

(19)



(11)

**EP 3 579 733 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:

**08.02.2023 Bulletin 2023/06**

(21) Application number: **18710158.9**

(22) Date of filing: **09.02.2018**

(51) International Patent Classification (IPC):

**A47L 5/32** <sup>(1968.09)</sup>      **A47L 7/00** <sup>(1968.09)</sup>  
**A47L 11/20** <sup>(1968.09)</sup>      **A47L 11/34** <sup>(1968.09)</sup>  
**A47L 11/40** <sup>(1968.09)</sup>

(52) Cooperative Patent Classification (CPC):

**A47L 11/201; A47L 5/32; A47L 7/009; A47L 11/34; A47L 11/4086; A47L 11/4094**

(86) International application number:

**PCT/IT2018/050017**

(87) International publication number:

**WO 2018/146710 (16.08.2018 Gazette 2018/33)**

(54) **MULTIFUNCTION VACUUM CLEANER**

MULTIFUNKTIONSSTAUBSAUGER

ASPIRATEUR MULTIFONCTION

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(30) Priority: **09.02.2017 IT 201700014029**

(43) Date of publication of application:

**18.12.2019 Bulletin 2019/51**

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## Description

### Field of application

**[0001]** The invention concerns a multifunction vacuum cleaner, generally usable by itself, both to clean surfaces and eliminate bacterial loads from them, and also to produce steam for multiple uses, such as cleaning or ironing.

### State of the Art

**[0002]** Vacuum cleaners are known which comprise, synthetically, a container body which houses the suction unit, a tank to contain the material sucked in, a filtering unit and a flexible pipe through which the material to be sucked in is sent to the containing tank.

**[0003]** Typically, these vacuum cleaners can be of the so-called "bagless" type, that is, without a bag to contain the material sucked in, or equipped with a containing bag located at the end of the suction circuit and interchangeable when it becomes completely full.

**[0004]** Some types of bagless vacuum cleaners have a liquid filter, typically water, which is located inside the containing tank and in which the suction air flow is made to bubble, causing the material sucked in to be released into the liquid.

**[0005]** A vacuum cleaner with a liquid filter is known from the patent EP2138083, in the name of the same applicant, which comprises a body inside which a tank is defined which contains the liquid which forms a free surface and in which the flow of air sucked in bubbles, said air coming from a suction opening obtained in the body and to which the flexible suction pipe is connected.

**[0006]** Above the free surface of the liquid a chamber is defined in which a rotating device is mounted which is able to separate, by impact, from the almost clean air flows sucked in, exiting from the liquid, any residual particles of materials sucked in before the air flows are re-introduced into the environment, after passing through another filter.

**[0007]** According to the patent, the presence of a UV-C-ray lamp is also provided, disposed above the free surface of the liquid, to eliminate the bacterial loads that are transported by the flows of air sucked in.

**[0008]** From the prior art patent EP2901907, which derives from a divisional application of the previous patent, a vacuum cleaner with a water filter is known which, as in the previous case, has a body in which a containing tank is defined in which a filtering liquid is contained, inside which the flows of air sucked in that contain the material sucked in are made to bubble.

**[0009]** In this case too, the material sucked in is retained by the liquid during the bubbling, while the air flows, after leaving the latter substantially purified, pass through another rotating device suitable to dynamically separate from the latter possible residual particles in suspension of material sucked in, before passing through a dry filter and being definitively re-introduced into the en-

vironment.

**[0010]** According to this patent, in order to facilitate the release of the material sucked inside the liquid, a substantially circular turbulent motion is created in the latter and is oriented by means of undulating walls which are located in the tank and which force the liquid, thrust by the suction action generated by the motor, to be violently mixed, creating, as we said, a turbulent motion which, together with the bubbling, increases the action of separating the material sucked in by the air flows that transport it and release it inside the tank.

**[0011]** In this case too a UV-C lamp is installed, located above the free surface of the liquid, to irradiate it and eliminate the bacterial loads that the air flows transport from the outside and that the dry filter is not able to block, before the air flows are re-introduced into the environment.

**[0012]** Vacuum cleaners with dry filters are also known, for cleaning operations, which, in addition to the typical suction action of the material to be collected, are equipped with devices for the production of jets of steam.

**[0013]** These latter devices are used to improve the overall cleaning action of the vacuum cleaner, especially to dissolve any possible residues of dirt that form deposits that remain adherent to the surface to be cleaned, despite the suction action of the vacuum cleaner.

**[0014]** With a suitable command, normally positioned ergonomically on the handle of the conventional flexible suction pipe of the vacuum cleaner, the user can drive on command the emission of jets of steam, directing them in a targeted manner toward the zone where the dirt remains tenaciously adherent to the surface to be cleaned, in order to dissolve it and to suck it up completely.

**[0015]** For this purpose, the vacuum cleaner is equipped, as well as with the normal devices that generate the suction force, also with a boiler in which a dose of is loaded, which is heated until it transforms into steam which can be used on command, as previously said.

**[0016]** From US2004/0111822 a steam vacuum cleaner is known.

**[0017]** The steam vacuum cleaner includes a vacuum cleaner and a steam mechanism, to inhale dust and small particles, and at the same time injects high temperature steam to soft and loose heavy stain and stubborn dirt for detailed cleaning and sterilizing purpose.

**[0018]** The state of the art has some disadvantages.

**[0019]** A first disadvantage is that in order to have at the same time both the efficiency of the filtration obtainable with vacuum cleaners with water filters and the cleaning power of vacuum cleaners with steam production, it is necessary to have two separate types of vacuum cleaners available.

**[0020]** This obliges users to a substantially double expense in order to purchase the two types of vacuum cleaners mentioned above and a consequent double maintenance of the vacuum cleaners and a double availability of space for their storage when not in use.

**[0021]** Moreover, when the user needs to remove stub-

born dirt, he must alternatively use two vacuum cleaners to obtain a complete and accurate cleaning and this makes the cleaning work particularly inconvenient and prolonged over time, as he has to prepare and use a first vacuum cleaner and then prepare and use a second vacuum cleaner and then empty the vacuumed materials from them both.

**[0022]** A second disadvantage of the state of the art is that the steam produced in steam-type vacuum cleaners of a known type is used exclusively for cleaning work in combination with the suction action.

**[0023]** A third disadvantage is that known vacuum cleaners have suction powers which may be insufficient for particularly heavy use.

#### Presentation of the invention

**[0024]** One purpose of the invention is to improve the state of the art.

**[0025]** Another purpose of the invention is to perfect a multifunction vacuum cleaner that allows both to perform, with a single apparatus, thorough cleaning work even in cases of persistent dirt, and also to become a source of steam to carry out other work other than cleaning, such as, for example ironing with steam irons.

**[0026]** Another purpose of the invention is to provide a multifunction vacuum cleaner that allows to sanitize environments from bacterial contamination, even without using the specific suction function, using it as an autonomous source for delivering disinfecting and/or fragranting substances, and also as an ionization unit.

**[0027]** Another purpose of the invention is to be able to regulate, according to needs, the performance of the multifunction vacuum cleaner according to the power required to perform an accurate cleaning work.

**[0028]** According to one aspect of the invention a multifunction vacuum cleaner is provided, according to the characteristics of claim 1.

**[0029]** Other aspects of the invention are indicated in the dependent claims.

**[0030]** The invention allows to obtain the following advantages:

- to comprise, in a single apparatus, the suction function to carry out particularly precise cleaning work, even in bacterially contaminated environments, the steam production function, both autonomous in order to power steam appliances, and also in combination with the suction action, the function of environmental sanitation and ionization;
- to regulate the performance of the multifunction vacuum cleaner according to the stress load to be endured when carrying out work to clean and sanitize the environment.

#### Brief description of the drawings

**[0031]** Other characteristics and advantages of the in-

vention will become clearer from the detailed description of a preferred but not exclusive embodiment of a multifunction vacuum cleaner, shown by way of non-restrictive example in the accompanying schematic drawings, wherein:

fig. 1 is a vertical sectional view of the multifunction vacuum cleaner according to the invention, taken along a longitudinal plane;

fig. 2 is a vertical sectional view of the multifunction vacuum cleaner according to the invention, taken along a transverse plane;

fig. 3 and fig. 4 are vertical section views of the multifunction vacuum cleaner according to the invention, taken on transversal planes different from that in fig. 2;

fig. 5 is an interrupted and enlarged view of a detail of fig. 4;

fig. 6 is an interrupted and enlarged view of a detail of fig. 3;

fig. 7 is a perspective view of the vacuum cleaner according to the invention, without the upper half-shell so as to view some components;

fig. 8 is a perspective view from above of the vacuum cleaner in fig. 7, from a different observation point;

fig. 9 is a perspective view on a slightly reduced scale of the vacuum cleaner in fig. 8, from another observation point;

fig. 10 is a view of an enlarged scale detail of the vacuum cleaner in fig. 9;

fig. 11 is a perspective view of the multifunction vacuum cleaner according to the invention, in a more complete version;

fig. 12 is a perspective view of the multifunction vacuum cleaner used as a source of steam for supplying an iron;

fig. 13 is a schematic front view of a part of the multifunction vacuum cleaner, in a version equipped with two motors disposed horizontally;

fig. 14 is a schematic view from above of a part of the multifunction vacuum cleaner, in a version equipped with two vertically disposed motors;

fig. 15 is a schematic perspective view from above of the multifunction vacuum cleaner in fig. 11, without the upper cap in order to be able to see the components housed in the upper half-shell.

#### Detailed description of a preferred embodiment.

**[0032]** With reference to the attached drawings, the reference number 1 indicates in its entirety a multifunction vacuum cleaner according to the invention, hereafter referred to in short as vacuum cleaner 1.

**[0033]** The vacuum cleaner 1 comprises a body which is formed by two coupled half-shells, that is, a first half-shell 2, or upper half-shell 2, and a second half-shell 3, or lower half-shell 3, which are coupled in a separable manner and constrained to each other by means of hooks

4.

**[0034]** At the lower part, the body is provided with wheels 5 for sliding on the ground.

**[0035]** As can be seen in the drawings, particularly in fig. 1, the first half-shell 2 houses inside, as well as the conventional functioning components, not described because they do not affect the invention, a suction unit, indicated as a whole with 6, which, in a less powerful version, comprises a single motor 7 which rotates a drive shaft (not visible in the drawings) on which a fan 8 is keyed and the rotation of which generates the suction action of the vacuum cleaner 1.

