(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 035 247 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.09.2000 Bulletin 2000/37

(51) Int Cl.[7]: **D06F 37/00**

(21) Application number: **99203647.5**

(22) Date of filing: **04.11.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **02.03.1999 IT MI990411**

(71) Applicant: **CANDY S.p.A.**
I-20052 Monza (Milano) (IT)

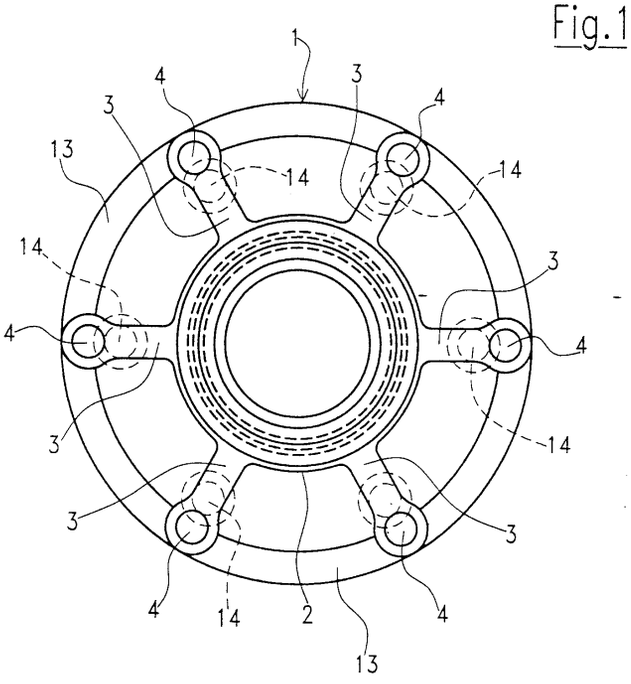
(72) Inventor: **Fumagalli, Silvano**
20052 Monza (IT)

(74) Representative: **Mittler, Enrico**
c/o Mittler & C. s.r.l.,
Viale Lombardia, 20
20131 Milano (IT)

(54) Tank unit for washing machine

(57) Tank unit for washing machine, in particular of the type in which a drum containing the laundry to be washed is tumingly mounted into a washing tank, comprising a structure consisting of a bearings support to tumingly bear the drum, coupled to a tank bottom of the washing tank. Said tank bottom is made up of two flanges, a back flange (6b; 10b; 11b; 12b) and a fore flange (6a; 10a; 11a; 12a) facing and each one of them provided with a central hole. Said bearings support (1) consisting of a single piece, made up of a hollow central body (2) provided with housings to house bearings, said central body (2) having a plurality of external tabs (3), substantially radial, said support having an external ring (13; 20), connecting the tabs in coincidence with their end, said bearings support (1) having appropriate elements for coupling with the two flanges (6a; 6b; 10a; 10b; 11a; 11b; 12a; 12b) of the tank bottom.

Fig.1



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Description

[0001] The present invention refers to a tank unit for washing machine, in particular of the type in which a drum containing the laundry to be washed is turningly mounted in a container for the washing water that is suspended by means of suspension members inside the cabinet of the washing machine. Even more in particular it is an invention that refers to a tank unit of a front load washing machine.

[0002] As known, in modern washing machines a so called tank unit is provided, that comprises a washing tank inside which a rotating drum supported by bearings is housed.

[0003] The achievement of the increasingly higher performances and the desired length of service depend on the structure of the tank unit, and in particular on the bearings support for the rotating drum.

[0004] In particular said support is subject to a considerably heavy service, in fact it must resist the considerable mechanical stresses due to suspension forces, especially during the centrifugal stage, and it must simultaneously resist the chemical attack of the washing mixture, that is made particularly aggressive by the temperature even high that it can reach.

[0005] The technique currently adopted for the assembly of the bearings support, although fulfilling the aforesaid needs in a satisfactory way, nevertheless shows substantial inherent disadvantages in its structure. In fact the bearings support is traditionally assembled to the tank bottom by welding; this requires a high consumption of electric power and of discontinuous type such as to involve high costs both for installation and service. In addition in order to guarantee an adequate protection of the bearings support from the water-cleanser mixture polluting procedures are used.

[0006] The known assembly technique is therefore complex because of the composite structure of the tank unit in several pieces and because of the various mechanical machinings.

[0007] In view of the state of the art herein described, object of the present invention is to provide for a tank unit of a washing machine, preferably with front load, that is simple, that nevertheless guarantees high performances both at medium as well as at low speed, that is capable to suitably meet to the requirement for a lower consumption of energy either during the stage of machining and of service.

