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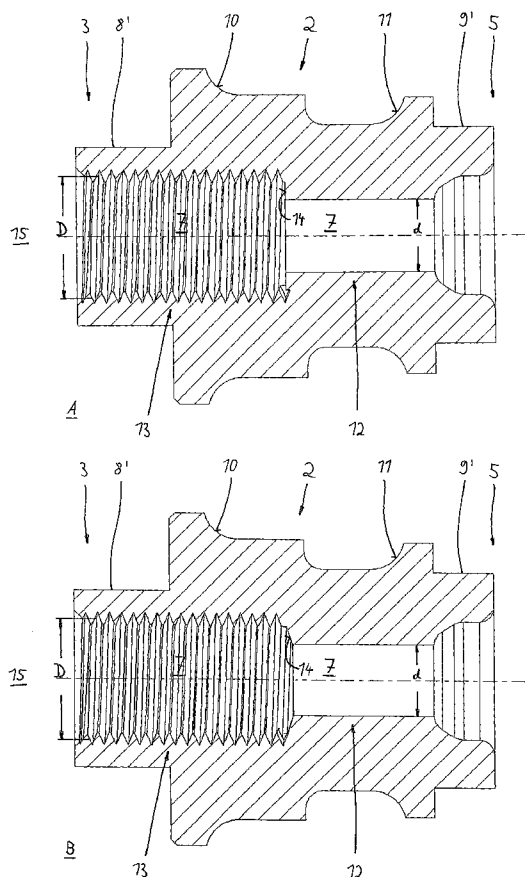
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(54) Title: DRIVE SECTION FOR USE IN A BEARING ARRANGEMENT



(57) Abstract: The invention relates to a drive section (2) for use in a bearing arrangement (1) of a driven vehicle wheel end, especially of a truck or trailer, wherein the drive section (2) comprises at least one inner raceway (10, 11) for rolling elements (22, 23), wherein the drive section (2) is arranged to be connected at one axial end (3) at an outboard side (15) with a hub element (4) and is arranged to be connected at the other axial end (5) distal from the outboard side (15) with a drive element (6) and wherein the drive section (2) has a center bore (7), which extends through the whole drive section (2) from one axial end (3) to the other axial end (5). To facilitate the assembly and disassembly of the vehicle wheel end, the invention is characterized in that the center bore (7) in the drive section (2) has a first bore section (12) and a second bore section (13), wherein the diameter (d) of the first bore section (12) is smaller than the diameter (D) of the second bore section (13) and wherein the bore section (13) with the greater diameter (D) is arranged adjacent to the outboard side (15) of the hub element (4).

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Drive Section for Use in a Bearing Arrangement

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Technical Field

The invention relates to a drive section for use in a bearing arrangement, especially for a driven vehicle wheel end of a car or truck. The invention is suitably applied to a wheel end bearing arrangement for road and/or off road
10 vehicles, and it can also be applied to other automotive and industrial applications, e.g. forklift trucks and agricultural vehicles.

Background

Wheel bearing arrangements are known to firmly mount a tire on a hub unit
15 radially and axially relative to a vehicle suspension. Traditionally two-row angular contact roller or ball bearings are employed in an "O"-configuration. Therefore, it is known to employ a drive section, wherein the drive section comprises at least one inner raceway for rolling elements, wherein the drive section is arranged to be connected at one axial end at an outboard side with a
20 hub element and is arranged to be connected at the other axial end distal from the outboard side with a drive element and wherein the drive section has a center bore, which extends through the whole drive section from one axial end to the other axial end. The use of the wording "drive section" includes specifically an inner ring element for the bearing arrangement, which bears
25 the wheel end.

A drive section of the mentioned kind is disclosed e.g. in **US 6,450,585 B1**. A two-row annular contact ball bearing holds a shaft element in position which transfers the torque of a combustion engine from a drive shaft to the wheel end. The shaft element has a center bore which extends through the whole distance between the two axial ends of it between a constant velocity joint (CVJ) and a hub element like a brake disk. So, the shaft element, carrying the two inner rings of the two-row annular contact ball bearing, functions as a drive element which transfers the torque from the drive shaft to the hub element.

To mount the pre-known device according to **US 6,450,585 B1**, the shaft element with the center bore is pushed from the side, where the CVJ is arranged, through the bearing arrangement. To mount the hub element, e.g. the brake disk, it is pushed from the other side on the pre-mounted shaft element and is fixed by means of a bolt, which is screwed into the center bore of the shaft element. The wheel by itself is then connected with the hub element (e.g. the brake disk).

Consequently, the manufacturing and the assembly of the entire bearing arrangement is complex, time consuming and expensive.

Summary of the invention

According to the invention a drive section for transmitting the drive torque for a wheel bearing assembly together with a wheel hub system is designed so that the manufacturing, assembly and disassembly (maintenance) of the entire system becomes significantly easier and cheaper.

Therefore, it is an object of the invention to create an improved drive section for use in a bearing arrangement of a driven vehicle wheel end, especially of a car or a truck, which allows an easy and fast in-line assembly and disassembly (maintenance) of the hub element and also of the whole bearing arrangement.

These and many other advantages are obtained according to the invention creating a drive section of the above mentioned kind which is characterized in that the center bore in the drive section has a first bore section and a second bore section, wherein the diameter of the first bore section is smaller than the diameter of the second bore section and wherein the bore section with the greater diameter is arranged adjacent to the outboard side of the hub element.

As will become apparent in detail later this design makes it possible to manufacture, assemble and disassemble the bearing arrangement and the entire wheel end in a very easy, quick and cost efficient way.

This is especially the case when a counter surface is arranged at the transition between the first bore section and the second bore section. The perpendicular on the counter surface is preferably arranged in axial direction of the drive section. Furthermore, both bore sections have preferably a substantial cylindrical shape. A preferred embodiment of the invention has a first bore section, which has a plane surface; the second bore section has preferably a thread machined into the surface of the bore section.

This design makes it possible to connect the front wheel and/or rear wheel drive section for transmitting the drive torque with the usually employed constant velocity joint (CVJ) with a mechanical fastening element from the

outboard side of the hub element. From this side also the hub element is mounted (as it is usual).

The hub element is typically the wheel flange, a wheel-carrying device and/or a brake disk. As mentioned above the drive element for transferring the torque from a drive shaft is usually for front wheel driven vehicles a constant velocity joint (CVJ), which is connected with the drive shaft for the transmission of motion/torque between two shafts with varying degrees of misalignment.

To allow a reliable transfer of the drive torque through the drive section from the CVJ to the hub element torque transfer means can be employed which are arranged at at least one axial end of the drive section.

A preferred embodiment is characterized in that the torque transfer means consist of two cooperating sections of the drive section and the hub element and the drive element respectively, which drive means are designed form-fitted. Specifically, the form-fitted connection can have a non-circular cross-section. Beneficially, the form-fitted connection can have flattened round cross section, such as an oval cross-section.

While an oval cross-section can be employed, other forms are of course also suitable, for example a spline form, a square form, a triangular form or an irregular shaped section like a round cross section with one ore more flat sides can be used. So the strength of the material of the drive section is used in an optimum way.

The drive section can have a male part which meshes with a corresponding female part at or in the hub element. Also, the drive section can have a male

part which meshes with a corresponding female part at or in the drive element. Furthermore, the drive element can have a female part which meshes with a corresponding male part at or in the hub element; finally the drive element can have a female part which meshes with a corresponding male part at or in the drive element.

Preferably, the at least one raceway is machined into the material of the drive section. Specifically, the drive section can have two raceways, with equal or different diameters, spaced apart in axial direction.

For connecting the drive section with the drive element (CVJ) mechanical fastening elements can be employed. A preferred embodiment is characterized in that the drive section and the drive element are connected by means of a bolt, wherein the bolt head contacts the counter surface, which is formed in the center bore. This allows the connection of the CVJ with the drive element from the outboard side with the mentioned advantage. The hub element and the drive section can be connected also by means of a mechanical fastening element, especially by means of a bolt, wherein the thread of the bolt is engaged with the thread of the second bore section.

A preferred solution is characterized in that the drive section and at least one outer ring, preferably two outer rings, and rolling elements (ball or roller elements) form a self contained bearing unit. This bearing unit is preferably pre-adjusted, lubricated and sealed for life. The bearing arrangement can be a two-row ball or roller bearing arrangement, especially a two-row annular contact ball bearing arrangement; this arrangement is typically arranged in an O-configuration.

The raceways of the two rows of balls or rolling elements of the bearing arrangement can have equal or different diameters. Specifically, the diameter of the raceway adjacent to the outboard side can be the bigger one.

- 5 The at least one outer ring of the bearing arrangement can be arranged stationary. As known as such, at least one sensor element can be located in or at the bearing arrangement.

By the suggested design according to the invention the manufacturing,
10 assembly and disassembly (maintenance) of the bearing arrangement and of the entire wheel hub or wheel end system becomes significantly easier, compared with the other solutions as discussed above. This is especially the case when a one-piece inner ring concept is employed, i.e. when the drive section has two machined raceways for the two rows of rolling elements or
15 balls. In the latter case no separate inner rings are necessary. It can be noted that the invention with the CVJ left out can of course also be used for a non-driven application.

Further preferred embodiments of the invention are defined below and in the
20 claims.

Brief description of the drawings

The drawings show embodiments of the bearing arrangement according to the
25 invention.

Fig. 1 shows a partly cross sectional view of a wheel end (without wheel) according to the invention,

Fig. 2 shows an embodiment of the invention designed as a self contained, pre-loaded bearing unit,

Fig. 3A shows the cross sectional view of a drive section as a torque transfer means according to the invention,

Fig. 3B shows the same depiction as fig. 3A with an alternative design of the counter surface in the center bore on the drive section,

Fig. 4A shows the drive section in perspective view, regarded from the CVJ side (inboard),

Fig. 4B shows an alternative embodiment of the drive section according fig. 4A with a female section of a torque transfer means,

Fig. 5A shows the drive section in perspective view, regarded from the wheel side / brake disk side (outboard),

Fig. 5B shows an alternative embodiment of the drive section according fig. 5A with an outer thread for a nut,

Fig. 5C shows a further alternative embodiment of the drive section according fig. 5A with a female section of a torque transfer means,

Fig. 6A shows the self contained pre-loaded bearing unit regarded from the wheel side / brake disk side (outboard),

Fig. 6B shows the self contained pre-loaded bearing unit according fig. 6A regarded from the CVJ side, (inboard)

Fig. 7A shows the self contained bearing unit with a CVJ and drive shaft in exploded view,

5 Fig. 7B shows the self contained bearing unit with a CVJ and a drive shaft in the mounted state,

Fig. 8A shows the mounted unit containing the self contained bearing unit with a CVJ and a drive shaft and a suspension / steering knuckle
10 before assembly,

Fig. 8B shows the parts of fig. 8A in the mounted state,

Fig. 9A shows the mounted unit containing the self contained bearing unit with a CVJ, a drive shaft and a suspension / steering knuckle and a
15 wheel flange / brake disk before assembly and

Fig. 9B shows the parts of fig. 9A in the mounted state.

20

Detailed description of the invention

Fig. 1 shows a driven wheel end assembly with a hub element 4 in the form of a wheel flange or a brake disk which is hold axially and radially relatively to a steering knuckle 30 (in the case of a front wheel driven vehicle) by means of a
25 bearing arrangement 1. While a steering knuckle 30 for a front wheel driven vehicle is depicted, the invention can of course be also employed for a vehicle with rear wheel drive.

