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PCT/FR98/01500

Signed this 12th day of February 1999

*AS Marland*  
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SUMMARY OF PARTICULARS OF A FRENCH PCT APPLICATION  
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Name of applicant	ROBOT COUPE SNC
Form of incorporation:	SOCIETE EN NOM COLLECTIF (a form of commercial partnership)
Address of applicant:	12 avenue du Maréchal Leclerc F-71300 Montceau-les-Mines FRANCE
Title:	A HAND-HELD BLENDER
Other points (if any):	None.

## A HAND-HELD BLENDER

The present invention relates to a portable electric appliance or hand-held blender particularly, but not exclusively, for preparing food.

5           Such appliances are well known and are in widespread use. They comprise a case having a handle and containing an electric motor which rotates a first end of a shaft included in a fixed tube or sleeve, with the tool being mounted at the other end of the shaft. The tool is  
10 driven at high speed and is plunged into food that is to be prepared, where the tool chops, blends, emulsifies, etc. the food.

The problem which arises with that type of appliance is essentially a problem of hygiene. Given the presence  
15 of an electric motor, it is not possible to clean the appliance properly, particularly in a dishwasher, and in particular it is not possible to sterilize the leading end carrying the tool that is to come into contact with successive preparations that are generally different.  
20 Unfortunately, the tool rotating at high speed acts as a pump providing upward suction. This means that in spite of the precautions taken concerning sealing, a small portion of the blended and chopped liquids rises inside the tube where it can often putrefy under the action of  
25 bacteria.

An object of the present invention is to mitigate that drawback and to enable a hand-held blender to be provided that is capable of being used on a catering scale, together with the necessary hygiene qualities.

30           According to the invention, the hand-held blender comprising a case having a handle, said case including an electric motor for rotating a first end of a shaft included in a tube secured to the case, with a tool being mounted at the second end of said shaft, is characterized  
35 in that a removable endpiece secured to the tool is mounted on the free end of the tube, the tool is mounted so as to be removable inside the endpiece.

It is thus possible to remove the endpiece for thorough cleaning or sterilization. It is thus possible not only to remove the endpiece, but also to dismantle the tool for more thorough cleaning or maintenance, in particular of the bearing that lies behind the tool.

According to yet another characteristic of the invention, the base of the motor unit is sealed, with the necessary air inlet and outlet being situated in the top portion thereof to establish an appropriate flow of cooling air. The sealing of the bottom portion prevents food penetrating into the motor unit during normal use and thus prevents bacteria forming inside it, it also reduces the risk of an electrical accident in the event of the appliance being dropped since the ventilation orifices are high, and it prevents carbon dust from the brushes penetrating into the food that is being prepared.

The electrical power supply circuit preferably includes a "loss-of-voltage" card. In the event of the thermal protection contacts opening (e.g. because the motor is overheating), then the loss-of-voltage card is no longer powered and prevents the motor being restarted until the user has acted deliberately on the on/off switch of the appliance. User safety is thus improved.

In certain particular applications where heat is applied continuously to the receptacle, in which the food is raised to a temperature that may be as high as 100°C, a large increase in temperature has been observed at the bearing of the bell, the heat being transmitted to the bearing by the metal shaft of the tool. Since the bearing is embedded in plastics material, which is a thermal insulator, it is difficult to evacuate the heat transmitted by the tool. This phenomenon is accentuated by the heating specific to the bearing due to the shaft of the tool rotating at a speed that may be as great as several thousand revolutions per second. This gives rise to a serious risk of overheating.

In a preferred embodiment, a heat bridge is established by means of a heat-conducting ring mounted between the bell and the bearing. In this way, heat can be evacuated under good conditions. The bearing is thus  
5 in thermal contact with the bell whose large surface area makes it possible to evacuate heat from the bearing.

Other characteristics and advantages of the present invention appear from the following description of particular embodiments, given purely as non-limiting  
10 examples, and with reference to the figures, in which:

- Figure 1 is a perspective view of a blender of the invention;

- Figure 2 is a section view on a vertical plane through the bottom portion of the tube and the endpiece  
15 in the working position;

- Figure 3 is an exploded view of the top portion of the tube;

- Figure 4 is an exploded view of the bottom portion of the blender;

- Figure 5 is a view showing cooling air circulation within the motor cover;

- Figure 6 is a view showing a variant mount for the tool inside the endpiece, and

- Figure 7 is a section through the bottom portion  
25 of a hand-held blender with a removable endpiece that includes a thermal bridge.

In Figure 1, it can be seen that the blender comprises from the bottom upwards: a removable endpiece 1 fixed to a tube or sleeve 2, the tube 2 being secured to  
30 a case 3 which includes an electric motor (not shown) together with electrical connection means for connecting the motor to a source of electricity including a thermal fuse and a loss-of-voltage card. The top of the case 3 has a handle 4 integrally formed thereon, said handle 4  
35 optionally including a switch for controlling the operation of the motor. In Figure 1, the blender is shown in its operating state.

