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(54) Capping head for a capping machine

(57) Capping head for a capping machine, intended to fit caps onto bottles or the like, which is supported removably via connecting means (2) by a corresponding hollow sleeve (3) mounted peripherally on a rotating carousel of the said machine. Each head (1) is provided with actuator means (4) which rotate about a central axis (Z) of the head (1) so as to fit a cap on the top of a container, retaining it thereon by means of a screw-type connection. According to the invention, the connecting means (2) are formed by a first element (5) mechanically connected to the sleeve (3) and by a second element (6) mechanically connected to the top of the head (1), which elements can be removably coupled together by means of fast-fit engaging means (7).

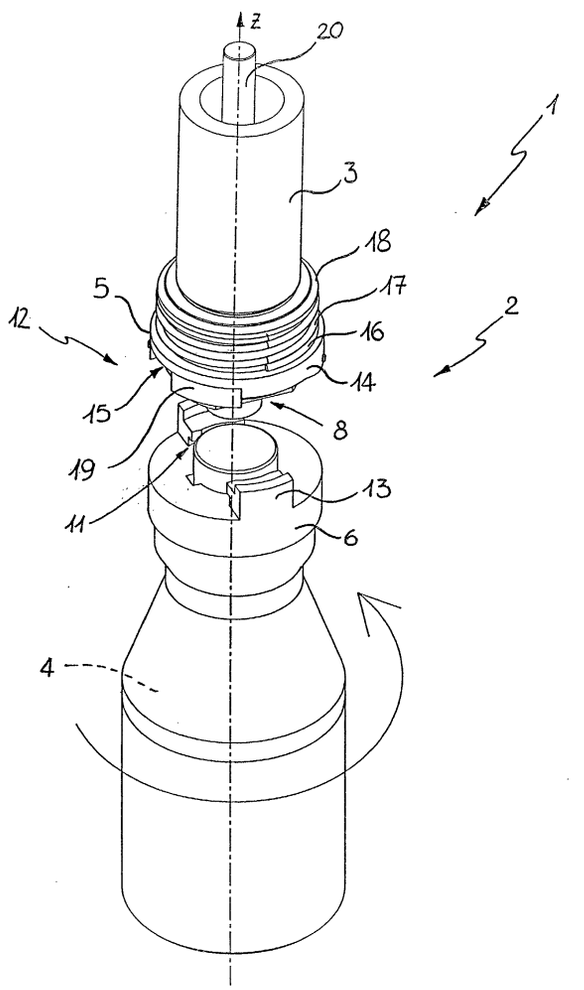

FIG. 1

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Description

Field of application

[0001] The present invention concerns a capping head for a capping machine, intended to fit caps onto containers, in particular bottles or the like.

[0002] The apparatus in question is intended to be advantageously used in industrial plants for bottling beverages such as wine, whisky, mineral water, juices, etc., in order to seal the mouth of the containers with caps or capsules which are usually retained on the said containers by means of screwing.

State of the art

[0003] As is known, the industrial bottling plants which are nowadays traditionally available on the market perform in sequence the various packaging steps such rinsing, filling and capping. For this purpose, they use operating machines designed to perform the individual functions and a series of recessed wheels, screw feeders or conveyor belts for conveying the containers from one machine to another.

[0004] The final stage of packaging envisages obviously automatic closing of the containers using capping machines which are generally of the rotating carousel type. Numerous capping heads are mounted peripherally above the carousel, at the same distance from each other, and perform closing of the containers when they engage over them during their movement around the carousel.

[0005] It is known that different types of capping machines exist, said machines performing closing of the containers by means of operating heads equipped with specific mechanical devices designed depending on the cap which is to be fitted and the container which is to be closed.

[0006] A first type of capping machine - a so-called capsule-fitting machine - performs screwing of screw-type capsules, generally made of plastic, onto the threaded top of a container.

[0007] A second type of capping machine is instead used in order to fit "rolled caps", i.e. caps which form threads or just indentations by means of deformation of their flange against a finish on the mouth of the containers.

[0008] In this latter case each head is provided internally with threading rollers which are made to perform a rotary movement by the head itself against the caps so as to form threads in their flanges, as is for example described and illustrated in the patents US 4,086,747 and US 3,303,955.

[0009] In the case of capsule-fitting machines, however, grippers are provided inside each head so as to grip firstly the capsules and then screw them onto the containers, rotating them about the axis of the head, as is for example described and illustrated in the patents EP 248,145 and DE 3912324.

[0010] In any case, the heads are supported all the way around the machine by means of a corresponding number of sleeves with a diameter and height which are mostly standardised. For this purpose, the sleeves are threaded at the bottom so as to allow screwing of the heads by means of engagement of a threaded ring.

[0011] The sleeves are in turn generally mechanically connected to the machine by means of chucks able to cause them to rotate together with the heads.

[0012] The heads and the sleeves have, arranged inside them, rod-like thrusting means which, in particular in the case of threading capping machines, assist fitting of the caps, pushing them onto the mouth of the containers as a result of the action of a spring. This favours hermetic sealing of the caps on the containers. Otherwise these thrusting means may simply slide axially inside the head and the hollow sleeve so as to apply the threading rollers onto the caps or actuate the grippers in the case of capsule-fitting machines.

[0013] As is known in the bottling sector, and in particular in the whisky bottling sector, a particularly widespread requirement is to replace frequently the capping heads depending on the type of cap or the type of bottle which is to be used.

[0014] At present, this operation is performed by unscrewing manually each individual head from the corresponding sleeve by means of a spanner and replacing it with another head more suitable for the capping to be performed.

[0015] This operation is tiring, extremely laborious and results in the machine being inactive for a fairly long time.

[0016] These circumstances obviously negatively affect the bottling performance of the entire industrial plant.

