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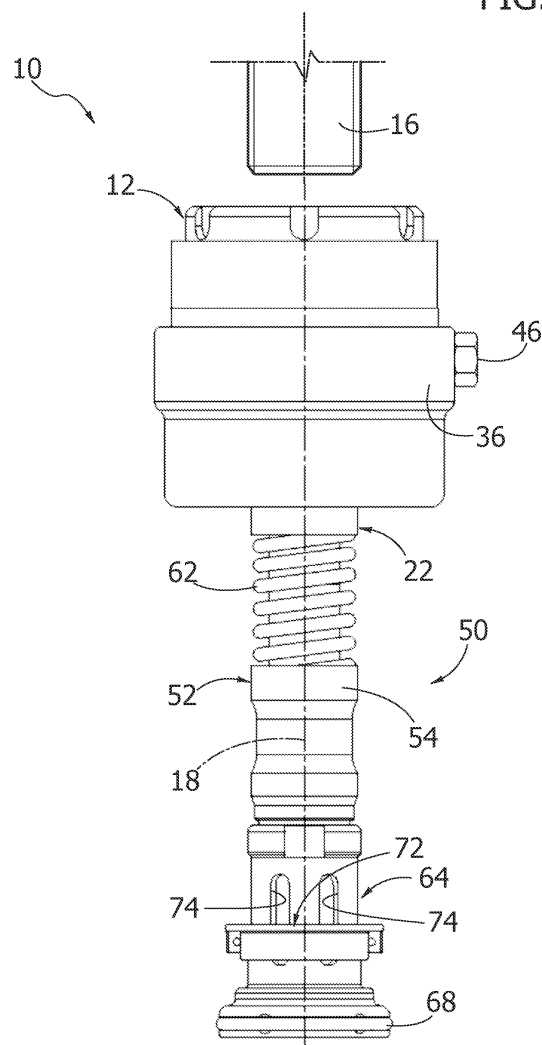
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(54) **Head for the application of threaded caps on containers**

(57) A head for the application of threaded caps on containers, comprising:

- a hollow supporting body (12);
- a member for gripping the caps (50);
- 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); and
- a rotary bushing (22) rotatably mounted within the supporting body (12) about said longitudinal axis (18) and axially fixed with respect to the supporting body (12), wherein 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) elongated along said longitudinal axis (18) and that engages said prismatic guide (26, 28), said shaft (52) being rotationally fixed and axially mobile with respect to the rotary bushing (22).

FIG. 1



Description

[0001] The present invention relates to a head for the application of threaded caps on containers.

[0002] More precisely, the invention relates to a head comprising a hollow supporting body, a member for gripping the caps, and a magnetic clutch set between the supporting body and the member for gripping the caps.

[0003] 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.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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 element 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.

[0016] 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.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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),

characterized in that it comprises a rotary bushing (22) rotatably mounted within the supporting body (12) about said longitudinal axis (18) and axially fixed with respect to the supporting body (12), wherein said second magnetic ring (34) is fixed to said rotary bushing (22), wherein 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). 5
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). 10
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). 15 20
8. The head according to Claim 1, **characterized in that** said rotary bushing (22) has a cylindrical cavity (26) having a grooved profile (28). 25

