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(54) **Suction device for creating a vacuum inside containers, in particular food containers**

(57) The present invention refers to a suction device (1) for creating a vacuum inside containers, such as basins, glasses and the like, of the kind used to preserve perishable products and in particular foodstuff.

The suction device (1) according to the invention comprises a vacuum pump, a motor (8) for actuating said pump and control systems all placed inside a single device designed to be placed on a table, as well as a detachable push rod (3), connected to said vacuum pump by a coil tube (4), suitable to couple to a valve element generally provided on the cover of the foodstuff containers, to link the inside of the container to the vacuum pump when the device is actuated.

The fact of having all the devices placed inside a single apparatus, which is separate from the push rod (3) and designed to be placed on a table, permits to create more powerful and noiseless, and at the same time more user-friendly, suction devices, since the user has to handle only one push rod for the connection to the container and not a device, which comprises also the motor and different suction systems, which would be more bulky and heavier.

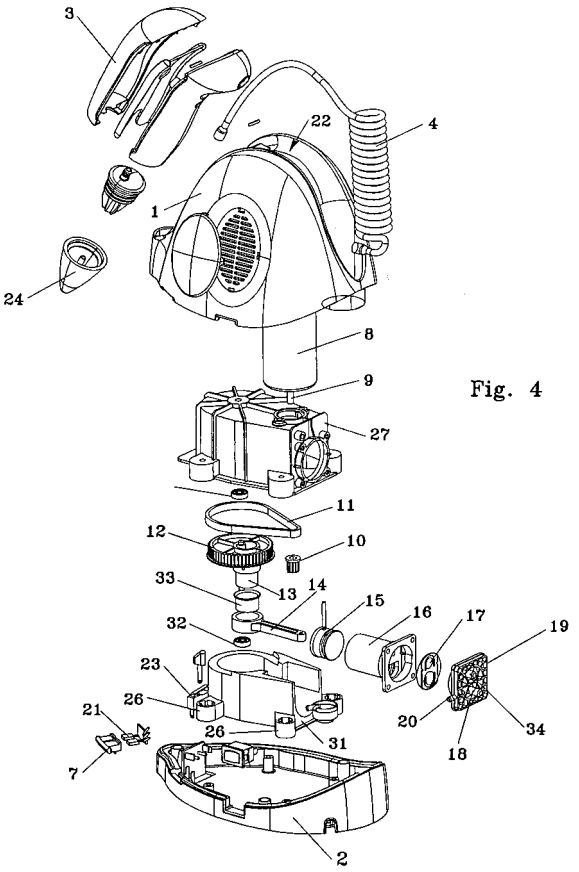

Fig. 4

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Description

[0001] The present invention refers to a suction device for creating a vacuum inside containers, such as basins, glasses and the like, of the kind used to preserve perishable products and in particular foodstuff.

[0002] The suction device according to the invention comprises a vacuum pump, a motor for actuating said pump and control systems, all placed inside a single device designed to be placed on a table, as well as a detachable push rod, connected to said vacuum pump by a coil tube, suitable to couple to a valve element generally provided on the cover of foodstuff containers, to link the inside of the container to the vacuum pump when the device is actuated.

[0003] The fact of having all the devices placed inside a single apparatus, which is separate from the push rod and designed to be placed on a table, permits to create more powerful and noiseless, and at the same time more user-friendly, suction devices, since the user has to handle only one push rod for the connection to the container and not a device, which comprises also the motor and different suction systems, which would be more bulky and heavier.

[0004] In the small domestic appliances sector, suction devices used to create a vacuum inside bags or containers such as food basins or the like are already known.

[0005] In particular, it is known from US patent Nº 5,195,427 a suction device to create a vacuum in rigid food containers, comprising a casing inside of which a motor is installed, which through a worm actuates a crown gear, which is solidly connected to an eccentric, which by means of a connecting-rod actuates the alternate movement of the piston of a suction pump.

[0006] This device is fed by batteries, which recharge when the device is placed on its base.