**[0036]** On the same shaft, at the lower end thereof, a rotating separator device 9 is also keyed, provided to separate the molecules and the particles of material and dirt sucked in, after they have been filtered by a water-type filtering unit located along a suction and purification path, described in more detail hereafter.

**[0037]** With reference again to fig. 1, it should be noted that the second half-shell 3 is equipped with a mouth 10 which extends inside the latter with a segment of pipe 12 which forms an elbow-shaped segment 12A.

**[0038]** The elbow-shaped segment 12A leads to a first containing tank 11 in which a volume of water "V1" is loaded, as indicated in figs. 4 and 5 and which constitutes the water filtering unit cited above.

**[0039]** The mouth 10 toward the outside of the lower half-shell 3 is provided with a closing cover 10A and with removable attachment members of one end of a flexible suction pipe which is typically supplied with a vacuum cleaner and which for this reason has not been shown in detail.

**[0040]** As previously stated, the mouth 10 is connected to the first containing tank 11 by means of the segment of pipe 12 which forms the elbow-shaped segment 12A, which faces the bottom of the first tank 11 and consequently conveys in this direction the flows of air sucked in with the materials that are transported in suspension by them, making them bubble in the volume of water "V1".

**[0041]** In this way, the materials sucked in and/or the parts of these are imbued with water and are retained by the latter, which separates them from the air flows that transport them.

**[0042]** The flows of air that exit from the first tank 11, together with part of the water, are then conveyed toward the separator device 9, by a conveyor 11A which is formed in the upper part of the tank 11.

**[0043]** The separator device 9 consists of a truncated cone-shaped turbine, slightly tapering toward the bottom, whose lateral surface has a plurality of apertures 13 separated by separating and ridged vertical fins 14.

**[0044]** In the apertures 13, the air flows sucked in are intended to penetrate, after the particles of water in suspension and the imbibed and transported dirty material have been completely eliminated from them and have left the volume of water "V1" which has filtered them out, depriving them of the coarsest and heaviest parts.

**[0045]** When the turbine of the separator device 9 ro-

tates, the fins 14 generate around it a perimeter barrier of air which repels any possible residual particles that can accidentally have remained suspended in the already filtered flows of humid air, separating them from these and making them fall into the volume of water "V1", simultaneously keeping the surface and the fins 14 of the turbine of the separator device 9 humidified.

**[0046]** In this way, the air that passes through the apertures 13 is completely free of any impurities.

**[0047]** With reference to figs. 4 and 5 it should be noted that immediately above the containing tank 11 an antibacterial unit 15 is mounted which consists of at least one lamp 15A which emits UV-C rays, that is, UV rays which have a spectrum such as to kill any form of bacterium present both in the flows of air sucked in that exit from the volume of water "V1", and also in the same volume of water "V1" in which the collected debris accumulates.

**[0048]** In a possible executive variant of the vacuum cleaner 1, the lamp 15A can be selected from those which also provide to form ozone during functioning.

**[0049]** It is important to underline that this specific characteristic, in combination with the production of steam, which will be described below, makes the vacuum cleaner 1 according to the invention particularly suitable for use in health environments, such as clinics, hospitals, surgeries and suchlike, since it is able to perform a complete and accurate sanitization process.

**[0050]** However, this characteristic of the vacuum cleaner 1 guarantees a high quality of sanitization and cleaning even in the domestic-industrial environment, allowing on the one hand to eliminate all types of bacteria from the surfaces and environments treated and on the other hand to improve the environmental and health conditions with the emission of ozone.

**[0051]** As can be seen in the drawings, the entire suction unit comprising the motor 7 and the fan 8 is encapsulated in a soundproof casing 16, which constitutes a possible embodiment of soundproofing means.

**[0052]** The casing 16 dampens both the noise generated by the motor 7 and the fan 8 during their functioning, and also the noise generated by the passage of the flows of air sucked in which flow inside the same casing 16, inside channels 18 which are specifically made in the latter.

**[0053]** The flows "AF" of air sucked in and purified of the material sucked in pass into the upper part of the half-shell 2, following a filtration and/or conveying path which leads them to lap the motor 7, cooling the components thereof (for example the carbon brushes with which it is equipped) and finally flow toward an outlet aperture 20 which is provided with another micro-pore filter 19 to filter them further before being definitively re-introduced into the environment.

**[0054]** With reference to figs. 1 and 3, it can be seen that a second tank 17 is also housed in the second half-shell 3, in which a second volume "V2" of water is loaded which is intended for the production of steam.

**[0055]** In detail, it should be noted that one end of a pipe 21 draws from the second tank 17 and, at an opposite upper end, is provided with a valve 22 which controls the passage of the water.

**[0056]** As can be seen in fig. 7, the second tank 17 is connected to a pump 26 by means of a connection pipe 27 which is connected to the end of the pipe 21 and which carries the water intended to produce steam from the second tank 17 to the boiler 23.

**[0057]** Along the connection pipe 27 a filter 27A is also provided, to retain any possible impurities present in the water coming from the second tank 17 (arrows H<sub>2</sub>O).

**[0058]** The pump 26, through another segment of pipe 28, is connected to a terminal socket 29 which is mounted in the first half-shell 2 and which allows to attach a concurrent terminal end of a connection pipe 35 to an apparatus that functions with the use of steam produced by the vacuum cleaner 1, for example an iron 36, as shown in fig. 12, or to another household appliance.

**[0059]** With reference to figs. 7-10, it should be noted that inside the first half-shell 2 a boiler 23 is also housed, in a position substantially adjacent to the motor 7.

**[0060]** The boiler 23 is normally provided with one or more internal electric resistances 23B to heat the water, and with an upper mouth 23A in which a stopper 24 is engaged.

**[0061]** The latter, as described in the patent EP 1217341, property of the same applicant, has in the lower part a stem probe 25 which, when the stopper 24 is arranged in its normal position to close the mouth 23A, is intended to penetrate inside the heating chamber of the boiler 23.

**[0062]** Inside the latter, the probe 25 detects the level of the water present therein, to prevent the heating resistors from being accidentally activated when there is little water or when the boiler 23 is even completely empty, and therefore may be damaged irreparably.

**[0063]** The socket 29 is protected by a cover 30 which can be lifted and has inside a mouth 31 to which the end of the pipe 35 can be attached, using in this case the vacuum cleaner 1 as a mere source of steam (STEAM arrow in fig. 10), in this case the steam iron 36 which has been mentioned previously.

**[0064]** In order to cool the motor 7, in addition to the passage of the air flows "AF", in the upper part of the first half shell 2 air intakes 32 are provided, through which cool air is sucked inside by means of a suitable fan 38 which is driven by the motor 7 itself.

**[0065]** The air sucked in is conveyed together with the flows "AF" to lap the motor 7, as schematically shown in fig. 1.

**[0066]** The multifunction vacuum cleaner 1, in a more complete embodiment shown in fig. 11, is also equipped with means to contain detergent fluids or a disinfecting gas, such as nitrous oxide for example.

**[0067]** The containing means can be made, for example, as a container or a cartridge 33, either of a rechargeable type or of a disposable type, which contains, as we

said, a detergent fluid or a disinfecting gas which can be coupled, for example by means of a screw and watertight coupling, with the first half-shell 2, precisely with an attachment 34 made in the latter and connecting the container 33 with the socket 29, through a delivery pipe 40.

**[0068]** On the delivery pipe 40 a heat exchanger 41 is positioned which provides to heat, when necessary, the detergent or the disinfecting gas which are contained in the container 33 and which pass through it in order to carry out a "hot" disinfection.

**[0069]** With reference to figs. 13 and 14, there are two possible alternative versions of the vacuum cleaner 1, which, in both cases, is equipped with two motors and two separator devices 9.

**[0070]** The use of two motors allows on the one hand to considerably increase the overall suction power of the vacuum cleaner 1 for use in particularly severe conditions, and on the other hand, when necessary, to modify its working power, using alternatively both motors or only one of them.

**[0071]** In detail, as can be seen in the version shown in fig. 13, the two motors, indicated in this case by 50 and 51 respectively, are disposed parallel to one another and with horizontal rotation shafts R1 and R2.

**[0072]** On each of the rotation shafts R1 and R2, respective separator devices 9 are mounted which function in parallel.

**[0073]** The mouth 10 through which the flows of air sucked in enter, which carry the collected debris in suspension, extends inside the vacuum cleaner 1 with the segment of pipe 12 which, in this case, at the end that faces the containing tank 11, splits into two parts 12A and 12B which divide and convey the flows of air sucked in toward the respective separator devices 9.

**[0074]** With reference to fig. 14 the other possible version of the vacuum cleaner 1 can be seen in which the two motors, indicated in this case by the references 60 and 61, unlike the version shown in fig. 13, are disposed vertically parallel to each other.

**[0075]** In this version too, on the rotation shafts of each motor, indicated respectively by R3 and R4, a respective separator device 9 is keyed, which rotates integrally with the respective motor.

**[0076]** As can be seen in the drawing, downstream of the mouth 10 and inside the vacuum cleaner 1, shaped walls 62 are provided which diverge from one another and are disposed to divert the flows of air sucked in toward the two separator devices 9.

**[0077]** The functioning of the multifunction vacuum cleaner 1 can be deduced from the description above.

**[0078]** The multifunction vacuum cleaner 1 is typically equipped with electronic means to control its functioning, for example an electronic control unit that is programmed and equipped with at least three functioning programs, more precisely to function as a vacuum cleaner, or as a source of steam, or again as a sanitizing unit for rooms.

**[0079]** The functioning according to the three programs is indicated in detail below, separately for each of

the functions it is able to perform.

**[0080]** The person of skill understands that the functioning programs can be used both singly and jointly by selecting commands provided on the vacuum cleaner 1, but not indicated in detail here because their structure is irrelevant to its working characteristics.

#### Functioning as a vacuum cleaner.

**[0081]** When a user starts the multifunction vacuum cleaner 1 to perform cleaning work, air flows are sucked in which contain in suspension the materials to be sucked in the form of parts of dirt or more or less heavy debris through the mouth 10, to which the end of a conventional, normally flexible, suction pipe has been previously attached.