The bearing arrangement 1 is connected with the hub element 4 at the left hand side by means of a one single bolt 18 which is inserted in a center bore 7 in a drive section 2 of the bearing arrangement 1 from an outboard side 15. To transfer the drive torque from a drive shaft 28 to the hub element 4 torque transfer means 8, which are explained later in detail, are arranged between the drive section 2 and the hub element 4 at the axial end 3 of the drive section 2.

The drive section 2 is connected with a coupling 6, e.g. a constant velocity joint (CVJ), at its inboard side at the axial end 5 of the drive section 2. The CVJ 6 has basically a star, a cage 31 and a bell 32; the connection between the drive shaft 28 and the bell 32 is established by balls 33. Also, a seal or boot 34 is used for protecting the inside of the CVJ against the environment and to hold lubricant in the CVJ 6.

For torque transfer, torque transfer means 9 are employed between the drive section 2 and the CVJ 6. The firm connection between the drive section 2 and the CVJ 6 is established by means of a single bolt 16, which is screwed through the center bore 7 into the CVJ 6 from the outboard side 15, as will become more apparent later.

Both bolts 16 and 18 have a threaded portion to interfere with respective threads in the CVJ 6 and the center bore 7 as will be explained in more detail later. The pitch of both threads of the bolts 16, 18 can be identical or different. Especially the pitch of the thread of the bolt 16 can be bigger than the pitch of the thread of the bolt 18.

Fig. 2 shows a self contained bearing unit 24 which is used as the bearing arrangement 1. Core of the unit 24 is the drive section 2 which has two raceways 10 and 11 which are machined directly into the material of the drive

section 2. Both raceways 10, 11 have different diameters in the depicted embodiment of the invention. Also the drive section 2 – functioning as a torque transfer element – has a center bore 7 extending from one axial end 3 to the other axial end 5 of the drive section 2. At both axial ends 3, 5 cooperating sections 8', 9' of torque transfer means 8, 9 (see fig. 1) are located which have a non-circular cross section.

The center bore 7 consists of two different sections 12 and 13. The first bore section 12 is smaller in diameter than the second bore section 13. While the first bore section 12 suitably has a flat inner surface, the second bore section 13 suitably has a thread for engagement with the bolt 18 (see fig. 1). Between both bore sections 12, 13 a ring-shaped counter surface 14 is formed for the bolt head of the bolt 16 (see fig. 1), which fixes the drive section 2 with the CVJ 6. The two bore sections 12, 13 are preferably of substantial uniform diameter in each respective bore section. The drive section can be made of a through hardened, inductive hardened or PM hardened material in a forged or rolled pre-condition.

Furthermore, the unit 24 has two bearing outer rings 20 and 21, wherein between the outer rings 20, 21 and the raceways 10, 11 of the drive section 2 balls (rolling elements) 22, 23 are arranged in two rows. Between both outer rings 20, 21 a clamp ring 35 is arranged. The whole unit 24 is placed in a housing 36, i. e. the different parts of the unit 24 are held together in the housing 36; a circlip 37 – which is located in a respective groove in the housing 36 – prevents disassembly of the unit. The unit 24 is sealed by means of seals 25 and 26.

The housing 26 can be made of a ferrous or a light non-ferrous metal, e.g. aluminum, magnesium or alloys thereof.

Also suitable sensor elements (not depicted) can be employed; in fig. 2 a sensor element contact 27 is shown. The sensor element can be designed to monitor and/or control at least one wheel end function, the rotational speed of the bearing, the vibration of the bearing, the temperature of the bearing or the load of the bearing or adjacent parts of it, e.g. a hub unit. The sensor for monitoring the bearing load can be connected with the brake system and/or control system of the vehicle for controlling the dynamic behavior of the vehicle, e.g. at a potential risk of rollover.

Details of the drive section 2 are depicted in fig. 3A. Especially, the both bore sections 12 and 13 with their respective diameters d and D are shown. The diameter d of the bore section 12 is smaller than the diameter D of the bore section 13 (which is here the pitch diameter of the thread machined in the bore section 13), e. g. the diameter d is between 60 % and 90 %, preferably between 75 % and 85 %, of the diameter D . Thereby, the counter surface 14 is formed. The perpendicular on the counter surface 14 shows in axial direction of the drive section 2. The diameter D of the bore section 13 has to be at least a little bigger than the diameter of the bolt head 17 of the bolt 16 (see fig. 7A), so that the whole bolt 16 can be passed through the center bore 7 but the bolt head 17 comes into contact with the counter surface 14.

Not depicted is that bores can be machined into the drive section 2 to provide a pneumatic gas transfer for tire pressure surveying systems. Those bores can not only been machined in the rotating part (drive section 2) but also in stationary parts of the bearing arrangement for passing through a gas, e.g. air, from the stationary to the rotating parts.

The material of the drive section 2 is usually steel, which is through hardened or induction hardened. While a one-piece solution for the drive section 2 is preferred, it can also consist of different parts, which are permanently connected (e.g. friction welded) together.

5

The inboard end of the center bore 7 widens from the diameter d to a trumpet-shaped end section to save weight of the drive section 2.

It may also be noted that the diameter of the force-bearing material of the drive section 2 at the axial location of both raceways 10 and 11 is about the same. I.e. the difference between the outer diameter of raceway 10 and the diameter D is about the same as the difference between the outer diameter of the raceway 11 and the diameter d . So, the ability to bear forces is optimized for the drive section 2.

15

While – as shown in fig. 3A – the perpendicular on the counter surface 14 shows in axial direction of the drive section 2, this is not the case in the alternative embodiment of a drive section 2 according to fig. 3B. Here, the counter surface 14 has a slanted (conical) shape, i. e. the perpendicular on the counter surface 14 and the axis of the drive section 2 are not parallel; the head of the bolt 16 (see fig. 1) can have a corresponding conical section.

20

The non-circular form of the cooperating sections 8' and 9' of the torque transfer means 8 and 9 becomes visible in fig. 4A. Here both cooperating sections 8' and 9' are designed as male sections interfering with corresponding female sections in the hub element 4 and the CVJ 6 respectively.

25

The alternative embodiment according to fig. 4B has a female cooperating section 9' in which a male counterpart is inserted.

5 In fig. 5A the cooperating section 8' of the torque transfer means 8 is depicted, designed as a male element.

The alternative embodiment according to fig. 5B has an extended cylindrical section 38 with a thread 39, on which a nut (not shown) can be screwed to connect the drive section 2 with the hub element 4.

10

The embodiment according fig. 5C shows a cooperating section 8' designed as a female element.

15 Figures 6A and 6B show the pre-loaded, self-contained bearing unit 24 and again the non-circular cross section of the two cooperating sections 8' and 9' of the torque transfer means 8 and 9. Fixation holes 40 are arranged at the housing for its fixation on e.g. a steering knuckle 30 or on a suspension.

20 The different assembly steps are depicted in figures 7A till 9B. In figures 7A and 7B the self-contained bearing unit 24 is connected with the CVJ 6, which by itself is connected with the drive shaft 28. The connection between the unit 24 and the CVJ 6 is established by the bolt 16. In the mounted state (see fig. 7B) the bolt head 17 of the bolt 16 contacts the counter surface 14 (see e. g. fig. 3). The bolt 16 interferes with its threaded part in a corresponding thread
25 in the CVJ 6 to create the thread interference 29.

In figures 8A and 8B the steering knuckle 30 is connected with the unit 24 by means of bolts 41. Finally, the pre-mounted unit according to fig. 8B is connected with the hub element 4 (wheel flange / brake disk / brake drum

(especially for front driven vehicles)) as can be seen in fig. 9A and 9B. The connection is established by means of the bolt 18 wherein the thread 19 of the bolt 18 interferes with the thread in the second bore section 13 in the drive section 2.

5

If the invention is used for non-driven applications the coupling, e.g. CVJ, and a center bore is not necessary.

The drive section 2 can be made, as mentioned above, from a through
10 hardened or induction hardened steel material, wherein specifically the raceways for the rolling elements have to be hardened. It can be produced from a bar material which can be forged and/or rolled. The housing 36 can consist from a ferrous or non-ferrous material.

15

Reference Numerals:

5	1	Bearing arrangement
	2	Drive section (inner ring element)
	3	Axial end
	4	Hub element (wheel flange, wheel carrying device, brake disk)
	5	Axial end
10	6	Drive element/coupling (e.g. CVJ)
	7	Center bore
	8	Torque transfer means
	8'	Cooperating section of the torque transfer means
	8''	Cooperating section of the torque transfer means
15	9	Torque transfer means
	9'	Cooperating section of the torque transfer means
	9''	Cooperating section of the torque transfer means
	10	Raceway
	11	Raceway
20	12	First bore section of the center bore
	13	Second bore section of the center bore
	14	Counter surface (ring-shaped)
	15	Outboard side of the hub element
	16	Bolt
25	17	Bolt head
	18	Bolt
	19	Thread
	20	Outer ring
	21	Outer ring

	22	Rolling elements (ball or roller)
	23	Rolling elements (ball or roller)
	24	Self contained pre-adjusted bearing unit
	25	Seal
5	26	Seal
	27	Sensor element contact
	28	Drive shaft
	29	Thread interference
	30	Steering knuckle
10	31	Cage
	32	Bell
	33	Ball
	34	Seal
	35	Clamp ring
15	36	Housing
	37	Circlip
	38	Cylindrical section
	39	Thread
	40	Fixation hole
20	41	Bolt

d Diameter

D Diameter

25

Claims:

5

1. Drive section (2) for use in a bearing arrangement (1) of a driven vehicle wheel end, especially of a car or truck, wherein the drive section (2) comprises at least one inner raceway (10, 11) for rolling elements (22, 23), wherein the drive section (2) is arranged to be connected at one axial end (3) at an outboard side (15) with a hub element (4) and is arranged to be connected at the other axial end (5) distal from the outboard side (15) with a drive element (6) and wherein the drive section (2) has a center bore (7), which extends through the whole drive section (2) from one axial end (3) to the other axial end (5),

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characterized in

that the center bore (7) in the drive section (2) has a first bore section (12) and a second bore section (13), wherein the diameter (d) of the first bore section (12) is smaller than the diameter (D) of the second bore section (13) and wherein the bore section (13) with the greater diameter (D) is arranged adjacent to the outboard side (15) of the hub element (4).

20

2. Drive section according to claim 1, characterized in that a counter surface (14) is arranged at the transition between the first bore section (12) and the second bore section (13).

25

3. Drive section according to claim 2, characterized in that the perpendicular on the counter surface (14) is arranged in axial direction of the drive section (2).

4. Drive section according to at least one of claims 1 till 3, characterized in that both bore sections (12, 13) have a substantial cylindrical shape.
5. Drive section according to claim 4, characterized in that the first bore
5 section (12) has a plane surface.
6. Drive section according to claim 4, characterized in that the second bore
section (13) has a thread machined into the surface of the bore section
(13).
10
7. Drive section according to at least one of claims 1 till 6, characterized in
that the hub element (4) is the wheel flange, a wheel carrying device
and/or a brake disk.
- 15 8. Drive section according to at least one of claims 1 till 7, characterized in
that the drive element (6) is a coupling, e.g. a constant velocity joint
(CVJ), which is connected with a drive shaft (28).
9. Drive section according to at least one of claims 1 till 8, characterized in
20 that torque transfer means (8, 9) are arranged at at least one axial end (3,
5) of the drive section (2) for transferring a torque between the drive
section (2) and the hub element (4) and/or between the drive section (2)
and the drive element (6).
- 25 10. Drive section according to claim 9, characterized in that the torque
transfer means (8, 9) consist of two cooperating sections (8', 8''; 9', 9'')
of the drive section (2) and the hub element (4) and the drive element (6)
respectively, which are designed form-fitted.