[0008] According to the present invention, such object is attained by means of a tank unit for washing machine, in particular of the type in which a drum containing the laundry to be washed is turningly mounted into a washing tank, comprising a structure consisting of a bearings support to turningly bear the drum, that is coupled to a tank bottom of the washing tank, characterized in that said tank bottom is made up of two flanges, a back flange and a fore flange, facing and each one of them provided with a central hole, said bearings support consisting of a single piece, made up of a hollow central body provided with housings to house bearings, said central body having a plurality of external tabs, substantially radial, said support having an external ring, connecting the tabs in coincidence with their ends, said bearings support having appropriate elements for coupling with the two flanges of the tank bottom.

[0009] The characteristics and the advantages of the present invention will become evident from the following detailed descriptions of two embodiments thereof, that are illustrated as non limiting examples in the enclosed drawings, in which:

Figure 1 is a front view of a first type of bearings support for a tank unit according to the invention;
Figure 2 is a sectional view of the bearings support of Figure 1 assembled the tank bottom of a washing tank according to a first embodiment of the invention;
Figure 3 is a sectional view of the bearings support similar to Figure 2 in a magnified scale;
Figure 4 is a sectional view of said bearings support assembled the tank bottom of a washing tank in accord to a second embodiment;
Figure 5 is a sectional view of the bearings support of Figure 1 assembled to the tank bottom of a washing tank according to a third embodiment of the invention;
Figure 5a shows a different coupling of the flanges making up the tank bottom;
Figure 6 is a front view of a second type of bearings support according to the invention;
Figure 7 is a sectional view of the bearings support of Figure 6 assembled to the tank bottom of a washing tank.

[0010] With reference to the annexed figures, by 1 there is globally indicated a bearings support, in front view, made up of a hollow central body 2 provided with housings to accommodate bearings, having a plurality of radial tabs 3. In particular the radial tabs 3 are provided with back 4 and fore 14 toes, that allow the coupling of the aforesaid support with the tank bottom of the washing tank. In particular, the bearings support is made as a single piece of casting of aluminum or other alloys, and has a ring 13, connecting the ends of the tabs 3, that is suitable to confer a better resistance to the high speeds of rotation at which the aforesaid support can work.

[0011] As shown in Figure 2 and, in magnified scale in Figure 3, the tank bottom consists of two flanges, a fore one 6a and a back one 6b each provided with a central hole.

[0012] A first embodiment of the tank unit provides the fixing of the bearings support 1 by means of the upsetting of the ends of the hollow central body 2 around the edges of the central holes of the two flanges 6a, 6b of the tank bottom. This upsetting can be carried out either

on the entire circumference of the edge of the hollow central body 2 or only on some sectors. In addition, the two flanges, fore 6a and back 6b, of the tank bottom are both provided with a circumferencial sequence of holes to house the toes 4, 14 of the radial tabs 3 of the bearings support. Such toes 4, 14 are upset on the edges of the holes of the flanges 6a, 6b too in order to confer a greater solidity to the structure. More in particular said flanges are made of pre-treated structural steel to improve their resistance to the high working speed. A stainless steel plate 5 is laid over the fore flange 6a of the tank bottom in order to improve the resistance of the tank bottom to the chemical attack of the washing mixture. As shown in figure 2 the two flanges 6a, 6b of the tank bottom and the stainless steel plate 5 are fixed to the tank 15 by means of a fastening ring 7 comprising a gasket 8. In addition a gasket 9 is inserted between the stainless steel plate 5 and the flange 6b of the tank bottom, in coincidence with the central hole of the latter, so as to protect the flange of common pre-treated steel from the infiltration of the washing mixture.

[0013] The tank unit illustrated and described so far is suitable for an operation of the aforesaid at high speed. To this purpose it is also possible use additional coupling means of the two flanges 6a, 6b as, for instance, rivets or pins made directly on the flanges 6a, 6b.

[0014] A second embodiment of the tank unit according to the invention, suitable to the use in case of an operation at low speed, is shown in Figure 4. In this different embodiment, the bearings support 1 is fixed by means of a seam folding of the edges 30, 31 of the central holes of the flanges 10a, 10b of the tank bottom, around the ends of the hollow central body 2 of the bearings support in order to keep it under pressure. Differently from the case previously illustrated the fore flange 10a of the tank bottom is upset and fastened around the fore toes 14 of the radial tabs 3 of the central body of the bearings support, whereas equally to the previous case the flange 10b is provided with a circumferencial sequence of holes to house the toes 4 of the radial tabs 3 of the bearings support which are upset on the holes. In order to resist to the washing mixture it is preferable that the fore flange 10a of the tank bottom is made of stainless steel, while the back flange 10b can be made of common pre-treated structural steel.