A first embodiment is shown in Figures 2, 3, and 4.

Figure 2 is a section through the leading end of the blender comprising the leading end of the tube 2 in which there extends a drive shaft 5 whose top end (not shown) is mechanically connected to the outlet shaft of the motor. Naturally, the shaft 5 is elongate and of sufficient length to ensure that the case 3 is remote from the tool which is designed to operate in fluids, and generally at relatively high temperature. Naturally, like the case, the handle must at all times be kept remote from and outside the preparation.

A coupling piece 7 for coupling with the removable endpiece 1 is mounted at the bottom end of the tube 2. The leading end of the piece 7 (on the right-hand side of the figure) has an assembly portion 7a for assembly with a piece 8 whose inside face 8a corresponds to the surface 7a which, in the example shown, is conical. The piece 8 has studs 21 at its top end (only one of which is shown in the figure) capable of engaging in a groove 22 in the piece 7 to form a bayonet fastening. A static gasket 23 is disposed between the pieces 7 and 8. A bell-shaped metal guard 9 is secured to the piece 8 so as to prevent the tool 13 from touching the bottom or the walls of the receptacle and so as to allow the tool to operate by the processed matter being reflected on its walls.

In the axial portion, there can be seen an extender 6 secured to the bottom portion of the shaft 5 and extending it. The extender 6 has its leading end inserted in a drive piece screwed into the extender 6, and constituting a drive cage 11 surrounding a drive hub 17.

In Figure 3, going from right to left, there can be seen the drive shaft 5 and the extender 6, a ball bearing 30 and a ring 30a, the tube 2 having an assembly cup 2a for sealed assembly on the motor housing 3. The bottom portion of the tube 2 carries the endpiece and its conical portion 7a. Below that there is a lip gasket 18

and the drive cage 11 which is secured to the shaft 5 by the extender 6.

Similarly, Figure 4 shows, from top to bottom, the drive hub 17, a cylindrical bearing 16, e.g. made of graphite, the sleeve 8 terminated by the bell 9, and a sealing piece 15 having a low coefficient of friction against which a resilient bellows 14 bears after assembly. Inside the assembly there is mounted a shaft 12, 12a for the tool 13.

These elements are shown assembled together in Figure 2. Inside the drive cage 11 there is mounted, via the hub 17, the smaller diameter end 12a of the shaft 12 whose other end carries the tool 13 which, in the example shown, has three blades. A first level of sealing is provided by the bellows 14, e.g. made of neoprene, having one side bearing against a surface of the piece 15 which is made of ceramic, for example. Because of the resilience of the bellows 14, the tool can move axially through several tenths of a millimeter, as explained below.

Thereafter, the shaft 12 is received in the cylindrical bearing 16. The drive hub 17 is secured by screw engagement to the trailing portion of the shaft 12 and is surrounded by the drive cage 11 secured to the endpiece 6. This rotary endpiece is itself protected against upwardly-travelling liquid by the lip gasket 18, and it rotates in the ball bearing 30.

When rotating in the food preparation, the tool 13 exerts a centrifugal pumping effect which tends to suck liquid into the inside of the tube 2 giving rise to the drawbacks mentioned above. In the appliance of the invention, this problem is solved firstly by the presence of means providing improved sealing, and secondly by the presence of a decompression chamber 19 of appropriate volume formed inside the endpiece around the drive members for driving the tool.

Sealing is improved by allowing a small amount of axial clearance to the tool which, as mentioned above, presses against the bellows 14 while it is in rotation. To this end, and as can be seen at the top of Figure 4, the drive hub 17 has ribs 17a while the cage 11 has internally projecting portions 11a (Figure 3). The projecting portions 11a which bear against the ribs 17a move over a camming surface 17b of the hub 17 so as to attract the shaft 12 and the tool towards the extender 6, thereby producing the desired compression of the bellows gasket 14 as soon as the motor is switched on.

Figure 3 shows the elements as described above, and in particular the endpiece 7 with its bayonet fastening groove 22.

The bottom portion of Figure 4 shows clearly that the tool mounted inside the endpiece 1 can easily be dismounted by rotating the tool shaft 12 to disengage the projecting portions 11a from the cam surface 17b, and then rotating the sleeve 8 so that the studs 21 of the sleeve face the inlets to the grooves 22.

The endpiece can thus be dismantled very quickly by rotating it through one-fourth of a turn, thereby releasing the teeth 21 from the groove 22, after which traction is applied to the endpiece 1, thereby disconnecting the piece 11 from the piece 17 and disengaging the piece 8 from the cone 7a. The tool can then be dismantled by causing the piece 17 to rotate counterclockwise, thereby unscrewing the threaded portion 12a.