11. Drive section according to claim 10, characterized in that the form-fitted connection (8', 8''; 9', 9'') has a non-circular cross-section.
12. Drive section according to claim 11, characterized in that the form-fitted
5 connection (8', 8''; 9', 9'') has a flattened round cross-section, specifically an oval cross-section.
13. Drive section according to claim 11, characterized in that the form-fitted connection (8', 8''; 9', 9'') has a spline form.
10
14. Drive section according to at least one of claims 9 till 13, characterized in that the drive section (2) has a male part (8') which meshes with a corresponding female part (8'') at or in the hub element (4).
- 15 15. Drive section according to at least one of claims 9 till 13, characterized in that the drive section (2) has a male part (9') which meshes with a corresponding female part (9'') at or in the drive element (6).
16. Drive section according to at least one of claims 9 till 13, characterized
20 in that the drive element (2) has a female part (8') which meshes with a corresponding male part at or in the hub element (4).
17. Drive section according to at least one of claims 9 till 13, characterized
25 in that the drive element (2) has a female part (9') which meshes with a corresponding male part at or in the drive element (6).
18. Drive section according to at least one of claims 1 till 17, characterized in that the at least one raceway (10, 11) is machined into the material of the drive section (2).

19. Drive section according to claim 18, characterized in that the drive section (2) has two equal raceways (10, 11) spaced apart in axial direction.

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20. Drive section according to claim 18, characterized in that the drive section (2) has two different raceways (10, 11) spaced apart in axial direction.

10 21. Drive section according to at least one of claims 2 till 20, characterized in that the drive section (2) and the drive element (6) are connected by means of a bolt (16), wherein the bolt head (17) contacts the counter surface (14).

15 22. Drive section according to at least one of claims 6 till 21, characterized in that the hub element (4) and the drive section (2) are connected by means of a bolt (18), wherein the thread (19) of the bolt (18) is engaged with the thread of the second bore section (13).

20 23. Drive section according to at least one of claims 1 till 22, characterized in that the drive section (2) and at least one outer ring (20, 21) and rolling elements (22, 23) form a self contained bearing unit (24).

24. Drive section according to claim 23, characterized in that the self
25 contained bearing unit (24) is pre-adjusted, specifically pre-loaded.

25. Drive section according to claim 23 or 24, characterized in that the self contained bearing unit (24) is lubricated and sealed (25, 26).

26. Drive section according to at least one of claims 1 till 25, characterized in that the bearing arrangement (1) is a two-row ball or roller bearing arrangement or a combination of these.

5 27. Drive section according to claim 26, characterized in that the bearing arrangement (1) is a two-row annular contact ball bearing arrangement.

28. Drive section according to claim 27, characterized in that the bearing arrangement (1) is arranged in an O-configuration.

10

29. Drive section according to at least one of claims 26 till 28, characterized in that the raceways (10, 11) of the two rows of balls or rolling elements of the bearing arrangement (1) have different diameters.

15 30. Drive section according to at least one of claims 26 till 28, characterized in that the raceways (10, 11) of the two rows of balls or rolling elements of the bearing arrangement (1) have equal diameters.

20 31. Drive section according to claim 30, characterized in that the diameter of the raceway (10) adjacent to the outboard side (15) is the bigger one.

32. Drive section according to at least one of claims 23 till 31, characterized in that the at least one outer ring (20, 21) of the bearing arrangement (1) is stationary.

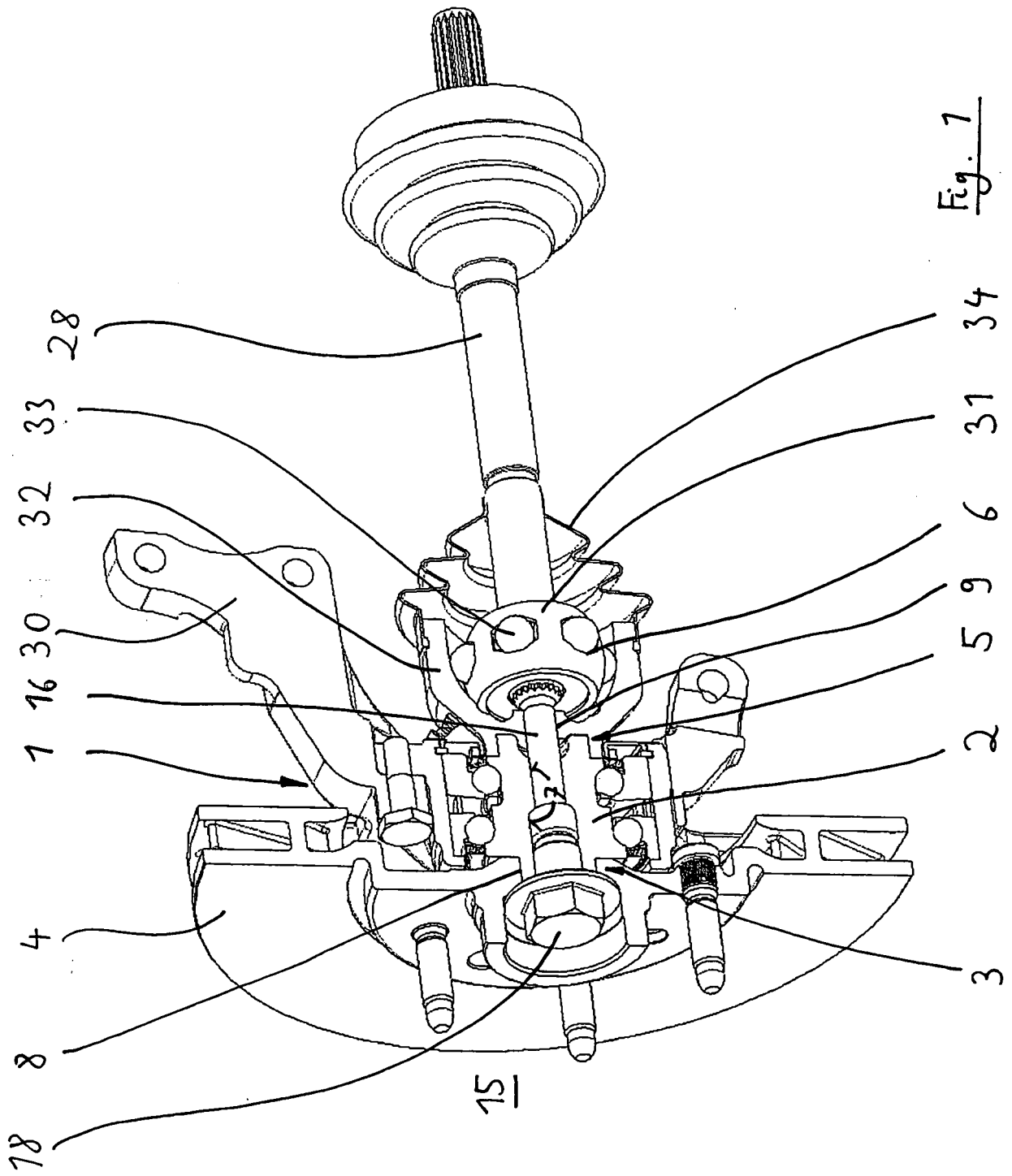
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33. Drive section according to at least one of claims 1 till 32, characterized in that at least one sensor element is located in or at the bearing arrangement (1).

34. Drive section according to at least one of claims 1 till 33, characterized in that it has at least one hole for passing through a gas, specifically air, and for controlling and/or monitoring the pressure in a tire.

