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

Saugvorrichtung zur Erzeugung eines Vakuums in Behältern, insbesondere in Lebensmittelbehältern

Dispositif d'aspiration pour créer le vide à l'intérieur de récipients, en particulier de récipients alimentaires

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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 preamble of claim 1 (see WO 02/064429 A1) 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] A further suction device is known from EP 1 053 945 A1.

[0009] The present invention falls into this sector, by proposing the suction device according to claim 1.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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.

[0014] The details of the device will be now described with reference to figures 2 through 4.

[0015] 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.

[0016] 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.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] The coil tube 4, which ends, at the opposite side, with the push rod 3, is connected to the joint 18.

[0022] 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.

[0023] 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.

[0024] 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.

[0025] 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.

[0026] 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.

[0027] The functioning is as follows.

[0028] 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.

[0029] 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.

[0030] 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.

[0031] 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.

[0032] 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.

[0033] 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.

[0034] 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.

[0035] 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.

[0036] Of course, the size, as well as the materials used, may be changed according to the user's requirements.

Claims

1. Suction device intended to create the vacuum in containers of the kind comprising a vacuum pump (14, 15, 16) and a motor (8) for actuating the said pump both placed inside a common appliance (2), means suitable to connect the said pump to the inner side of the container wherein the vacuum must be created, constituted by a push rod (3) separated from the said appliance (2) and able to be joined with valve means present on the container and connected through a duct (4) with the said vacuum pump, the said push-rod (3) having a tip (24) provided with means suitable to cause the inflow air to have a winding course in the said push-rod (3) in order to allow to the humidity in the air to condensate and to be collected in a chamber (30) obtained in the tip (24), **characterised by** the fact that the said means apt to cause the inflow air to have a winding course in the said push rod (3) are constituted by a couple of coaxial ducts (26, 29) partially inserted one in the other and obtained in the tip (24).

2. Suction device intended to create the vacuum in containers, according to Claim 1, **characterised by** the fact that the inflow air in the push rod (3) takes the following course:

   - goes through the conduct (29);
   - goes through the annular conduct defined by the outer wall of the duct (29) and the inner wall of the duct (28);
   - goes up again in the upper part of the tip (24) where enters in the tube (4)

3. Suction device intended to create the vacuum in containers, according to Claim 1, of the kind comprising a vacuum pump (14, 15, 16) and a motor (8) for actuating said pump both placed inside a common appliance (2), means suitable to connect said pump to the inside of the container wherein the vacuum must be created, constituted by a push rod (3) separated from the said appliance (2) and able to be joined with valve means present on the container and connected through a duct (4) with the said vacuum pump, **characterised in that** it provides that the said motor and the said pump are contained in a closed crankcase (17) and 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 (16).

Patentansprüche

1. Saugvorrichtung zum Erzeugen eines Vakuums in Behältern von dem Typ, der eine Vakuumpumpe (14,

15, 16) sowie einen Motor (8) zum Antrieb dieser Pumpe, die beide in einem gemeinsamen Gerät (2) angeordnet sind sowie eine Einrichtung zum Verbinden der Pumpe mit dem Inneren des Behälters, in welchem das Vakuum erzeugt werden muss, bestehend aus einem vom Gerät (2) getrennten Andrückteil (3), welches derart eingerichtet ist, dass es dicht an eine am Behälter befindlichen Ventileinrichtung angelegbar und über eine Leitung (4) mit der Vakuumpumpe verbunden ist, umfasst, wobei dieses Andrückteil (3) eine Spitze (24) aufweist, die mit einer Einrichtung versehen ist, welche die einströmende Luft zu einem gewundenen Strömungsverlauf im Andrückteil (3) zu veranlassen vermag, um die Kondensation der Luftfeuchtigkeit zu bewirken, so dass diese in einer in der Spitze (24) befindlichen Kammer (30) gesammelt werden kann, **dadurch gekennzeichnet, dass** diese Einrichtung, welche die einströmende Luft zu einem gewundenen Strömungsverlauf im Andrückteil (3) zu veranlassen vermag, aus einem Paar koaxialer Rohre (28, 29) besteht, die teilweise ineinander gesteckt und in der Spitze (24) untergebracht sind.

