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(54) **Drive of a cylinder or roll of a paper or board machine and replacement kit for a drive of a cylinder or roll of a paper or board machine**

Antrieb eines Zylinders oder einer Walze einer Papier- oder Kartonmaschine und Austauschsatz für den Antrieb eines Zylinders oder einer Walze einer Papier- oder Kartonmaschine

Mécanisme d'entraînement d'un cylindre ou rouleau d'une machine à papier ou carton et kit de remplacement pour un mécanisme d'entraînement d'un cylindre ou rouleau d'une machine à papier ou carton

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Description

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

- a casing body having a bearing cap,
- shaft bearings mounted in the casing body in 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 main gear wheel 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, and
- single-stage or multi-stage gearing mounted to the casing body.

[0002] The invention also relates to a replacement kit for changing the main gear wheel.

[0003] Finnish patent 62575 (corresponding to US-A-4 597 310) 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.

[0004] 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.

[0005] 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 no more require an expensive welded bearing housing in the casing body for the main gear wheel.

[0006] 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.

[0007] The replacement kit according to the invention can utilize the main bearing, the housing cap and some smaller components of the old casing gear.

[0008] 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.

[0009] 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 24 and the housing cover 25 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).

[0010] 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.

[0011] 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.

[0012] 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 15b. 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.

[0013] It is understood by those skilled in the art that the invention can be modified in many ways within the scope of the claims. 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) having a bearing cap (24),
   - shaft bearings (23) mounted in the casing body (R) in 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 main gear wheel bearings (13a, 13b) to the casing body (R),
   - a gear coupling (11a, 12, 15b) coupled between the shaft main gear wheel (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), and
   - a single-stage or multi-stage gearing mounted to the casing body (R),

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

2. A drive according to claim 1, **characterized in that** a 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 main gear wheel bearing (13a, 13b) being thus mounted to the bearing housing (16) and the inner race to the sleeve-like shaft part (15).

3. Drive according to claim 2, **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.

4. A drive according to claim 1, **characterized in that** lubrication of the shaft bearing (23) and the bearings (13a, 13b) of the main gear wheel (21) 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.

5. 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 (23) supporting the shaft (22) of the cylinder/roll (10) are mounted to a bearing cap (24') of a casing body (R),
   and which replacement kit comprises

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

the new main gear wheel (21) being adapted to be coupled to the external toothing (12b) of the shaft sleeve (12), and

- 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 main gear wheel bearings (13a, 13b), the internal part (11) of the gear wheel coupling being arranged to be mounted in place of the old gear wheel (21').

Patentansprüche

1. Für einen Zylinder/eine Walze (10) einer Papier- oder Kartonmaschine bestimmte Antriebsvorrichtung, die

   - einen Gehäusekörper (R) mit einem Lagerdekkel (24),
   - an den Lagerdeckel (24) des Gehäusekörpers (R) montierte Wellenlager (23) zum drehbaren Stützen des Zylinders/der Walze (10) an seiner/ihrer Welle (22),
   - ein die Welle (22) antreibendes und zu dieser konzentrisch angeordnetes Hauptzahnrad (21), mit den Hauptzahnradlagern (13a, 13b) drehbar montiert an den Gehäusekörper (R),
   - eine zwischen die Welle (22) und das diese antreibende Hauptzahnrad (21) geschaltete Zahnkupplung (11a, 12, 15b) zum Eliminieren der Fehlausrichtung (Winkelfehler) der Welle in Bezug auf das Hauptzahnrad (21), wobei die Zahnkupplung ein an die Welle (22) fest montiertes Kupplungs-Innenverzahnungsteil (11a) und ein an das Hauptzahnrad (21) montiertes Zahnkupplungs-Außenverzahnungsteil (15b) hat, und
   - ein an den Gehäusekörper (R) montiertes ein- oder mehrstufiges Getriebe

   umfasst, **dadurch gekennzeichnet, dass** das Hauptzahnrad (21) einschließlich der Hauptzahnradlager (13a, 13b) an den Lagerdeckel (24) des Gehäusekörpers montiert ist.

2. Antriebsvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das das Hauptzahnrad (21) tragende Lagergehäuse (16) am Lagerdeckel (24) ausgebildet ist, wobei das Hauptzahnrad (21) ein buchsenartiges Wellenteil (15) auf der Seite des Lagerdeckels (24) umfasst und der Außenring jedes der Hauptzahnradlager (13a, 13b) an das Lagergehäuse (16) und der Innenring an das buchsenartige Wellenteil (15) montiert wird.

3. Antriebsvorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Lager (13a, 13b) des Hauptzahnrades (21) zwei in einem gegenseitigen Abstand angeordnete Pendelkugellager umfassen.

4. Antriebsvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Schmierung des Wellenlagers (23) und der Lager (13a, 13b) des Hauptzahnrades (21) über im Lagerdeckel (24) angeordnete Schmierkanäle (24.1) und einen an dessen Außenseite angeordneten Zuführstutzen (24.2) erfolgt.

5. Für die Antriebsvorrichtung eines Zylinders/einer Walze (10) einer Papier- oder Kartonmaschine bestimmter Austausch-Satz zum Auswechseln des traditionell starr befestigten Hauptzahnrades (21') in eine Ausrichtungsfehler (Winkelfehler) erlaubende Zahnradanordnung, wobei in der Antriebsvorrichtung die die Welle (22) des Zylinders/der Walze (10) tragenden Lager (23) an den Lagerdeckel (24') des Gehäusekörpers (R) montiert sind und der Austausch-Satz:

   - eine an die Welle des Zylinders/der Walze zu montierende Zahnkupplung, bestehend aus einem mit Innenverzahnung (11a) versehenen Innenteil (11) und einer mit Innenverzahnung (12a) und Außenverzahnung (12b) versehenen Wellenbuchse (12),
   - ein neues mit Außenverzahnung (15b) versehenes Antriebs-Hauptzahnrad (21), das als Ersatz für das besagte starr befestigte Zahnrad (21') eingerichtet ist, wobei die Innenverzahnung (11a) des Innenteils (11) zum Koppeln an die Innenverzahnung (12a) der Wellenbuchse (12) eingerichtet ist, und die Außenverzahnung (15b) des Hauptzahnrades (21) zum Koppeln an die Außenverzahnung (12b) der Wellenbuchse (12) eingerichtet ist, und
   - einen neuen Gehäusekörper-Lagerdeckel (24), der dazu dient, den ursprünglichen Lagerdeckel (24') zu ersetzen, und an den das neue Hauptzahnrad (21) mit den Hauptzahnradlagern (13a, 13b) montiert wird, während das Innenteil (11) der Zahnradkupplung anstelle des alten Zahnrades (21') einzubauen eingerichtet ist, umfasst.

Revendications

1. Dispositif d'entraînement du cylindre/rouleau (10) dans une machine à papier ou à carton, comprenant

   - un carter (R) avec un chapeau de palier (24),
   - des paliers d'arbre (23) installés dans le carter (R) dans son chapeau de palier (24) pour soutenir le cylindre/rouleau (10) de manière rotative par son arbre (22),
   - une roue d'engrenage principale (21) entraî-

nant l'arbre (22) et disposée de manière centrale par rapport à celui-ci, installée de manière rotative dans le carter (R) à l'aide des paliers de roue d'engrenage principale (13a, 13b),
- un accouplement par engrenage (11a, 12, 15b) accouplé entre l'arbre (22) et la roue d'engrenage principale (21) qui l'entraîne, pour éliminer le désalignement de l'arbre par rapport à la roue d'engrenage principale (21), où l'accouplement par engrenage comprend une partie dentée intérieure (11a) installée sur l'arbre (22) de manière fixe et une partie dentée extérieure (15b) installée sur la roue d'engrenage principale (21), et
- un engrenage à un seul ou plusieurs étages installé dans le carter (R)

caractérisé en ce que la roue d'engrenage principale (21) avec les paliers de roue d'engrenage principale (13a, 13b) est installée dans le chapeau de palier (24) du carter.

2. Dispositif d'entraînement selon la revendication 1, **caractérisé en ce qu'**un logement de palier (16) qui soutient la roue d'engrenage principale (21) est formé dans le chapeau de palier (24), alors que la roue d'engrenage principale (21) comprend une partie arbre de type manchon (15) du côté du chapeau de palier (24), la bague extérieure de roulement de chaque palier de roue d'engrenage principale (13a, 13b) étant ainsi installée dans le logement de palier (16) et la bague intérieure de roulement dans la partie arbre de type manchon (15).

3. Dispositif d'entraînement selon la revendication 2, **caractérisé en ce que** les paliers (13a, 13b) de la roue d'engrenage principale (21) comprennent deux roulements à bille sur rotule installés à un intervalle donné l'un de l'autre.

