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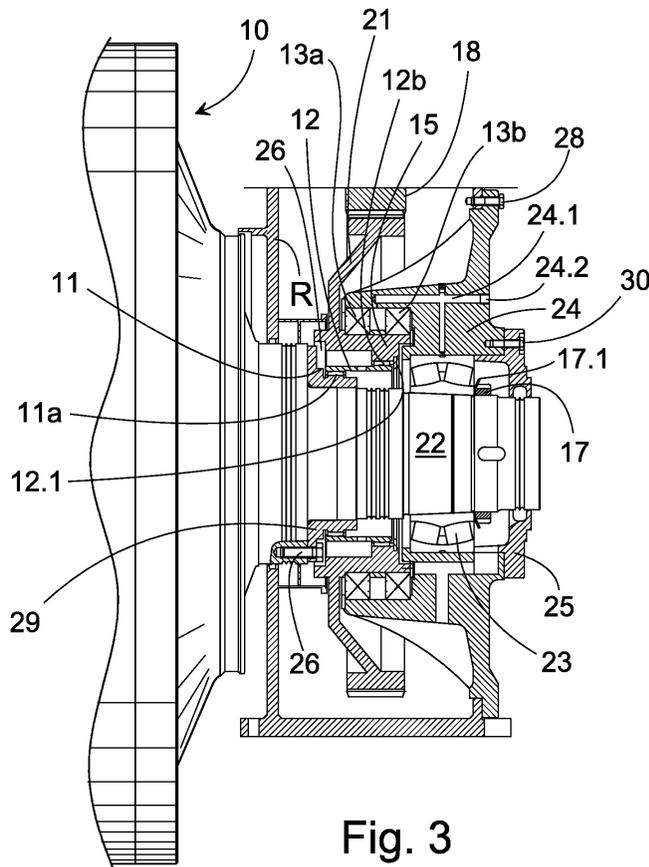
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(54) **Drive of a cylinder or a roll for a paper or board machine**

(57) The invention relates to a drive of a cylinder or equivalent (10) in a paper or board machine, in which the main gear wheel (21) driving the cylinder shaft (22) and centrally mounted in relation thereto is rotably mounted with bearings to the casing body (R) and con-

nected to the shaft via a gear coupling. The main gear wheel (21) with bearings (13a, 13b) is mounted to the bearing cap (24) of the casing body, allowing it to be replaced together with the gear coupling with the main gear wheel fixedly mounted on the shaft.



**Fig. 3**

## Description

**[0001]** The invention relates to a drive of a cylinder/roll in a paper or board machine, comprising

- a casing body,
- bearings mounted in the casing body and its bearing cap for supporting the cylinder/roll rotably by its shaft,
- a main gear wheel driving the shaft and arranged centrally in relation thereto, rotably mounted with bearings to the casing body,
- a gear coupling coupled between the shaft and the main gear wheel driving the shaft for eliminating misalignment in relation to the main gear wheel, with the gear coupling comprising internal toothing of the coupling fixedly mounted on the shaft and external toothing of the coupling mounted to the main gear wheel,
- single-stage or multi-stage gearing mounted to the casing body. The invention also relates to a replacement kit for changing the main gear wheel.

**[0002]** Finnish patent 62575 proposes a traditional paper machine dryer cylinder group drive, in which the drive of several cylinders is integrated together. The shaft of each cylinder is rotated by the main gear wheel and the entire group is rotated by one drive shaft. A small gear wheel arranged on this rotates a selected idle gear, from which the draw is distributed to the nearest main gear wheels via the idle gears and further to the following main gear wheels via the idle gears. The shafts of the cylinders and idle gears, as well as the input shaft, are mounted with bearings to the same casing. This type of construction does not allow cylinder misalignment, which, as it has been established, appears in practice due to sagging of the foundation, for example. This problem has been technically solved in the Finnish utility patent 4507. According to it, the gear wheel rotating the cylinder shaft is mounted with bearings to the casing and coupled to the shaft via a gear coupling. The gear coupling comprises internal toothing arranged in the main gear wheel, external toothing related to the shaft and a sleeve shaft with corresponding toothing between these. The toothings of the gear coupling are crowned, which allows even a remarkable misalignment.