**[0082]** In the version equipped with a single motor 7, the air flows sucked in through the pipe 12 are diverted by the elbow-shaped segment 12A into the volume "V1" of water in which they bubble and release the particles which are naturally heavier than the materials sucked in, and those that become so because they have imbibed water.

**[0083]** From the volume of water "V1" the air flows sucked in are then conveyed with the conveyor 11A in the direction of the separator device 9 which, rotating with the motor 7, generates a perimeter barrier of air which on one hand prevents the particles of water in suspension from passing through it and on the other hand breaks down any possible particles of materials sucked in still present in suspension in them, making them fall into the tank 11.

**[0084]** The air flows sucked in that pass through the separator device 9 are then conveyed into the upper part of the first half-shell 2, they lap the motor 7 and pass into the channels 18 made in the casing 16.

**[0085]** From the latter they are then directed toward the outlet aperture 20 toward the outside, passing through the microporous filter 19.

**[0086]** It must be underlined that in the travel that the air flows follow inside the vacuum cleaner 1, precisely from when they are bubbled inside the volume of water "V1" and before being treated with the separator device 9, they are subjected to the germicidal action of the antibacterial group 15, preferably consisting, as we said, of a lamp emitting UV-C rays which hit both the volume of water "V1" contained in the tank 11 below, and also the same air flows that leave it, directed toward the separator device 9.

**[0087]** In this way, both the volume of stagnant water contained in the tank 11, and the air flows that are reintroduced into the environment are deprived of bacterial load.

**[0088]** Functioning of the multifunction vacuum cleaner 1 as a source of steam.

**[0089]** When it is required to use the multifunction vacuum cleaner 1 as a source of steam, without necessarily having to use the suction action, for example to feed the

iron 36, one acts on a special command, not shown, but which can normally be located on a control panel that can be associated with the container body of the multifunction vacuum cleaner 1.

5 **[0090]** When the command is actuated, the pump 26, through the connection pipe 27, sucks the water from the second tank 17 (arrows H<sub>2</sub>O in fig. 8) contained therein and sends it toward the boiler 23 in which it is heated until it is transformed into steam.

10 **[0091]** The steam formed, through the segment of pipe 28, reaches the socket 29 (arrow STEAM in fig. 10), to which a user apparatus has been previously connected, from whose mouth 31 it is available for use.

15 **[0092]** It should be noted that the expression "user apparatus" means not only any type of external appliance whatsoever that uses steam for its functioning, but also the same suction pipe typical of the multifunction vacuum cleaner 1 which, in this case, can have a specific connection that can be coupled with the socket 29 and a suitable additional pipe that carries the steam toward the suction end of the pipe, which, in this case, also becomes the ejection end of the steam to reinforce the cleaning action.

20 **[0093]** Function of the multifunction vacuum cleaner 1 as a unit for sanitizing rooms.

25 **[0094]** When necessary, it is possible to use the multifunction vacuum cleaner 1 as an independent unit to recirculate stale air in a room.

30 **[0095]** For this function, the flexible pipe must be disconnected from the mouth 10, leaving it open, however, and the motor 7 of the multifunction vacuum cleaner 1 is driven, using a special command.

35 **[0096]** The motor 7 can rotate at selectable speeds with the suitable selection commands supplied with the multifunction vacuum cleaner 1 in relation to the intensity of sanitization to be obtained or maintained if already performed previously.

40 **[0097]** The air flows sucked in from the environment which are to be sanitized enter through the mouth 10, and follow the normal filtration and conveying path inside the vacuum cleaner 1, that is, they bubble in the volume of water "V1" contained in the tank 11, they are subjected to the direct and germicidal action of the lamp 15A with UV-C rays, they are then conveyed toward the separator device 9 and, after passing through it, are directed toward the motor 7 and subsequently toward the micro-porous filter 19, finally exiting from the aperture 20 to be reintroduced into the environment after having been completely purified.

45 **[0098]** This sanitizing function is particularly suitable to be combined with the functioning program as a source of steam, if the user apparatus is an iron.

50 **[0099]** In this case, this characteristic allows both to supply steam to the iron and, at the same time, to sanitize the environment in which the iron is used, for example by constantly filtering the air flows sucked in from the environment and making them pass through the vacuum cleaner 1 which is maintained at a controlled and reduced

operating regime compared to when it is required to use it as a vacuum cleaner to eliminate dirt and debris.

**[0100]** It should also be noted that by mounting a lamp 15A in the multifunction vacuum cleaner 1 able to emit both UV-C rays and also ozone, a bactericidal action and an ionization action of the room to be sanitized are obtained, combined with each other, thus considerably improving the quality of the air present.

**[0101]** When using the multifunction vacuum cleaner 1 as a sanitizing unit, it is also possible to integrate the action of recirculating stale air, providing to deliver fragrance and/or disinfecting substances, normally in a nebulized state.

**[0102]** For this purpose, a container 33 is applied to the connection 34 which contains a deodorizing or disinfecting substance which, after passing through the heat exchanger 41, is diffused by the socket 29.

**[0103]** The electronic control unit with which the vacuum cleaner 1 is equipped for this purpose and for controlling its functioning, controls the delivery into the environment of the substance with a programmable intensity and time interval, at the end of which the delivery is automatically stopped.

**[0104]** The person of skill understands that the functions that the multifunction vacuum cleaner 1 is able to perform can be activated either separately or, as previously stated, in combination with each other, in order to obtain specific performances of the vacuum cleaner 1, adapting them to the conditions of use.

**[0105]** In versions equipped with two motors, the functioning of the multifunction vacuum cleaner 1 is substantially the same as for the version equipped with a single motor 7, with the only difference being that the air flows sucked in, after having passed through the elbow-shaped segment 12A and bubbled in the volume of water "V1", are divided into two parts, each of which is directed to a specific separator device 9 and a relative motor.

**[0106]** Furthermore, the overall power of the multifunction vacuum cleaner 1 is significantly increased when the two motors function simultaneously.

**[0107]** In practice it has been found that the invention achieves the intended purposes.

**[0108]** The invention as conceived is susceptible to modifications and variants, all of which come within the scope of the appended claims.

**[0109]** Furthermore, all the details can be replaced by other technically equivalent elements.

**[0110]** In practical implementation, the materials used, as well as the shapes and the sizes, can be diverse according to requirements, without departing from the field of protection of the following claims.

## Claims

1. A multifunction vacuum cleaner (1) comprising:

- a container body (2, 3) in which the following

are disposed:

- a suction unit (6) of air flows and materials from the outside;

- an inlet (10) and an outlet (20) of sucked air flows;

- a filtration path of the air flows and sucked materials sucked by said suction unit (6) defined between said inlet (10) and said outlet (20);

- filter means (V1) of sucked air flows arranged along said filtration path;

- a storage tank (11) of materials sucked from the outside and filtered by said filter means;

- a steam production unit (23) arranged in said container body; and

- transport means (28, 29) to the outside of said container body of produced steam

**characterized in that** said container body comprises sound-proofing means (16) of at least said suction unit (6).

2. Vacuum cleaner as in claim 1, wherein said sound-proofing means comprise a capsule (16) made of polyurethane material disposed peripherally to at least said suction unit (6).

3. Vacuum cleaner as in claim 1, wherein in said sound-proofing means through channels (18) of sucked air flows are defined.

4. Vacuum cleaner as in claim 1, wherein said container body comprises a first half-shell (2) and a second half-shell (39) constrained to each other in a separable way.

5. Vacuum cleaner as in claim 1, wherein it comprises at least one emitting unit (15, 15A) of UV-C rays arranged in proximity to said filtration means (V1).

6. Vacuum cleaner as in claim 1, wherein said steam production means comprise:

- at least one loading tank (17) of a liquid to be vaporized;

- a heating and vaporizing boiler (23) of said liquid to be vaporized;

- pumping means (26) of said liquid to be vaporized from said loading tank to said boiler.

7. Vacuum cleaner as in claim 5, wherein said container body comprises at least a connecting socket (29) with steam user apparatuses and connected to said boiler.

8. Vacuum cleaner as in claim 1, wherein said steam production unit comprises at least a probe (25) to detect the volume of a liquid to be vaporized.

9. Vacuum cleaner as in claim 1, wherein it further comprises containing means (33) and dispensing means of substances chosen from among detergent substances, ionizing substances and fragrance substances.
10. Vacuum cleaner as in claim 1, wherein it comprises separator means (9) predisposed to separate said materials sucked from said sucked air flows.
11. Vacuum cleaner as in claim 1, wherein it comprises electronic operating control means equipped with selectable operating programs for a single or combined activation.
12. Vacuum cleaner as in claim 11, wherein said operating programs include an operating program as a vacuum cleaner, an operating program as a steam source, and an operating program as unit for sanitizing environments.

#### Patentansprüche

1. Multifunktionsstaubsauger (1), umfassend:

- einen Behälterkörper (2, 3), in dem das Folgende angeordnet ist:
- eine Saugereinheit (6) von Luftströmen und Materialien von außen her;
- einen Einlass (10) und einen Auslass (20) von gesaugten Luftströmen,
- einen Filtrationspfad der Luftströme und gesaugten Materialien, die von der genannten Saugereinheit (6) gesaugt werden, der zwischen dem genannten Einlass (10) und dem genannten Auslass (20) definiert ist;
- Filtermittel (VI) von gesaugten Luftströmen, die entlang des genannten Filtrationspfades angeordnet sind;
- einen Lagertank (11) von Materialien, die von außen her gesaugt werden und die von den genannten Filtermitteln gefiltert werden;
- eine Dampfproduktionseinheit (23), die im genannten Behälterkörper angeordnet ist; und
- Transportmittel (28, 29) nach außen hin des genannten Behälterkörpers von produziertem Dampf, **dadurch gekennzeichnet, dass** der genannte Behälterkörper schalldämmende Mittel (16) zumindest der genannten Saugereinheit (6) umfasst.

2. Staubsauger nach Anspruch 1, worin die genannten schalldämmenden Mittel eine Kapsel (16) aus Polyurethanmaterial umfassen, die umfangsseitig zumindest zu der genannten Saugereinheit (6) angeordnet ist.

3. Staubsauger nach Anspruch 1, worin in den genannten schalldämmenden Mitteln Durchgangskanäle (18) von gesaugten Luftströmen definiert sind.

- 5 4. Staubsauger nach Anspruch 1, worin der genannte Behälterkörper eine erste Halbschale (2) und eine zweite Halbschale (39) umfasst, die in einer trennbaren Weise zueinander erzwungen sind.