Figure 5 shows the top portion of the blender. As mentioned above, it is desirable for it to comply with sealing conditions that are as complete as possible. That is to say the case 3 must be completely sealed at its bottom end so as to avoid any splashes reaching the motor. Unfortunately, splashes are common because of the rotation of the tool. Thus, according to another characteristic of the invention, the air inlet and outlet

for cooling the motor take place via orifices 34 and 38 situated at the top of the case 3. Air flow through the motor follows the path shown by the arrows (not referenced). The inlet orifices 34 communicate with a chamber 36 located above the motor when in its working position with the tool pointing downwards. Air flows downwards between the rotor 32 and the stator 33. Thereafter it rises via a cylindrical chamber 35 to escape via the orifices 38.

Figure 6 shows a variant of the tool and dismountable endpiece assembly as described above. In this embodiment, the drive cage 10 is held captive in the bell-shaped endpiece 9 via a collar 29 having clearance which gives it two degrees of freedom, respectively axially and transversely. The hub 28 secured to the drive shaft 6 terminates in the leading portion thereof (to the right in Figure 6) by a centering cone 24 for the drive cage 10. A lip gasket 25 is mounted between the drive cage 10 and the bottom surface of the endpiece 1. The hub and the cage have a ramp system enabling the drive cage 11 to be pulled against the hub 28 so as to compress the lip gasket 25 and thereby provide a first level of sealing. A second level of sealing is obtained by a fitting 26 which rotates while the tool is being driven against a face of a piece 27 which is made of ceramic, for example. The drive shaft 6 rotates inside the endpiece via two ball bearings 30. It is secured to the drive shaft of the motor as before. After the appliance has been used, this solution makes it possible to remove the endpiece and the tool for cleaning purposes.

The removable endpiece 8, mechanically connected to the tube 2 and including motion transmission means, makes it possible to cover the metal pieces in such a manner as to present a surface that has no zones that might retain food.



In Figure 7, the shaft 12 of the tool rotates in a cylindrical bearing 16. One end of the shaft 12 carries the tool 13 which, in the example shown, is a knife with three blades. The second end 12a of the shaft 12 is  
5 mounted inside the drive cage 11 by means of a drive hub 17. Sealing is provided, starting from the tool 13, by the bellows 14, e.g. of neoprene, with one side bearing against a surface of the piece 15 having a low  
10 coefficient of friction and constituted by graphite, for example.

When the appliance is in operation, rotation of the shaft 12 in the bearing 16 can give rise to an increase in temperature which cannot be dissipated when the bearing 16 is embedded in plastic, and thus thermally  
15 insulated from the bell 9, and this runs the risk of damaging the appliance.

In accordance with the invention, a heat conducting ring 39, e.g. made of stainless steel, is inserted between the bearing 16 and the bell 9. The ring is  
20 generally frustoconical in shape with its outer surface 40 in contact with the top portion 49 of the bell 9, and with its inner orifice 41 being a tight fit around the bearing 16 over a major fraction of its length.

The ring 39 establishes a heat bridge between the  
25 bearing 16 and the bell 9, thereby enabling heat to be dissipated to the outside of the appliance.

Naturally, numerous variants can be provided, particularly by substituting equivalent technical means, without thereby going beyond the ambit of the invention.

## CLAIMS

- 1/ A hand-held blender comprising a case (3) fitted with a handle (4), the case (3) including an electric motor rotating a first end of the shaft (5) included in a fixed  
5 tube (2), a tool (13) being secured to the second end of the shaft (5), the blender being characterized in that the second end of the tube (2) has mounted thereon a removable endpiece (1) secured to the tool (13), the tool (13) being removably mounted on the endpiece (1).
- 10 2/ A blender according to claim 1, characterized in that the bottom portion of the tube (2) has an assembly piece (7) surmounted by a groove (22) in which teeth (21) of the coupling piece (8) of the endpiece (1) engage, a  
15 static gasket being interposed between the assembly piece (7) and the coupling piece (8).
- 3/ A blender according to claim 1 or 2, characterized in that the drive shaft (5) includes an extender (6) driving  
20 a drive cage (11) secured to the extender (6), and cooperating with a drive hub (17) secured to the shaft (12) of the tool (13).
- 4/ A blender according to claim 3, characterized in that  
25 the cage (11) has internal projections (11a) engaged in the hub (17) and bearing against camming surfaces (17b) to attract the shaft (12) and the tool towards the extender (6).
- 30 5/ A blender according to any preceding claim, characterized in that at the outlet of the endpiece (1) and secured to the shaft (12) of the tool, there is mounted a rotary bellows gasket (14) suitable for being  
35 compressed to bear against an annular piece (15) having a low coefficient of friction and fixed to the endpiece, followed by a decompression chamber (19) of appropriate volume.

6/ A blender according to claim 1, characterized in that the drive cage (10) is held captive in the bell-shaped endpiece (9) by a collar (29) with clearance giving it  
5 two degrees of freedom, respectively axially and transversely.

7/ A blender according to any preceding claim, characterized in that the extender (6) is mounted to  
10 rotate by means of a bearing (30) and is sealed by a lip gasket (18).