**[0003]** However, the gearing according to the utility patent 4507 is a relatively expensive solution for correcting the mere misalignment in a traditional drive. Thus a less expensive solution for the problem has been required.

**[0004]** The object of this invention is to provide a simple solution for changing the traditional drive gear into a construction allowing misalignment of the cylinder shaft. The characteristic features of the invention are set forth in the appended claims. With the replacement kit according to the invention, the main components of the existing drive gear are utilized, which makes the repair

financially feasible. The maintenance of the main bearing and the main gear wheel of the drive gear according to the invention is easy. New drives do not more require an expensive welded bearing housing in the casing body for the main gear wheel.

**[0005]** The driving gear wheel and bearing cap are most preferably arranged to be mounted in place of the corresponding components of a traditional drive gear, and instead of a traditional main gear wheel, the internal part of the gear coupling is mounted on the shaft. These assemblies are followed by mounting of the sleeve shaft and main bearing of the gear coupling. Most preferably, an integral bearing cap comprises bearing housings for both the cylinder shaft and the main gear wheel, but the bearing cap may also be assembled of parts. What is essential here is that all the bearings of the main gear wheel are mounted in the bearing housing of the bearing cap, in which case no changes are required in the casing frame.

**[0006]** The replacement kit according to the invention can utilize the main bearing, the housing cap and some smaller components of the old casing gear.

**[0007]** The invention is described below by making reference to the enclosed drawings, in which

Figure 1 is a front view of a traditional drive of a paper machine dryer group

Figure 2 is a cross-sectional view along line A-A of Figure 1

Figure 3 shows a modification of the drive according to the invention

Figure 4a shows a drive in a ready state for receiving the replacement kit

Figure 4b shows one replacement kit for changing the main gear wheel and for mounting the gear coupling.

**[0008]** A traditional drive of a cylinder/roll in a paper or board machine according to Figures 1 and 2 is set forth for example in the above-mentioned patent FI 62575. A drive according to the Finnish patent application 20035025 (HM U20040062) is also applicable. In Figures 1 and 2 the casing body is referred to with letter R and the cylinder with reference number 10. In the casing, visible to the outside remains the bearing cap 34 and the housing cap 24 therein. Figure 1 shows the supply connection 34 of the drive according to the invention. In other respects the new drive does not differ externally from the traditional model. Figure 1 illustrates the mutual connection between the various drive units, which is described in more detail in the referenced disclosures. The drives are connected together by their flanges 14. The drive is transmitted, using a single-stage or multi-stage gearing, to one of the idle gears, which thus drives the entire group (not shown).

**[0009]** Referring to Figure 2, the shaft of the dryer 10 has in the traditional model a main gear wheel 21' fixedly mounted with bolts 26' to the flange 29 of the shaft 22.

The main gear wheels 21' are connected via the idle gears 18. The shafts 19 of these are supported with bearings 20, which are further supported to the frame R by means of their bearing housings. The bearing cap 24' of the traditional model, being a functional component of the casing body R, supports the bearings 23 of the shaft 22. In this type of design the tooth contact of the main gear wheel 21' to the idle gear 18 does not remain within allowed limits, if misalignment appears in the shaft. In this case the drive can be modified as per Figure 3 by using the replacement kit according to Figure 4.

**[0010]** The bearing housing cover 25 is removed from the construction according to Figure 2 (after removing the bearing load by supporting the cylinder), which allows access for unscrewing the nut 17 that keeps the bearing in place and for removing the locking ring 17.1. After this the bearing 22 can be withdrawn from its housing. Next the bearing cap 24' is opened, which allows access to removing the old main gear wheel 21', which is fastened with bolts 26' to the flange 29 of the shaft 22.