[0007] This system has some limitations, mainly due to the fact that, since the device must be easy to handle, also with one hand only and therefore small-sized, it must necessarily have a limited power, as well as limited is the life of the batteries feeding the motor.

[0008] The present invention falls into this sector, by proposing a suction device suitable to create a vacuum inside containers, in particular for foods, capable of overcoming the aforesaid limitations.

[0009] More particularly, the present invention provides for a suction device consisting of an apparatus to be placed on a table, inside of which the suction devices, the motor and the different control systems, and a push rod, connected to the suction devices through a coil tube, suitable to couple with a valve installed on the container, inside of which the vacuum must be created, are installed.

[0010] In such a way, the manoeuvrable part of the device, i.e. the push rod, can be small-sized, handy and very light, while the body of the device, which is designed to be placed on the table, can have such size as to contain motor and suction means having also relatively high power.

[0011] This invention will be now described in detail, by way of example and without any limitation thereto, with reference to the figures annexed thereto, in which:

- figure 1 is a perspective view of a device according to the invention;
- figure 2 is a section of the device shown in figure 1;
- figures 3 shows only the suction devices and motor;
- figure 4 is an exploded view of the device according to the invention.

[0012] With reference to the figures annexed hereto, the suction device according to the invention consists of a device indicated as a whole with reference number 1, provided with a base 2 to be placed on a flat surface and which contains the suction systems, the motor and the control systems, as well as a push rod indicated with reference number 3, connected to the suction devices by means of a flexible coil tube 4, which push rod can be separated from the body of the device to be coupled to a valve provided on the containers wherein the vacuum must be created.

[0013] The push rod is provided with an air access consisting of a couple of coaxial tubes 28 and 29, which partially penetrate one inside the other, in such a way as to cause the air inflow to have a winding course, thus dropping the air humidity, which concentrates in the chamber 30 inside the push rod. Said push rod may be easily removed to be drained and cleaned.

[0014] A grid 5 enables a certain flux of air circulating inside the device, which is provided on a side with a switch 6 and an indicator 7, for example of a LED kind, which signals when the device is working and when the degree of vacuum has been reached.

[0015] The details of the device will be now described with reference to figures 2 through 4.

[0016] On the base 2, with damper means 26 in between, a crankcase 27 is fitted as a support of an electric motor 8, which actuates the suction devices placed inside the crankcase.

[0017] The crankcase is closed at its lower part by a wall 31, so that the pump is placed in a completely closed environment, in order to decrease the noiseness of the device.

[0018] On the shaft 9 of the motor 8, a pinion 10 is fitted, which by means of a toothed belt 11 actuates a cog-wheel 12 on which an eccentric 13 is mounted.

[0019] Said eccentric, by means of a connecting-rod 14 actuates the alternate movement of a piston 15, which slides inside the cylinder 16 fixed to the crankcase 27 structure.

[0020] The shaft 9 is fitted on bearing rolls 32, while the connecting-rod 14 is mounted on an eccentric pin with a bronze connecting-rod 33 in between, in order to reduce noise and friction.

[0021] On the cylinder 16, a sheet shutter 17 is fitted, which, by closing and opening, connects the inside of the cylinder 16 to a duct 18 provided on a grid 19, which

tightens the sheet 17 against the cylinder 16.

[0022] The coil tube 4, which ends, at the opposite side, with the push rod 3, is connected to the joint 18.

[0023] From the duct 18, a bypass 20 branches off, to which a pressure sensor, which is not shown by the figures, is connected, capable of checking when the desired degree of vacuum is reached.

[0024] This sensor generates signals, which are transmitted to a known electronic circuit, also not shown in figure 1, which when the set value is reached, actuates a LED 21 of the LED signaller 7, to inform the operator that the operation is concluded.

[0025] Still on grid 19, a second joint 34 is installed, which by means of a tube preferably made of silicone, not shown, connects the air outlet of the cylinder 16 to the inside of the chamber, which remains comprised inside the crankcase 17. This solution allows to dramatically reduce the noise deriving from the compression and expansion of the air inside the cylinder. In its upper part, the device is shaped in such a way as to create a seating 22 to lodge the push rod 3 when this is not in use.