[0017] It must also be remembered that each capping machine generally has several heads and that therefore the amount of time required to replace all of them is very considerable. The assembly and disassembly operations are moreover made even more difficult by the fact that, before unscrewing each head from the sleeve, it is required to unscrew a safety grub screw which is situated on the threaded connecting ring and obviously retighten it once the new head has been reassembled.

[0018] The said head assembly and disassembly operations require a considerable amount of physical force which necessarily requires the use of particularly strong personnel.

[0019] It should be noted moreover that, once the connecting ring has engaged onto the thread of the sleeve, it is required to overcome the opposing pressure of the thrusting means in order to complete screwing. This circumstance makes the task of replacing the heads even more difficult.

[0020] At present, in particular in the case of heads for a capsule-fitting machine, it is possible to adjust the twisting force with which the cap is screwed onto the

bottle by varying the distance between suitable magnetic coupling means or by regulating suitable friction clutch means, as is for example described in the patents WO 00/02810, US 5,490,369 and WO 96,07611.

[0021] These adjustments are, however, per se not always sufficient to avoid having to replace the heads completely with other heads more suitable for meeting specific capping requirements.

[0022] At present, capsule-fitting machines are also known where some parts (generally the bottom portion) may be easily replaced in order to be able to adapt operation to different containers and/or different caps.

[0023] This solution which has been designed solely for capsule-fitting heads is not suitable for use by other types of heads and in any case is unable to satisfy entirely the present need for versatility of the capping machines, which may be fulfilled only by completely replacing the heads.

Disclosure of the invention

[0024] In this situation the task forming the basis of the present invention is to eliminate the drawbacks of the known art mentioned above by providing a capping head for a capping machine, intended to fit caps onto containers, in particular bottles or the like, which allows replacement in a very easy manner and in a very short period of time.

[0025] Another object of the present invention is to provide a capping head which does not require a particular amount of physical force in order to replace it.

[0026] Another object of the present invention is to provide a capping head which allows extremely versatile use of the capping machine.

[0027] A further object of the present invention is that of designing a capping head provided with connecting means for replacement thereof, which are constructionally simple and operationally entirely reliable.

[0028] These and other objects are all achieved by a capping head for a capping machine, intended to fit caps onto containers, in particular bottles or the like, which is supported removably by a hollow sleeve of the machine via connecting means and is provided with actuator means able to rotate about a vertical axis of the head so as to fit a cap on the top of a container, retaining it thereon by means of a screw-type connection.

[0029] According to the invention, the capping head is characterized in that the connecting means comprise at least one first element mechanically connected to the sleeve and at least one second element mechanically connected to the top of the head, the first element and the second element being able to be removably coupled together by means of fast-fit engaging means.

[0030] As a result of this capping head it is possible to adapt rapidly the capping machine so as to operate with bottles and/or caps having different characteristics such as the size or shape.

Brief description of the drawings

[0031] The technical features of the invention, in accordance with the abovementioned objects, may be clearly determined from the contents of the claims indicated below and the advantages thereof will emerge clearly from the detailed description which follows, with reference to the accompanying drawings, which illustrate a purely exemplary and non-limiting embodiment thereof and in which:

- Fig. 1 shows a perspective schematic view of a head according to the invention with, highlighted, the connecting means for connection to a sleeve shown in a close position;
- Fig. 2 shows a schematic perspective view of the head according to Fig. 1 connected to the sleeve;
- Fig. 3 shows a schematic side view of the head and the sleeve according to Fig. 1;
- Fig. 4A shows a first schematic side view of the head and the sleeve according to Fig. 2;
- Fig. 4B shows a second schematic side view of the head and the sleeve according to Fig. 2;
- Fig. 5 shows a schematic sectioned view of the head and the sleeve according to Fig. 1;
- Fig. 6 shows a schematic sectioned view of the head and the sleeve according to Fig. 2.

Detailed description of a preferred embodiment

[0032] With reference to the attached drawings, 1 denotes in its entirety a capping head for fitting caps onto containers, in particular bottles or the like, forming the subject of the present invention.

[0033] Said head is arranged in an entirely conventional manner peripherally on the rotating carousel of a capping machine (not shown) and is therefore used during the final stage of industrial bottling processes for sealing containers by means of caps or capsules.

[0034] As is known, these plants are composed usually of a rinsing machine, a filling machine and a capping machine all of the carousel type, namely each provided with a plurality of operating heads mounted peripherally on the associated carousel, respectively for rinsing, filling and capping the containers passing through the plant.

[0035] The transition of the containers from one machine to another as well as between the plant and the feeding and expulsion means (consisting mainly of screw feeders) is generally performed by means of several motorised wheels with recesses.

[0036] The carousel of the capping machines rotates about its central axis of rotation Z which is substantially vertical and is provided with guide means for removing upstream the containers directly from the support disks of the filling machine or from a recessed wheel arranged immediately downstream of the filling machine itself. The carousel then releases downstream the containers,

which have been capped during the movement around the central axis of rotation Z, to a screw feeder or a conveyor belt which conveys them out of the plant.

[0037] The capping heads 1, in addition to rotating about the axis of the machine, also rotate about their central axis Z and for this purpose are supported on the machine removably via connecting means 2 by a hollow sleeve 3.

[0038] The latter is in turn mechanically connected to the machine by means of a chuck operated by suitable driving means able to cause rotation thereof, together with the head 1, about the common central axis Z of rotation.

[0039] Actuator means 4 (not shown in detail) are mounted on the head 1 and are also transported rotatably about the central axis Z of the sleeve 3 so as to fit the caps on the top part of the containers, fixing them by means of a screw-type connection, as will be described more clearly below.

[0040] According to the present invention, the connecting means 4 comprise a first element 5, which is mechanically connected to the sleeve 3, and a second element 6, which is mechanically connected to the head 1, which elements can be removably coupled together by means of fast-fit engaging means 7.