2. Saugvorrichtung zum Erzeugen eines Vakuums in Behältern nach Anspruch 1, **dadurch gekennzeichnet, dass** die in das Andrückteil (3) einströmende Luft den folgenden Strömungsverlauf nimmt:

- durch das Rohr (29);
- durch den ringförmigen Raum, der von der Außenwand des Rohres (29) und der Innenwand des Rohres (28) begrenzt ist;
- wieder nach oben in den oberen Teil der Spitze (24), wo sie in die Leitung (4) eintritt.

3. Saugvorrichtung zum Erzeugen eines Vakuums in Behältern nach Anspruch 1 von dem Typ, der eine Vakuumpumpe (14, 15, 16) sowie einen Motor (8) zum Antrieb dieser Pumpe, die beide in einem gemeinsamen Gerät (2) angeordnet sind sowie eine Einrichtung zum Verbinden der Pumpe mit dem Inneren des Behälters, in welchem das Vakuum erzeugt werden muss, bestehend aus einem vom Gerät (2) getrennten Andrückteil (3), welches derart eingerichtet ist, dass es dicht an eine am Behälter befindlichen Ventileinrichtung angelegbar und über eine Leitung (4) mit der Vakuumpumpe verbunden ist, umfasst, **dadurch gekennzeichnet, dass** der Motor und die Pumpe in einem geschlossenen Kurbelgehäuse (27) aufgenommen sind und eine Einrichtung vorgesehen ist, welche die aus dem Zylinder (16) ausströmende Luft in das Innere der Kammer im Kurbelgehäuse (27) zu leiten vermag, um die von der Kompression und der Expansion der Luft im Zylinder (16) herrührenden Geräusche zu vermindern.

Revendications

1. Dispositif d'aspiration destiné à créer le vide dans des récipients, du type comprenant une pompe (14, 15, 16) à vide et un moteur (8) pour actionner la pompe, placés tous deux à l'intérieur d'un appareil (2) commun, des moyens propres à mettre la pompe en communication avec l'intérieur du récipient, dans lequel le vide doit être créé, constitué par une tige (3) formant poussoir séparée de l'appareil (2) et apte à être réunie à des moyens de valve présents sur le récipient et communiquant par un conduit (4) avec la pompe à vide, la tige (3) formant poussoir ayant une pointe (24) pourvue de moyens propres à faire que l'air affluent ait un trajet sinueux dans la tige (3) formant poussoir afin de permettre à l'humidité de l'air de se condenser et d'être recueillie dans une chambre (30) obtenue dans la pointe (24), **caractérisé par le fait que** les moyens propres à faire que l'air affluent ait un trajet sinueux dans la tige (3) formant poussoir sont constitués par un couple de conduits (26, 29) coaxiaux, insérés en partie l'un dans l'autre et obtenus dans la pointe (24).

2. Dispositif d'aspiration destiné à créer le vide dans des récipients suivant la revendication 1, **caractérisé par le fait que** l'air affluent dans la tige (3) formant poussoir suit le trajet suivant :

- il passe dans le conduit (29) ;
- il passe dans le conduit annulaire défini par la paroi extérieure du conduit (29) et par la paroi intérieure du conduit (28) ;
- il revient dans la partie supérieure de la pointe (24) où il entre dans le tube (4).

3. Dispositif d'aspiration destiné à créer le vide dans des récipients suivant la revendication 1, du type comprenant une pompe (14, 15, 16) à vide et un moteur (8) pour actionner la pompe, placés tous deux à l'intérieur d'un appareil (2) commun, des moyens propres à mettre la pompe en communication avec l'intérieur du récipient, dans lequel le vide doit être créé, constitué par une tige (3) formant poussoir séparée du dispositif (2) et apte à être réunie à des moyens de valve présents sur le récipient et communiquant par un conduit (4) avec la pompe à vide, **caractérisé en ce qu'**il prévoit que le moteur et la pompe sont contenus dans une boîte de manivelle (17) fermée et il est muni de moyens propres à mettre en communication l'air qui va du cylindre (16) avec l'intérieur de la chambre à l'intérieur de la boîte de manivelle (17) afin de réduire le bruit provenant de la compression et de la détente de l'air à l'intérieur du cylindre (16).