[0026] In the lower part of the seating 22, a microswitch 23 is installed, which actuates the device when the push rod is raised and stops its functioning when it is stored.

[0027] The push rod 3 is also provided with an end 24 made of soft material, for example rubber or the like, shaped in such a way as to match with the valve provided on the vacuum food container.

[0028] The functioning is as follows.

[0029] The device is made ready to use by actuating the general switch 6, through which the eclectic supply is transmitted to the circuit of the motor 8, to which a microswitch 23 is installed, to the LED system 7, which controls the turning-on of a first LED to signal that the device is ready for use and to the other devices as the control electronic board and so forth.

[0030] The operator raises the push rod 3, by removing it from the seating 22 and thus causing the microswitch 23 to turn, enabling the feeding of the motor 8.

[0031] The motor, by means of the cog-wheels 10 and 12 and the eccentric 13, actuates the piston 15 that, by opening and closing the sheet shutter 17, sucks air from the duct 18, to which the push rod 3 is connected though the flexible coil tube 4.

[0032] The user presses the end 24 of the push rod 3 against the valve provided on the container, from the inside of which it sucks air until the vacuum is created.

[0033] When the vacuum inside the container has reached the set value, detected by the sensor through the bypass 20, the control board controls the turning on of the LED 21 to signal that the operation is concluded.

[0034] At this time, the operator is only required to lodge again the push rod 3 in its seating to actuate the microswitch 23 and thus stop the feeding of the motor 8.

[0035] Once the vacuum has been created in all the containers provided, the user can disconnect completely the device by means of the general switch 6.

[0036] As it can be clearly understood by the description above, the suction device according to the invention offers an improved practicality of use as compared to the known devices thanks to the fact that it provides for a push rod separated from the device, allows to use duly powered motor and suction systems, offering at the same time the lightness and the easy manoeuvrability of the device (the push rod 3) which can be actuated manually.

[0037] Of course, the size, as well as the materials used, may be changed according to the user's requirements.

Claims

1. Suction device of the kind comprising a vacuum pump, a motor for actuating said pump and means suitable to connect said pump to the inside of a container wherein the vacuum must be created, **characterised in that** it is provided with all the suction devices and the respective actuating means placed inside a common device, as well as a push rod separated from said device, suitable to couple to valve means placed on the container inside of which the vacuum must be created and connected through a duct by said suction means provided on said device.

2. Suction device according to claim 1, **characterised in that** it is provided, inside said device, both with suction means and the respective motor means, and the control devices of the apparatus.

3. Suction device according to claim 2, **characterised in that** it is provided with the casing of said device shaped in such a way as to create a seating suitable to lodge the push rod when this is not in use.

4. Suction device according to any one of the preceding claims, **characterised in that** it is provided, in said device, with a base supporting a motor, which through an eccentric actuates a piston which slides inside a cylinder closed, at the end, by a sheet shutter ending with a joint for a flexible tube connected to said push rod.

5. Suction device according to any one of the preceding claims, **characterised in that** it is provided with a vacuum sensor suitable to generate a signal when the set degree of vacuum is reached and means, which can be actuated by said signal, suitable to indicate that said degree of vacuum has been reached.

6. Suction device according to any one of the claims 3 through 5, **characterised in that** it is provided, in the seating of said push rod, with a microswitch suitable to open and close the feeding to said motor for actuating the vacuum pump, when said push rod is removed from or inserted into said seating.

7. Suction device according to any one of the preceding claims, **characterised in that** it is provided with said motor and said suction means mounted on said base, with damper means in between.

8. Suction device to create a vacuum inside the containers according to claim 1, **characterised in that** it is provided with:

- a base (2) to be placed on a flat surface;
- a vacuum pump (14, 15, 16) fitted on said base;
- a motor (8) suitable to actuate said vacuum pump;
- a flexible tube (4) suitable to connect said vacuum pump to a separate push rod (3) suitable to engage valve means provided on a container, inside of which a vacuum must be created;
- sensor means suitable to detect the degree of vacuum inside said duct and to generate a corresponding signal when the set degree of vacuum has been reached;
- means suitable to stop the feeding to said motor when said push rod is lodged into a seating provided on said device.