[0041] The first and the second element 5 and 6 are connected by means of screwing respectively to the bottom end of the sleeve 3 and to the top end of the head 1 so as to be mounted coaxially with respect to the central axis Z of the head 1 itself. For this purpose, in accordance with Figures 5 and 6, the first and the second elements 5 and 6 are respectively provided with an external thread and an internal thread intended correspondingly to engage by means of screwing onto the external thread of the sleeve 3 and onto the internal thread formed on the top of the head 1.

[0042] In greater detail, the fast-fit engaging means 7 comprise a shaped end-piece 8 which extends projecting at the bottom from the first element 5 over a cylindrical section 9 which is coaxial with respect to the sleeve 3 provided with two feet 10 connected transversely to the free end of the cylindrical section 9, and a guide 11 provided on the top part of the second element 6 shaped so as to receive the feet 10 of the shaped end-piece 8.

[0043] Once they have been inserted in the guide 11, the feet 10 co-operate with the latter so as to retain the two elements 5 and 6 which are joined together integrally.

[0044] Advantageously, the fast-fit engaging means 7 also comprise securing means 12 able to retain safely the feet 10 inside the guide 11. Said means are composed of two projecting lugs 13 which are fixed in diametrically opposite positions above the second element 6 and a movable collar 14 constrained to the first element 5 and provided with two seats 15.

[0045] The collar 14 is able to slide axially on a cylindrical portion 16 of the first element 5 between a first bottom position with the seats 15 engaged on the two lugs 13 and a second upper position with the seats 15 disengaged from the lugs 13.

[0046] It is envisaged using a spring 17 which is mounted externally on the cylindrical portion 16 of the first element 5 and which bears, on the one hand, against the collar 14 and, on the other hand, against a rim 18 (upper locating element) mounted fixed on the first element 5.

[0047] In this way, the spring 17 pushes the collar 14 against a bottom locating element 19 which is also integral with the first element 5.

[0048] The latter may for example be formed by two diametrically opposite segments projecting transversely and annularly from the cylindrical portion 16.

[0049] In accordance with a preferred embodiment of the present invention, the two opposite segments 19 define, together with the collar 14, the seats 15 inside which the lugs 13 are inserted. The latter defines also, in their bottom part, by means of a groove, the guide 11 inside which the feet 10 of the shaped end-piece 8 are inserted.

[0050] The actuator means 4 mentioned above are of a type already known per se and for this reason have not been shown in detail since they are within the scope of any person skilled in the art.

[0051] In particular, depending on the type of head, they may envisage a plurality of (angularly offset) threading rollers which are made to perform a rotary movement by the sleeve 3 against the caps so as to form threads in their flanges or may envisage a plurality of grippers able to grip caps (or capsules) already provided with an internal threading and screw them onto the external thread of the containers, rotating about the axis of the head 1.

[0052] In the accompanying figures, 20 denotes schematically rod-shaped thrusting means intended to cooperate operationally with the actuator means 4 for fitting of the caps. They are arranged coaxially inside the head 1 and the sleeve 3 and are actuated so as to compress the cap in a hermetically sealed manner on the mouth of the container owing to the action of a spring 40. The latter is mounted on the rod 41 of the thrusting means 20 and is suitably pretensioned during assembly of the first element 5. Therefore pretensioning of the spring 40 is performed once only and not every time the head 1 must be replaced.

[0053] The thrusting means 20 are provided at the bottom with an engaging element 42 - in particular tubular in shape - which is inserted into a correspondingly shaped seat 43 formed in the head 1.

[0054] It should be noted, however, that, although the present invention is advantageously suitable for use on capping machines of the threading type, it may also be associated with heads for capping machines of a different kind such as, for example, capsule-fitting machines.

[0055] The capping head for a capping machine, intended to fit caps onto containers, described hitherto

from a mainly structural point of view, allows use as is illustrated hereinbelow.

[0056] If it is required to replace a head 1 with another head capable, for example, of operating with bottles or caps of different size, firstly the rim 14 is raised, overcoming the opposition force of the spring 17 until it is raised above the two lugs 13, disengaging them from the seats 15.

[0057] At this point it will be possible to rotate the head 1 about the central axis Z so as to cause the feet 10 of the shaped end-piece 8 to come out of the guide 11 defined by the grooves formed at the base of the lugs 13.

[0058] At the end of these operations, the head 1 will therefore be separated from the sleeve 3 and may be replaced by another head, performing the same sequence of operations in the reverse order.

[0059] In particular, the rotation of the second element 6 on the first element 5 so as to insert the end-piece 8 into the guide 11 terminates when the lugs 13 come into contact with the locating segments 19.

[0060] The transmission of the torque between the sleeve 3 and the head is ensured precisely by this contact and by the securing means 12.

[0061] Finally, it should be noted that the connecting means 2 do not require particular adjustments to be made to the connection of the sleeve 3, which is in fact not varied in the slightest, allowing the heads according to the present invention to be easily mounted on any capping machine which is provided with sleeves 3 of the type conventionally standardised in the sector.

[0062] The invention thus conceived therefore achieves the predefined objects.

[0063] Obviously it may also assume, in its practical embodiment, forms and configurations different from that illustrated above without thereby departing from the present scope of protection.

[0064] Moreover, all the details may be replaced by technically equivalent elements and the dimensions, forms and materials used may be any in accordance with requirements.

Claims

1. Capping head for a capping machine, intended to fit caps onto containers, in particular bottles or the like, which is supported removably by a corresponding hollow sleeve (3) of said machine via connecting means (2) and comprising:

   - actuator means (4) capable of rotating about a central axis (Z) of the head (1) so as to fit a cap onto the top of a container, retaining it thereon by means of screw-type connection,

   characterized in that said connecting means (2) comprise at least one first element (5) mechanically connected to said sleeve (3) and at least one second element (6) mechanically connected to the top of said head (1), said first element (5) and said second element (6) being able to be removably coupled together by means of fast-fit engaging means (7).

