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(54) **Electrically powered aspirator unit with impeller for cooling the motor**

(57) A powered aspirator unit comprises an external shell (11) containing an electric motor (12, 13) on the shaft of which is keyed the suction fan (17). Between the motor and the fan there is a partition providing on a bottom face a fan containment cavity and on the other face

is made the stator part (23) of a motor cooling impeller (24). In the partition (21) is made a seat (31) for a bearing (30) supporting the motor shaft (14).

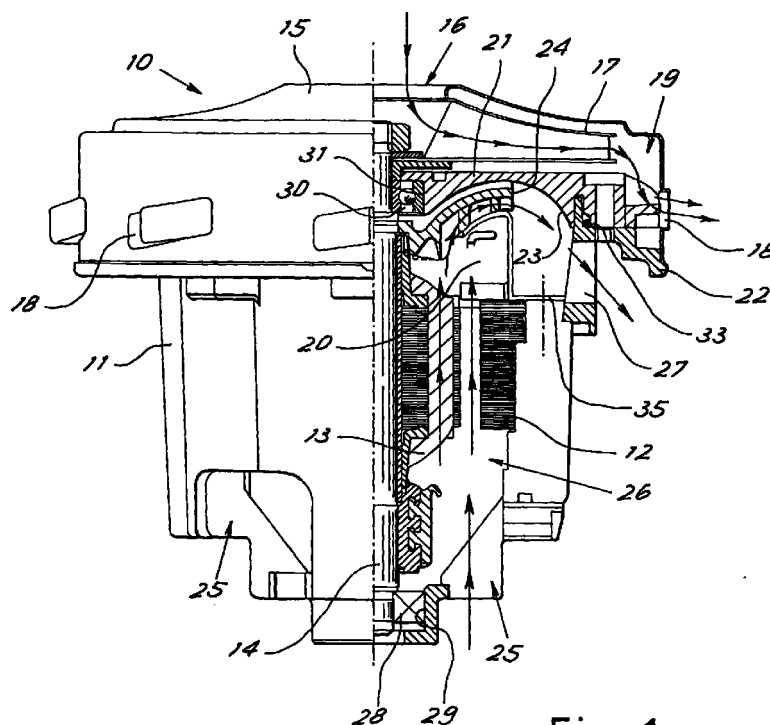


Fig. 1

Description

[0001] The present invention relates to a powered aspirator unit of the type termed 'bypass' i.e. the type in which the pump suction path and the motor cooling air path are separated to prevent any sucked liquid from reaching the electrical part of the motor. Units of this type are ordinarily used in aspirator cleaners having the ability to suck liquid also.

[0002] Usually the bypass units are supplied with a suction unit which is mounted at the motor head with the blower keyed to the drive shaft. At the opposite end of the shaft is mounted the motor cooling air circulation fan. Such an arrangement suffers principally from high axial dimension.

[0003] In addition, in the ever more frequent case of high rotation speeds (40 to 45 thousand rpm) shaft length and spacing of the supports become very critical factors.

[0004] Lastly, the cost of the assemblage in several parts as embodied in the prior art is relatively costly.

[0005] The general purpose of the present invention is to remedy the above mentioned shortcomings by making available a bypass unit having reduced space occupied, better performance and relatively reduced costs.

[0006] In view of this purpose it was sought to provide in accordance with the present invention a powered aspirator unit comprising an electric motor having an impeller for cooling and a suction assemblage with fan keyed on the drive shaft characterized in that between the motor and the fan there is a partition in which is made a seat for a shaft support bearing and that the impeller extends into the radial zone of the bearing.

[0007] To clarify the explanation of the innovative principles of the present invention and its advantages compared with the prior art there is described below with the aid of the annexed drawings a possible embodiment thereof by way of non-limiting example applying said principles. In the drawings:

FIG 1 shows a partially cross sectioned side elevation of a unit in accordance with the present invention,

FIG 2 shows a perspective view of a shell part of the unit of FIG 1, and

FIG 3 shows a perspective view of a deflector part of the unit of FIG 1.

[0008] With reference to the FIGS a 'bypass' unit indicated as a whole by reference number 10 comprises an external shell or bowl 11 pressed from plastic material, containing a stator part 12 and a rotor part 13 and supported on a shaft 14 of an electric motor.

[0009] A cap 15 completes the shell 11 and has an axial suction inlet 16 for a fan 17 keyed on the end of the shaft 14 to complete a sucking assemblage. The air pushed by the fan is evacuated through peripheral

channels 18.