- 10 5. Staubsauger nach Anspruch 1, worin er zumindest eine Emissionseinheit (15, 15A) von UV-C-Strahlen umfasst, die in der Nähe der genannten Filtermittel (VI) angeordnet ist.

- 15 6. Staubsauger nach Anspruch 1, worin die genannten Dampfproduktionsmittel umfassen:

- zumindest einen Ladetank (17) einer Flüssigkeit, die verdampft werden soll;
- einen Heiz- und Verdampfungskessel (23) der genannten Flüssigkeit, die verdampft werden soll;
- Pumpmittel (26) der genannten Flüssigkeit, die verdampft werden soll, vom genannten Ladetank zum genannten Kessel.

- 25 7. Staubsauger nach Anspruch 5, worin der genannte Behälterkörper zumindest eine Anschlussbuchse (29) mit Dampfverbrauchergeräten und mit dem genannten Kessel verbunden umfasst.

- 30 8. Staubsauger nach Anspruch 1, worin die genannte Dampfproduktionseinheit zumindest einen Fühler (25) zum Detektieren des Volumens einer Flüssigkeit, die verdampft werden soll, umfasst.

- 35 9. Staubsauger nach Anspruch 1, worin er ferner Aufnahmemittel (33) und Abgabemittel von Stoffen umfasst, die unter Reinigungsstoffen, Ionisierungsstoffen und Duftstoffen ausgewählt werden.

- 40 10. Staubsauger nach Anspruch 1, worin er Trennmittel (9) umfasst, die dazu bestimmt sind, die genannten gesaugten Materialien von den genannten gesaugten Luftströmen zu trennen.

- 45 11. Staubsauger nach Anspruch 1, worin er elektronisch betriebene Steuermittel umfasst, die mit auswählbaren Betriebsprogrammen für eine einzige oder kombinierte Betätigung ausgestattet sind.

- 50 12. Staubsauger nach Anspruch 11, worin die genannten Betriebsprogramme ein Betriebsprogramm als Staubsauger, ein Betriebsprogramm als Dampfquelle und ein Betriebsprogramm als Einheit zum Desinfizieren von Räumen einschließen.

**Revendications****1.** Aspirateur multifonction (1) comprenant :

- un corps de récipient (2, 3) dans lequel sont disposés : 5
- une unité d'aspiration (6) des flux d'air et des matières provenant de l'extérieur ;
- une entrée (10) et une sortie (20) de flux d'air aspiré ; 10
- un chemin de filtration des flux d'air et des matières aspirées aspirées par ladite unité d'aspiration (6) définie entre ladite entrée (10) et ladite sortie (20) ;
- des moyens de filtrage (V1) de flux d'air aspiré disposés le long dudit chemin de filtration ; 15
- un réservoir de stockage (11) de matières aspirées provenant de l'extérieur et filtrées par lesdits moyens de filtrage ;
- une unité de production de vapeur (23) disposée dans ledit corps de récipient ; et 20
- des moyens de transport (28, 29) vers l'extérieur dudit corps de récipient de vapeur produite

**caractérisé en ce que** ledit corps de récipient comprend des moyens d'insonorisation (16) d'au moins ladite unité d'aspiration (6). 25

**2.** Aspirateur selon la revendication 1, dans lequel lesdits moyens d'insonorisation comprennent une capsule (16) réalisée en un matériau de polyuréthane disposée de manière périphérique par rapport à au moins ladite unité d'aspiration (6). 30**3.** Aspirateur selon la revendication 1, dans lequel des canaux (18) de flux d'air aspiré sont définis dans lesdits moyens d'insonorisation. 35**4.** Aspirateur selon la revendication 1, dans lequel ledit corps de récipient comprend une première demi-coquille (2) et une seconde demi-coquille (39) liées l'une à l'autre d'une manière séparable. 40**5.** Aspirateur selon la revendication 1, **caractérisé en ce qu'il** comprend au moins une unité émettrice (15, 15A) de rayons UV-C disposée à proximité desdits moyens de filtrage (V1). 45**6.** Aspirateur selon la revendication 1, dans lequel lesdits moyens de production de vapeur comprennent : 50

- au moins un réservoir de chargement (17) d'un liquide à vaporiser ;
- une chaudière de chauffage et de vaporisation (23) dudit liquide à vaporiser ; 55
- des moyens de pompage (26) dudit liquide à vaporiser dudit réservoir de chargement à ladite chaudière.

**7.** Aspirateur selon la revendication 5, dans lequel ledit corps de récipient comprend au moins une douille de raccordement (29) avec des appareils utilisateurs de vapeur et reliée à ladite chaudière.**8.** Aspirateur selon la revendication 1, dans lequel ladite unité de production de vapeur comprend au moins une sonde (25) destinée à détecter le volume d'un liquide devant être vaporisé.**9.** Aspirateur selon la revendication 1, dans lequel il comprend en outre des moyens de rétention (33) et des moyens de distribution de substances choisies parmi des substances détergentes, des substances ionisantes et des substances parfumées.**10.** Aspirateur selon la revendication 1, dans lequel il comprend des moyens séparateurs (9) prédisposés à séparer lesdites matières aspirées desdits flux d'air aspiré.**11.** Aspirateur selon la revendication 1, **caractérisé en ce qu'il** comprend des moyens électroniques de commande de fonctionnement équipés de programmes de fonctionnement sélectionnables pour une activation unique ou combinée.**12.** Aspirateur selon la revendication 11, dans lequel lesdits programmes de fonctionnement comprennent un programme de fonctionnement en tant qu'aspirateur, un programme de fonctionnement en tant que source de vapeur, et un programme de fonctionnement en tant qu'unité pour désinfecter des environnements.