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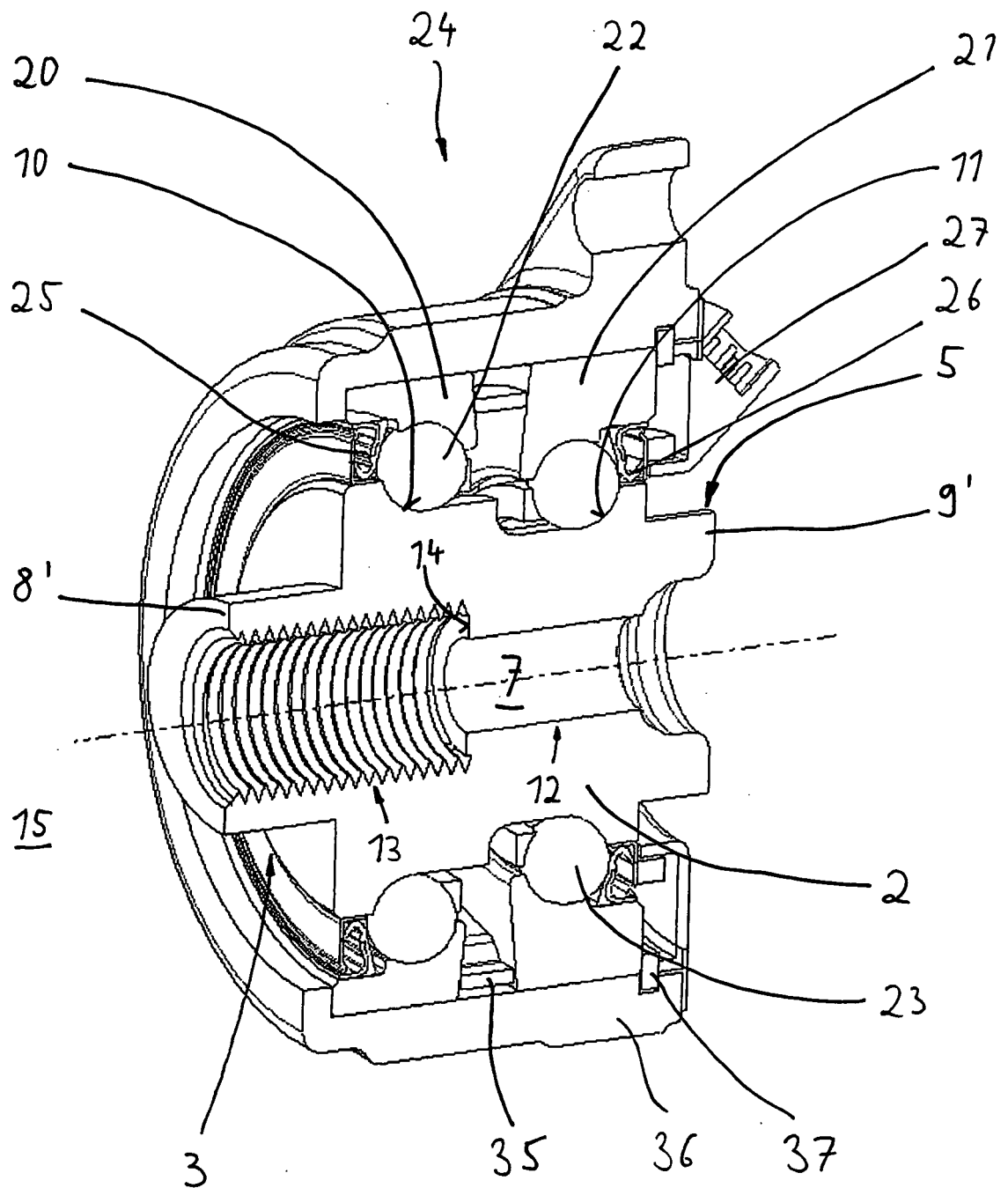
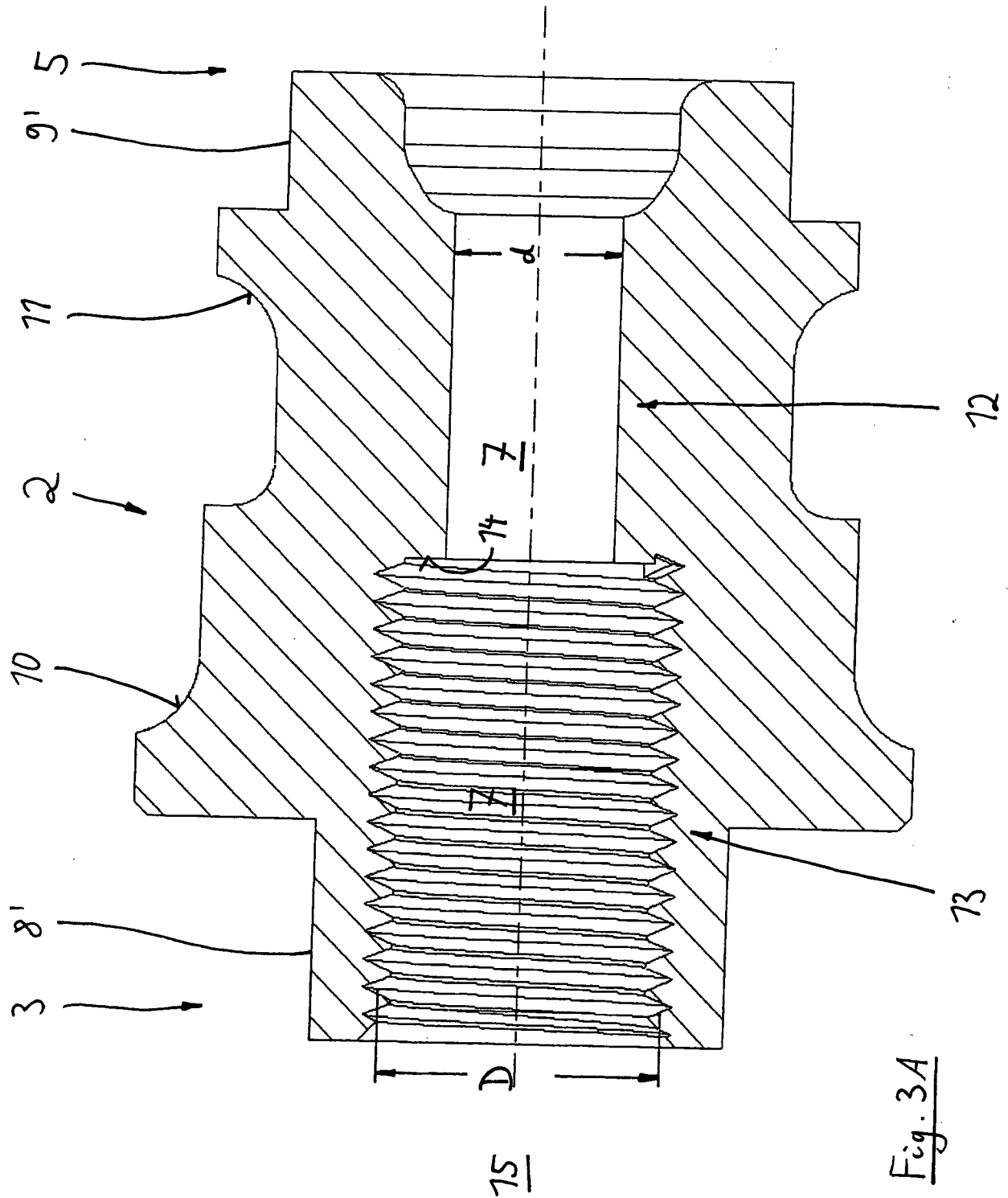
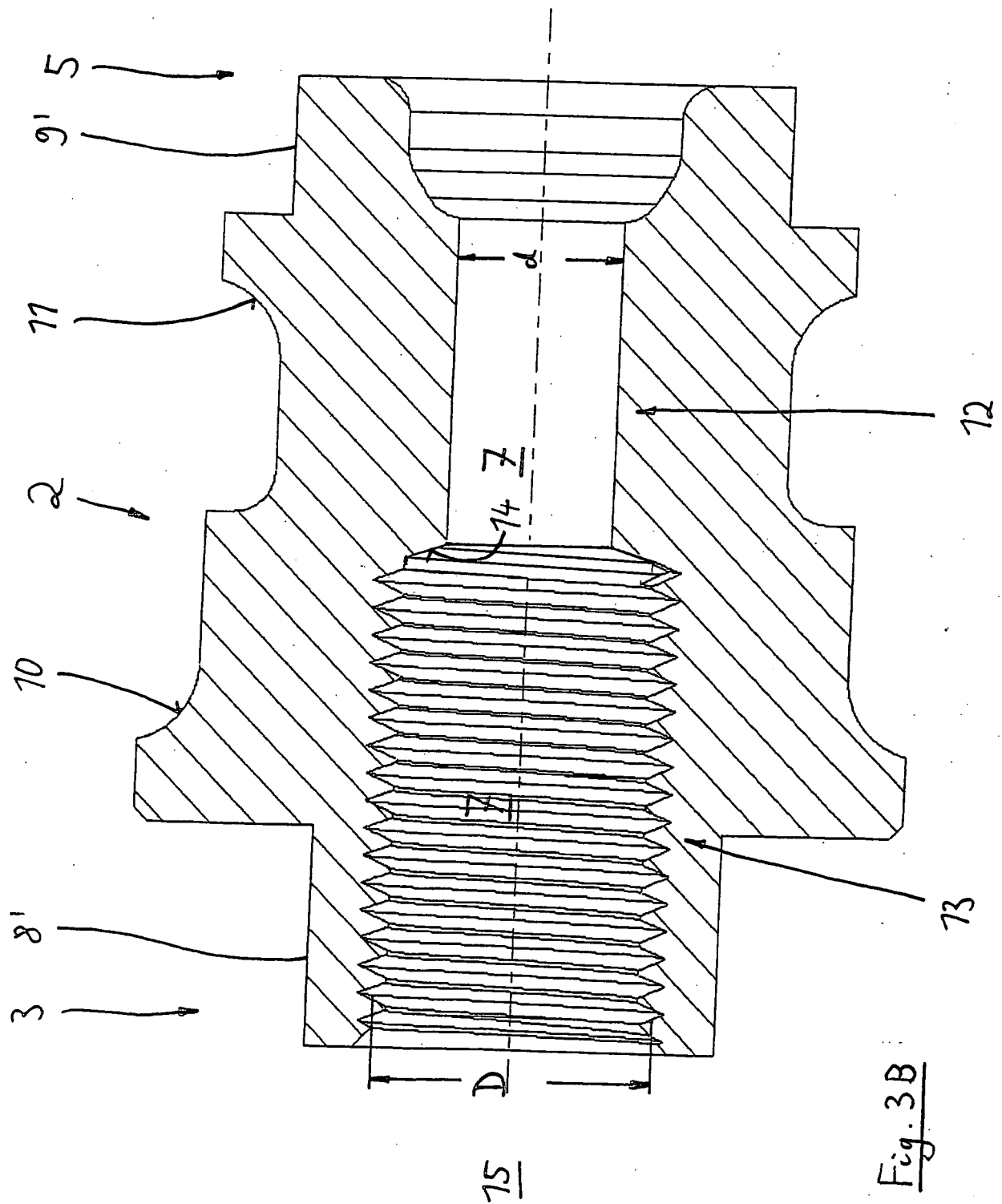


