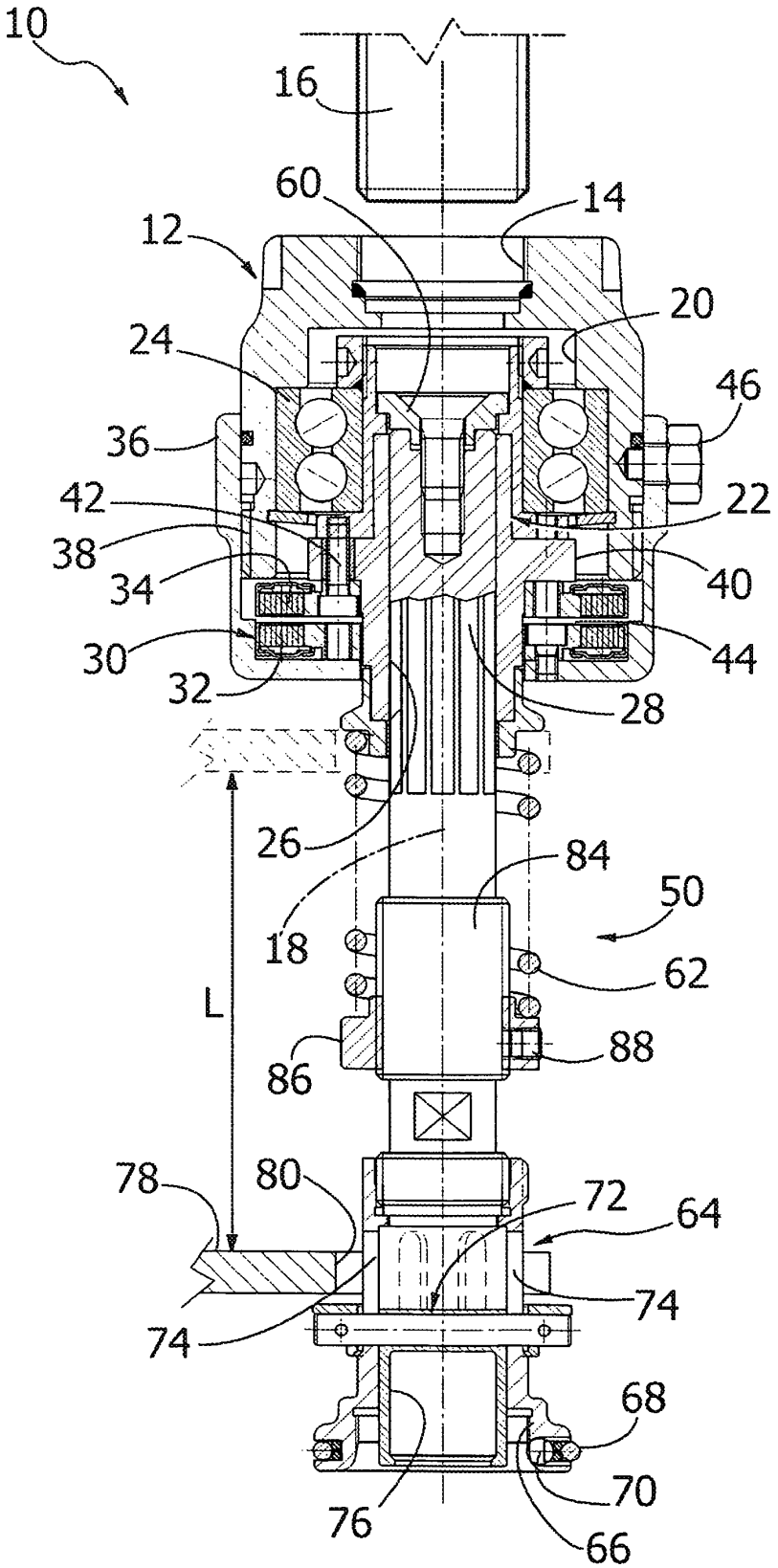

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FIG. 3


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Patent documents cited in the description

- EP 1405819 A **[0001]**