8/ A blender according to any preceding claim, characterized in that the case (3) is provided at its top  
15 end with inlet and outlet orifices (34, 38) for air, with the bottom portion of the case (3) being sealed.

9/ A hand-held blender according to any preceding claim, characterized in that a heat-conducting ring (39) is  
20 mounted between the bearing (16) and the bell (9).

## A B S T R A C T

## A HAND-HELD BLENDER

5           A portable electrical appliance or hand-held blender  
for processing food. According to the invention, the  
appliance comprises a case (3) having a handle (4), the  
case (3) including an electric motor rotating a first end  
of a shaft (5) included in a fixed tube (2), a tool (13)  
10 being secured to the shaft (5), and the blender being  
characterized in that a removable endpiece (1) secured to  
the tool (13) is mounted on the second end of the tube  
(2). The blender is applicable particularly to catering.

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35 Translation of the title and the abstract as they were when originally filed by the  
Applicant. No account has been taken of any changes that may have been made  
subsequently by the ECT Authorities acting ex officio, e.g. under ECT Rules 37.2,  
38.2, and/or 48.3.

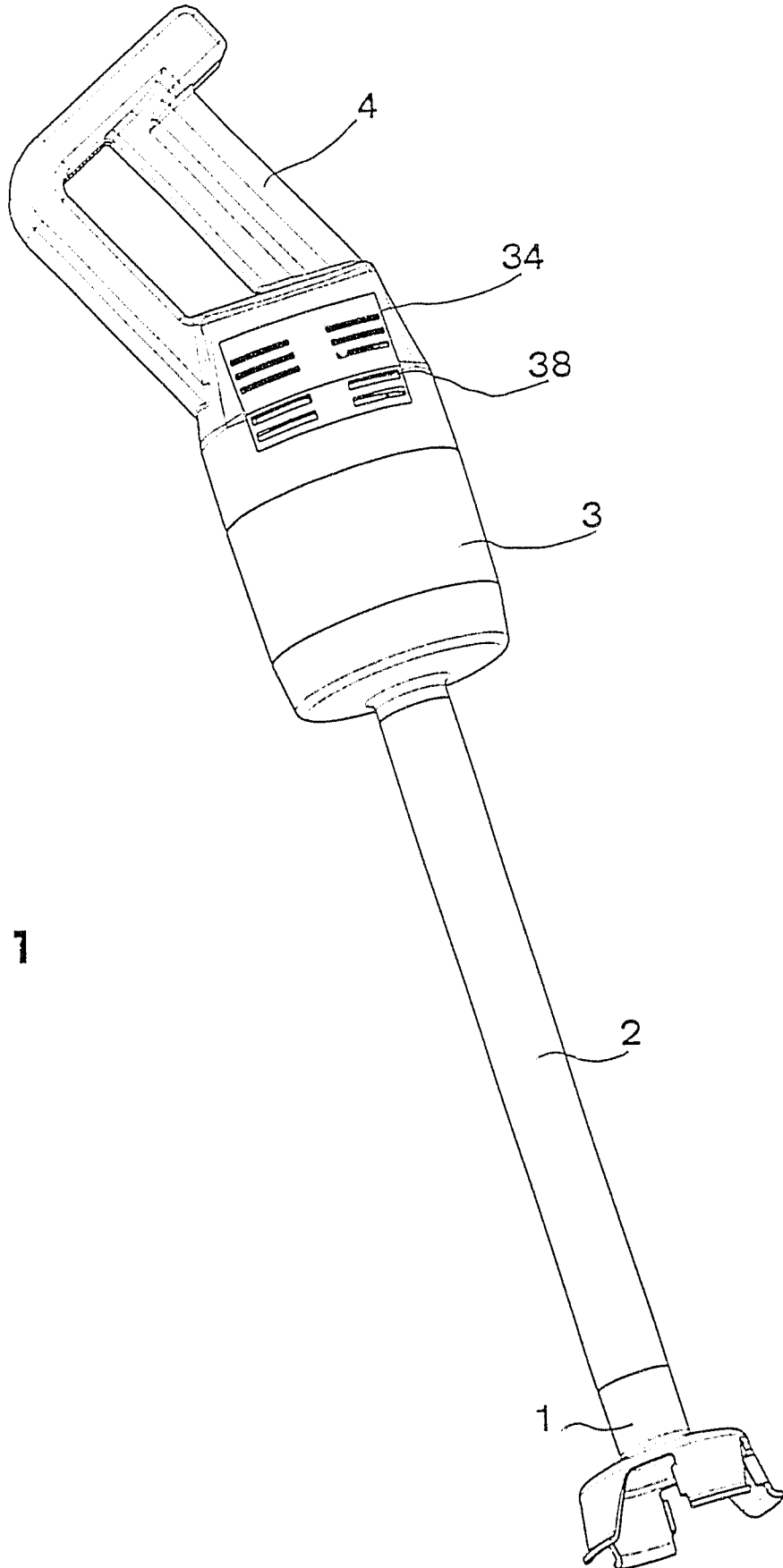
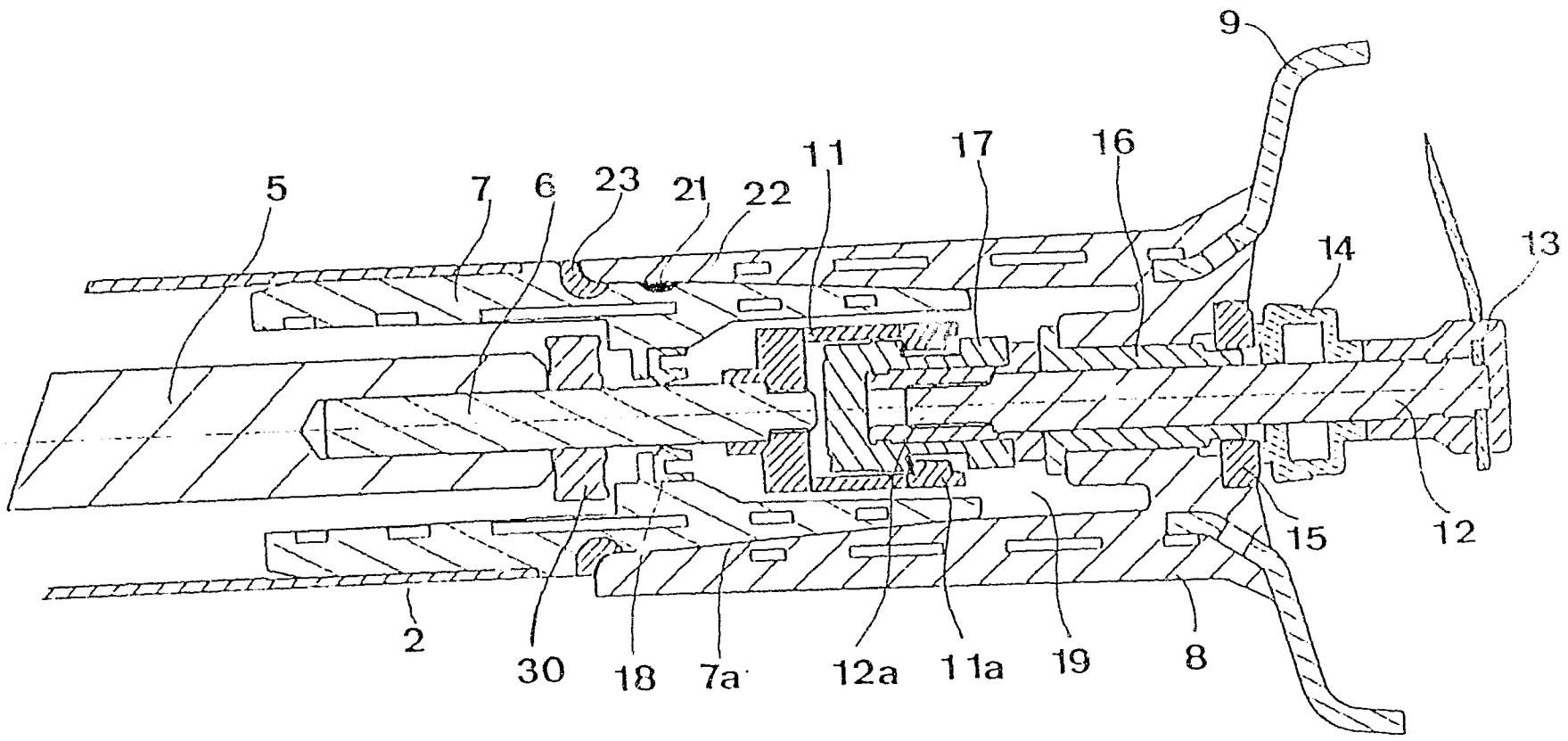