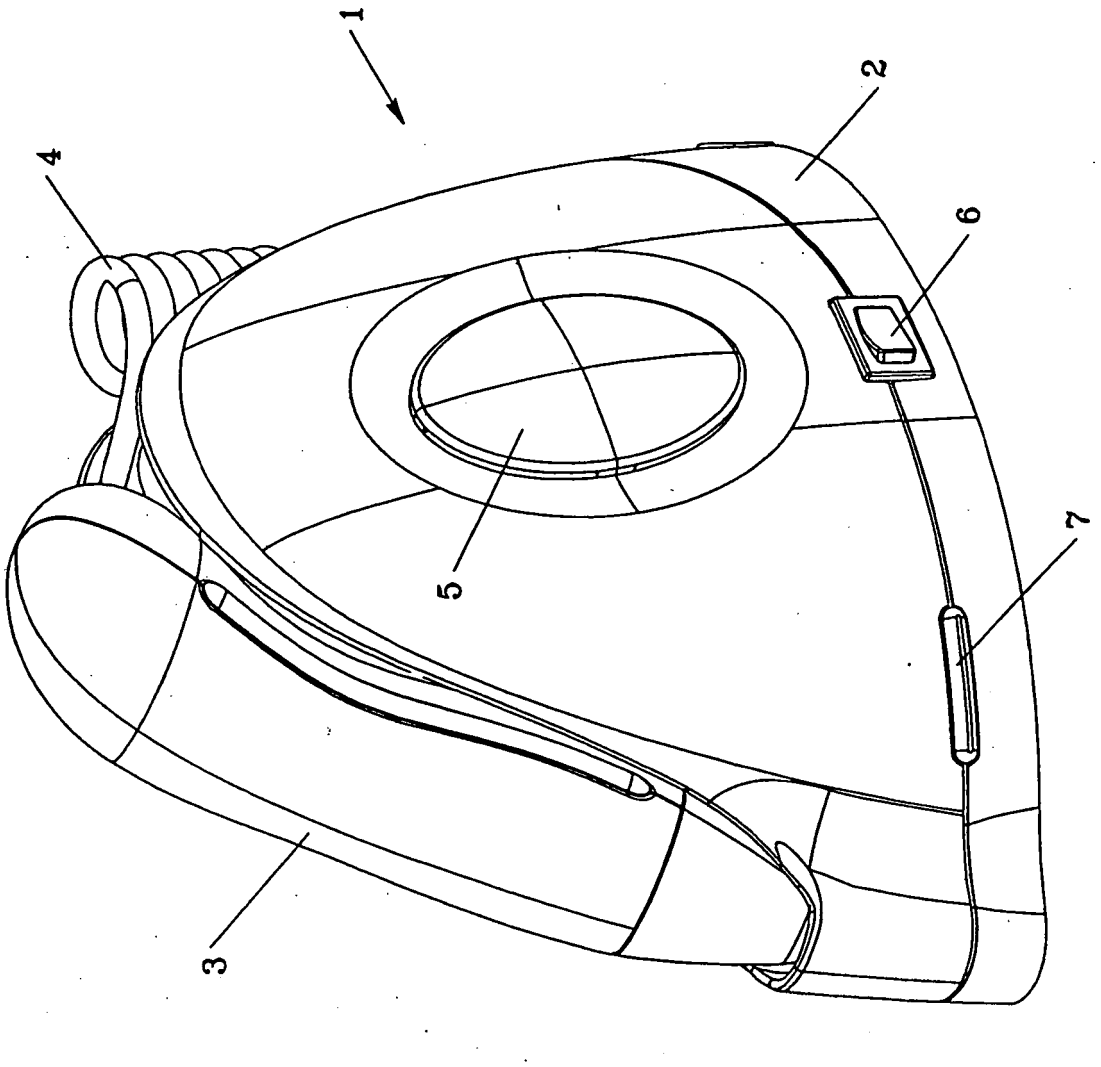


Fig. 1

Fig. 2