[0010] The cavity 19 containing the fan is separated from the motor cavity 20 by a partition 21 which partially embodies the evacuation channels 18 (for the rest embodied by the edge 22 of the bowl 11). On the motor side the partition 21 is shaped with a cavity 23 to form the stator part of a motor cooling impeller 24 which is keyed to the shaft 14.

[0011] The impeller 24 sucks air longitudinally to the motor starting from the inlets 25 embodied at the base of the bowl 11. The air flow traverses the motor at 26 as shown by the arrows in FIG 1 and is evacuated through the radial openings 27 made in the wall of the bowl immediately beneath the edge 22.

[0012] A pressed cap 35 provides a deflector arranged radially facing the evacuation openings 27 to channel the emerging flow and prevent possible recirculation.

[0013] As may be seen again in FIG 1 the shaft 14 is supported by a first bearing 28 housed in a seat 29 in the bowl base and by a second bearing 30 housed in a seat 31 made in the thickness of the partition 21. As may be seen in the section of FIG 1 the thickness of the partition 21 necessary for housing the bearing is also employed for receiving the cavity 23. In other words the impeller extends into the bearing radial zone.

[0014] In FIGS 2 and 3 can be seen how the suction unit evacuation ducts are made. The ducts are formed by a part 18a pressed in the edge of the bowl and a part 18b pressed in the partition 21. In particular on the edge of the bowl there are chutes 18a with inlet edge 32 and direct for a first section tangentially to then bend up to the radial outlets.

[0015] Similarly on the partition 21 separated from the cavities 23 of the impeller by an O-ring 33 there are open channels 18b with inlet edge 34 coinciding with the edge 32 of the chutes. The open channels 18b follow the same trend as the chutes 18a and constitute the cover thereof to form the complete channels 18. The channels lead through openings made laterally in the cap.

[0016] It is now clear that the predetermined purposes have been achieved. The arrangement of the cooling impeller between suction fan and electric motor permits limiting the axial dimensions of the unit. In addition the distance between the supporting bearings is reduced. This makes possible achieving high rotation speeds.

[0017] In addition the number of component parts of the unit is reduced and compared with the prior art embodiments the static part of the unit is reduced to three members (bowl, cap and partitions) easy to make (e.g. pressed from plastic material) and assemble. Lastly the stoutness of the assemblage is increased.

[0018] Naturally the above description of an embodiment applying the innovative principles of the present invention is given by way of non-limiting example of said principles within the scope of the exclusive

right claimed here. For example the proportions of the various parts can be different depending on specific requirements.

Claims

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1. Powered aspirator unit comprising an electric motor having an impeller (24) for cooling and a suction assemblage with fan (17) keyed on the motor shaft (14) characterized in that between the motor and the fan there is a partition (21) in which is made a seat (31) for a bearing (30) supporting a shaft (14) and that the impeller (24) extends into the radial zone of the bearing (30). 10
2. Unit in accordance with claim 1 characterized in that in the partition (21) is made the stator part (23) of the impeller (24). 15
3. Unit in accordance with claim 1 characterized in that the partition (21) provides the bottom of the suction assemblage. 20
4. Unit in accordance with claim 1 characterized in that the motor is contained in a bowl shell (11) with cavity closed by said partition (21) on which is arranged a cap (15) to provide a shell for the suction assemblage. 25
5. Unit in accordance with claim 4 characterized in that the bowl has an edge (22) near the cap (15) which protrudes radially and is shaped to define at least part (18a) of air evacuation ducts of the suction assemblage. 30
6. Unit in accordance with claim 5 characterized in that the evacuation ducts (18) traverse the partition and lead onto the peripheral wall of the bowl edge. 35
7. Unit in accordance with claim 5 characterized in that the remaining part (18b) of the ducts is defined in a peripheral part of the partition surrounding the stator part (23) of the impeller (24) and is separated and sealed therefrom when the partition is mounted on the bowl. 40 45
8. Unit in accordance with claim 4 characterized in that the bowl has a side wall near the partition and displays openings (27) for evacuation of the air sucked by the cooling impeller (24) from the base of the bowl and traversing the motor longitudinally. 50
9. Unit in accordance with claim 8 characterized in that the bowl contains a deflector member (35) arranged near the impeller (24) and radially facing said evacuation openings (27) to channel toward them the cooling air flow. 55