[0015] A third embodiment of the tank unit according to the invention, shown in Figure 5, provides the use of a different structure for the assembly of the tank bottom with the bearings support. Said tank bottom, as shown in figure 5, still consists of two flanges, a fore 11a and a back one 11b, both made of pre-treated structural steel, when, as in the case of Figures 2 and 3, the use of a protection flange for the fore flange 11a is provided, otherwise the fore flange 11a is made of stainless steel. The flanges are identical to each other and they are provided with a circumferencial sequence of holes in the housings to contain the toes 4, 14 of the radial tabs 3 of the bearings support. In the latter, in coincidence with the toes 4, 14, either through holes or blind holes are provided and stay screws or screws 40 fastened by bolts 50 are respectively used to connect the bearings support 1 with the two flanges 11a, 11b of the tank bottom. The two flanges of the tank bottom are fixed to the tank band 15 either by means of a screw 41, fastened by an appropriate bolt 51, screwed on appropriate holes that are previously pierced on the ends of the two flanges 11a, 11b of the tank bottom and on the edge of the tank band 15, as in Figure 5, or by means of roll forming and seam folding of the same tank band 15 onto the end of the two flanges, as in figure 5a. This embodiment of the tank unit is suitable for an operation at low speed.

[0016] A fourth embodiment of the tank unit according to the invention is shown in Figures 6 and 7. In this case the bearings support is still realised with a hollow central body 2 provided with housings to hold bearings, having a plurality of radial tabs 3 connected to a ring 20 that has appropriate grooves 23 along its entire fore and back circumference, and at least an antirotation pin 21. In particular the bearings support is made as a single piece of casting of aluminum or of other alloys. The two flanges, fore 12a and back 12b, of the tank bottom are connected to the bearings support by means of circular roll forming of the same around the grooves 23 of the circular ring 20 for the bearings support and by means of a seam folding of the edges 30, 31 of the central holes of the flanges of the tank bottom, around the ends of the hollow central body 2 of the bearings support in order to keep it under pressure.

[0017] Owing to the present invention it is possible to realise a tank unit for the assembly of which a lower power consumption is necessary since the welding operations are completely eliminated. An additional advantage consists in the compliance with the limitations imposed for the working environment for its manufacture, since no expensive means of protection of purification and similar are necessary as the polluting procedures for the protection of the bearings support are eliminated.

Claims

1. Tank unit for washing machine, in particular of the type in which a drum containing the laundry to be washed is turningly mounted into a washing tank, comprising a structure consisting of a bearings support (1) to turningly bear the drum, coupled to a tank bottom of the washing tank, characterized in that said tank bottom is made up of two flanges, a back flange (6b; 10b; 11b; 12b) and a fore flange (6a; 10a; 11a; 12a) facing and each one of them provided with a central hole, said bearings support (1) consisting of a single piece, made up of a hollow central body (2) provided with housings to house bearings, said central body (2) having a plurality of external tabs (3), substantially radial, said support

having an external ring (13; 20), connecting the tabs in coincidence with their end, said bearings support (1) having appropriate elements for coupling with the two flanges (6a; 6b; 10a; 10b; 11a; 11b; 12a; 12b) of the tank bottom.

2. Tank unit according to claim 1, characterised in that said bearings support (1) is made of casting of aluminium or of other alloys.

3. Tank unit according to claim 2, characterised in that said radial tabs (3) of said bearings support (1) are each provided with fore toes (14) and back toes (4), suitable to engage in respective housings provided in the tank bottom and said radial tabs (3) are joined together by a ring (13) in coincidence with their ends that is suitable to confer a better resistance to the bearings support (1).

4. Tank unit according to claim 3, characterised in that said flanges of the tank bottom are provided with holes that are pierced in order to house toes, back (4) and fore (14), of the external tabs (3) of the central body (2) of said bearings support (1).