FIG 1



**FIG 2**

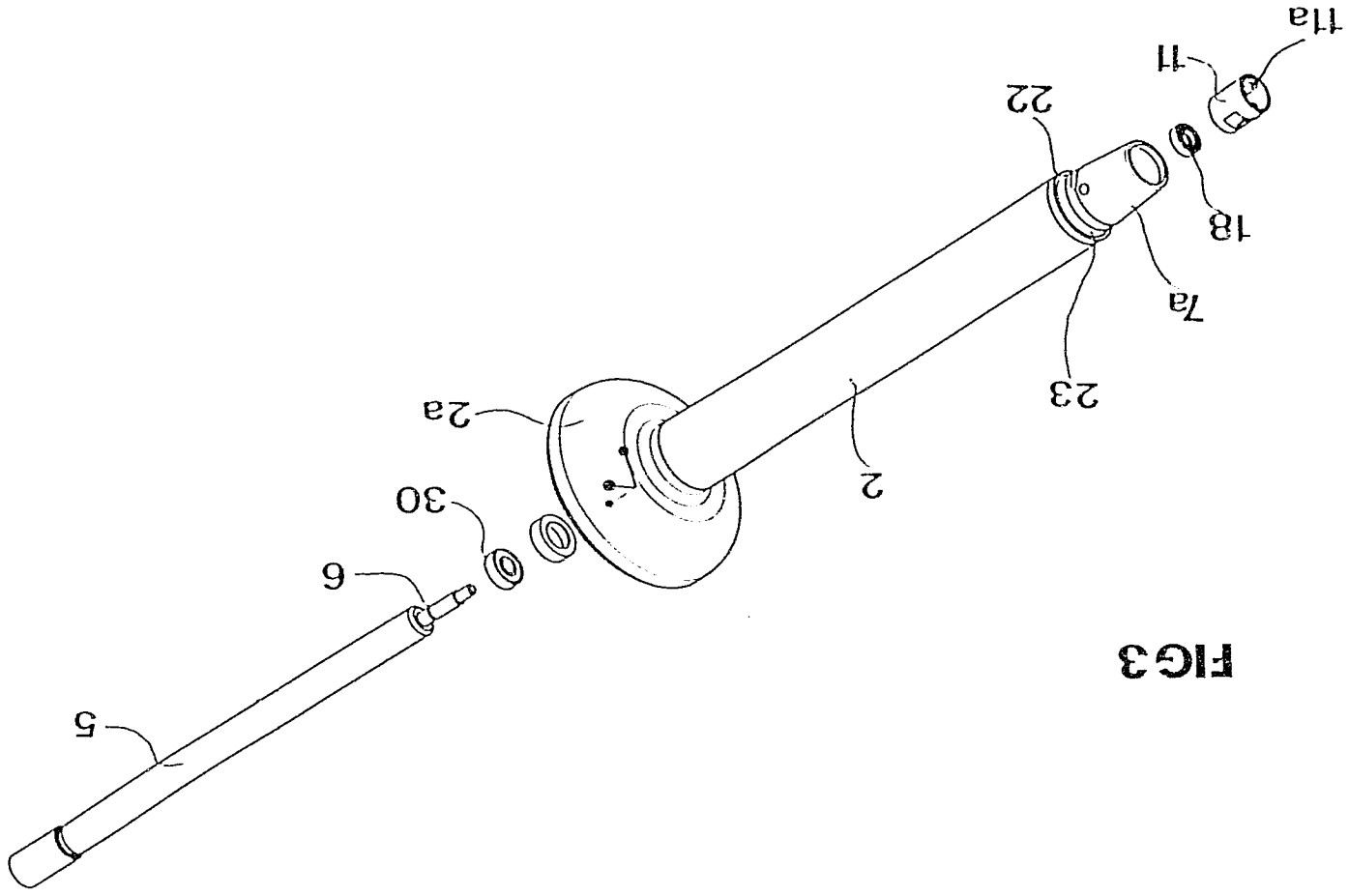