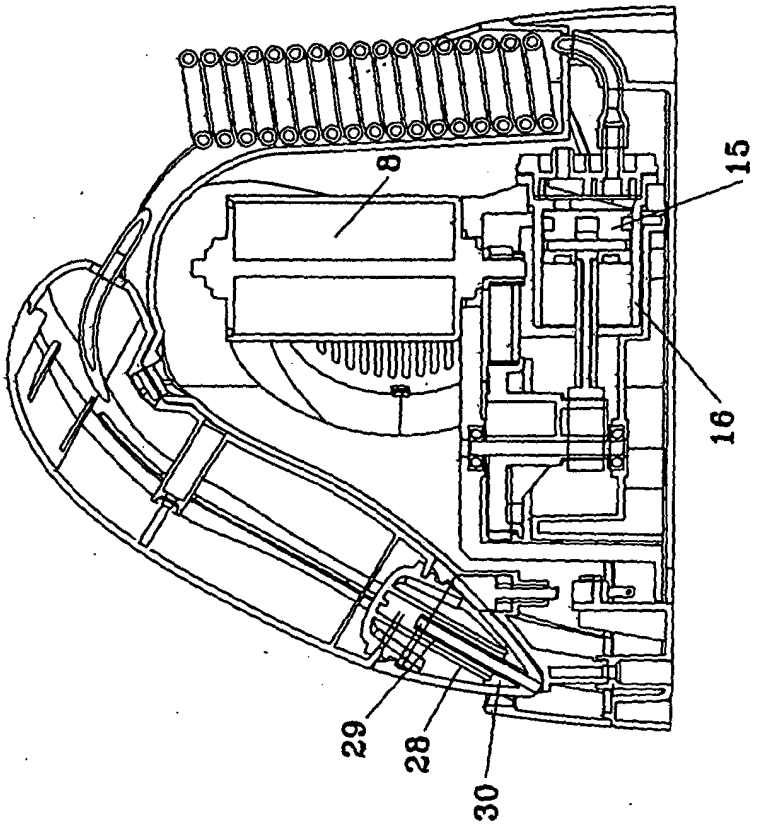
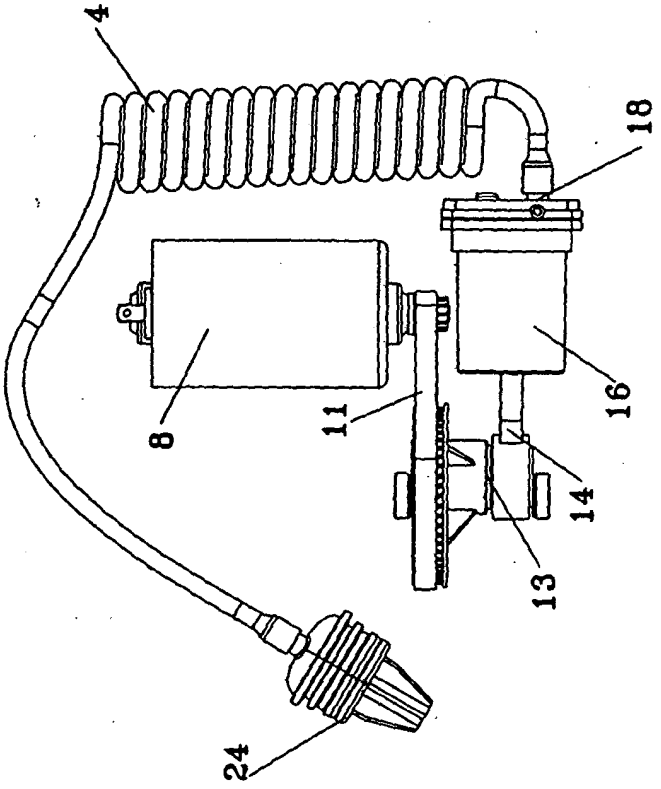