5. Tank unit according to claim 4, characterised in that said flanges (6a; 6b) of the tank bottom are fixed to said bearings support (1) by means upsetting of the ends of the hollow central body (2) of said bearings support (1) around the edges of the central holes of said flanges (6a; 6b), and by means upsetting of the toes, back (4) and fore (14), of the external tabs (3) of the central body (2) of said bearings support (1) around the edges of the respective holes pierced in the aforesaid flanges (6a; 6b) of the tank bottom.

6. Tank unit according to claim 5, characterised in that said flanges (6a; 6b) of the tank bottom are made of pre-treated structural steel in order to increase the resistance of the tank to the high working speeds.

7. Tank unit according to claim 6, characterised in that said fore flange (6a) of said flanges of the tank bottom is covered by a round plate made of stainless steel (5), that allows the protection of said fore flange (6a) of the aforesaid tank bottom from the chemical attack of the washing mixture.

8. Tank unit according to claim 7, characterised in that between said stainless steel round plate (5) and said fore flange (6a) of the tank bottom a protection gasket (9) is provided.

9. Tank unit according to claim 6, characterised in that said flanges (6a; 6b) of the tank bottom and said stainless steel round plate (5), are fixed to the tank band (15) by means of a fastening ring (7) comprising an internal gasket (8).

10. Tank unit according to claim 3, characterised in that said flanges (10a; 10b; 12a; 12b) of the tank bottom are fixed to said bearings support (1) by means upsetting of the ends of the central holes of said flanges of the tank bottom around the ends of the hollow central body (2) of said bearings support in order to keep it under pressure.

11. Tank unit according to claim 10, characterised in that said fore flange (10a) of the tank bottom is upset and fastened around the fore toes (14) of the external tabs (3) of the central body of said bearings support (1), whereas said back flange (10b) of the tank bottom is provided with holes that are pierced in order to house the back toes (4) of the external tabs (3) of the central body (2) of said bearings support (1), being said back toes (14) upset around the edges of the respective holes pierced in the aforesaid flange (10b) of the tank bottom.

12. Tank unit according to claim 11, characterised in that said fore flange (10a) of the tank bottom is made of stainless steel, whereas said back flange (10b) is made of pre-treated structural steel.

13. Tank unit according to claim 3, characterised in that said flanges, a fore one (11a) and a back one (11b) of the tank bottom are identical and they are both made of pre-treated structural steel, when the use of a protection flange for the fore flange (11a) is provided, otherwise the fore flange (11a) is made of stainless steel.

14. Tank unit according to claim 13, characterised in that in coincidence with said toes, fore (14) and back (4), through holes or blind holes are provided and respectively stay screws, or screws (40) fastened by bolts (50) are utilised in order to couple said bearings support (1) to the two flanges (11a; 11b) of the tank bottom.

15. Tank unit according to claim 14, characterised in that said flanges (11a) and (11b) of the tank bottom are fixed to the tank band (15) by means of roll forming and seam folding of the same tank band (15) on the edge of the two flanges (11a; 11b) of the tank bottom.

16. Tank unit according to claim 14, characterised in that said flanges (11a) and (11b) of the tank bottom are fixed to the tank band (15) by means of a screw (41) fastened by an appropriate bolt (51) screwed on appropriate holes that are previously pierced on the ends of the two flanges (11a) and (11b) of the tank bottom and on the end of the tank band (15).

17. Tank unit according to claim 2, characterised in that said bearings support (1) has appropriate grooves (23) along its entire fore and back circumference, and at least one antirotation pin (21), and said flanges, fore (12a) and back (12b), of the tank bottom are coupled to the bearings support (1) by means of circular roll forming of the same around said grooves (23) of the round ring (20) of the bearings support (1), and by means seam folding of the edges of the central holes of said flanges (12a; 12b) of the tank bottom around the ends of the hollow central body (2) of said bearings support (1) in order to keep it under pressure.