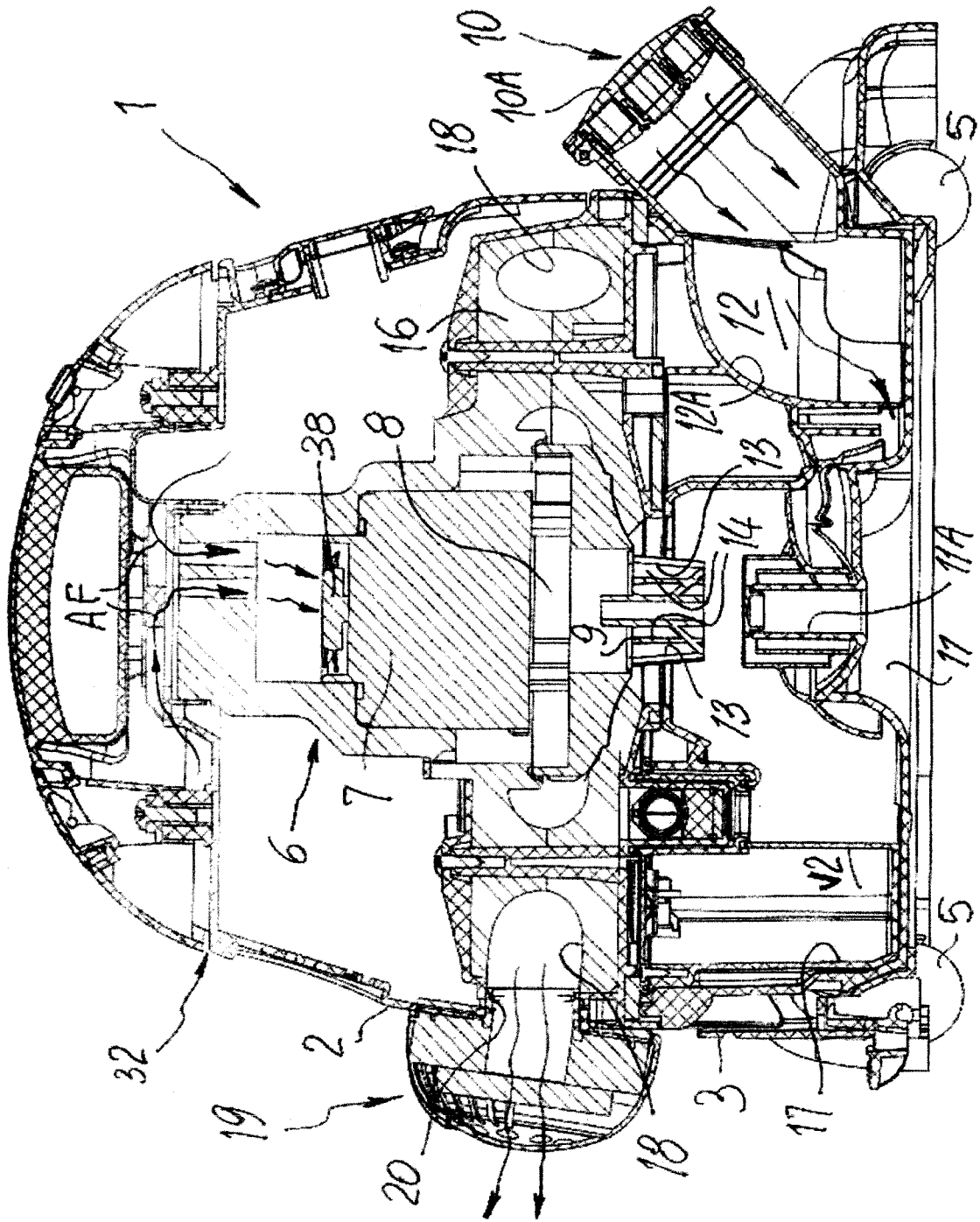


FIG. 1

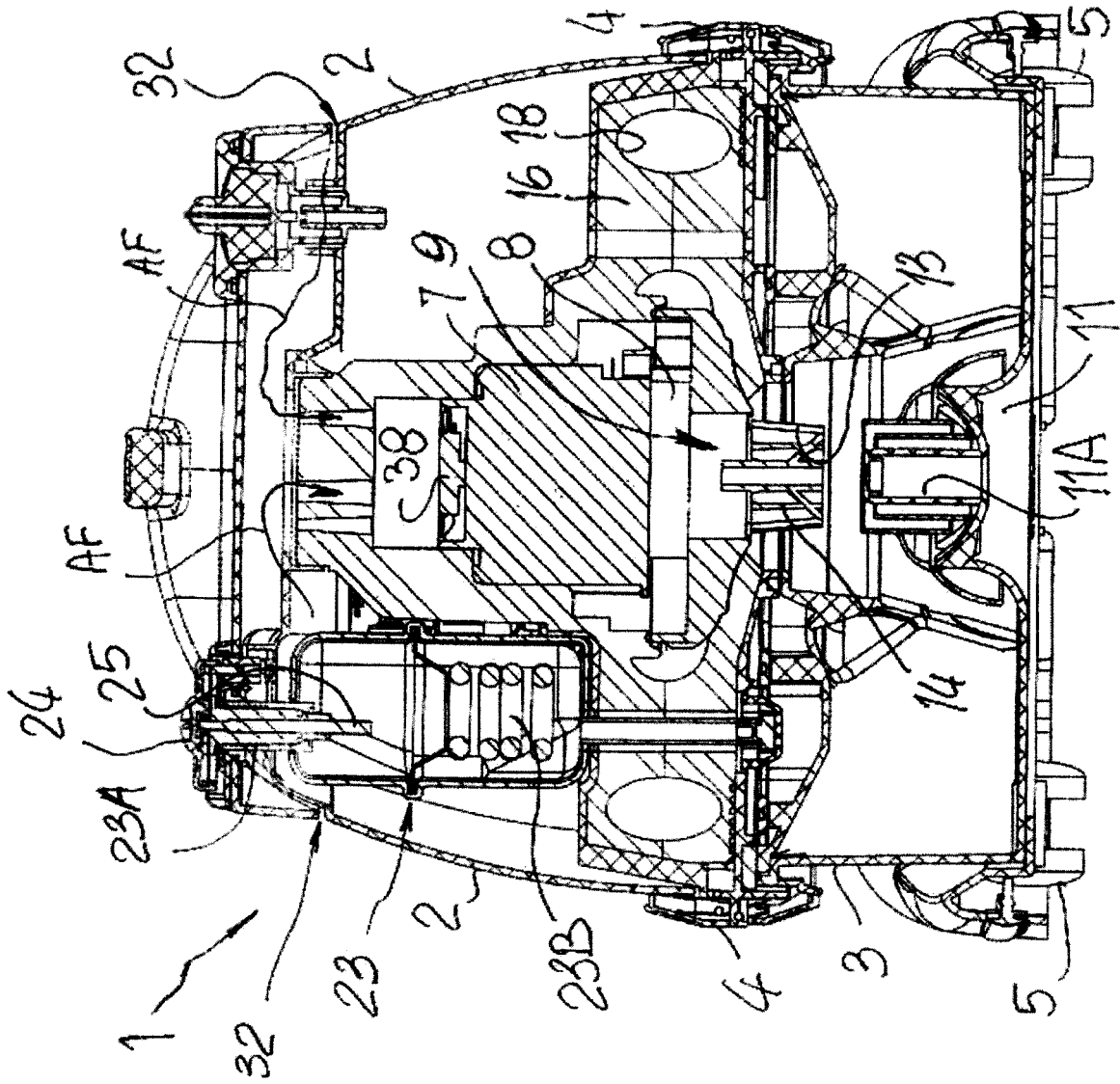


FIG. 2

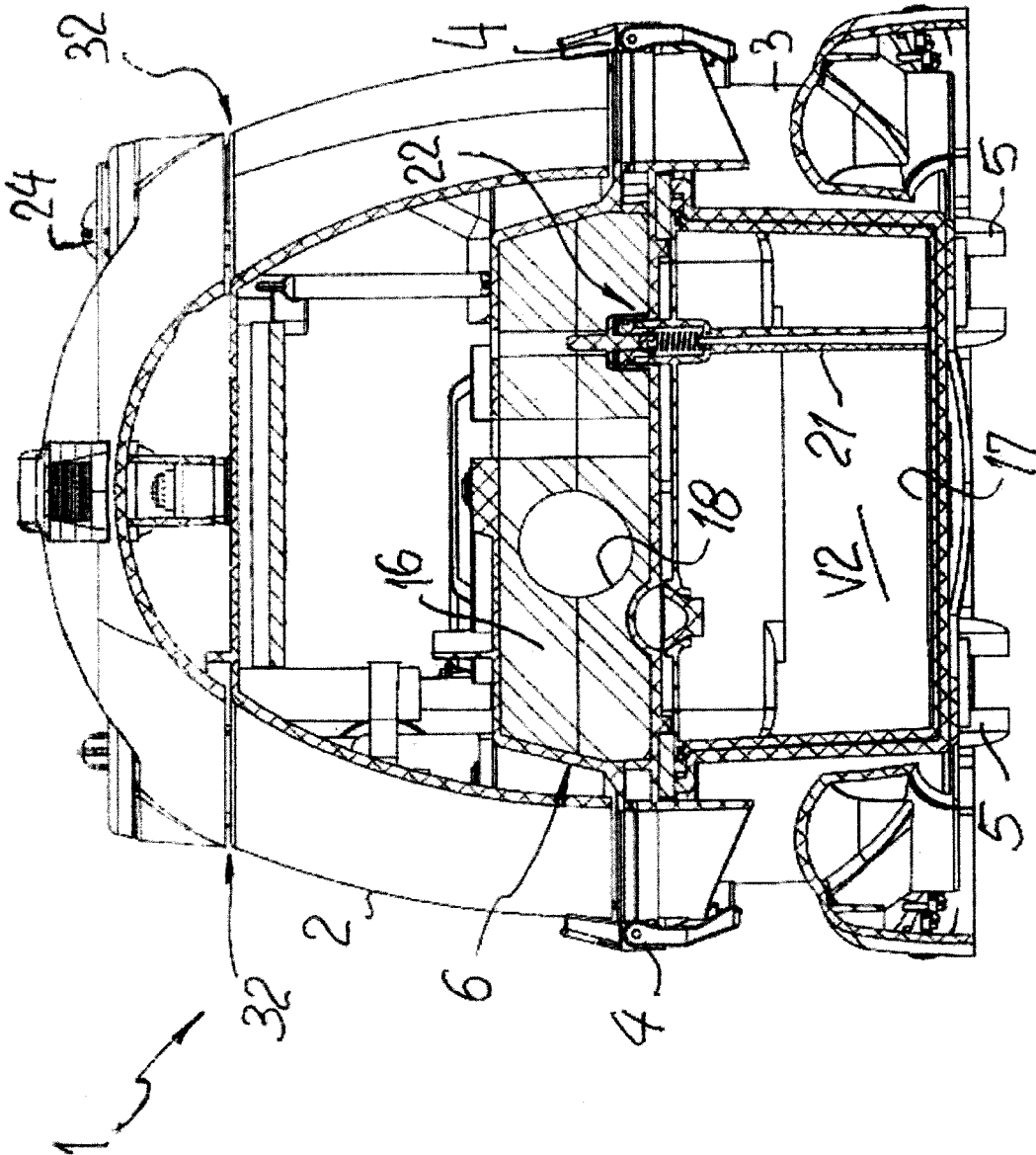