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FIG. 1

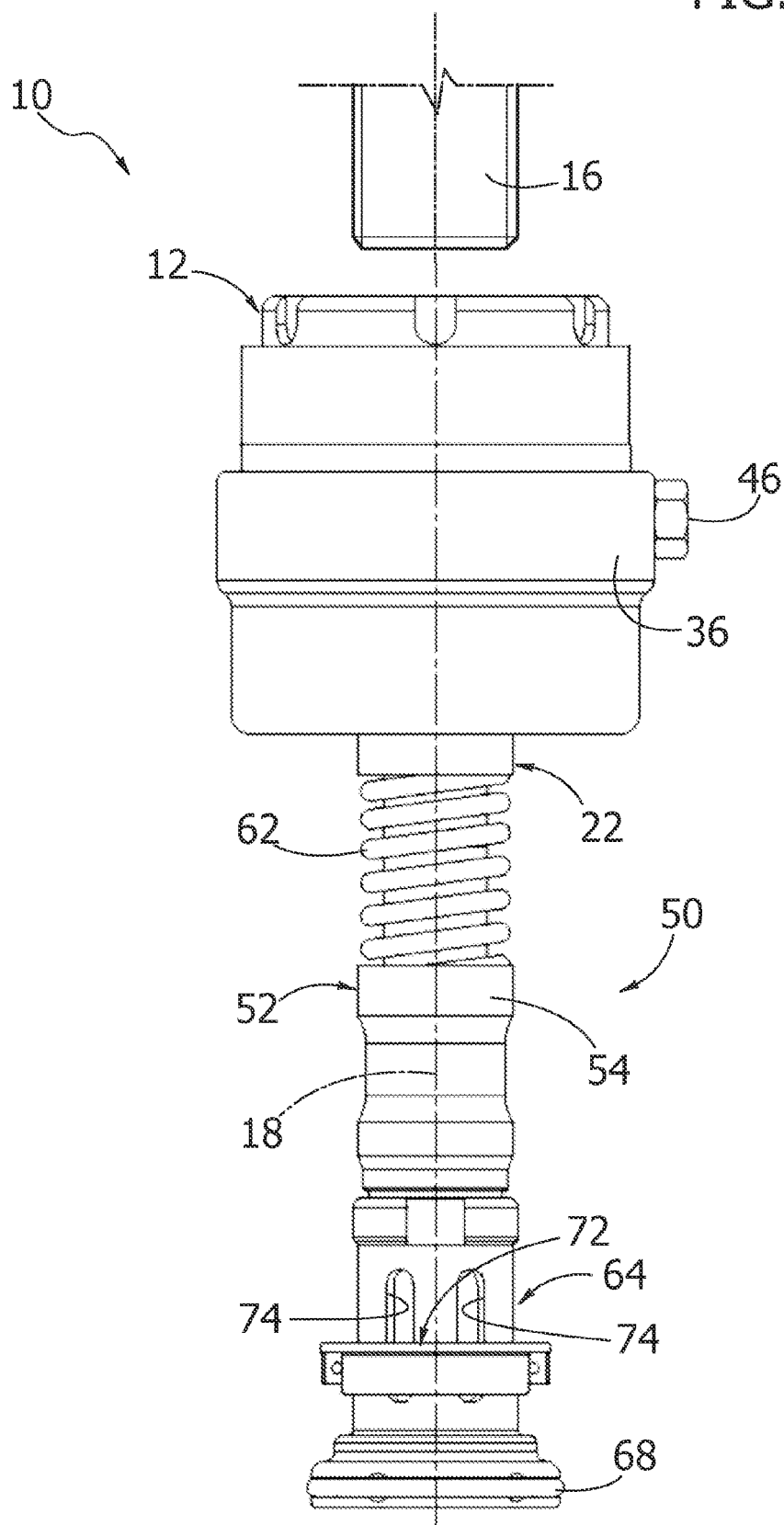


FIG. 2

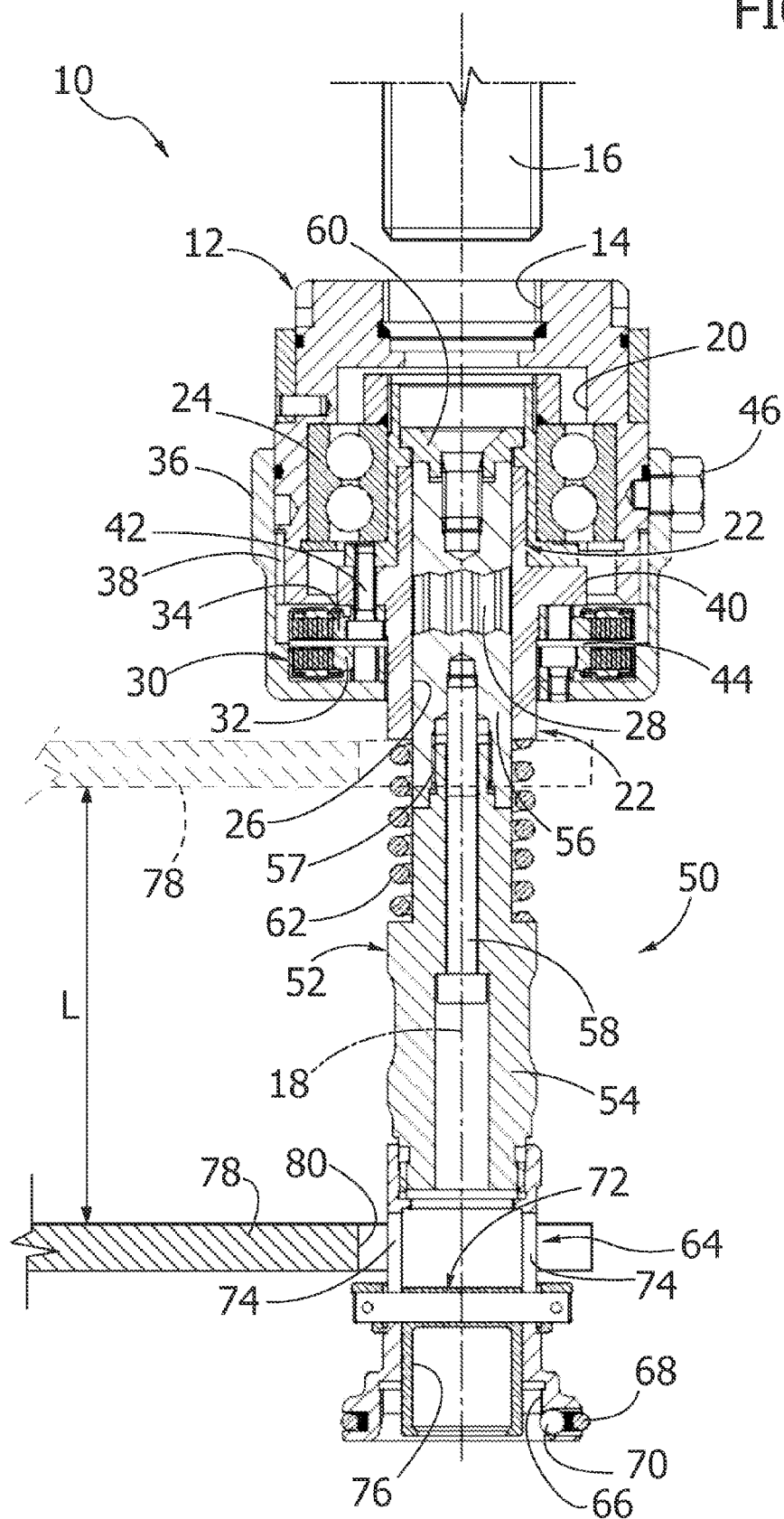
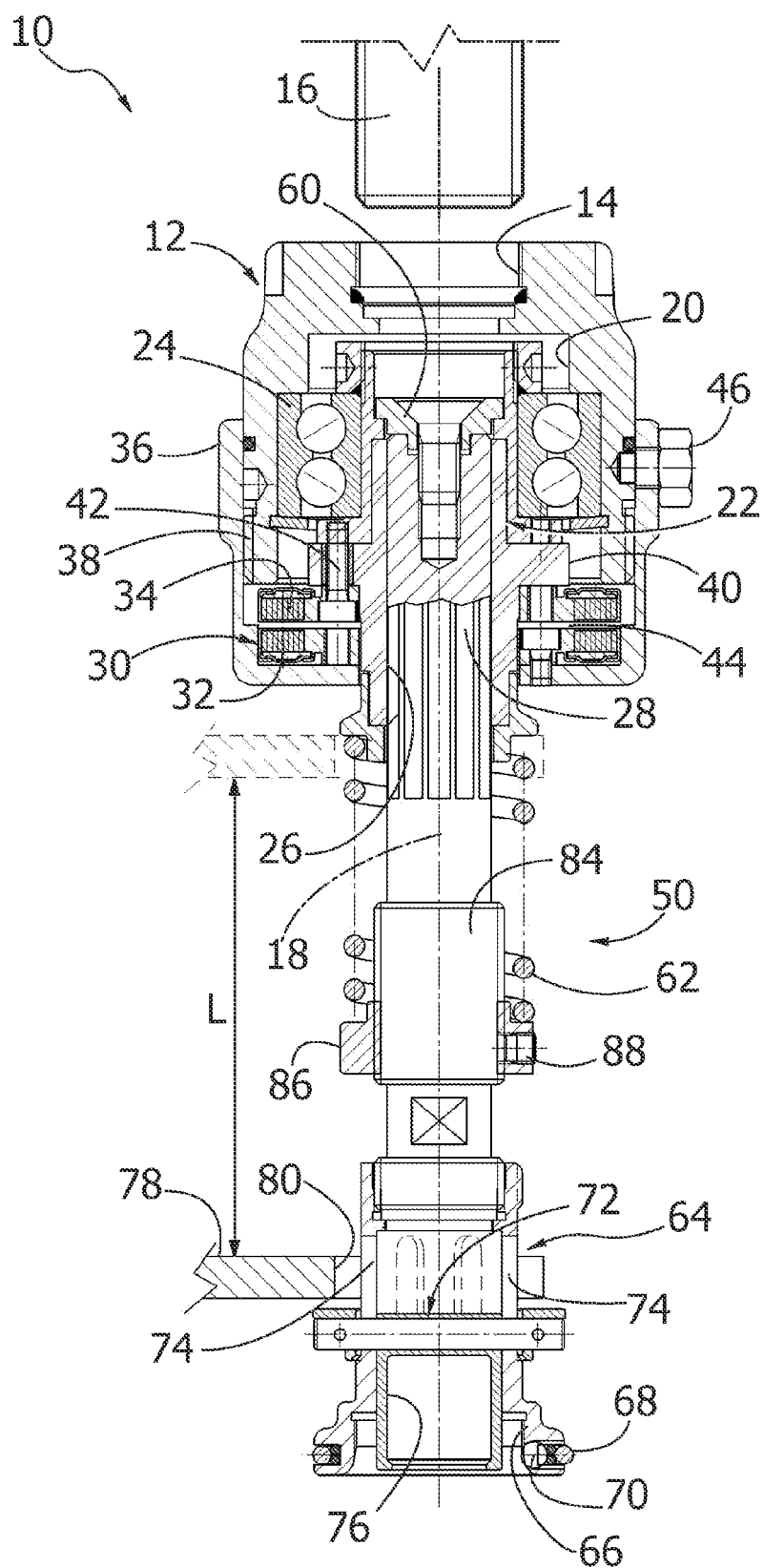


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 09 15 7213

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 405 819 A (AROL S P A [IT]) 7 April 2004 (2004-04-07) * paragraph [0019]; figure 2 *	1	INV. B67B3/20
A	WO 2006/122670 A (REJVES S R L [IT]; VESENTINI RENZO [IT]) 23 November 2006 (2006-11-23) * page 3, line 16 - line 26; figure 3 *	1	
A	US 4 633 646 A (ELLIS DARWIN L [US] ET AL) 6 January 1987 (1987-01-06)		
A	GB 626 172 A (JOSEPH WILLIAM DRIVER; ROY ALBERT HENRY MACHELL; CHARLES SIDNEY JACKSON) 11 July 1949 (1949-07-11)		
			TECHNICAL FIELDS SEARCHED (IPC)
			B67B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 June 2009	Examiner Wartenhorst, Frank
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 15 7213

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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08-06-2009

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