Fig.1

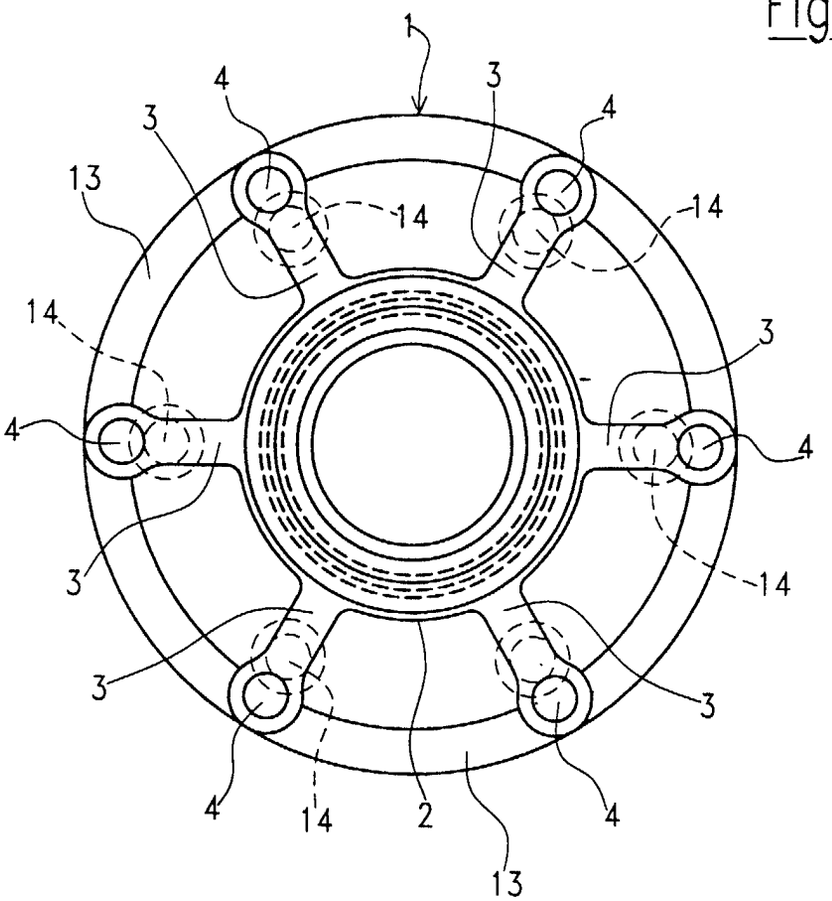

Fig.2

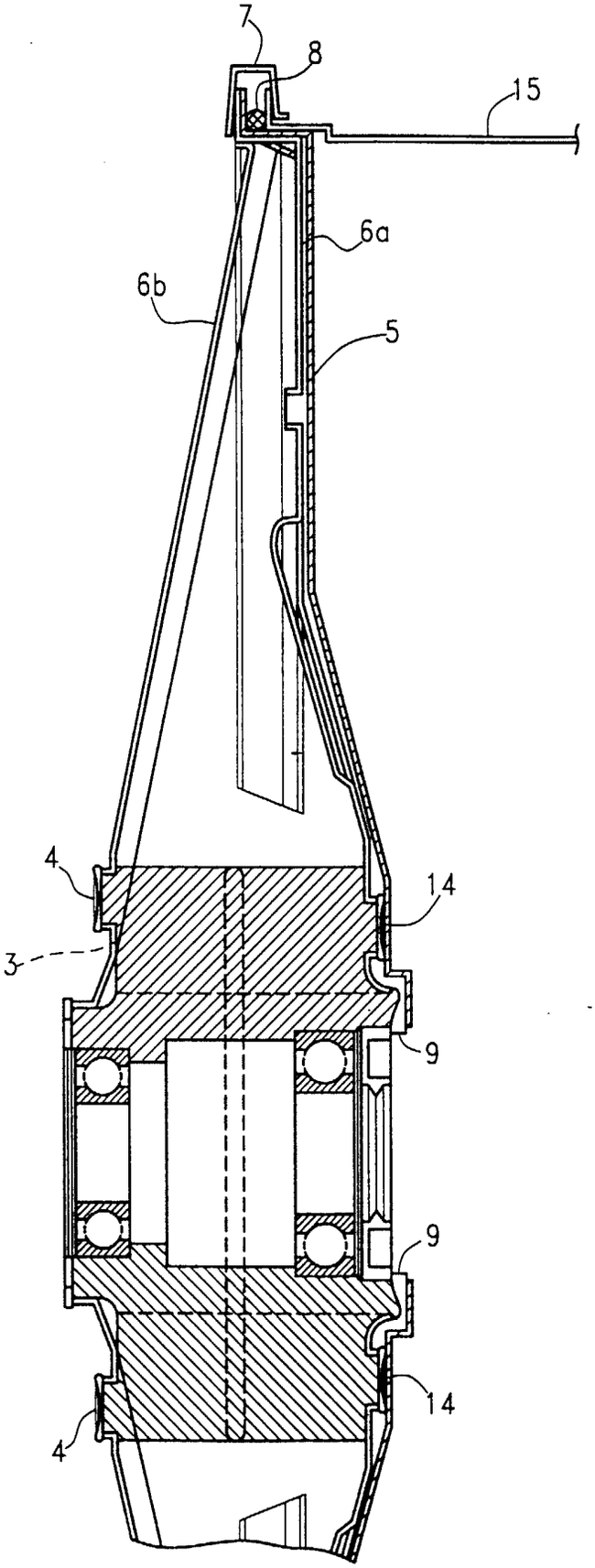