4. Dispositif d'entraînement selon la revendication 1, **caractérisé en ce que** la lubrification du palier de l'arbre (23) et des paliers (13a, 13b) de la roue d'engrenage principale (21) se fait à l'aide de canaux de lubrification (24.1) disposés dans le chapeau de palier (24) et d'une unité d'alimentation (24.2) disposée sur la surface extérieure de ce dernier.

5. Jeu de rechange du dispositif d'entraînement du cylindre /rouleau (10) dans une machine à papier ou à carton pour remplacer une roue d'engrenage principale (21') traditionnelle attachée de manière rigide par un ensemble de roue d'engrenage permettant un désalignement, dans lequel dispositif d'entraînement les paliers (23) soutenant l'arbre (22) du cylindre/rouleau (10) sont installés dans un chapeau de palier (24') dans un carter (R),
et lequel jeu de rechange comprend
- un accouplement par engrenage à installer sur l'arbre du cylindre/rouleau comprenant une partie intérieure (11) avec une denture intérieure (11a) et un manchon d'arbre (12) avec une denture intérieure (12a) et une denture extérieure (12b),
- une nouvelle roue d'engrenage principale motrice (21) avec une denture extérieure (15b), laquelle nouvelle roue d'engrenage principale (21) étant disposée de sorte à remplacer ladite roue d'engrenage (21') attachée de manière rigide, la denture intérieure (11a) de la partie intérieure (11) étant disposée de sorte à être accouplée à la denture intérieure (12a) du manchon d'arbre (12) et la denture extérieure (15b) de la roue d'engrenage principale (21) étant disposée de sorte à être accouplée à la denture extérieure (12b) du manchon d'arbre (12), et
- un nouveau chapeau de palier (24) du carter, lequel chapeau de palier est disposé de sorte à remplacer le chapeau de palier original (24') et auquel la nouvelle roue d'engrenage principale (21) est installé à l'aide des paliers de roue d'engrenage principale (13a, 13b), la partie intérieure (11) de l'accouplement par engrenage étant disposée de sorte à être installée à la place de la vieille roue d'engrenage (21').