2. Head according to Claim 1, **characterized in that** said fast-fit engaging means (7) comprise at least one shaped end-piece (8) fixed to said first element (5) and at least one guide (11) provided on said second element (6) and shaped so as to receive said shaped end-piece (8), co-operating with it in a mutually retaining arrangement.

3. Head according to Claim 2, **characterized in that** said fast-fit engaging means (7) comprise securing means (12) for retaining said shaped end-piece (8) in said guide (11).

4. Head according to Claim 3, **characterized in that** said securing means (12) comprise at least one lug (13) fixed in a projecting manner on said second element (6) and at least one movable collar (14) which is provided with at least one seat (15), constrained to said first element (5) and capable of being displaced between a first position, where said seat (15) engages on said lug (13), and a second position, where said seat (15) is disengaged from said lug (13).

5. Head according to Claim 4, **characterized in that** said collar (14) is able to slide axially on a cylindrical portion (16) of said first element (5) between said first position and said second position, the latter position being defined by the bearing contact of said collar against said fixed locating element (19) integral with said first element (5).

6. Head according to Claim 5, **characterized in that** said securing means (12) comprise at least one spring (17) able to push said collar (14) towards said locating element (19).

7. Head according to Claim 5, **characterized in that** said locating element (19) defines said seat (5) together with said collar (14).

8. Head according to Claim 4, **characterized in that** said guide (11) is formed in said lug (13).

9. Head according to Claim 4, **characterized in that** said first and second elements (5, 6) are arranged coaxially with respect to the axis of said head (1) and **in that** said shaped end-piece (8) is able to be inserted inside said guide (11) by means of rotation of said second element (6) with respect to said first element (5) about the central axis (Z) of said head (1).

10. Head according to Claim 9, **characterized in that** said rotation of said second element (6) with respect to said first element (5) for insertion of said shaped end-piece (8) inside said guide (11) terminates with the bearing contact of said lug (13) against said locating element (19).

11. Head according to Claim 1, **characterized in that** said first element (5) is connected by means of screwing to a bottom end of said hollow sleeve (3).

12. Head according to Claim 1, **characterized in that** said second element (6) is connected by means of screwing to the top part of said head (1).

13. Head according to Claim 1, **characterized in that** said actuator means (4) form a thread on said cap, compressing the lateral surface thereof against a finish on the mouth of the containers.

14. Head according to Claim 13, **characterized in that** it comprises rod-shaped thrusting means (20) which are arranged coaxially inside said head (1) and said hollow sleeve (3) and can be actuated so as to compress said cap on the mouth of said container and which are intended to co-operate operationally with said actuator means (4) in order to fit said cap on the container itself.

15. Head according to Claim 14, **characterized in that** said rod-shaped thrusting means (20) comprise a rod (41) having, mounted on it, a spring (40) capable of pretensioning during assembly of the first element (5).

16. Head according to Claim 14, **characterized in that** said rod-shaped thrusting means (20) are provided at the bottom with an engaging element (42) able to be inserted in a correspondingly shaped seat (43) formed in the head (1) following coupling of said first element (5) with said second element (6).