Fig. 2





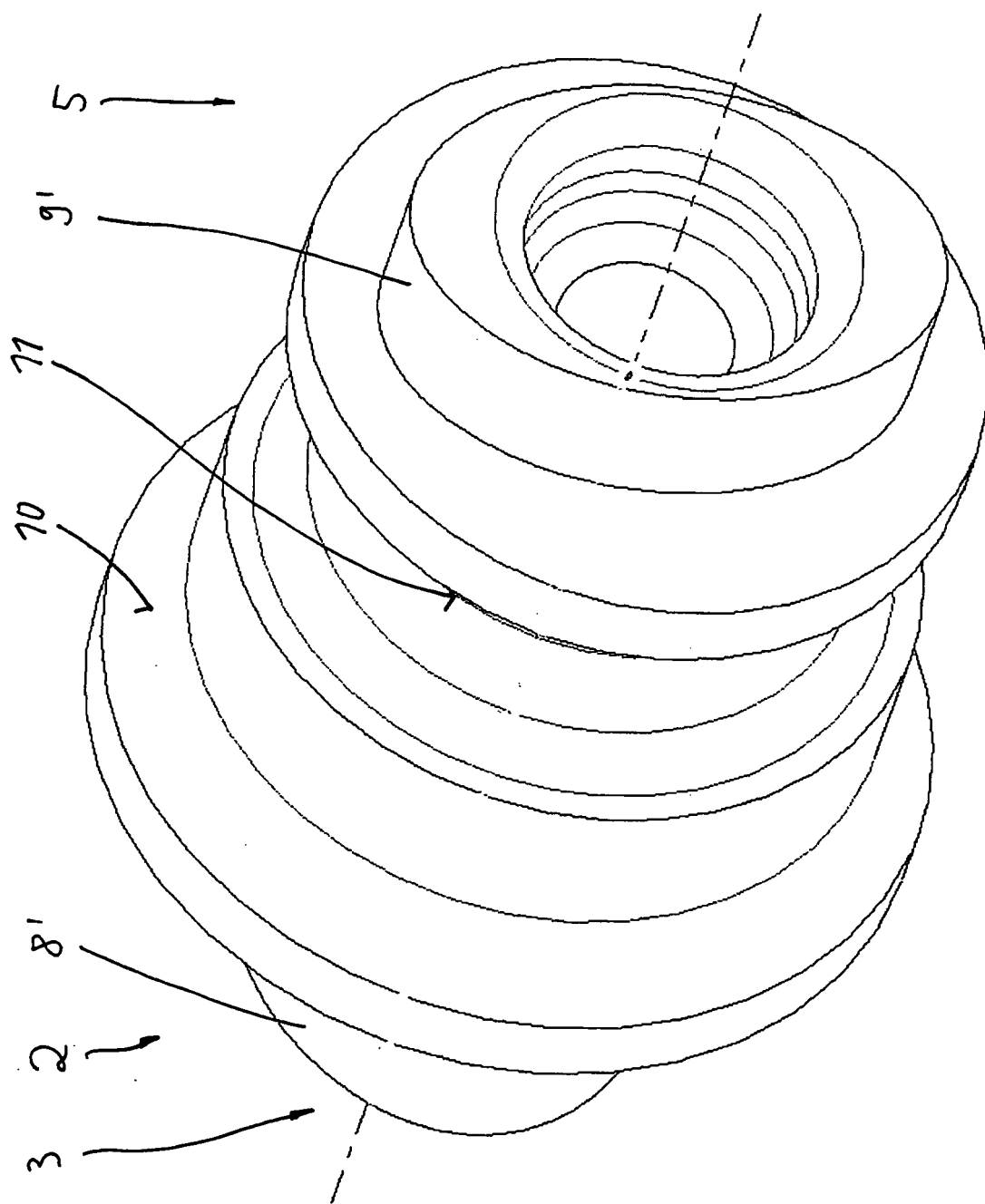


Fig. 4A

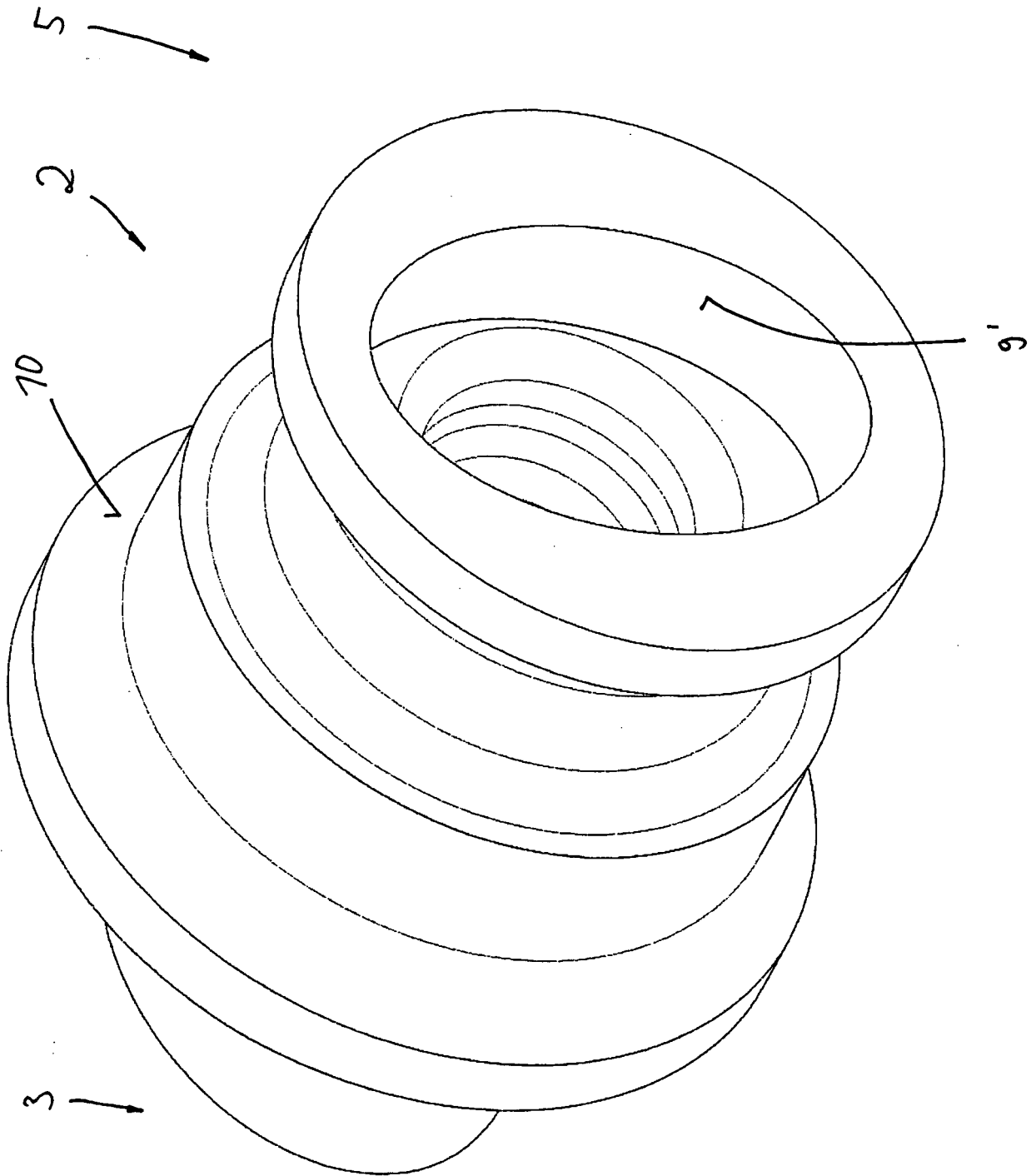


Fig. 4B

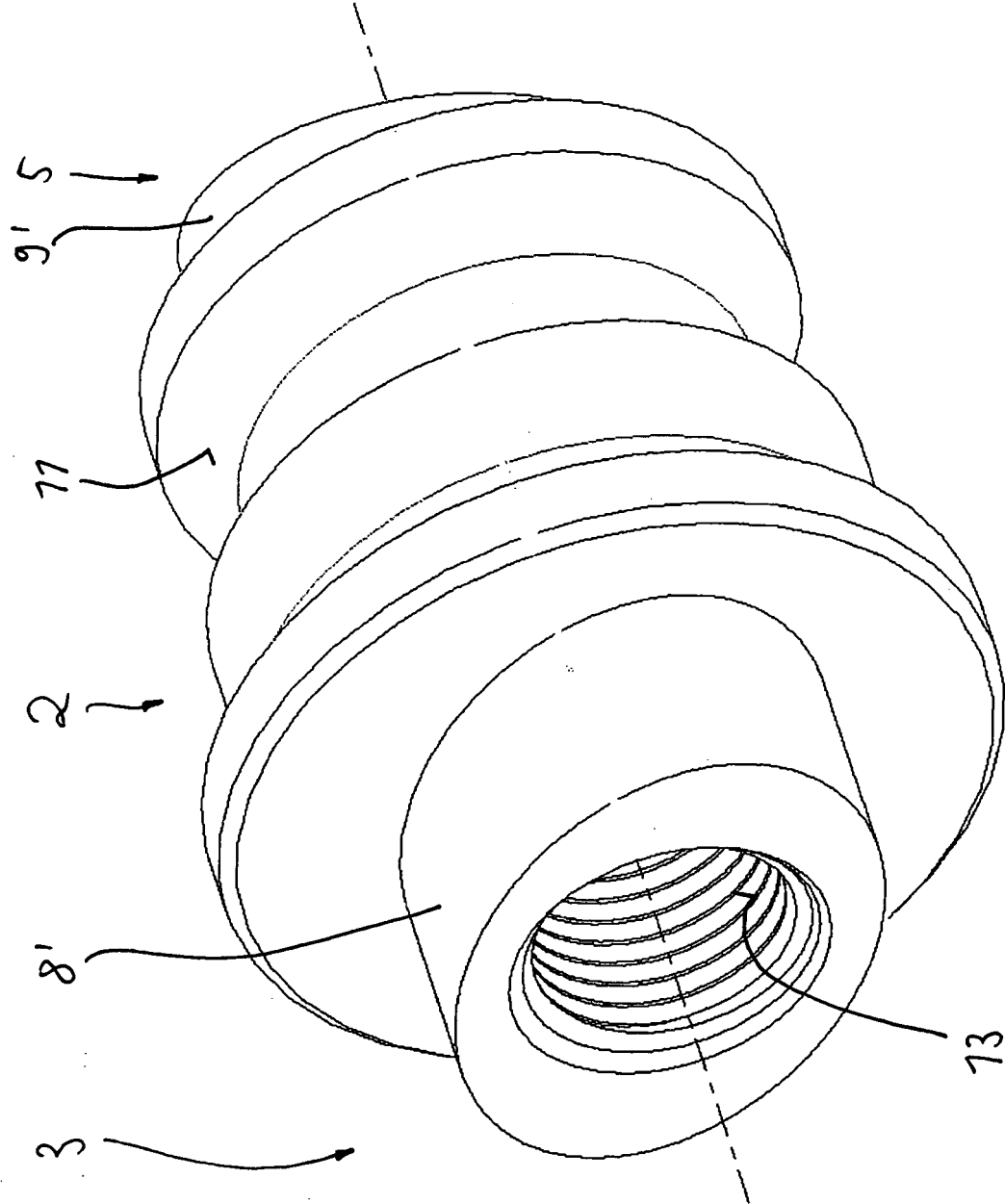


Fig. 5A

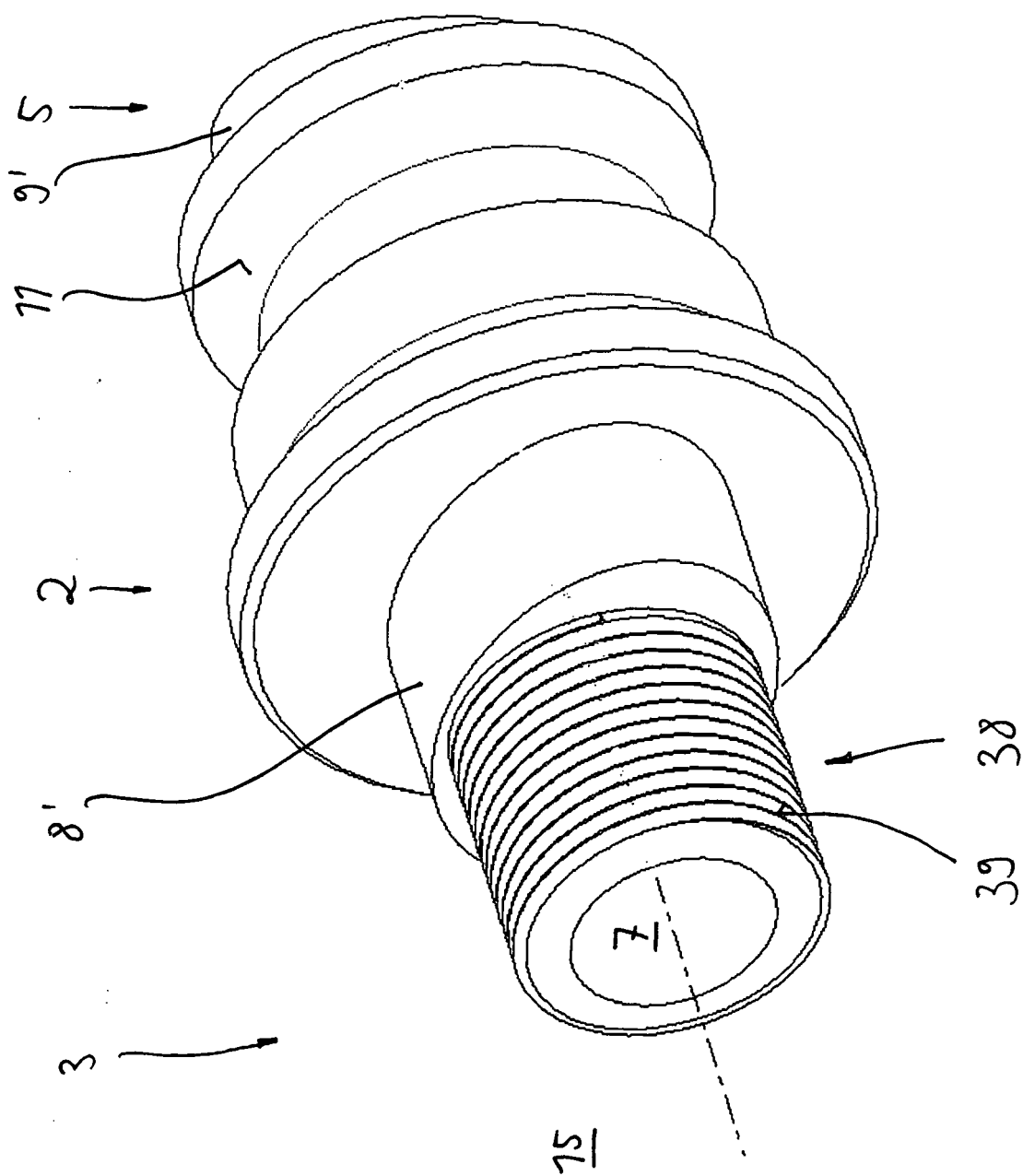


Fig. 5B

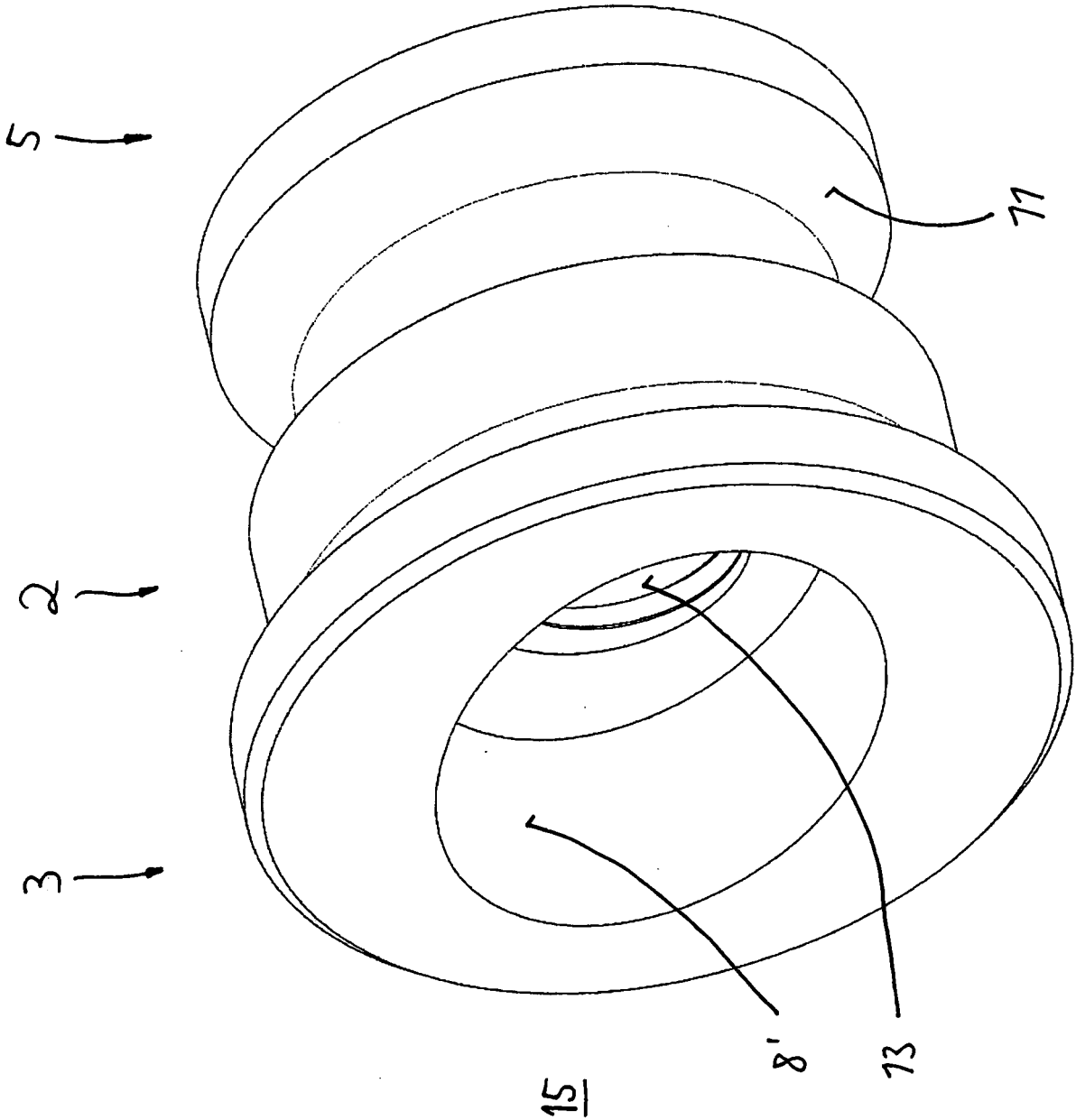


Fig. 5C

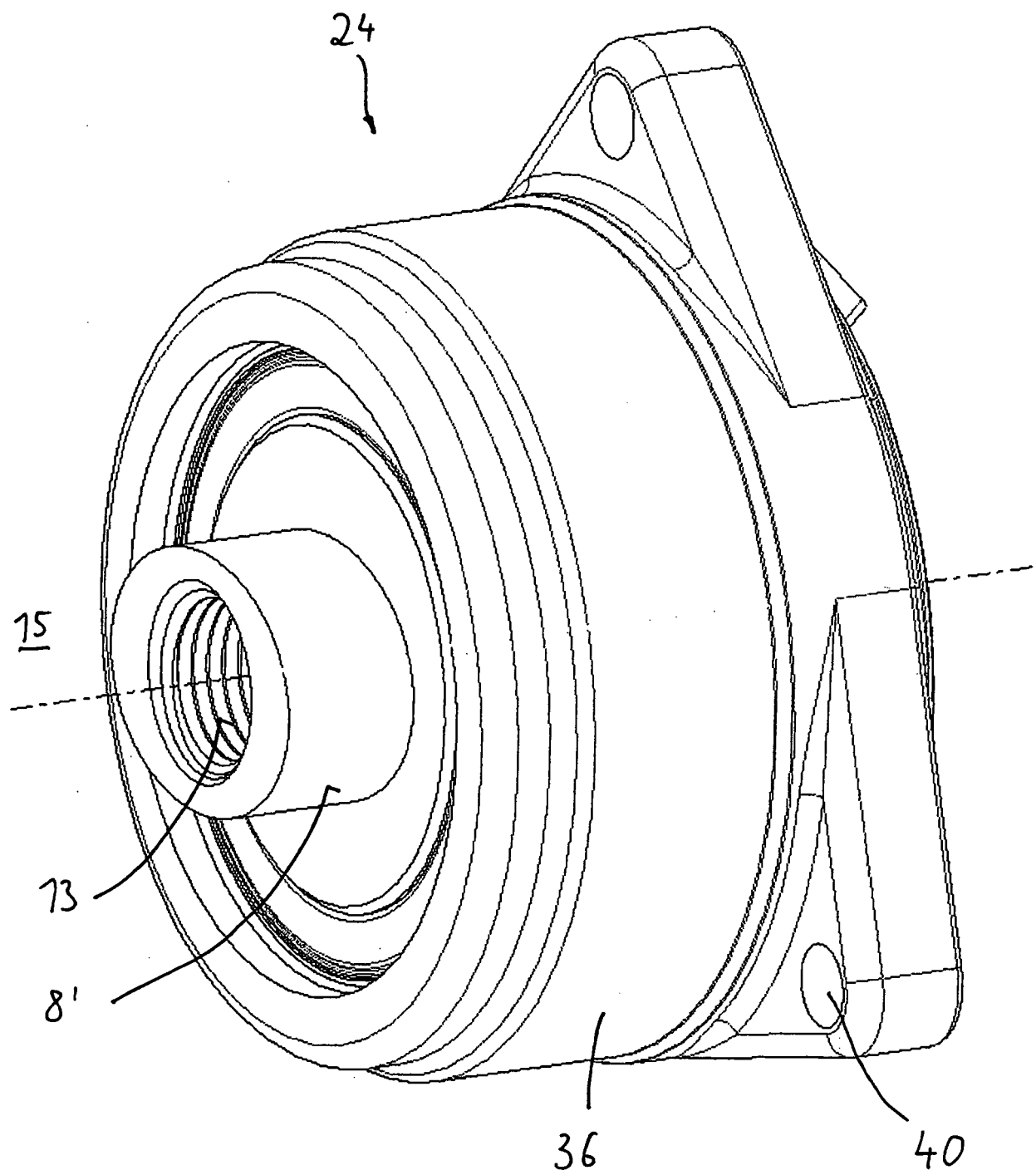


Fig. 6A

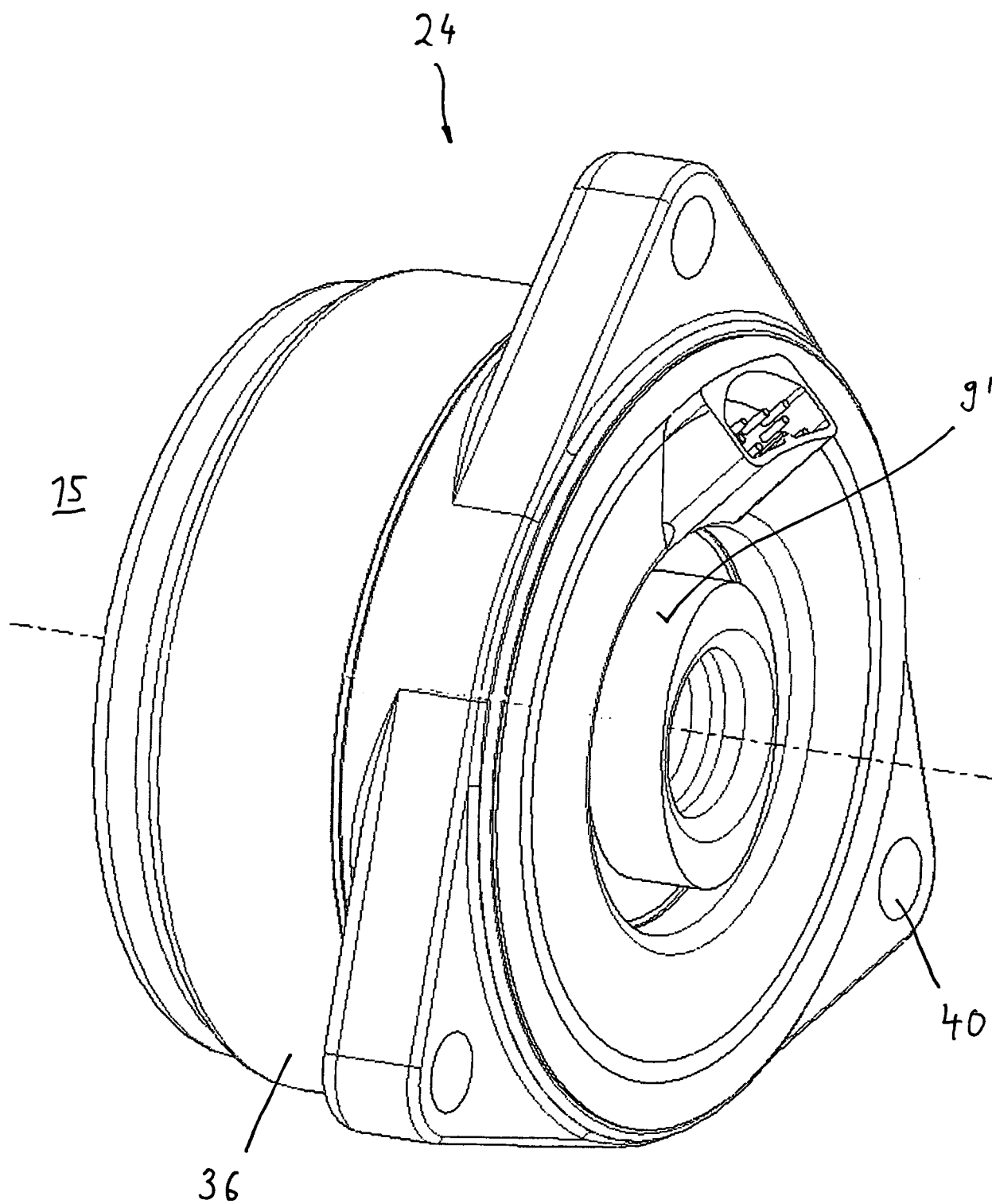


Fig. 6B

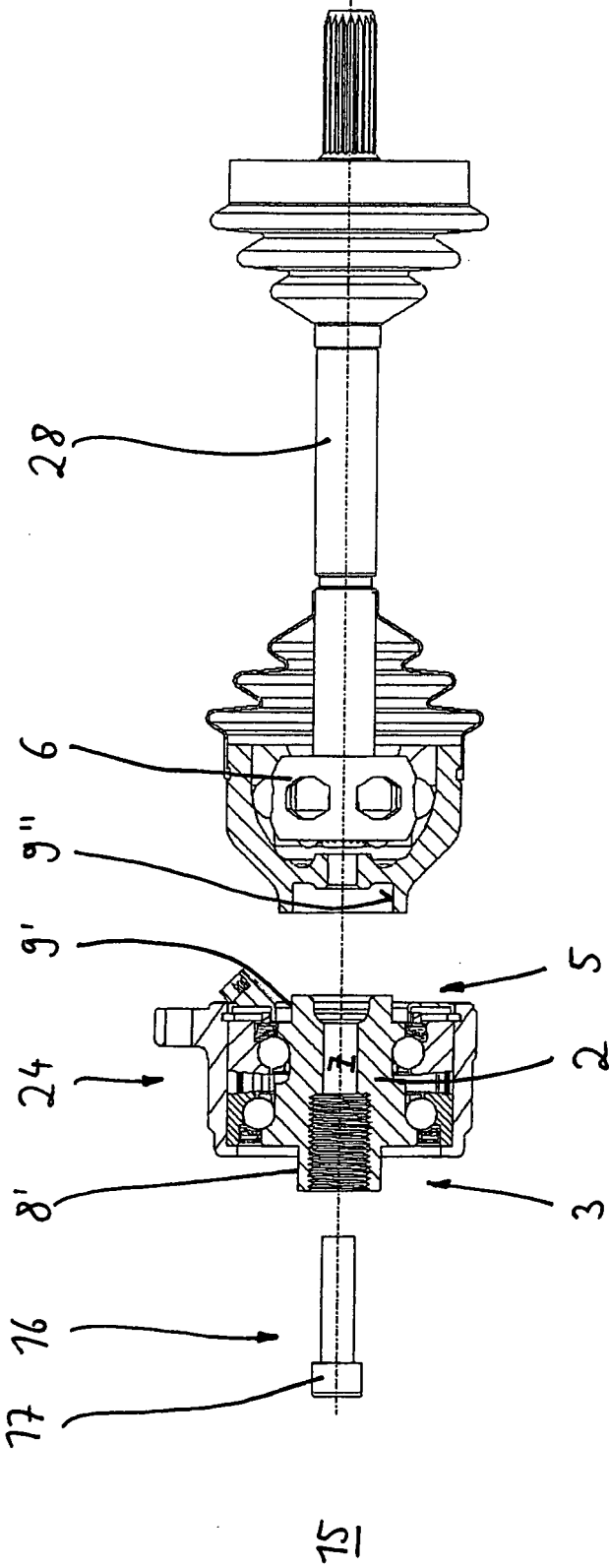


Fig. 7A

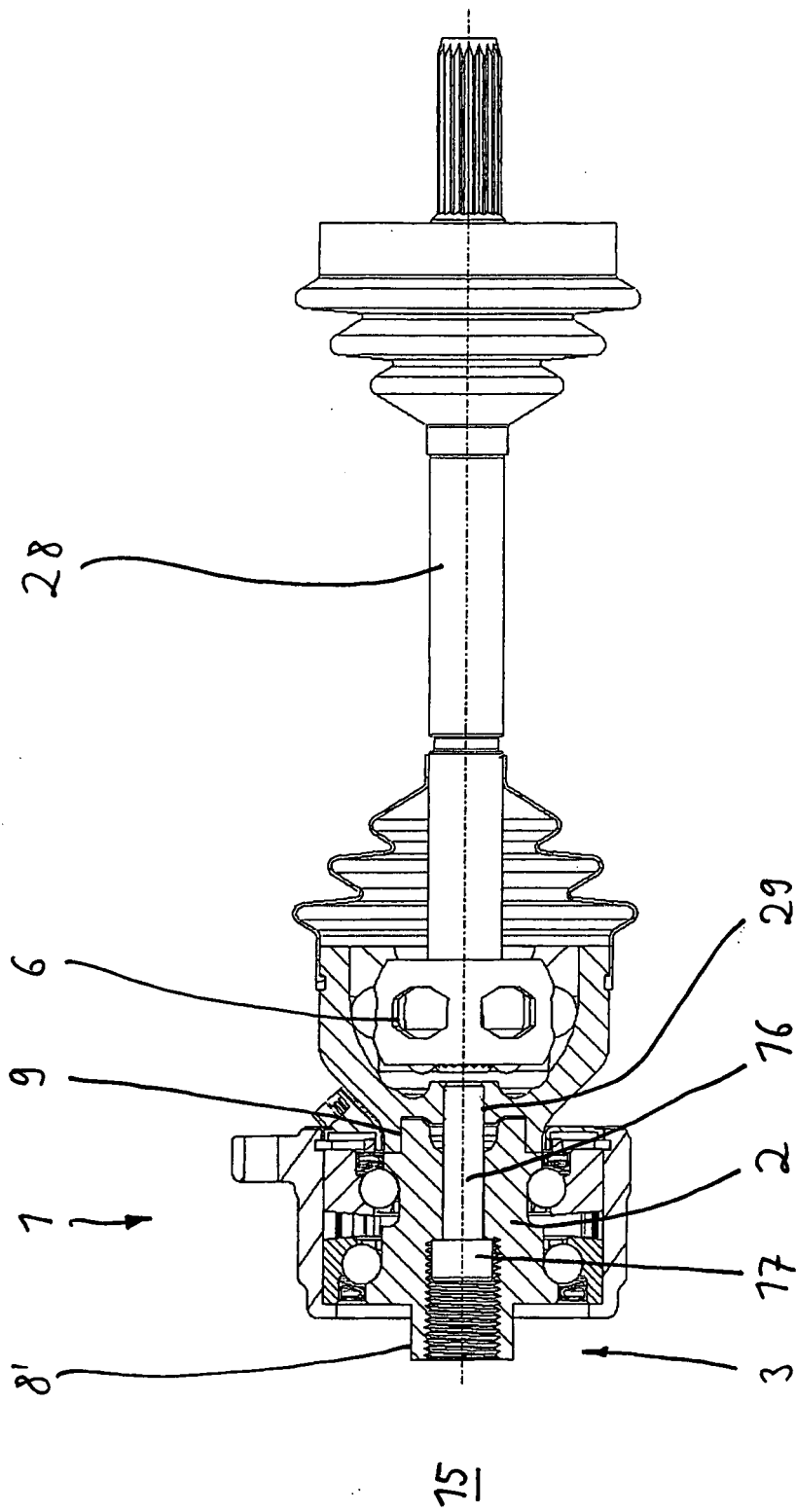