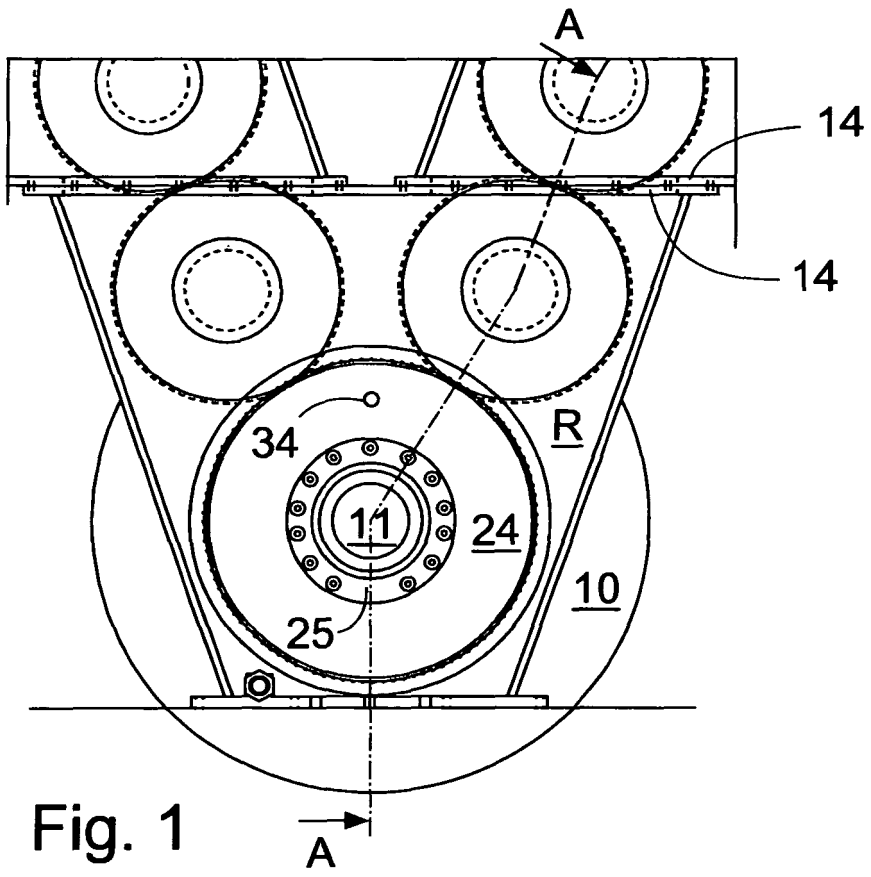


Fig. 1

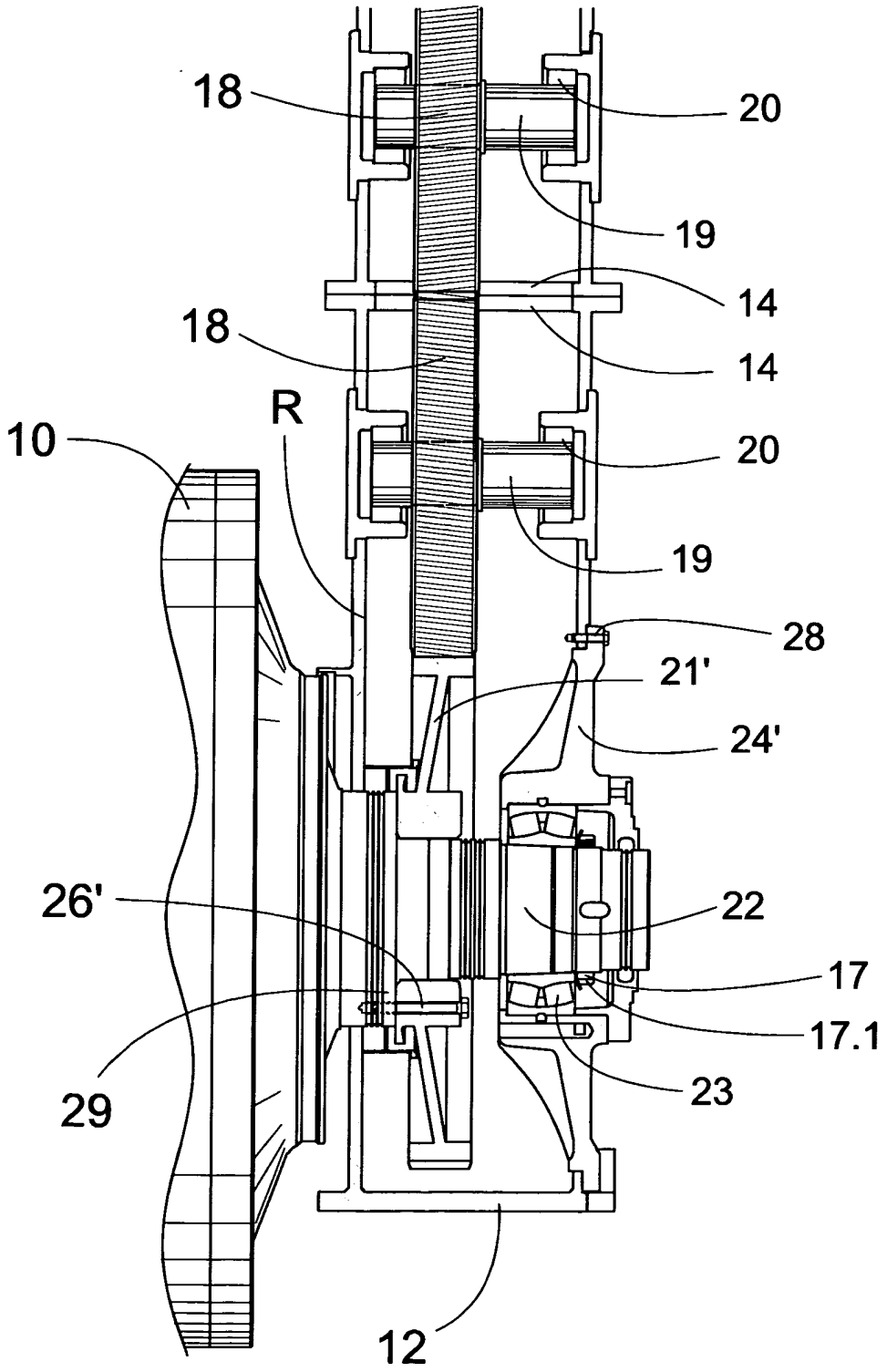