9. Suction device to create a vacuum inside of containers according to claim 8, **characterised in that** it is provided with means suitable to connect the air outflow from the cylinder (16) to the inside of the chamber inside the crankcase (17), in order to reduce the noise deriving from compression and expansion of the air inside the cylinder.

10. Suction device to create a vacuum inside containers according to claim 9, **characterised in that** it is provided, in the push rod (3), with a chamber (30) for collecting the condensation, means suitable to cause the inflow air to have a winding course in said push rod being provided.

11. Suction device to create a vacuum inside containers according to claim 10, wherein said means suitable to cause the inflow air to have a winding course, consist of a series of coaxial ducts, partially inserted one into the other.

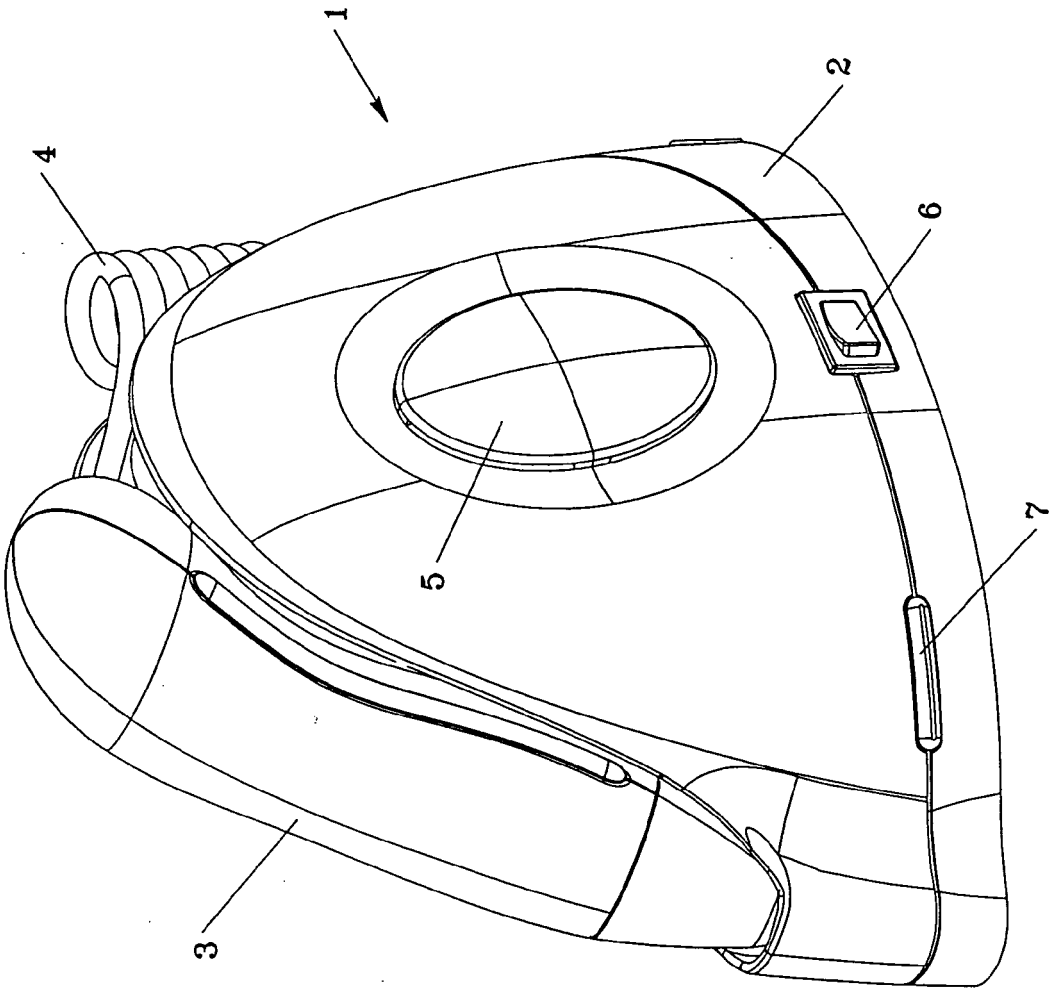


Fig. 1

Fig. 2

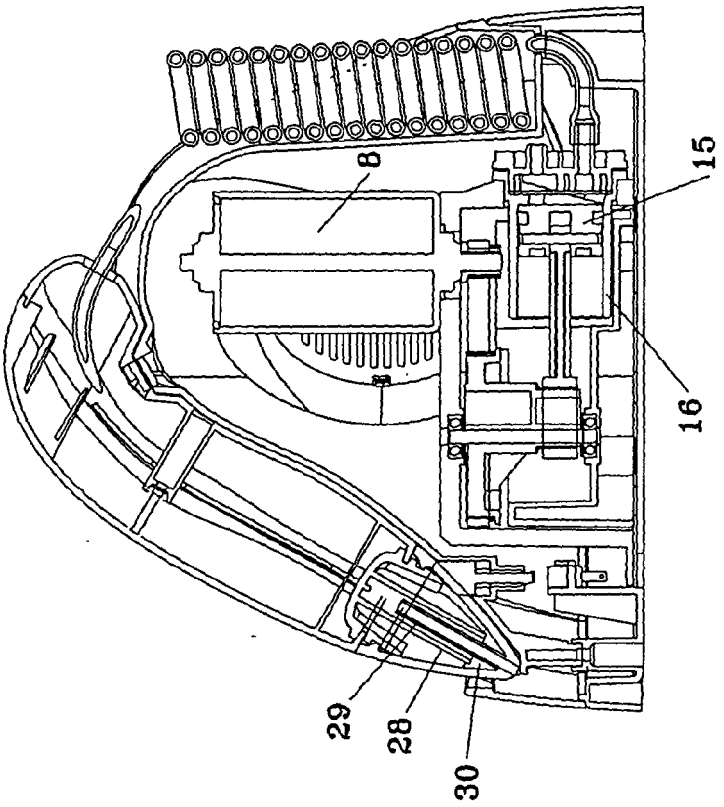
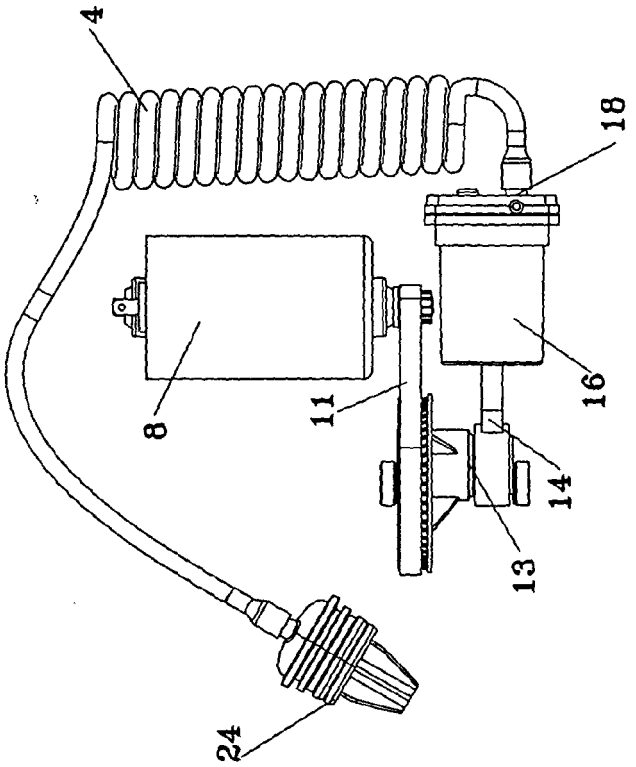