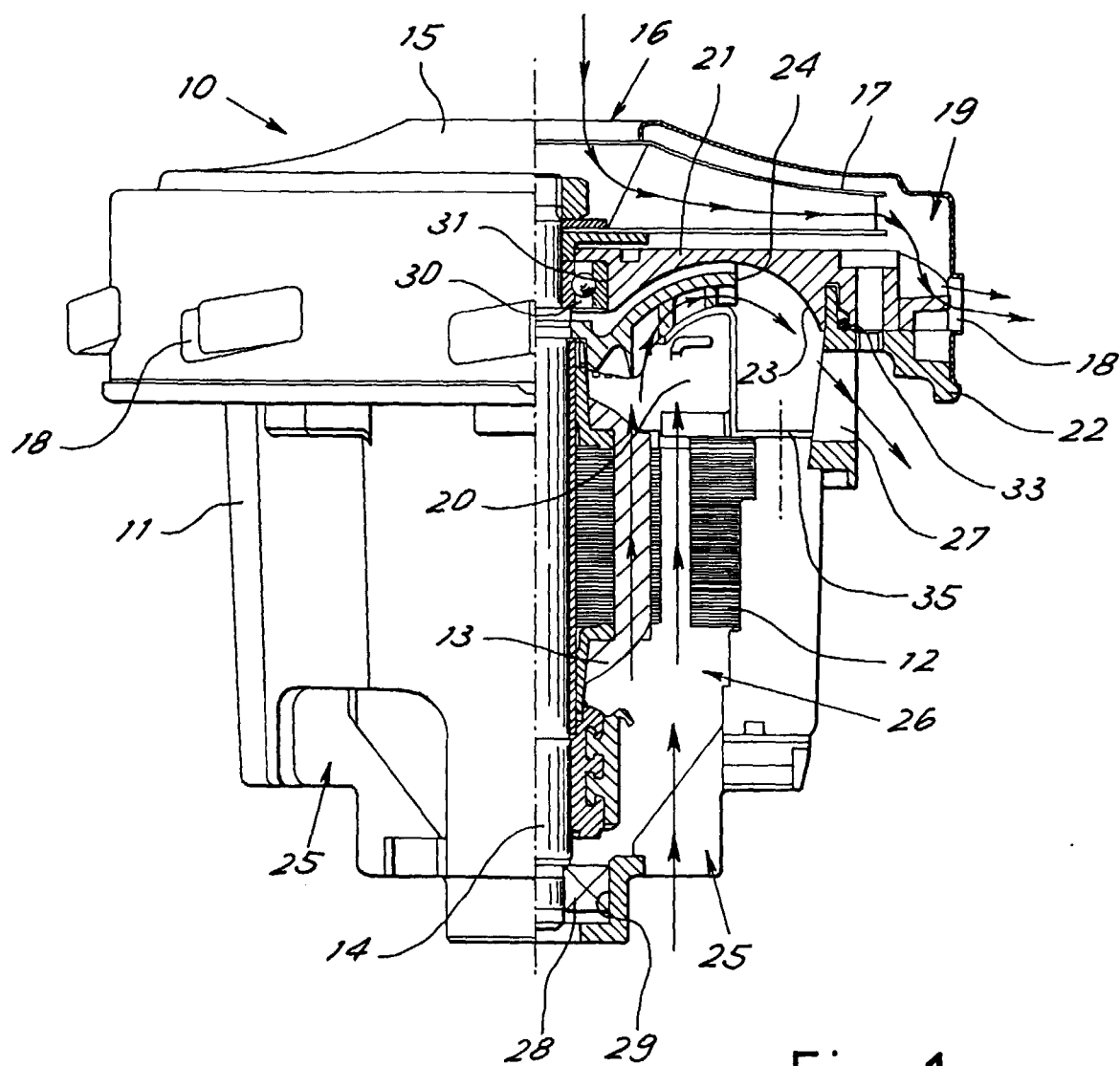


Fig. 1

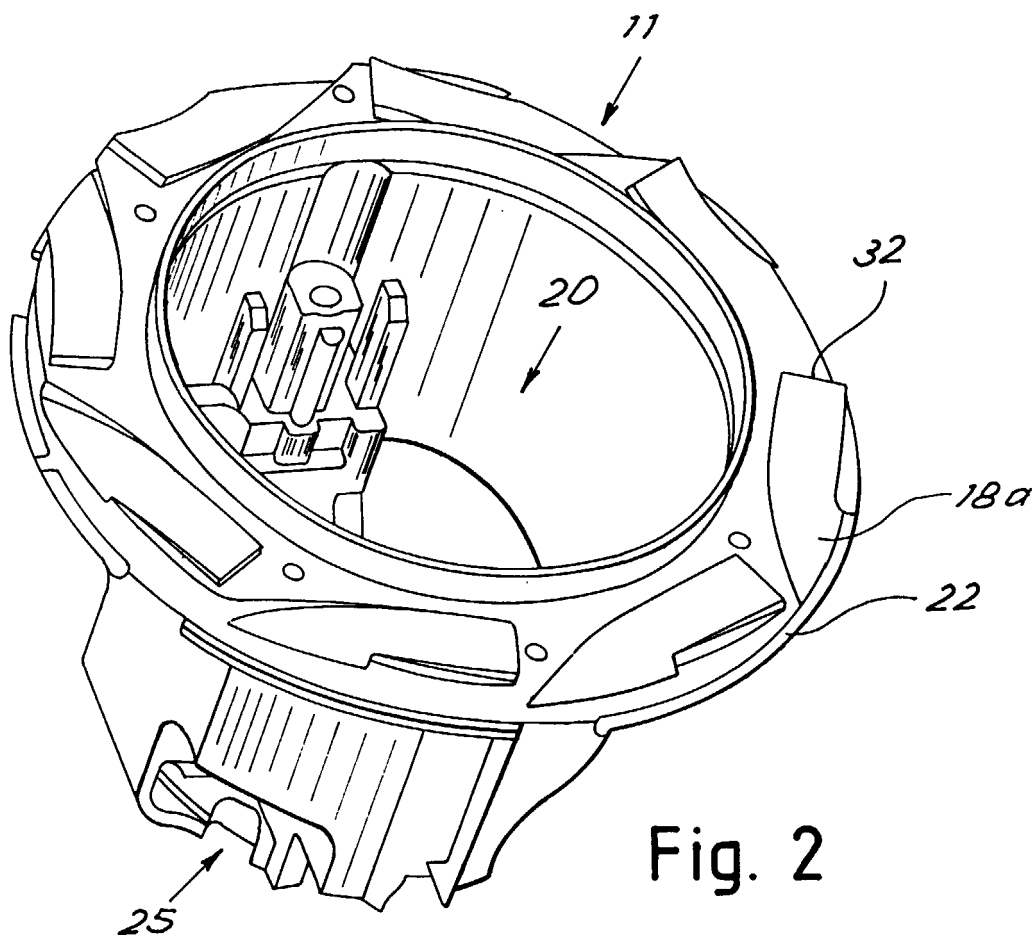