Fig. 2

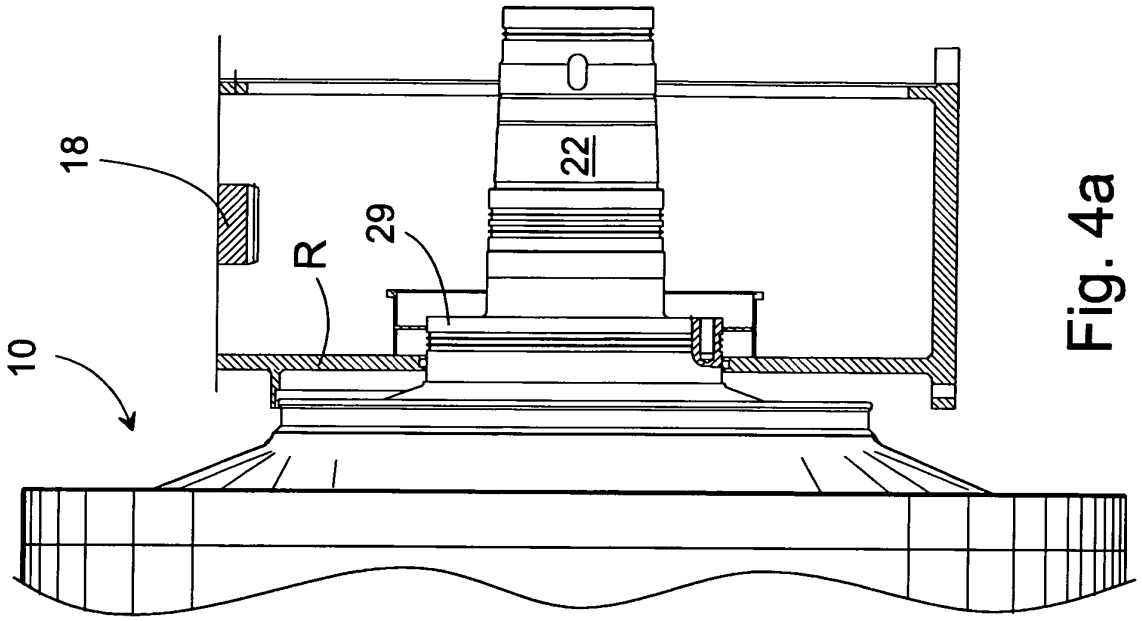
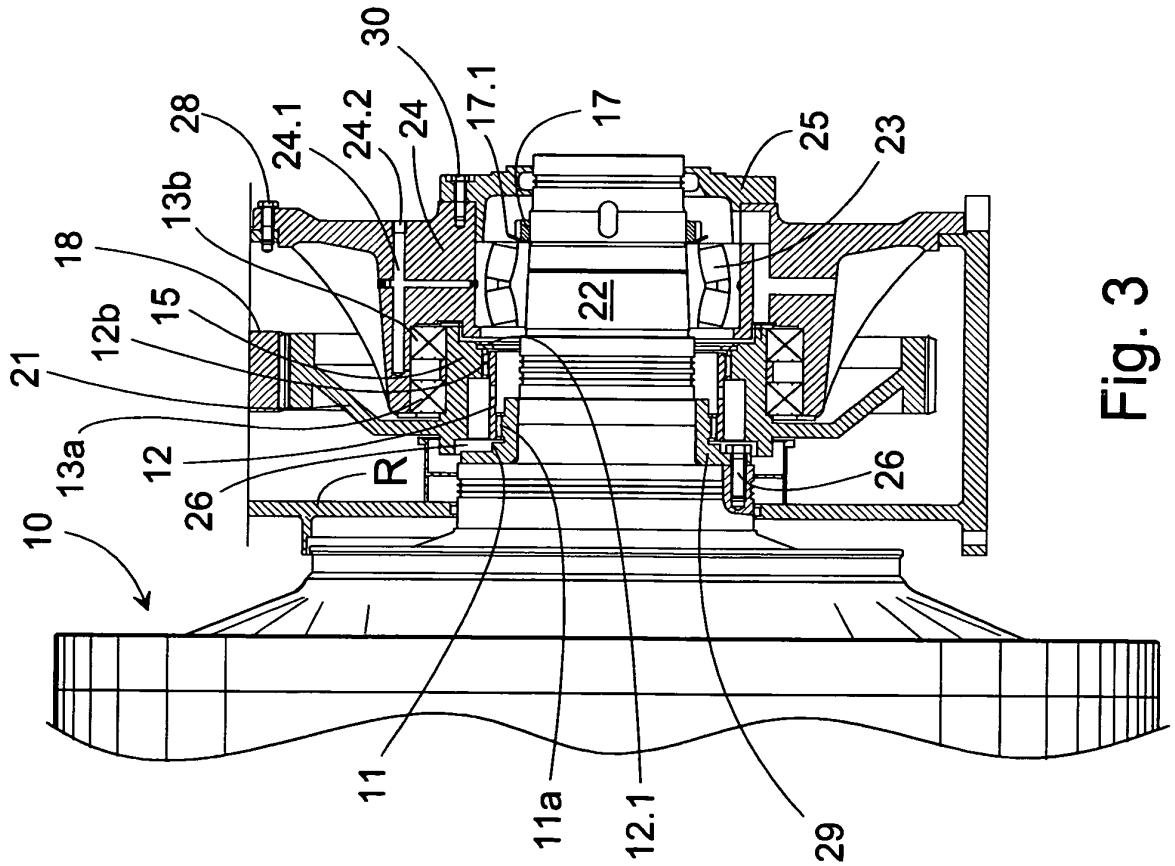