Fig.3

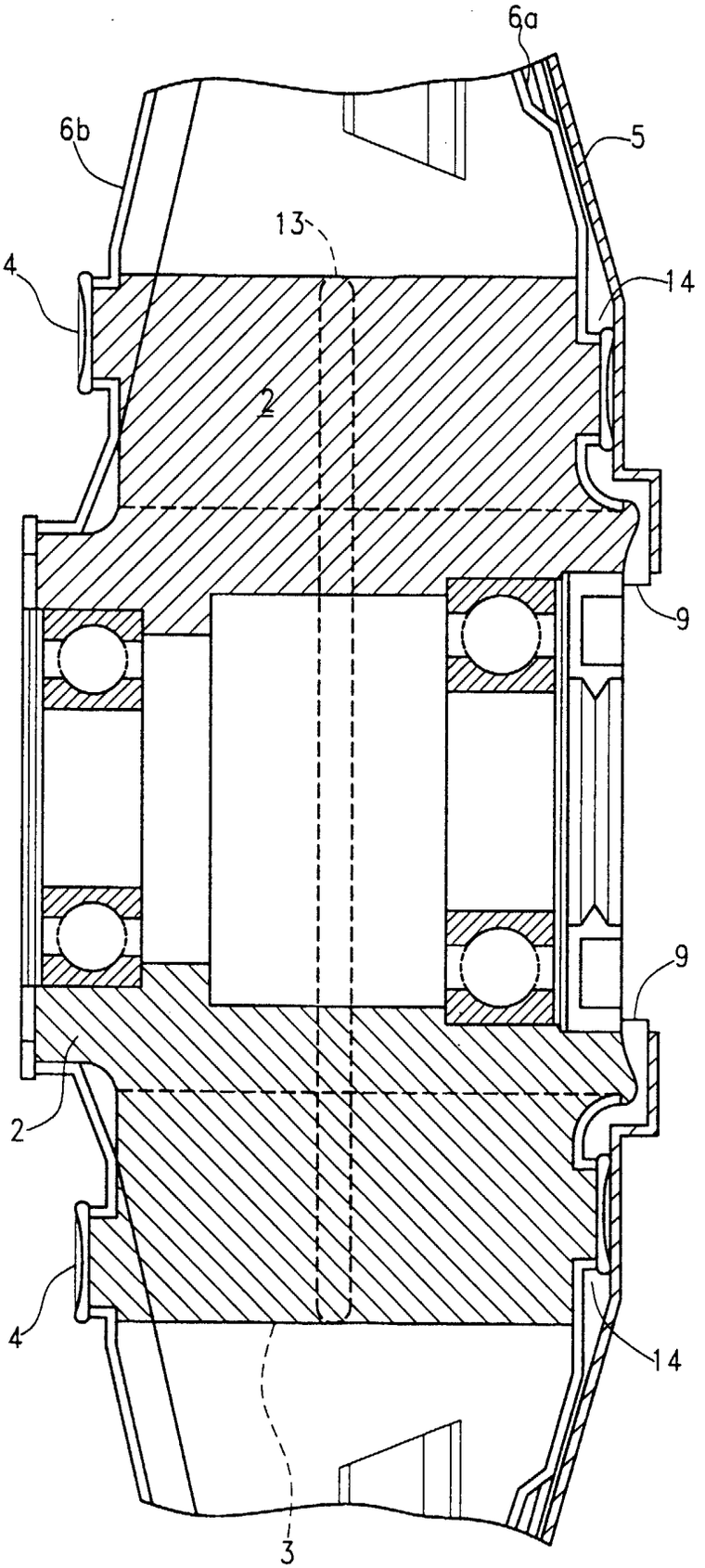

Fig.4