Fig. 3



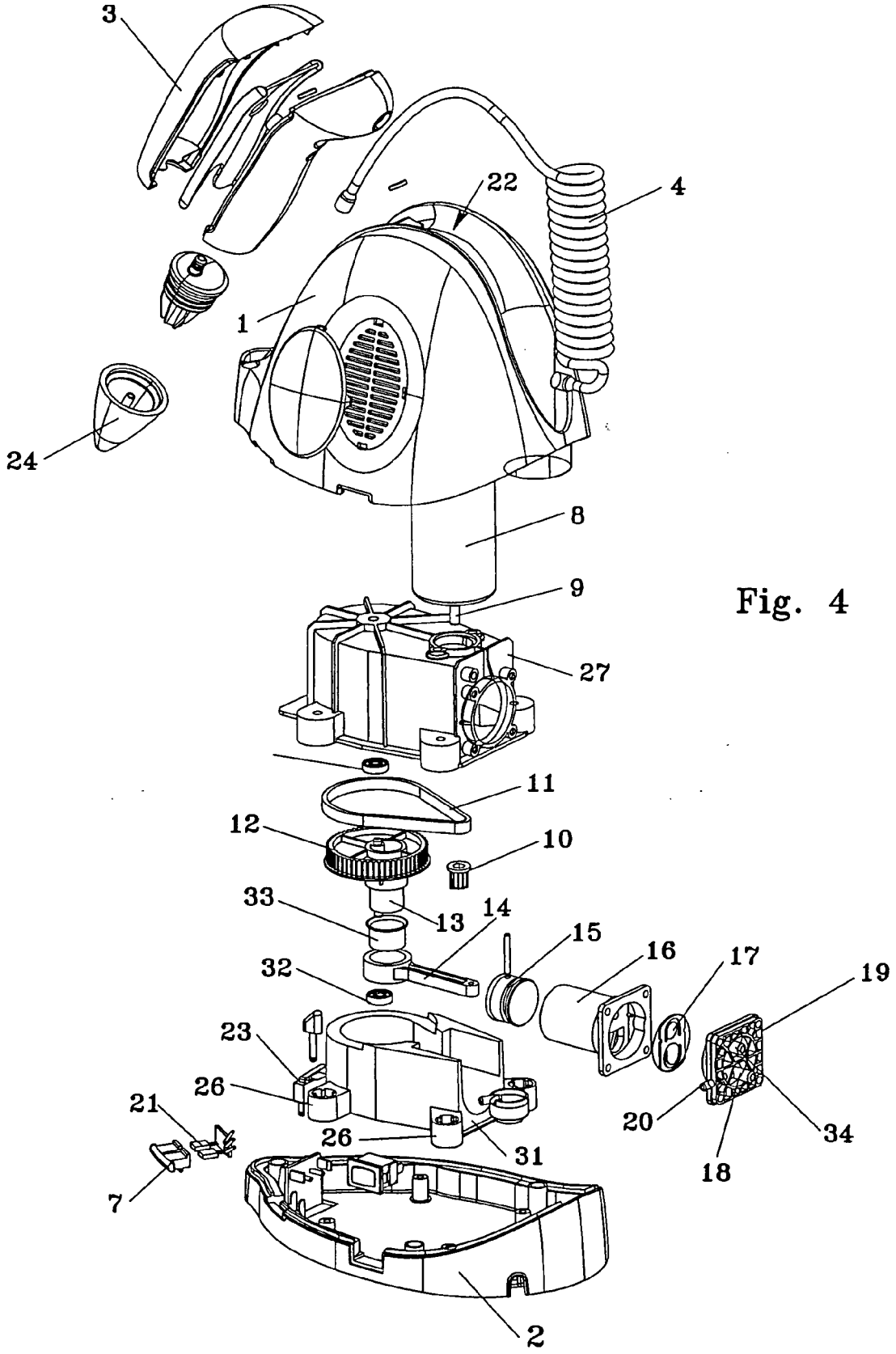

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Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 07 00 6812

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 October 2007	Schelle, Joseph

CATEGORY OF CITED DOCUMENTS

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