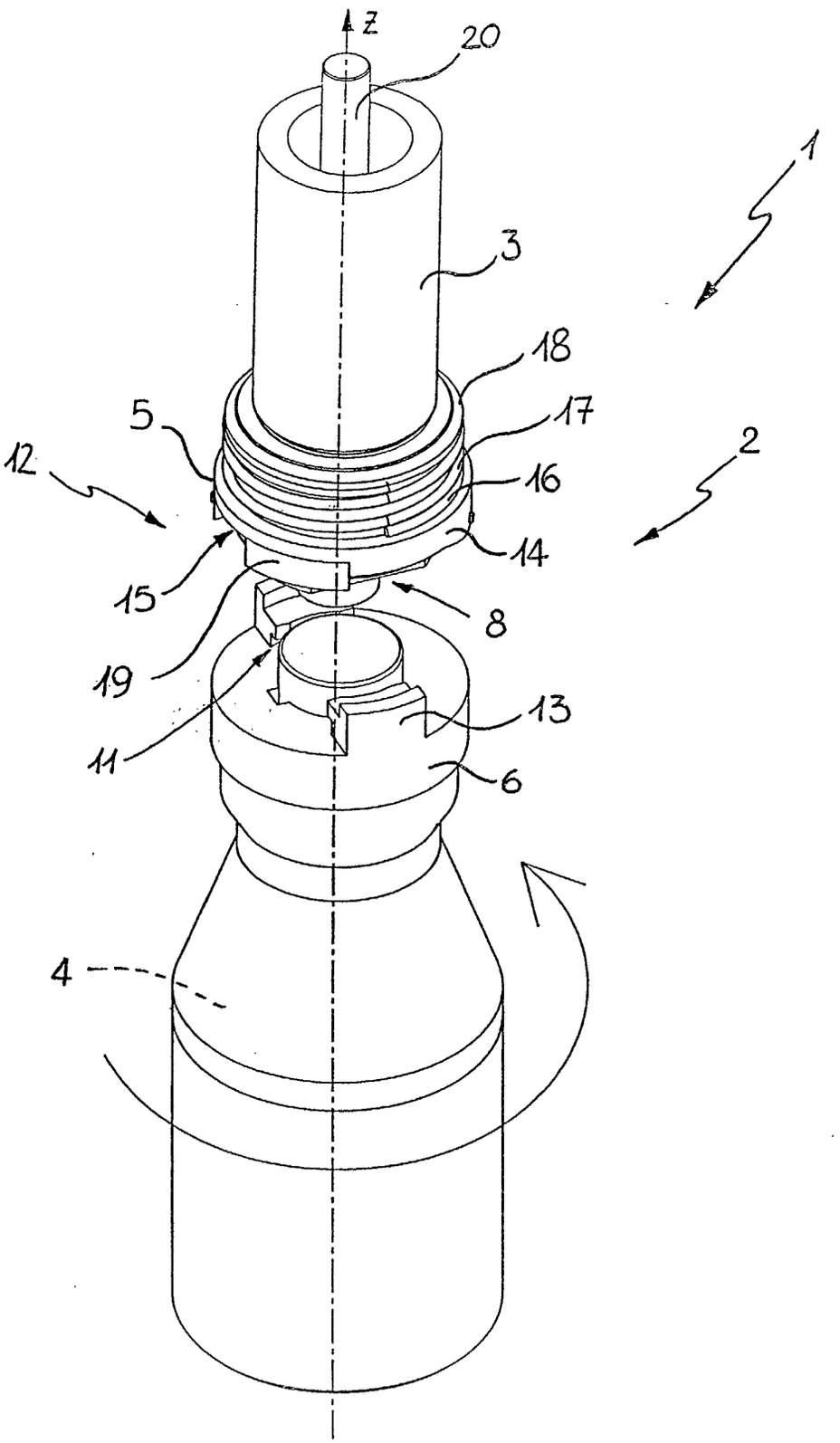

FIG. 1

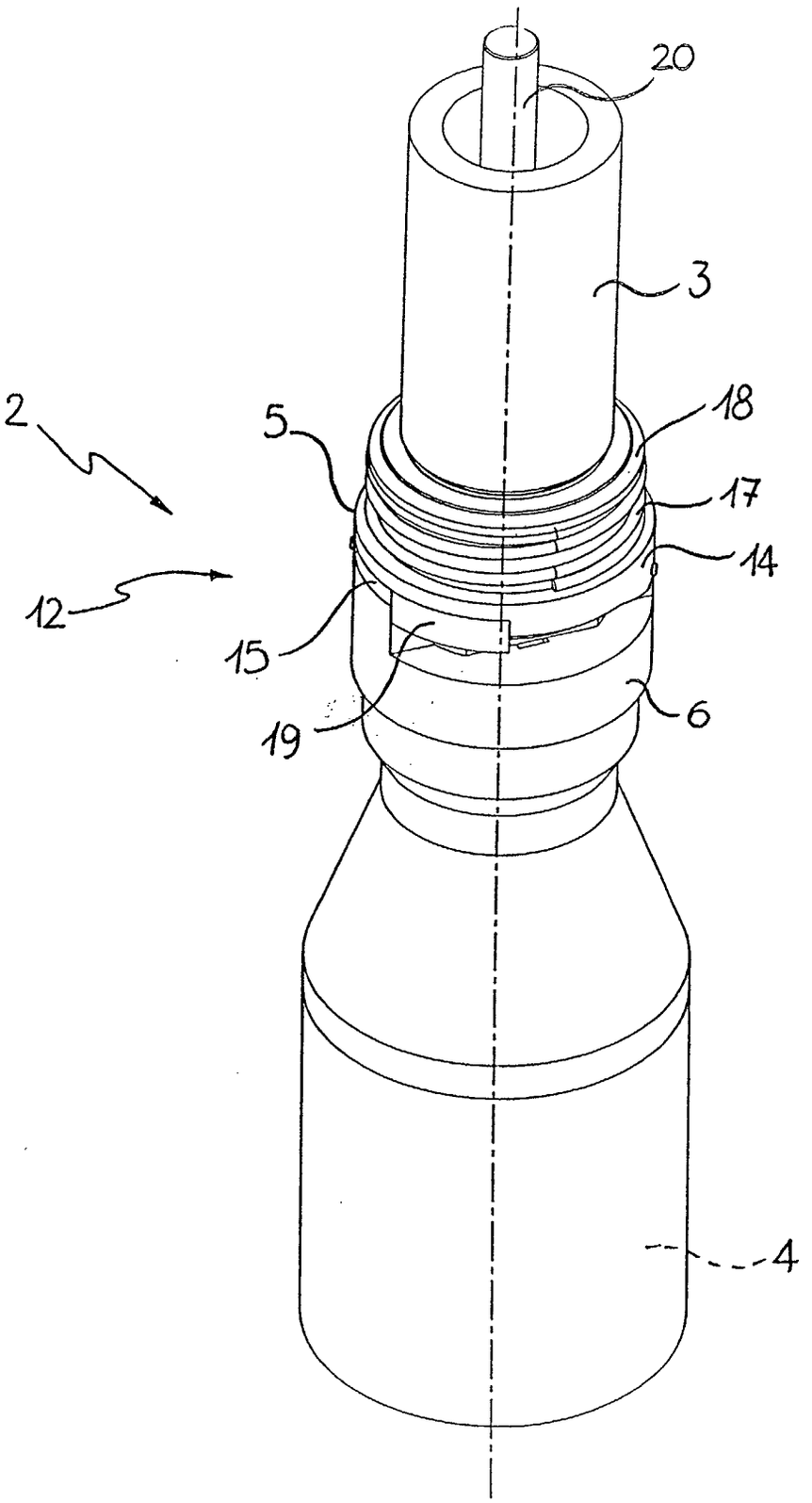

FIG. 2

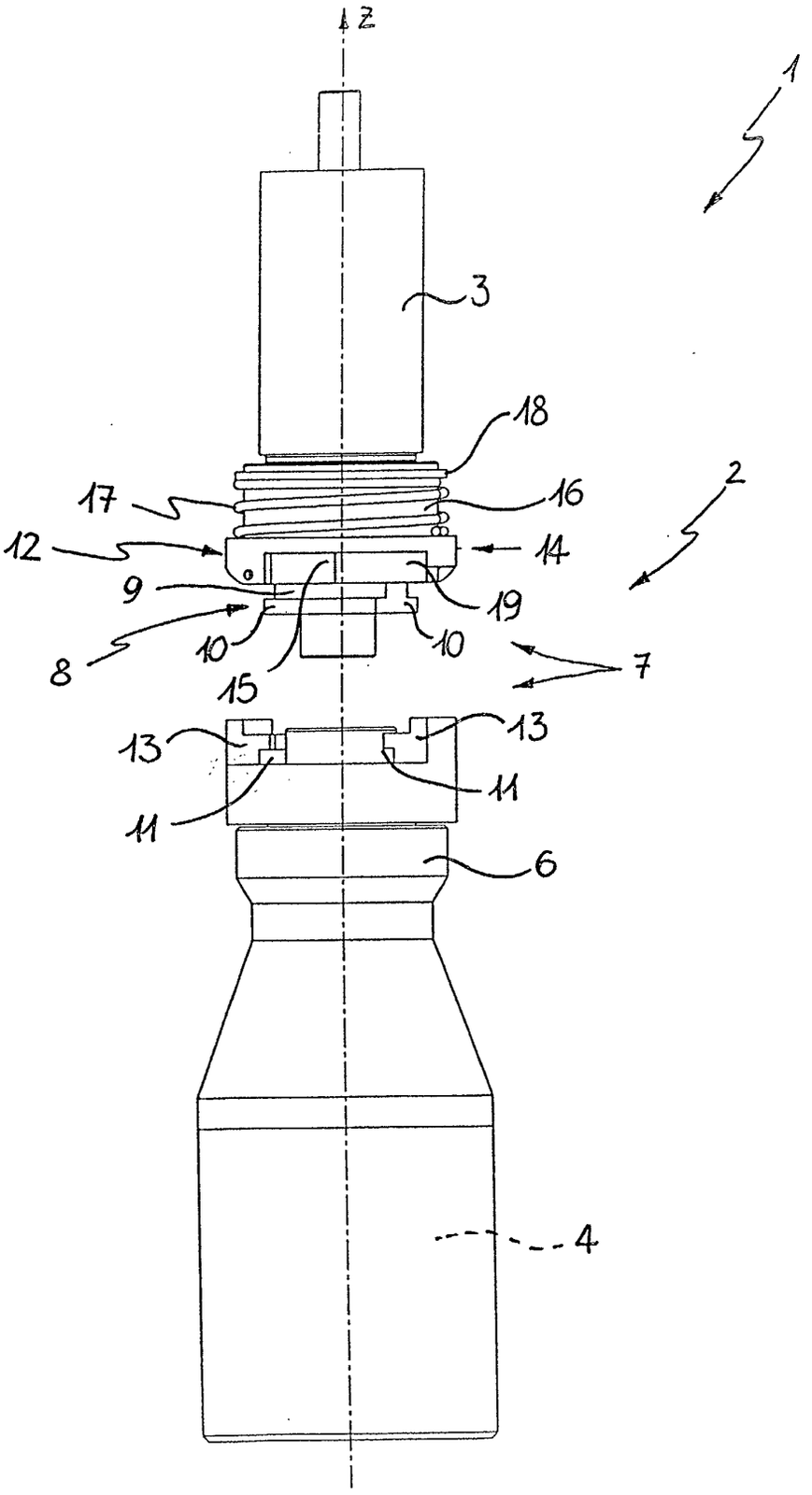

FIG. 3

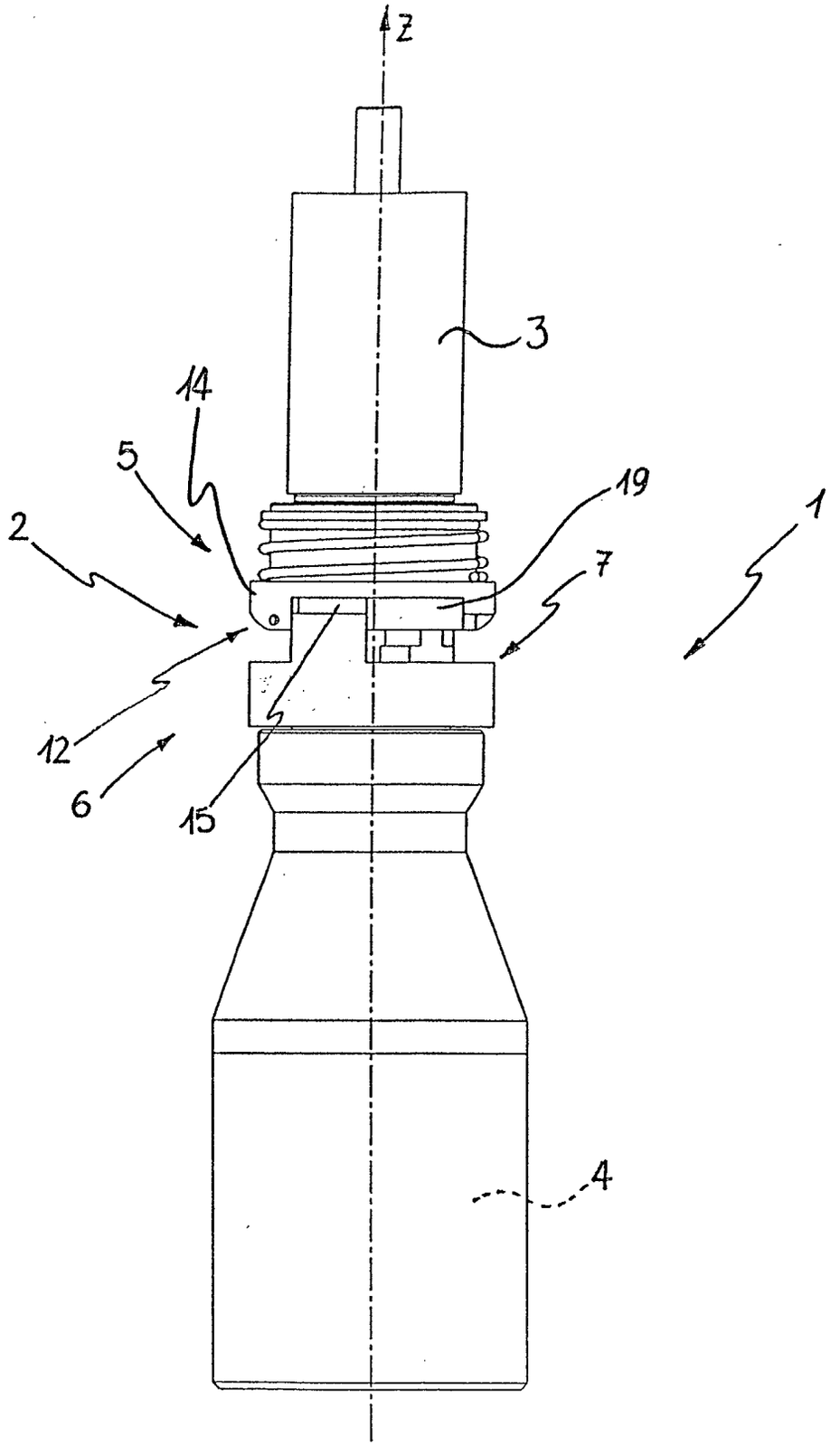