FIG. 3

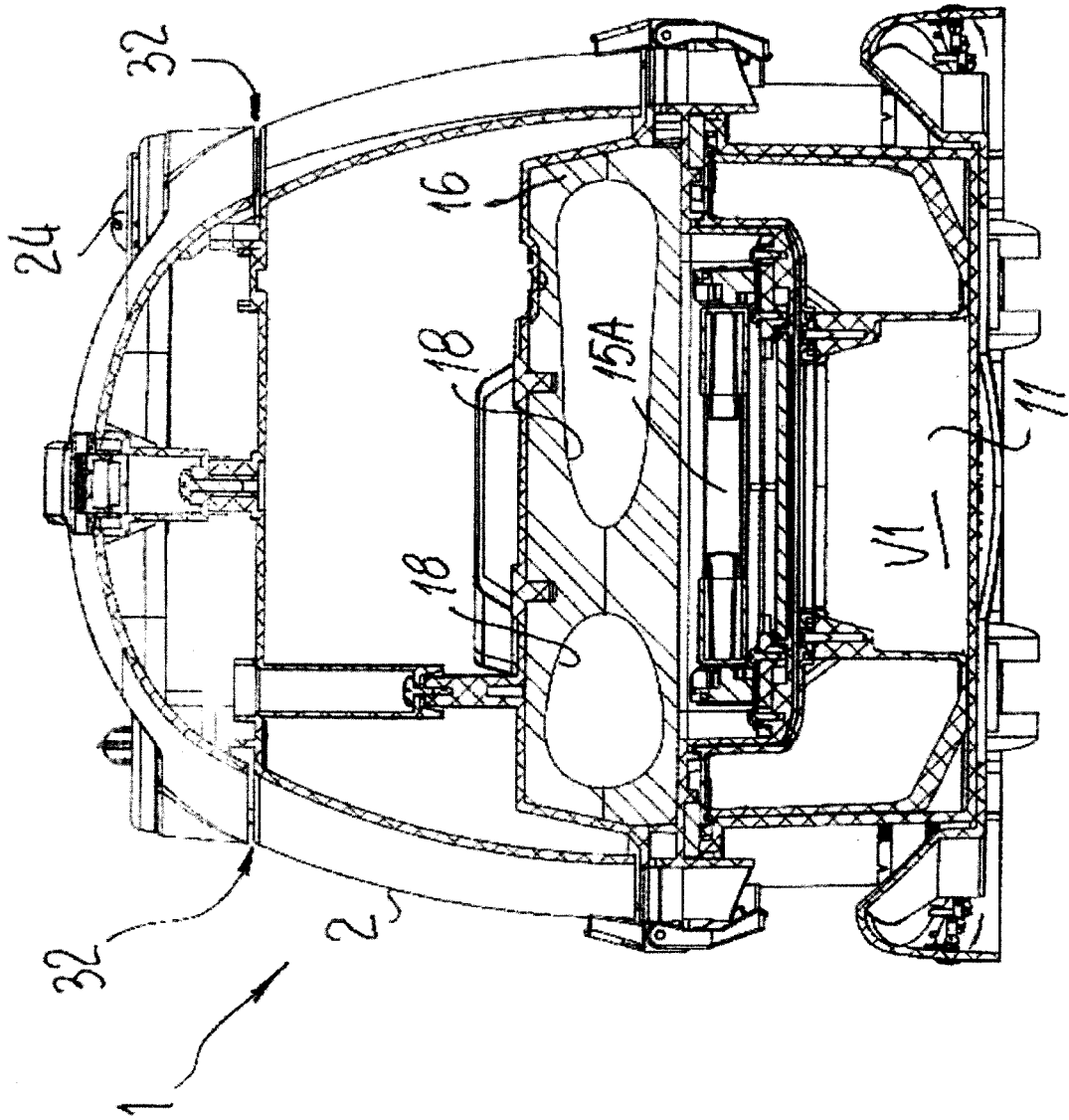


FIG. 4

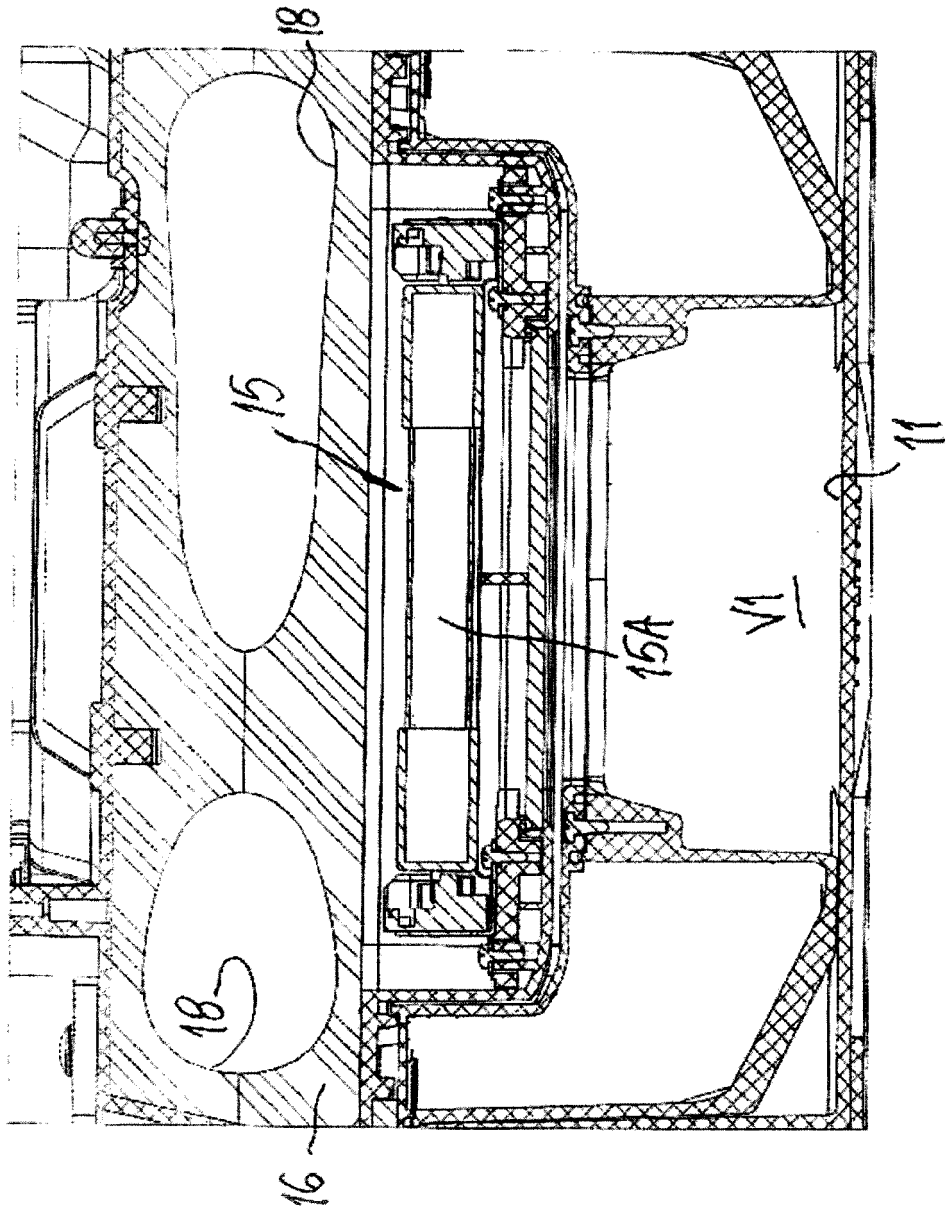
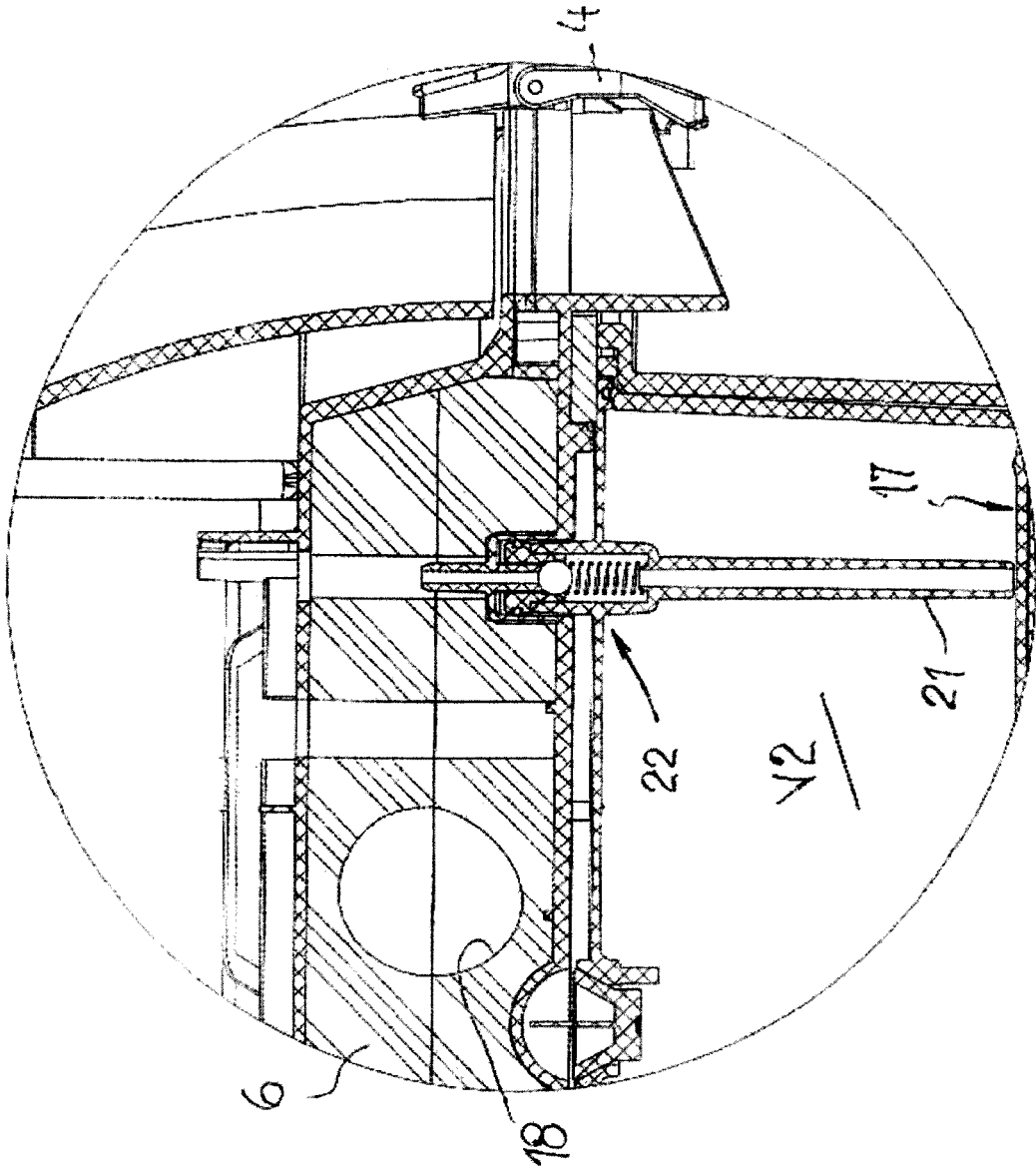