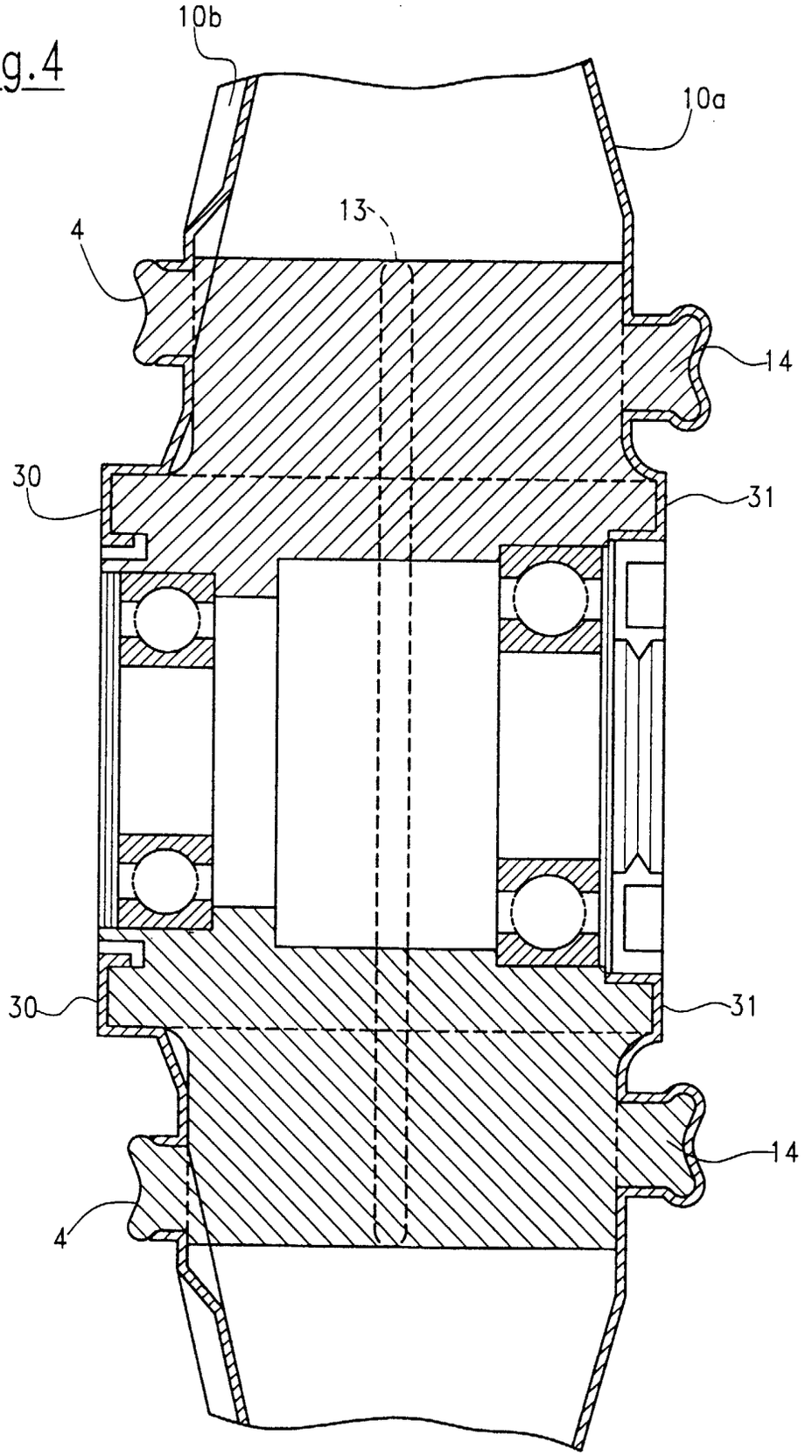

Fig.5A

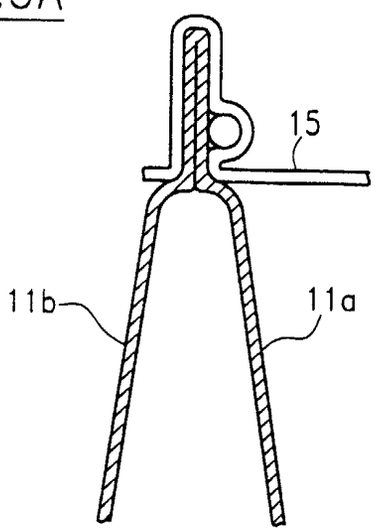

Fig.5