Fig. 3



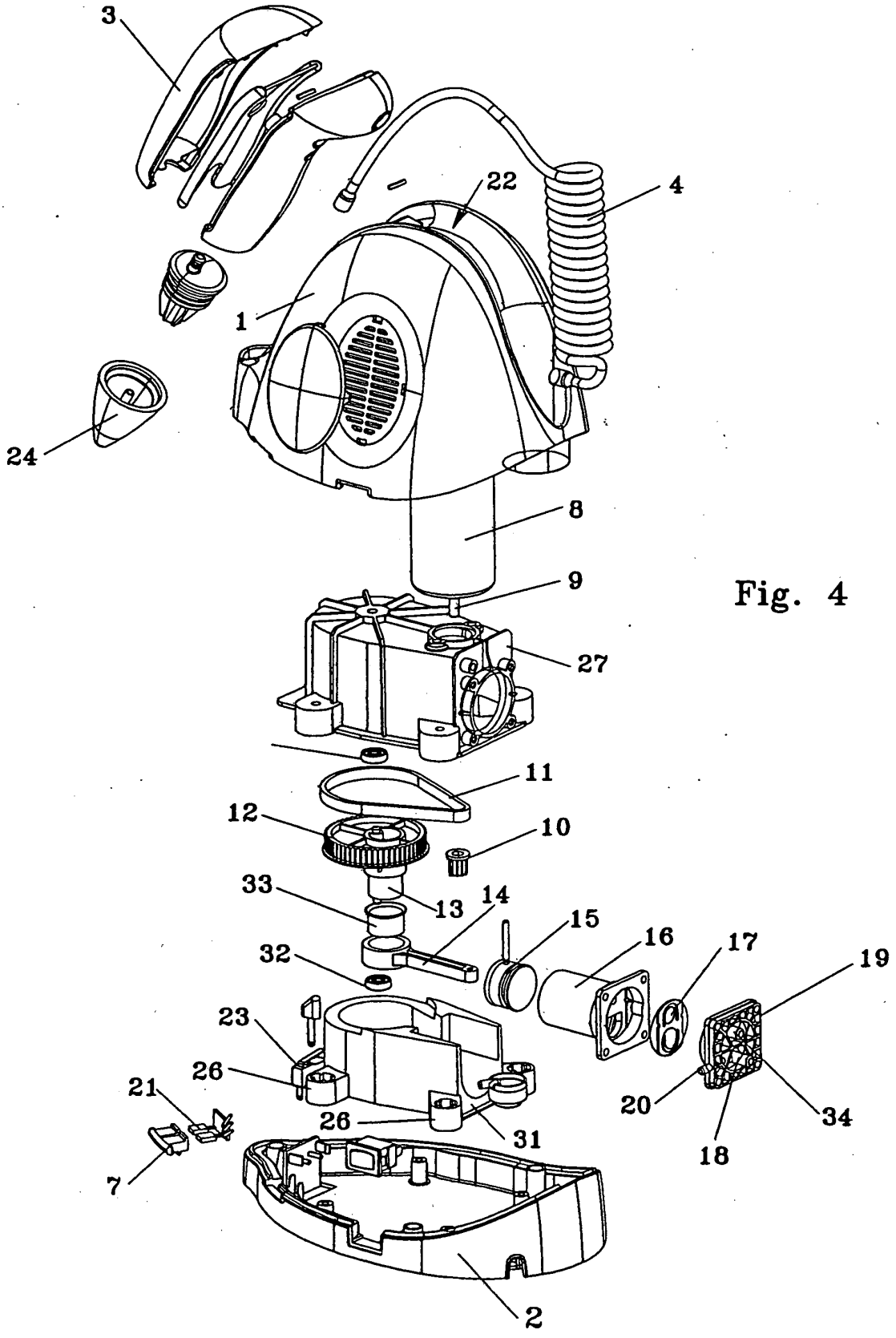

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Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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- US 5195427 A **[0005]**
- EP 1053945 A1 **[0008]**