**[0011]** After inspection, it is possible to start mounting the replacement kit of Figure 4b to achieve the state according to Figure 4b. The assembly order is as per Figure 4b. First the internal part 11 of the gear coupling is fastened with bolts 26 to the flange 29 of the shaft 22. Then the new bearing cap 24 with the new main gear wheel 21 is axially pushed in. The new bearing cap 24 can be fastened using the old bolts 28. Then comes the turn of the shaft sleeve 12 of the gear coupling, which is simply axially pushed in place. This couples the toothings 12a and 12b with the toothings 11a and 15a. This is locked axially with a retainer ring 12.1. Next the old bearing 23, its locking ring 17.1 and lock nut 17 can be mounted in place. Finally, the old housing cover 25 is mounted in place.

**[0012]** It is understood by those skilled in the art that the invention can be modified in many ways within the scope of the inventive idea. The gear coupling, for example, may be of some other type than the one proposed above as long as it allows axial assembly. Similarly, the bearing assembly of the bearing cap and the main gear wheel can be of a different type than those above.

## Claims

1. A drive of a cylinder/roll (10) in a paper or board machine, comprising

- a casing body (R),
- bearings (23) mounted in the casing body (R) and its bearing cap (24) for supporting the cylinder/roll (10) rotably by its shaft (22),
- a main gear wheel (21) driving the shaft (22) and arranged centrally in relation thereto, rotably mounted with bearings to the casing body (R),

- a gear coupling (11a, 12, 15b) coupled between the shaft (22) and the main gear wheel (21) driving it for eliminating misalignment of the shaft in relation to the main gear wheel (21), in which the gear coupling comprises internal toothing (11a) of the coupling fixedly mounted on the shaft (22) and external toothing (15b) of the gear coupling mounted to the main gear wheel (21),
- a single-stage or multi-stage gearing mounted to the casing body (R)

**characterized in that** the main gear wheel (21) complete with bearings (13a, 13b) is mounted to the bearing cap (24) of the casing body.

2. A drive according to claim 1, **characterized in that** the bearing cap (24) and the main gear wheel (21) are arranged to be replaced with traditional drive equipment such that the old bearing cap (24'), the bearing (23) and the old main gear wheel (21') with the internal part (11) of the gear coupling disassembled are arranged to be mounted in place of the old gear wheel (21') and the new bearing cap (24) with the main gear wheels (21) is arranged to be mounted in place of the existing bearing cap (24').

3. A drive according to claim 1 or 2, **characterized in that** the bearing housing (16) supporting the main gear wheel (21) is formed in the bearing cap (24), with the main gear wheel (21) comprising a sleeve-like shaft part (15) on the side of the bearing cap (24), the outer race of each bearing (13a, 13b) being thus mounted to the bearing housing (16) and the inner race to the sleeve-like shaft part (15).

4. Drive equipment according to claim 3, **characterized in that** the bearings (13a 13b) of the main gear wheel (21) comprise two spherical ball bearings set at an interval from each other.

5. A drive according to claim 1 or 2, **characterized in that** lubrication of the shaft bearing (23) and the bearings (13a, 13b) of the main gear wheel (24) is arranged by means of lubrication channels (24.1) adapted in the bearing cap (24) and a supply connection (24.2) arranged on the outer surface thereof.

6. A replacement kit for a drive of a cylinder/roll (10) in a paper or board machine (10) for replacing the traditional rigidly fixed main wheel gear (21') with a gear wheel assembly allowing misalignment, in which drive the bearings (14) supporting the shaft (22) of the cylinder/roll (10) are mounted to the bearing cap (24') of the casing body (R), and which replacement kit comprises

- a gear wheel (11a, 12, 15b) to be mounted on the shaft of the cylinder/roll comprising internal tothing (11a), shaft sleeve (12) and external tothing (15b),
- a new driving main gear wheel (21) and external tothing (15b) of the said gear coupling related thereto, the new main gear wheel (21) being arranged to replace the said rigidly fixed gear wheel (21'),

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**characterized in that** the replacement kit also comprises a new bearing cap (24) of the casing body, which bearing cap is arranged to replace the original bearing cap (24') and to which the new main gear wheel (21) is mounted with bearings, and in which the internal part (11) of the gear coupling is arranged to be mounted in place of the old gear wheel (21').