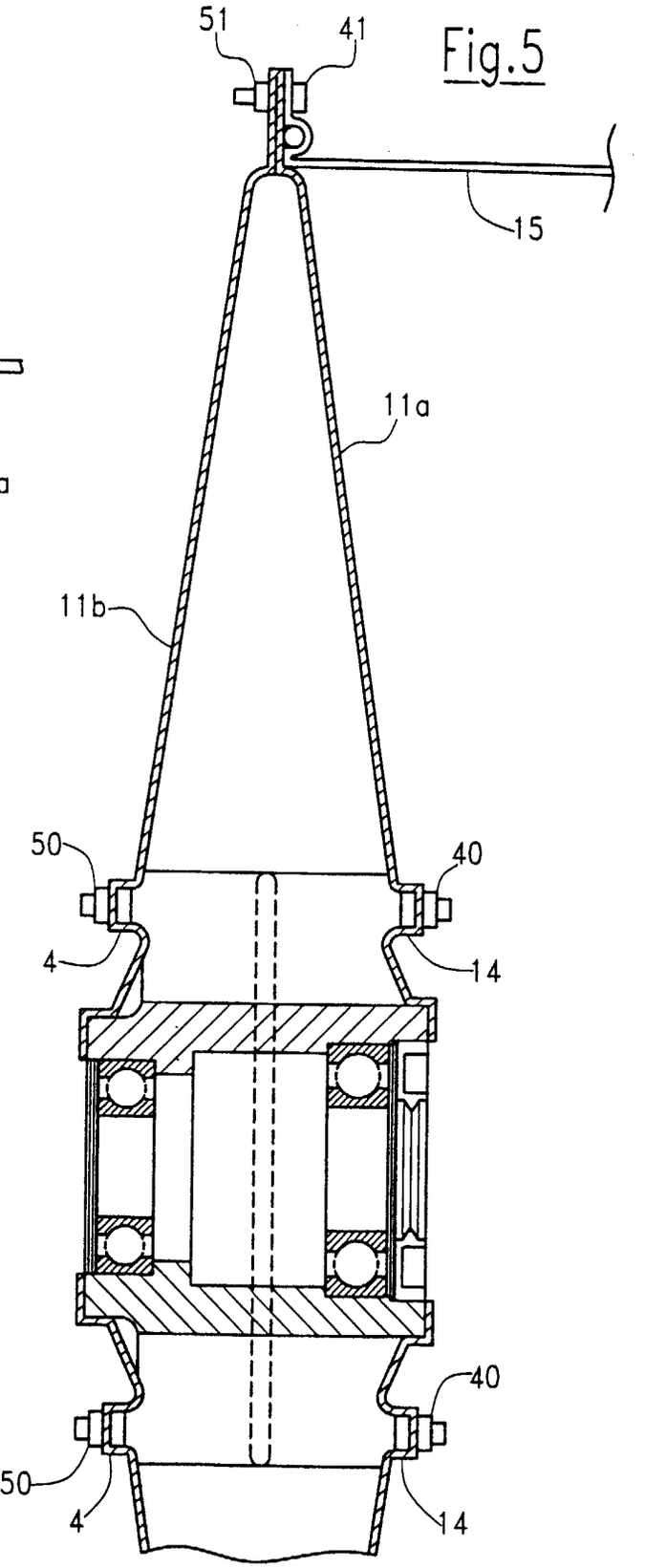

Fig.6

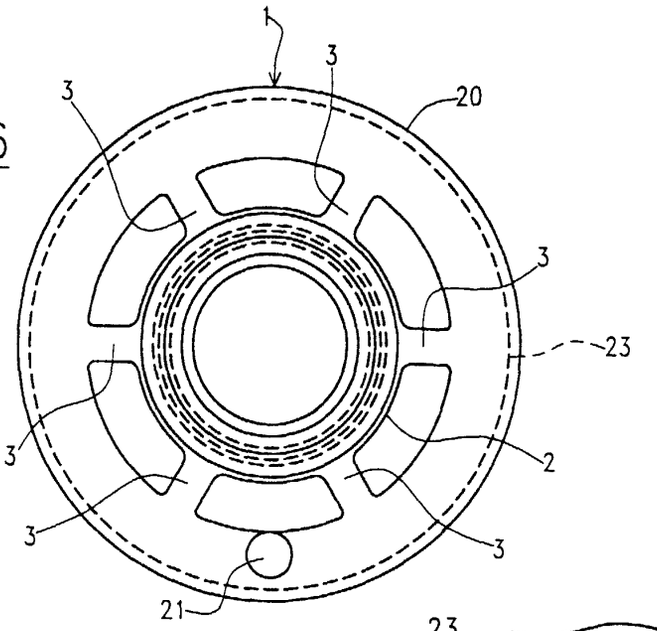

Fig.7