FIG. 5



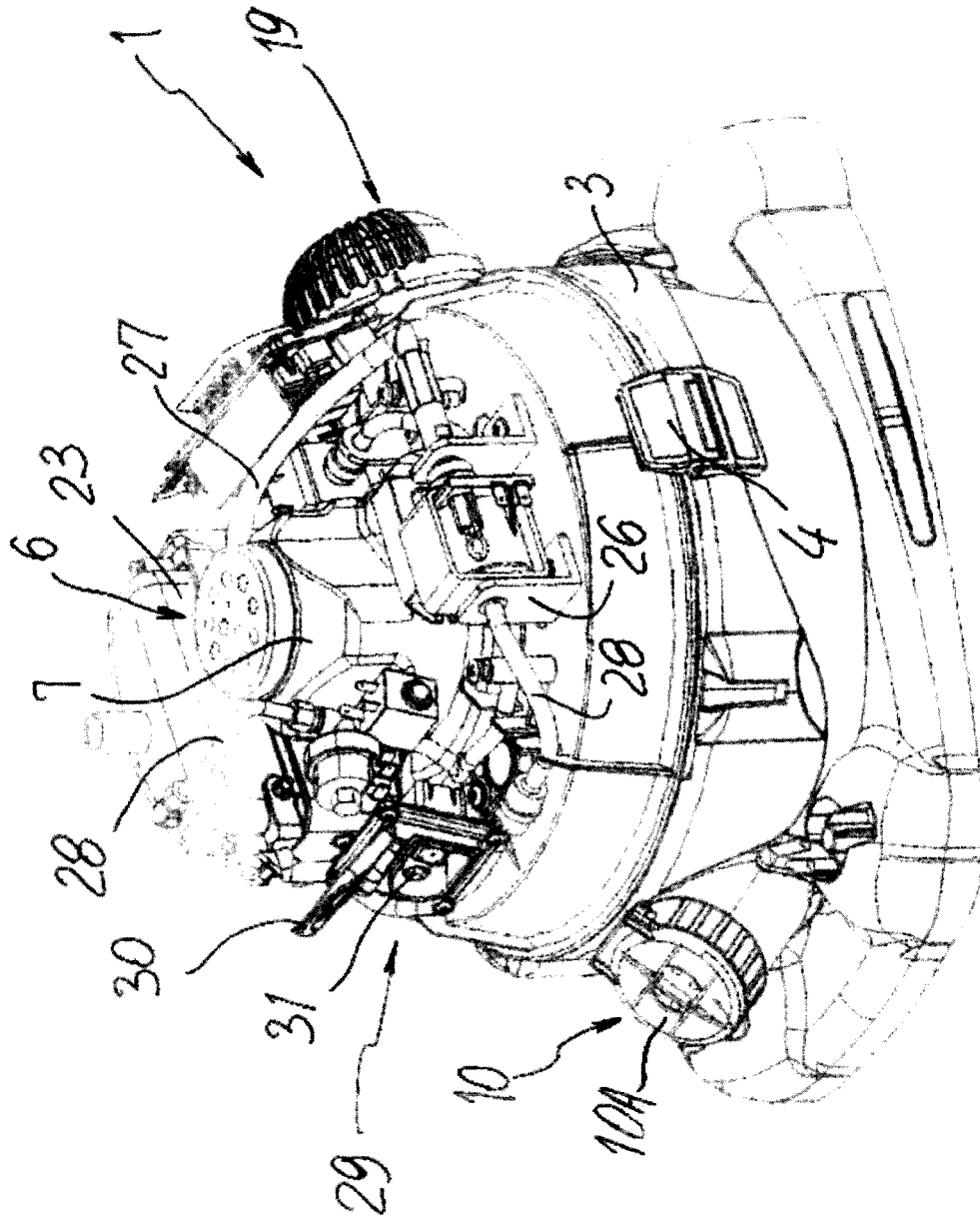


FIG. 7

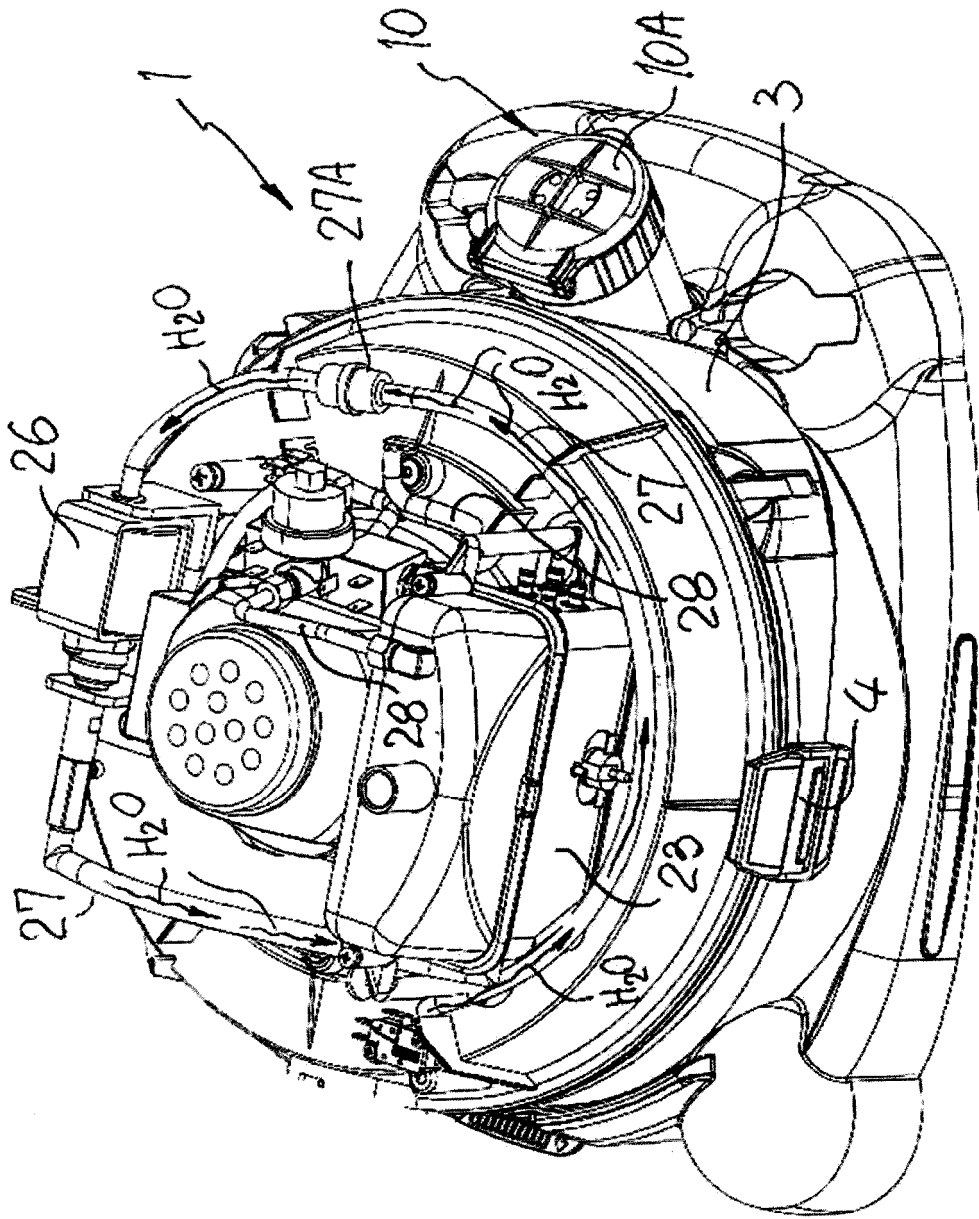


FIG. 8

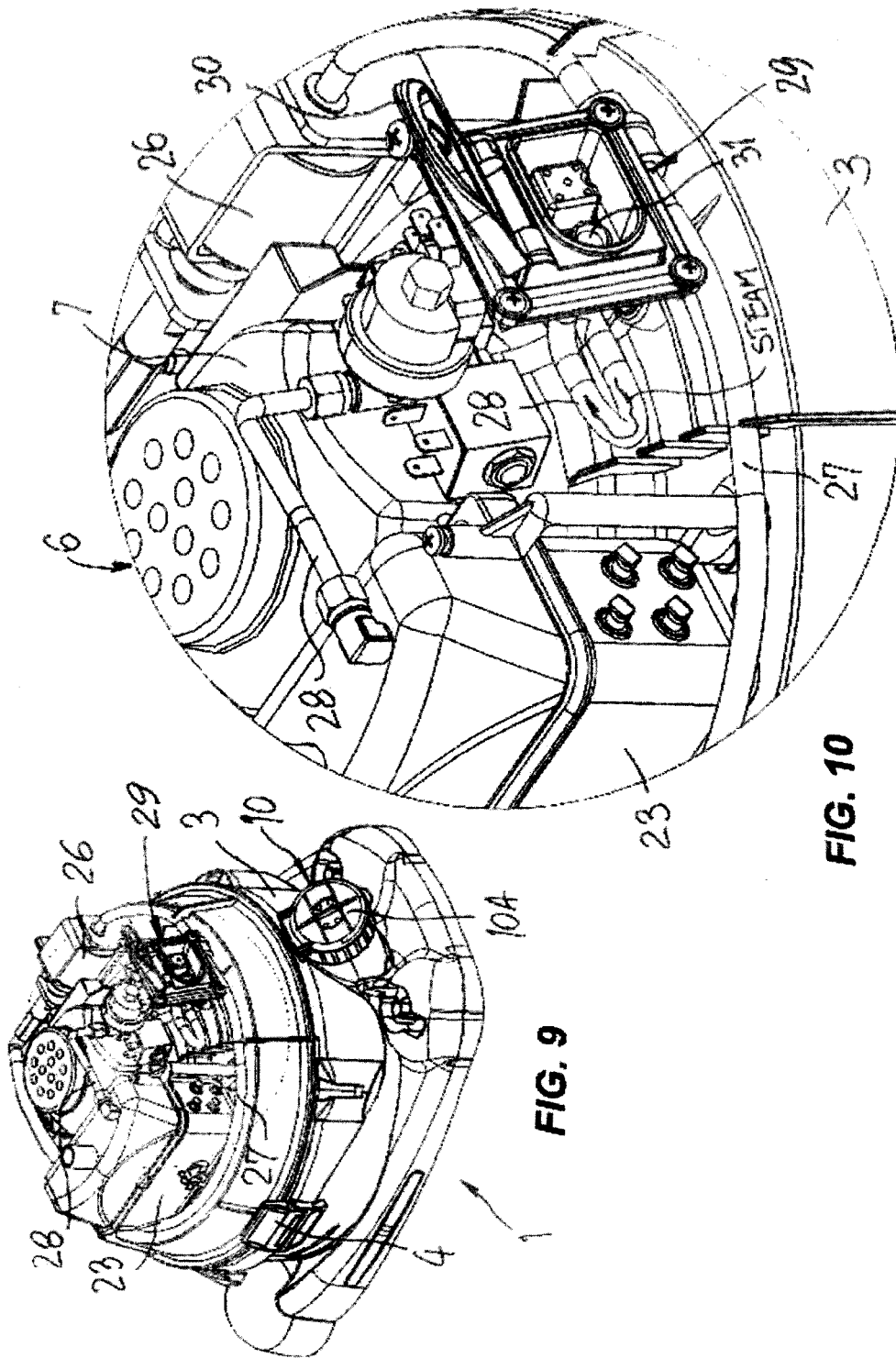


FIG. 9