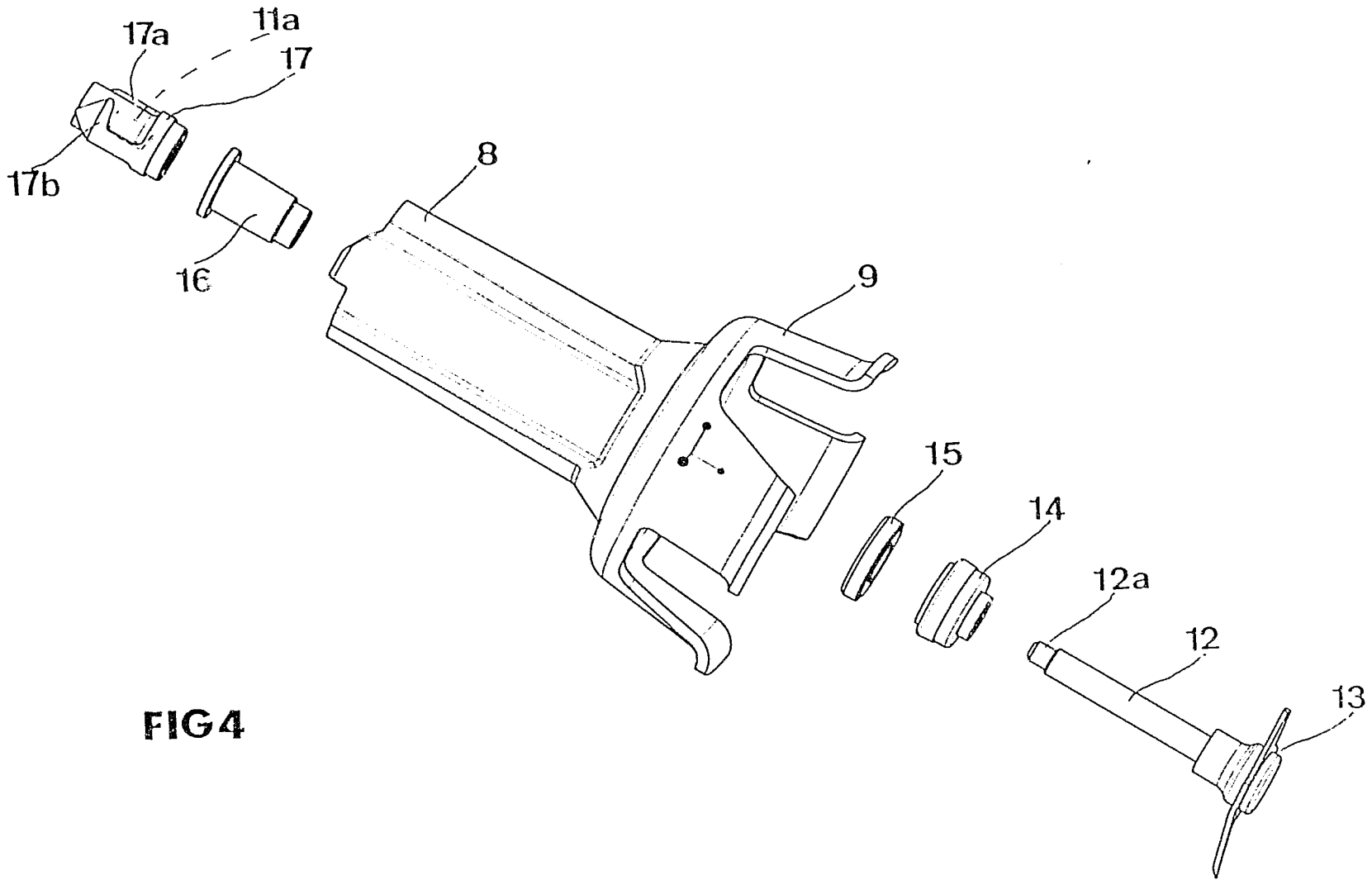