Fig. 7B

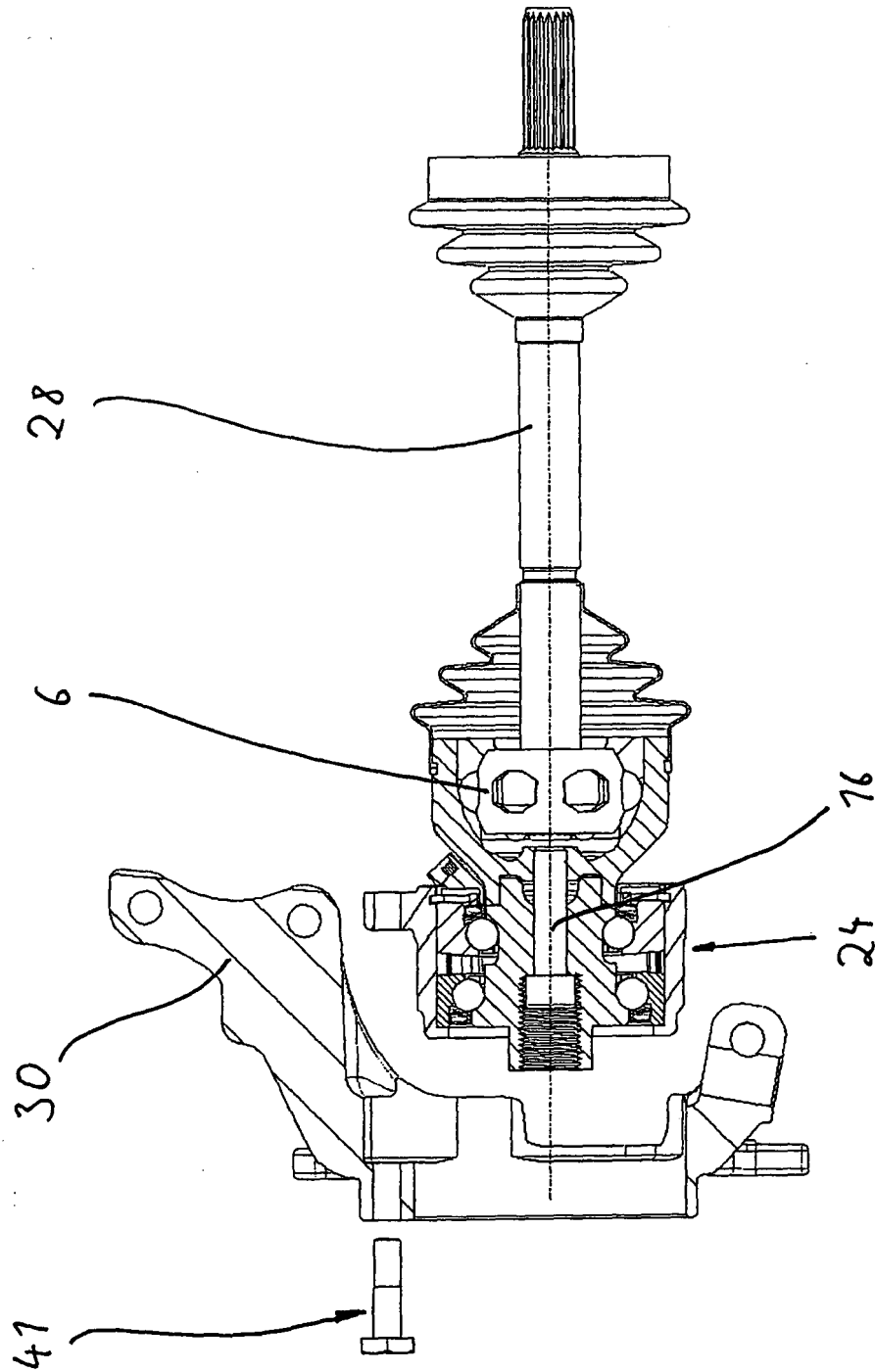


Fig. 8A

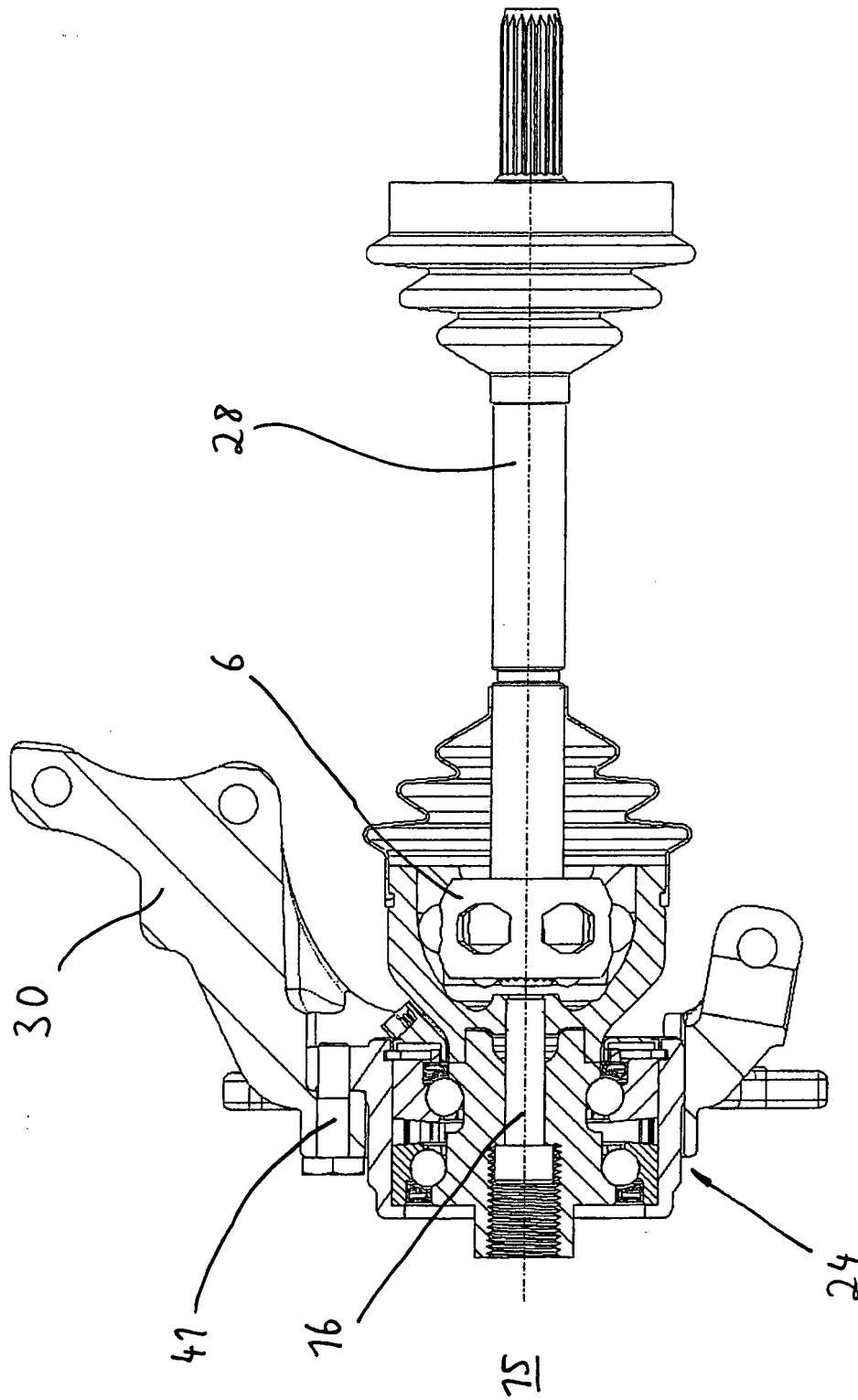


Fig. 8B

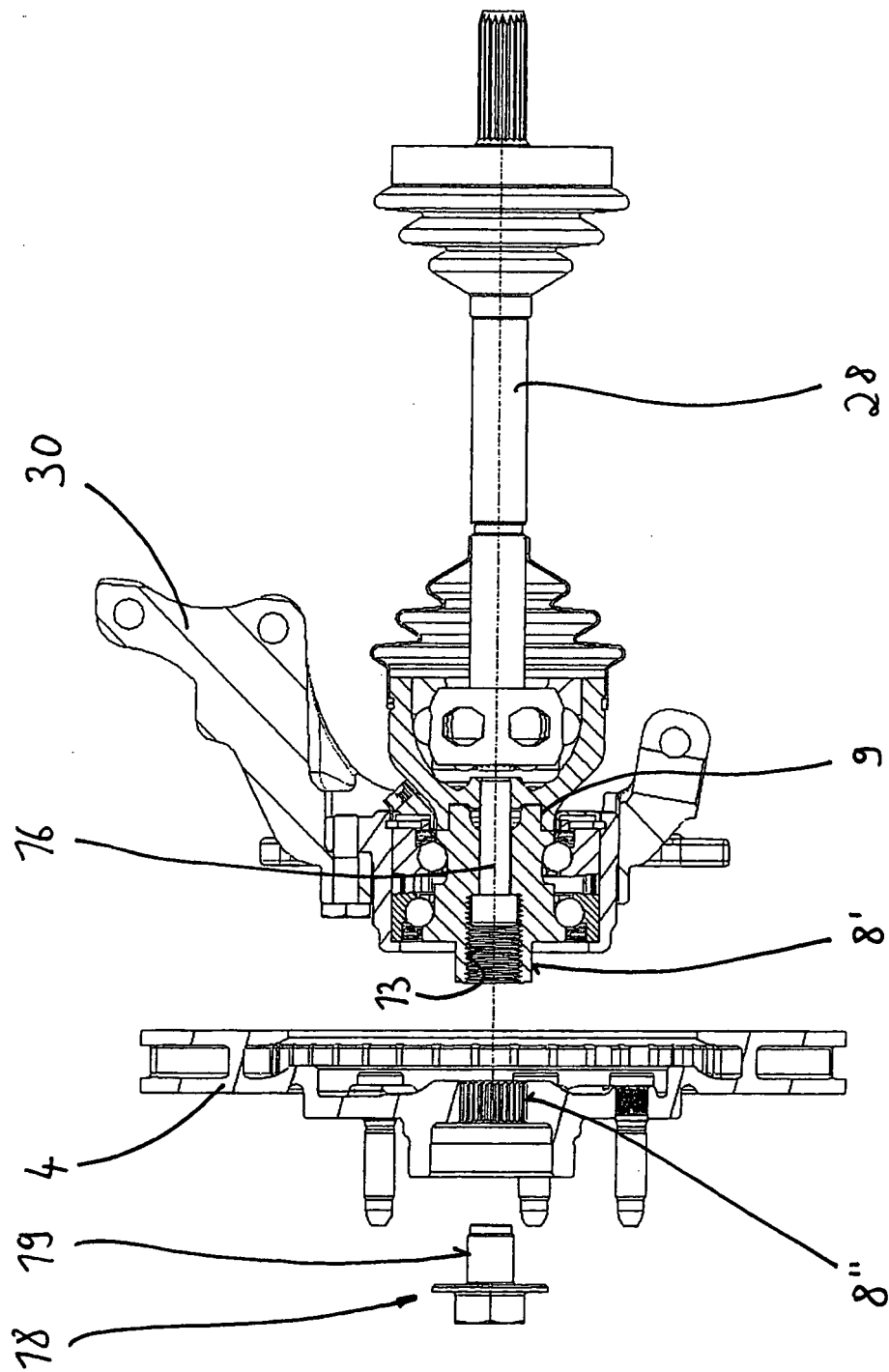


Fig. 9A

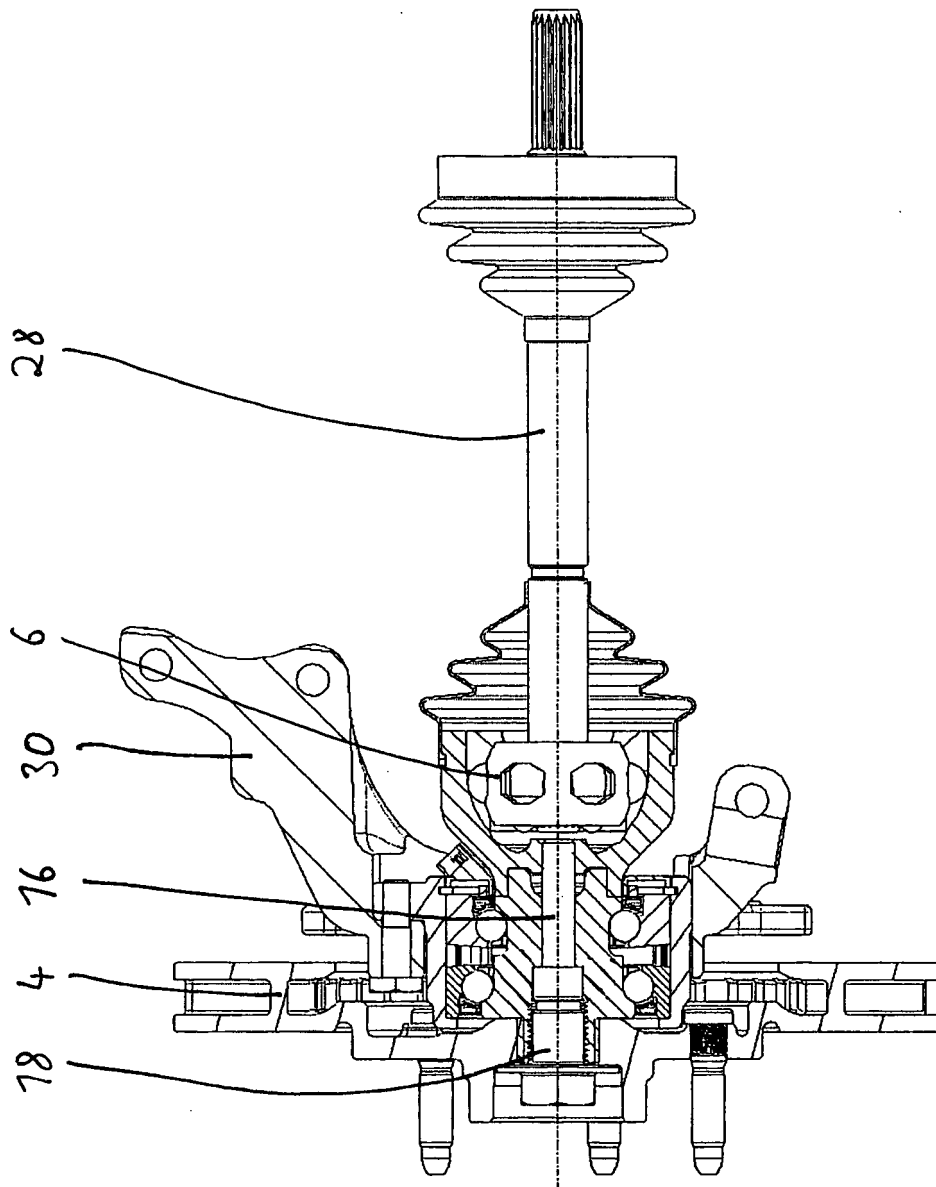


Fig. 9B

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2006/006211

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60B27/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 450 585 B1 (KOCHSIEK GUIDO [DE]) 17 September 2002 (2002-09-17) cited in the application	1-12, 14-17, 19,22, 25-28, 30,32
Y	the whole document	20,29, 33,34
X	EP 0 653 315 A1 (SKF IND TRADING & DEV [NL]) 17 May 1995 (1995-05-17)	1-5, 7-10,14, 16,18, 19,21, 23-28, 30,32
	the whole document	
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

21 February 2007

Date of mailing of the international search report

06/03/2007

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Hassiotis, Vasilis

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/006211

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	EP 1 234 690 A2 (MERITOR HEAVY VEHICLE TECH [US] ARVINMERITOR TECHNOLOGY LLC [US]) 28 August 2002 (2002-08-28) figure 1	34

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Information on patent family members

International application No

PCT/EP2006/006211

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