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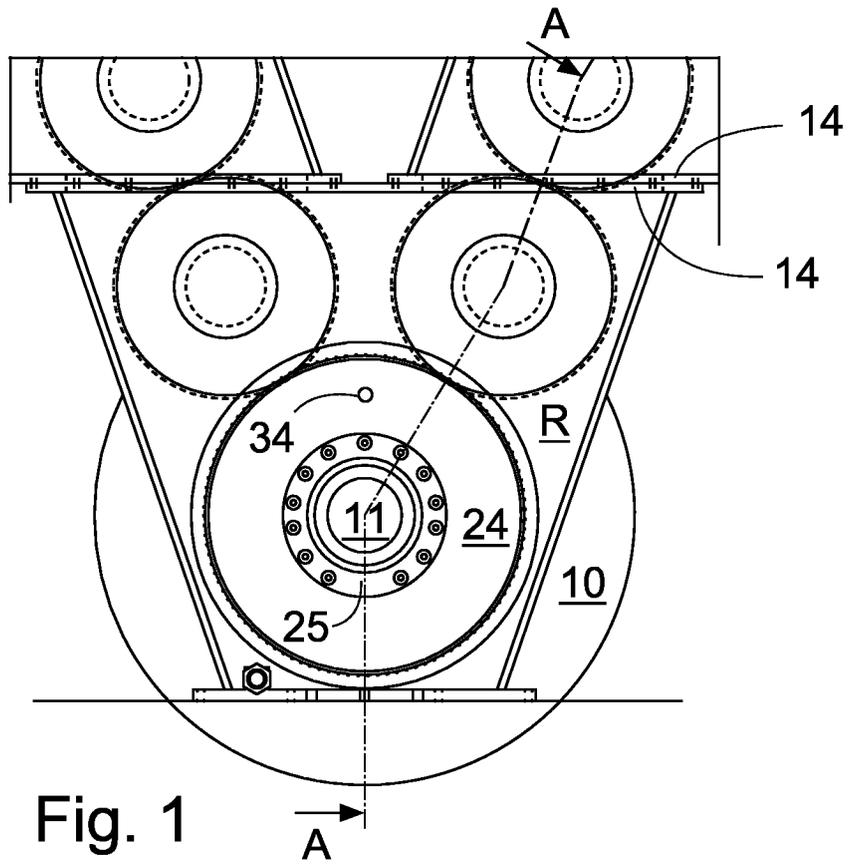