FIG 3



**FIG4**



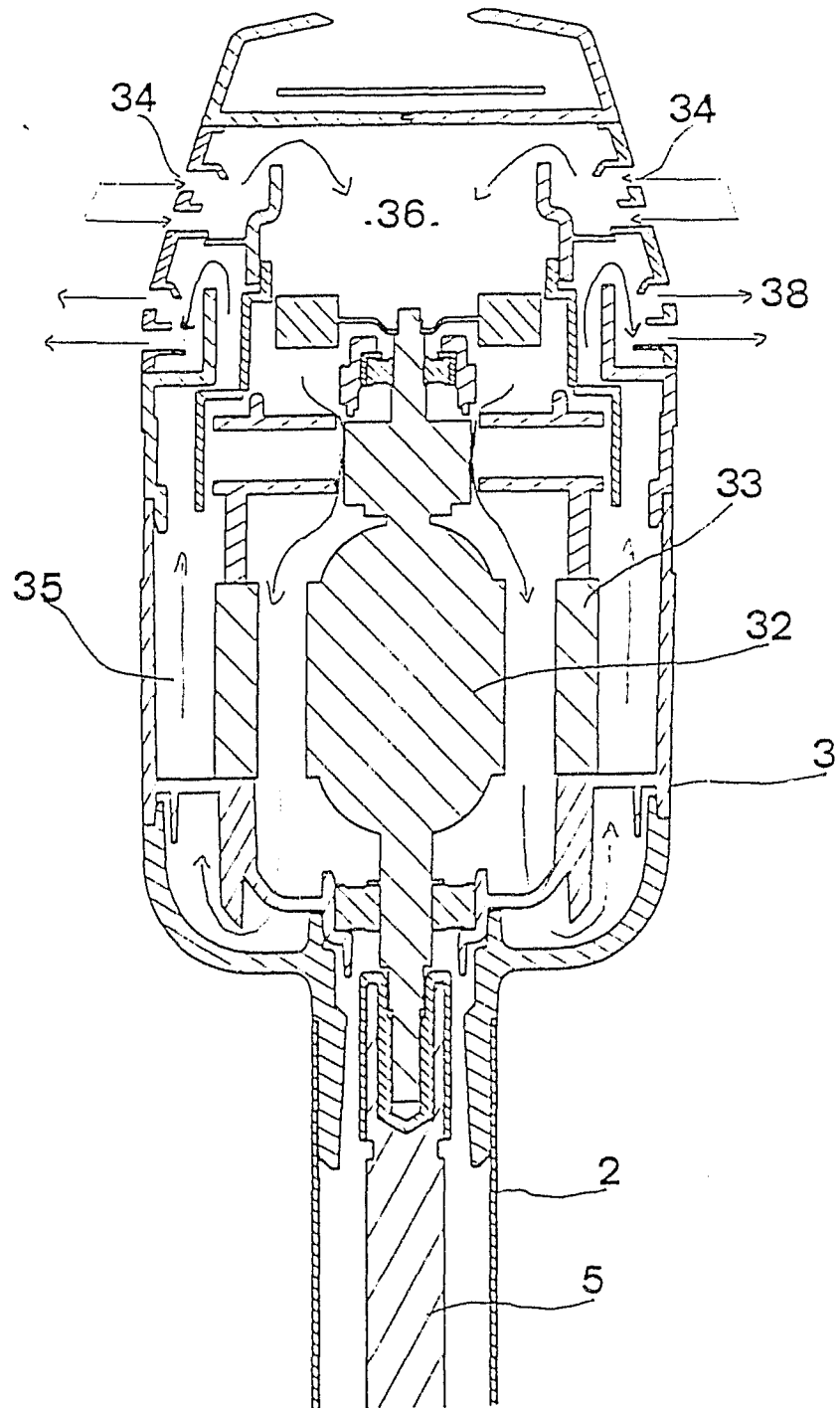


FIG 5

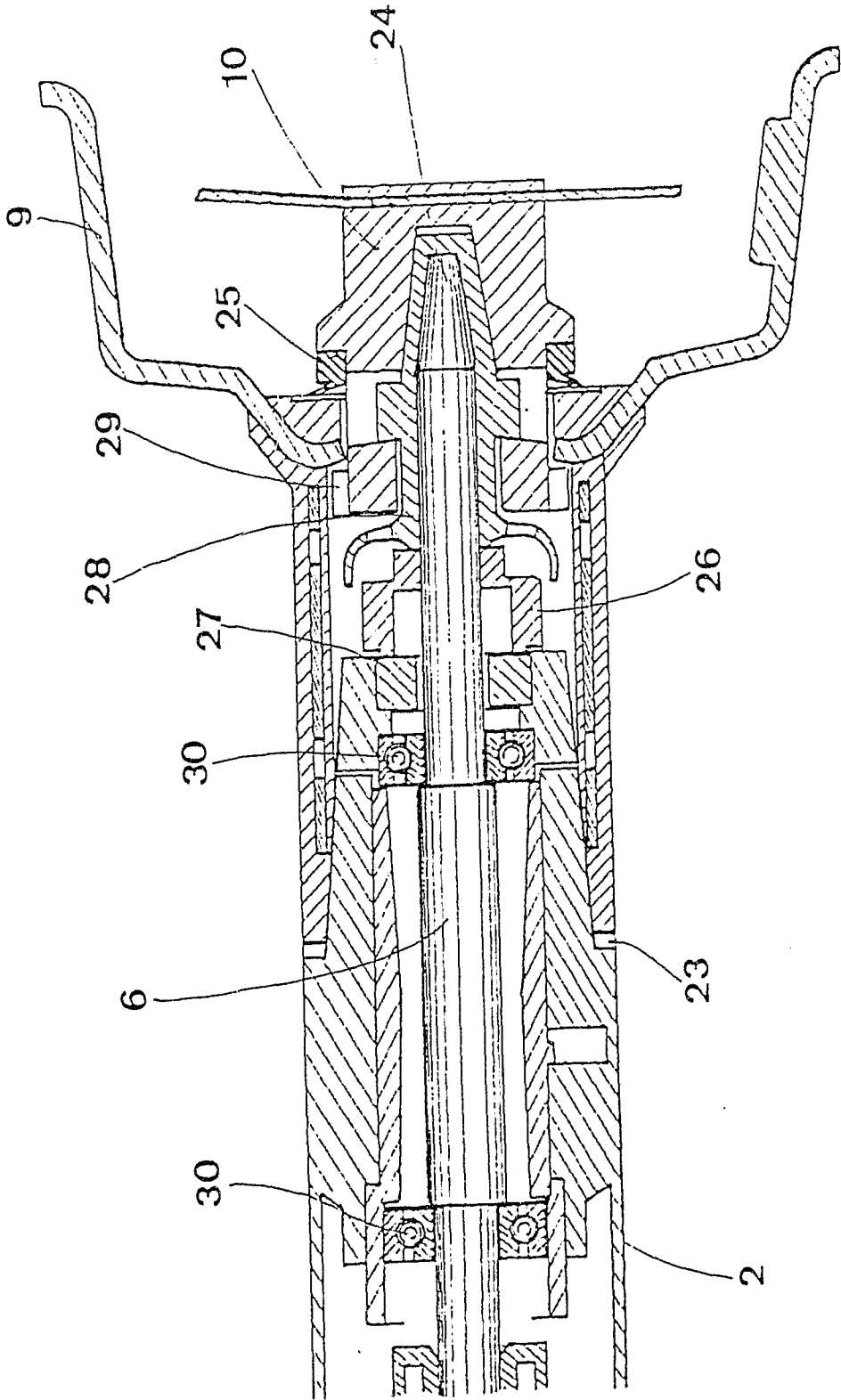


FIG 6

L/L