FIG. 4 A

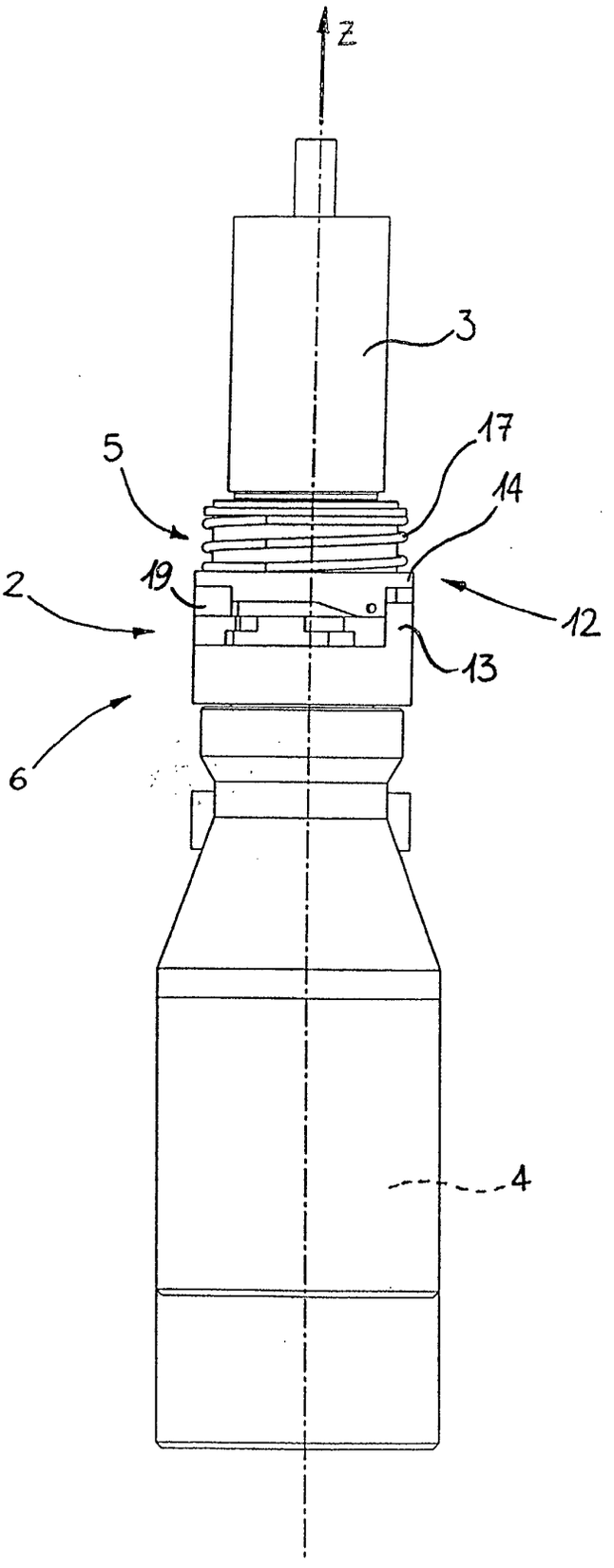

FIG. 4 B

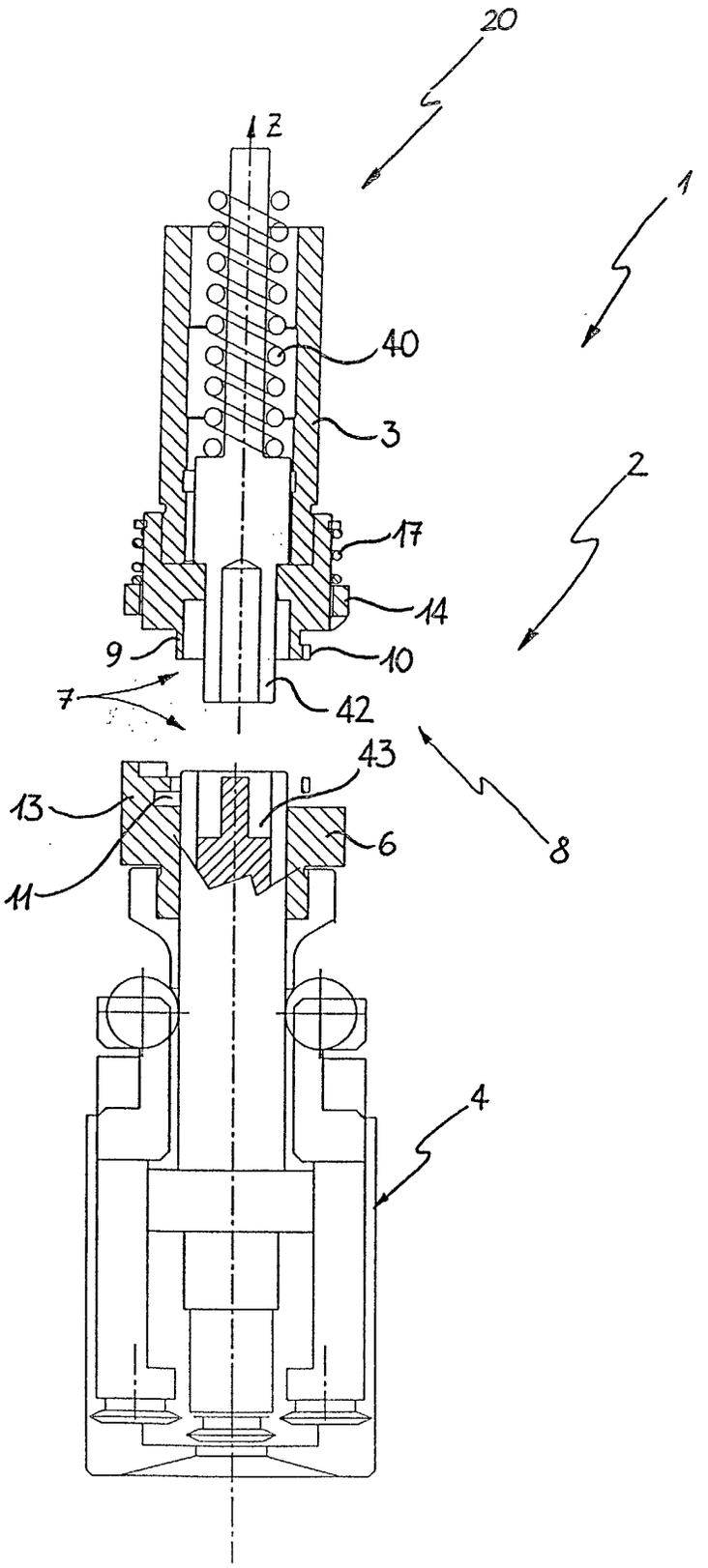

FIG. 5

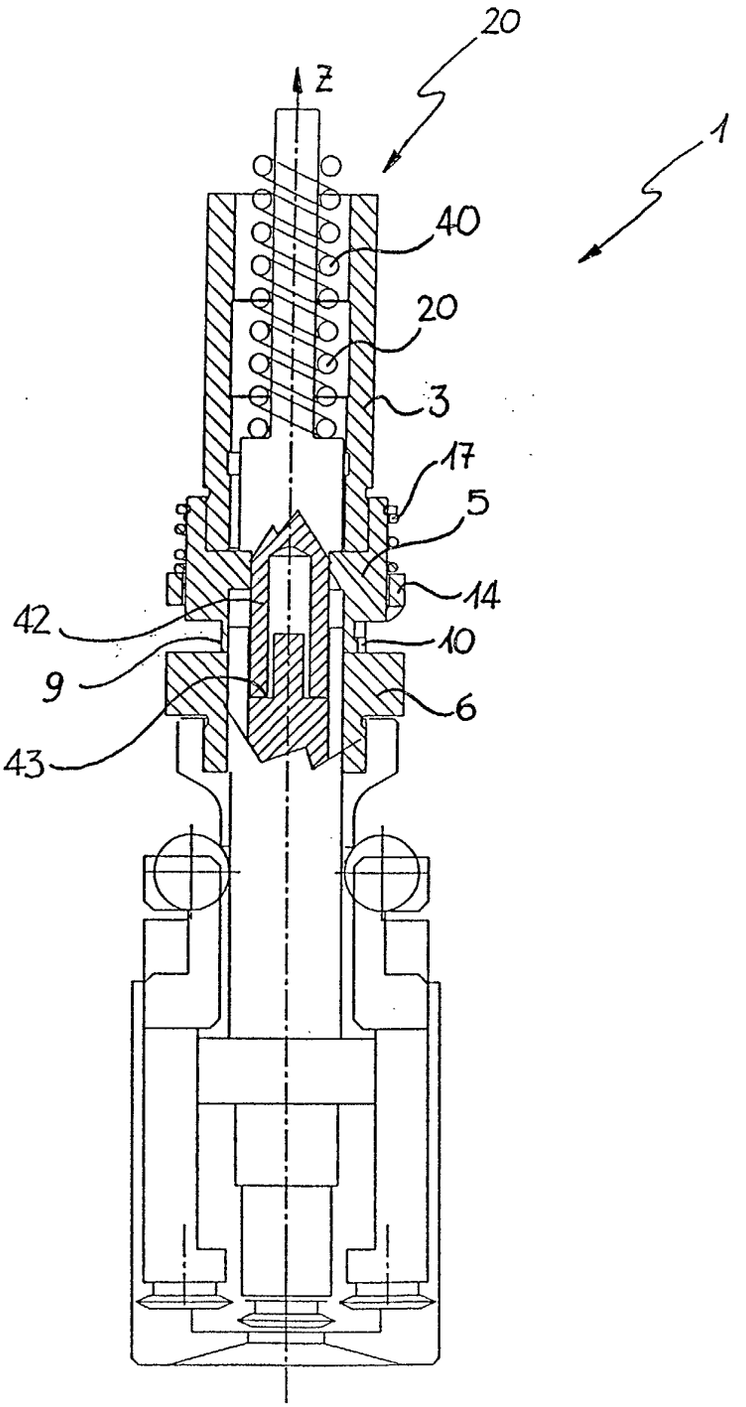

FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 07 7624

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)
B67B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 October 2002	Wartenhorst, F

CATEGORY OF CITED DOCUMENTS

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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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