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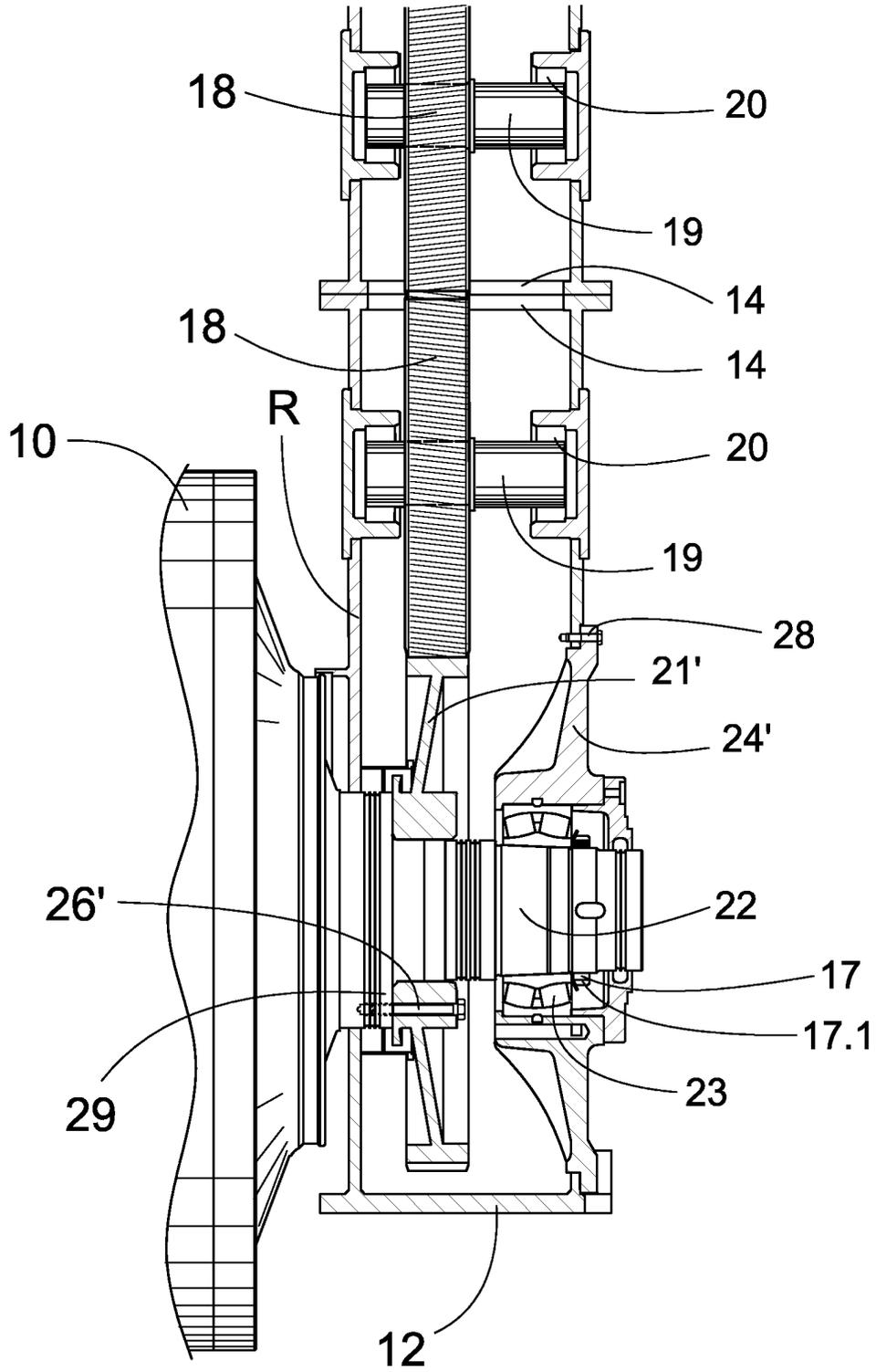