Fig. 2

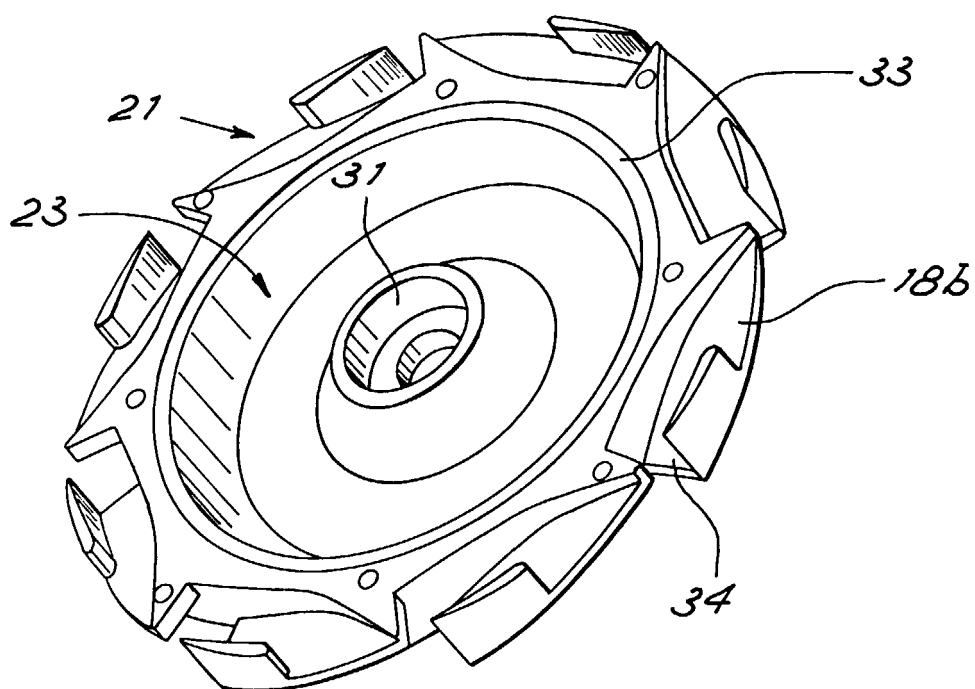


Fig. 3