18
R
29
22
10

Fig. 4a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17.1
17
28
24.1
24.2
24
25
23
13b
18
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15
12b
21
13a
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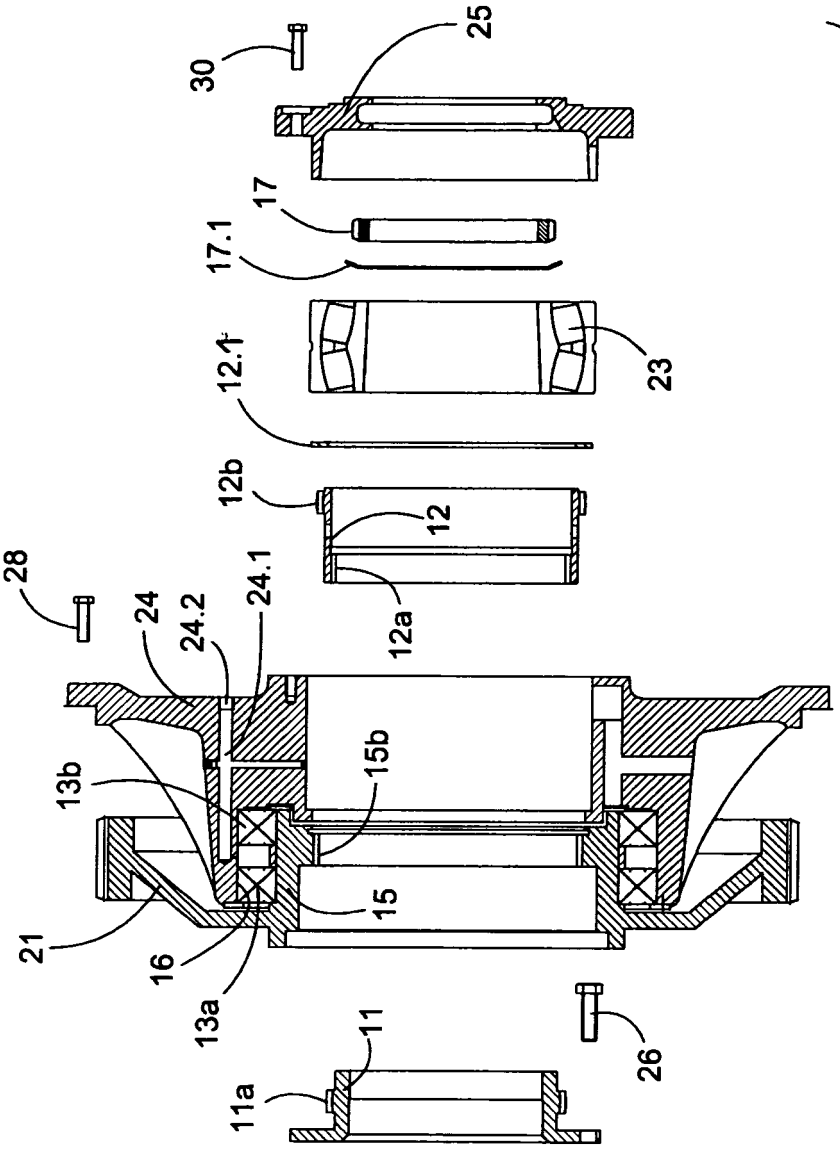
R
26
26
10
11
11a
12.1
29

Fig. 3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12b
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12a
28
24
24.2
24.1
13b
15b
15
21
16
13a
11
11a
26

Fig. 4b

REFERENCES CITED IN THE DESCRIPTION

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