Fig. 2

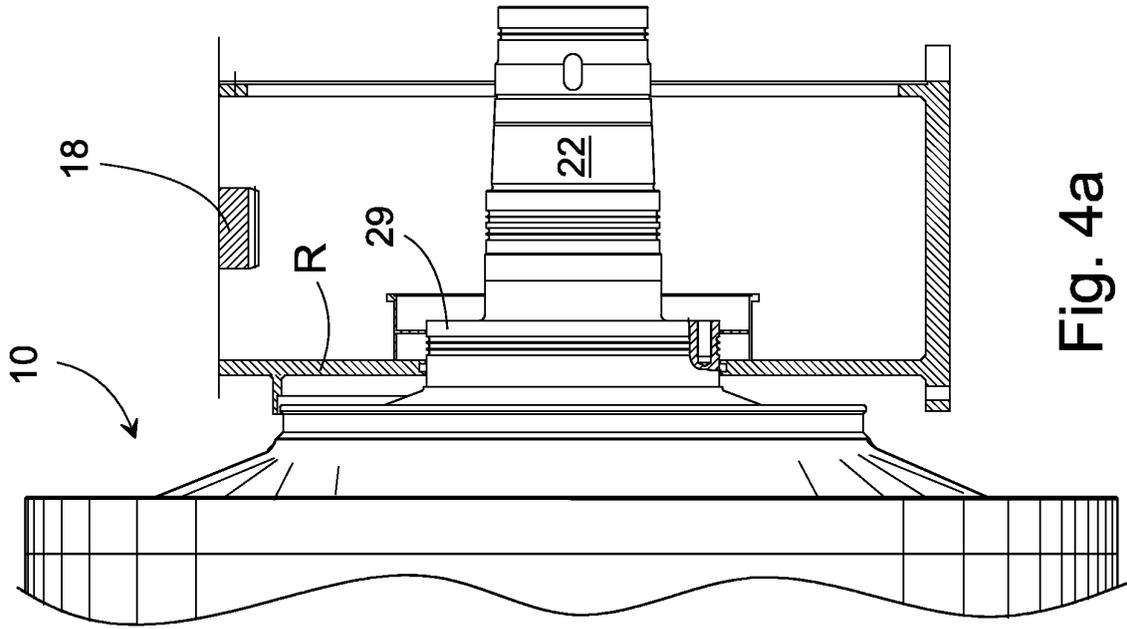


Fig. 4a

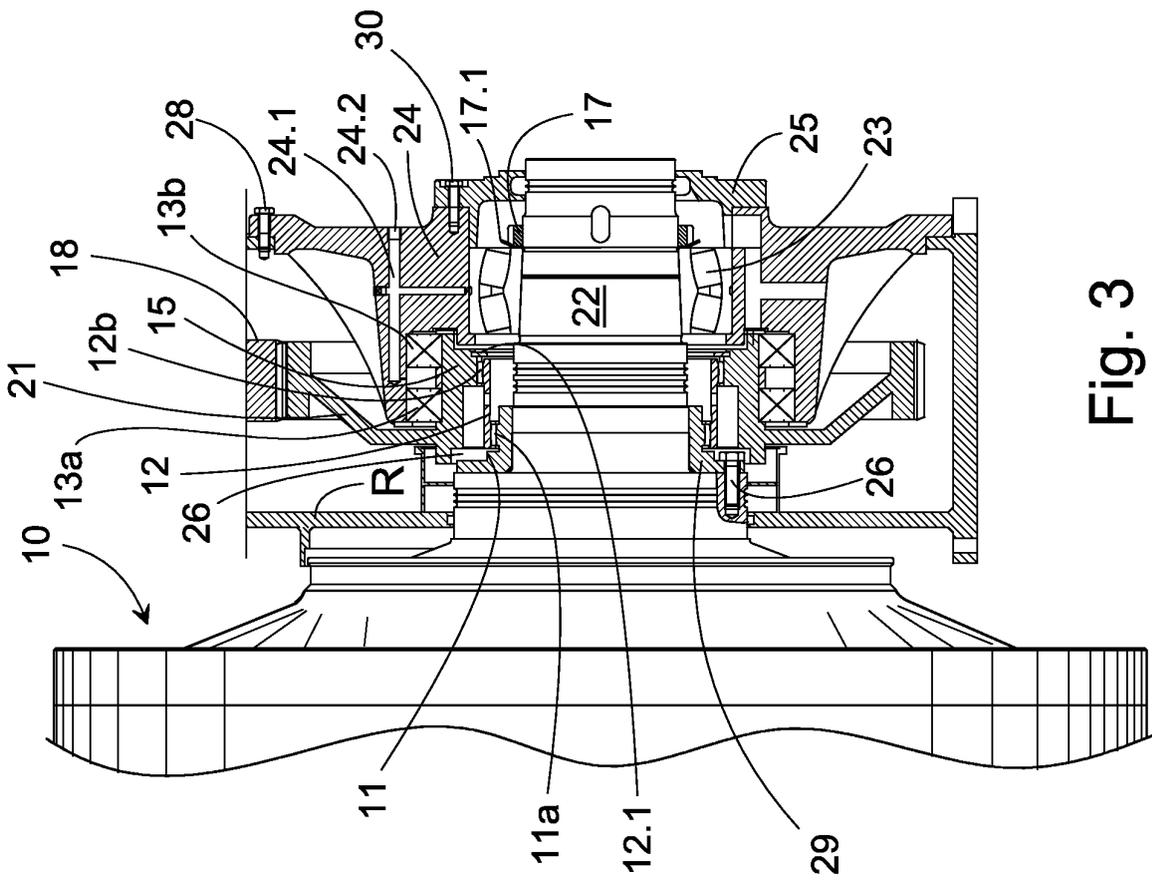
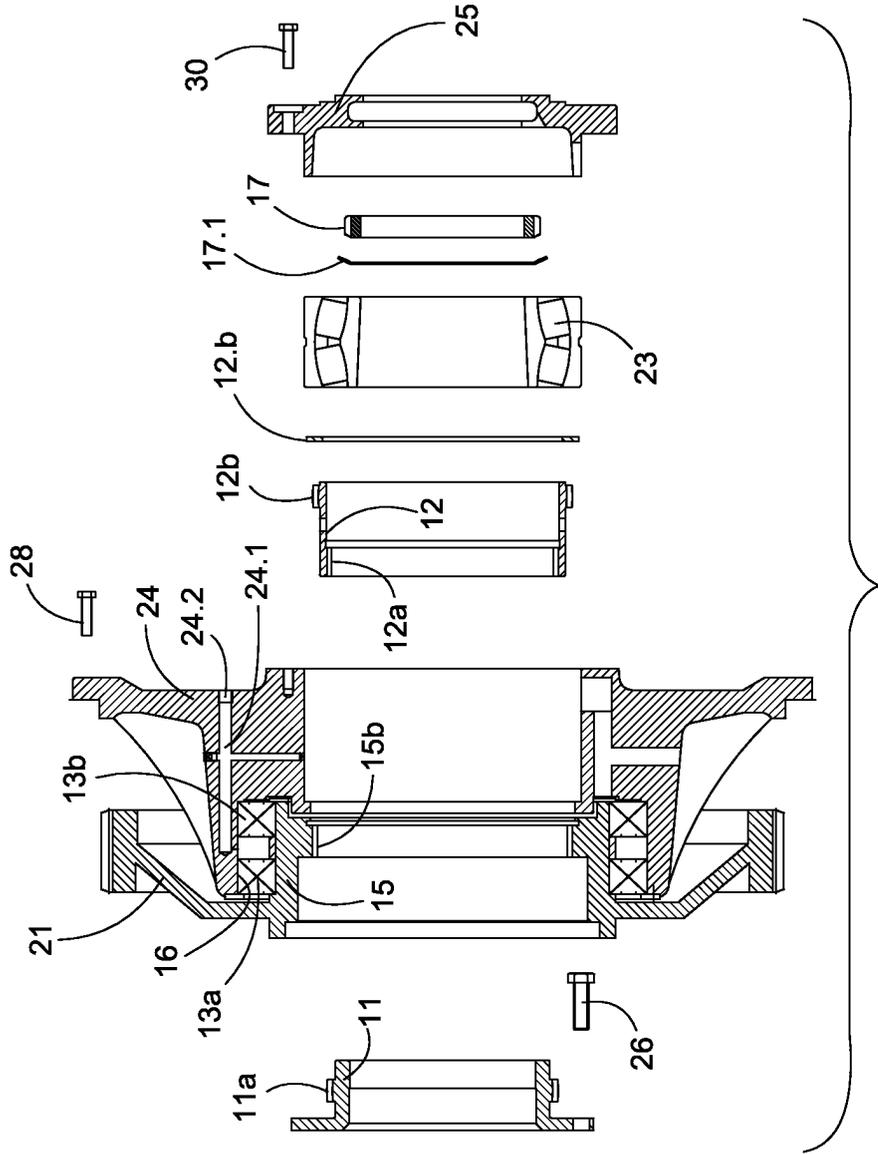


Fig. 3





European Patent  
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EUROPEAN SEARCH REPORT

Application Number  
EP 05 39 7005

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,A	US 4 597 310 A (PANTTILA ET AL) 1 July 1986 (1986-07-01) * the whole document * & FI 62 575 B (VALMET OY) 30 September 1982 (1982-09-30) -----	1,6	D21F7/02 D21G1/02
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 June 2005	Examiner Helpiö, T.
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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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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