FIG. 10

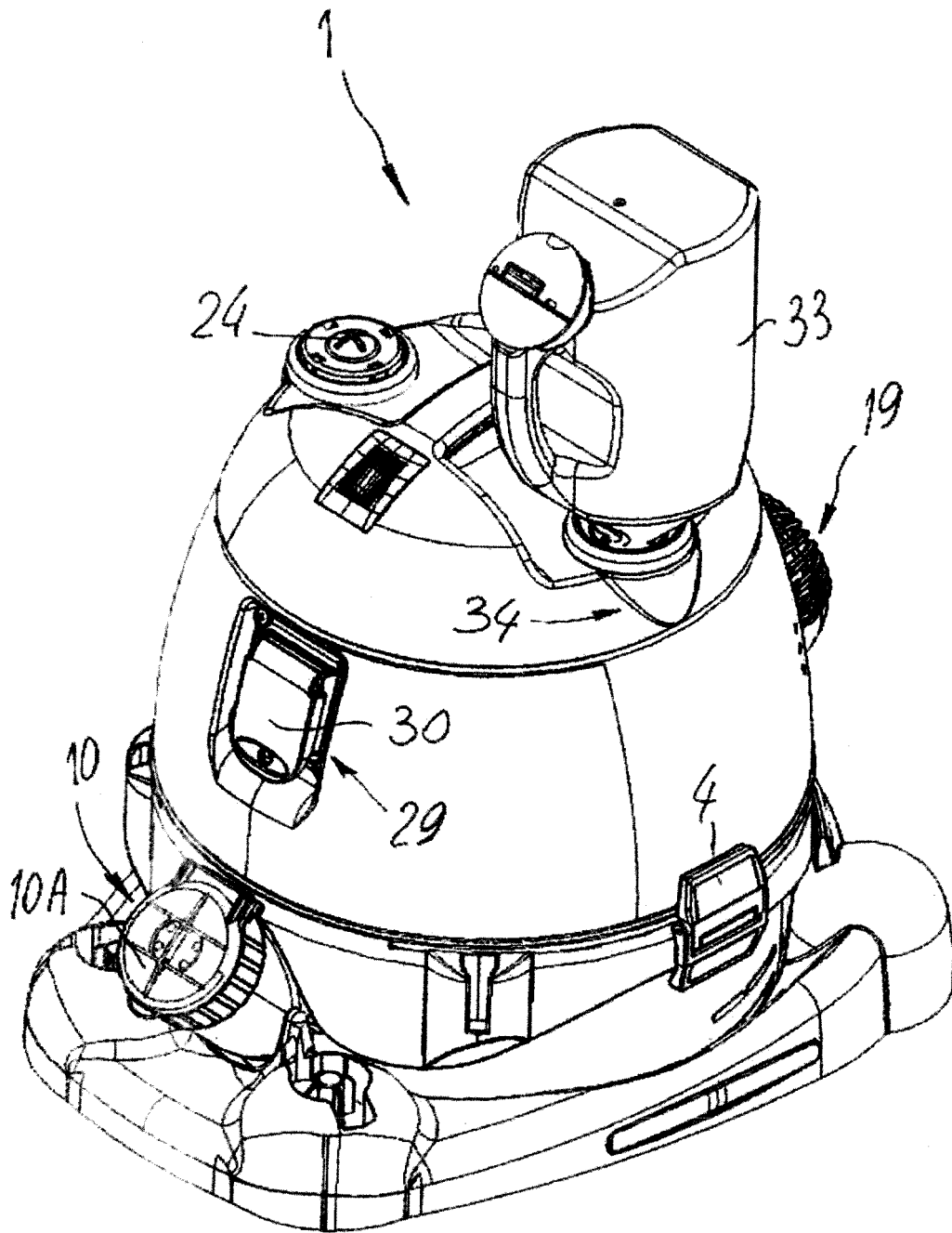
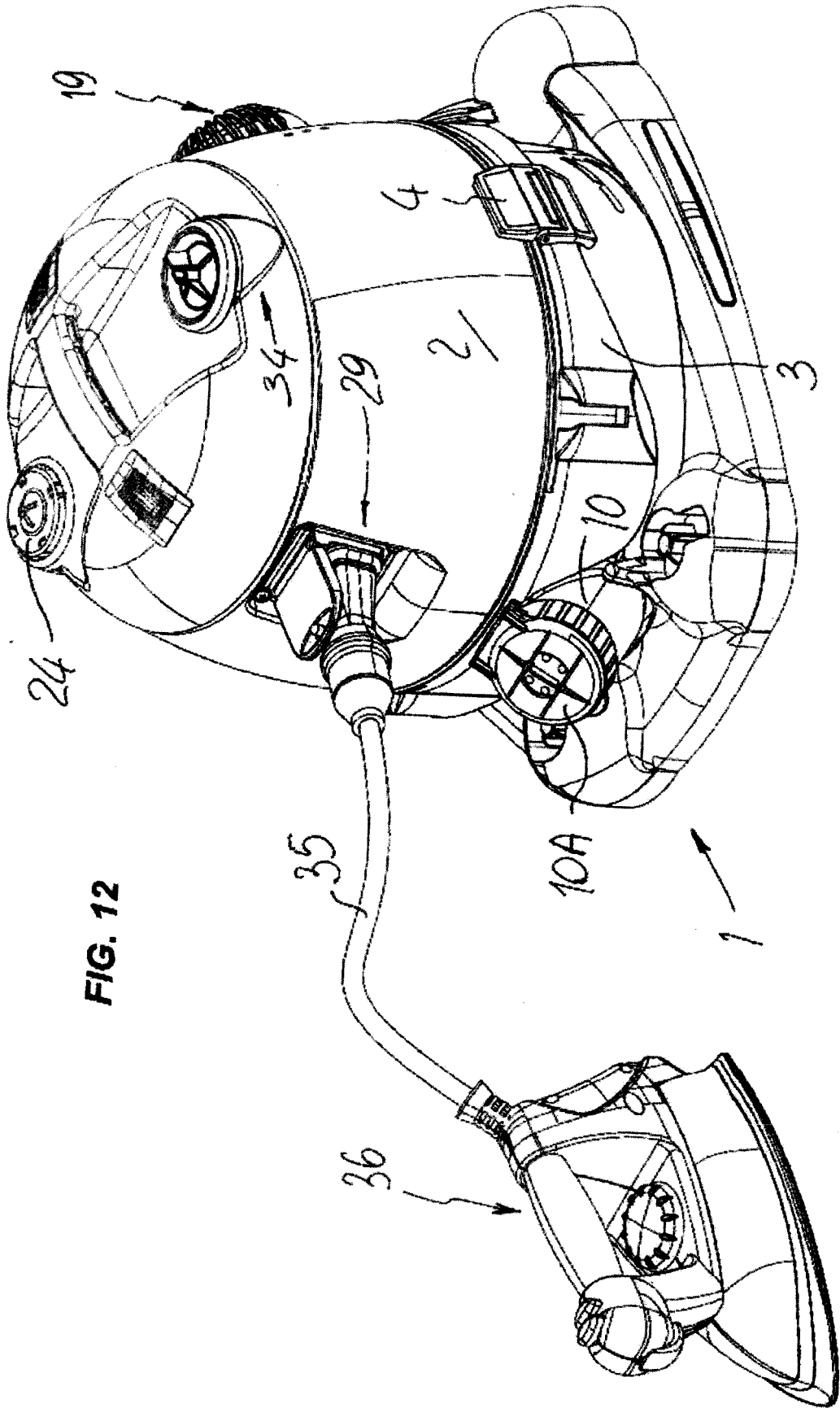


FIG. 11



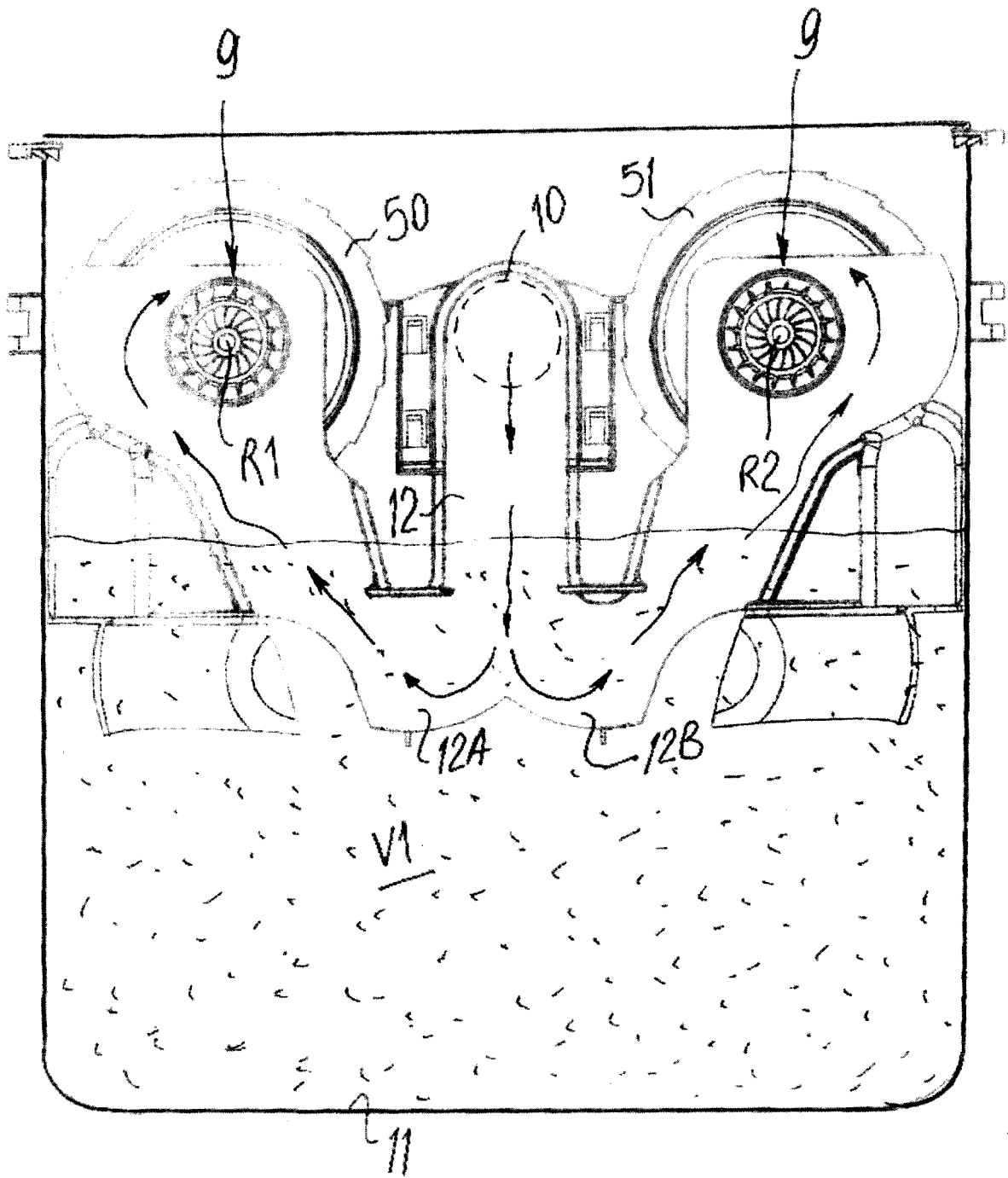


FIG. 13

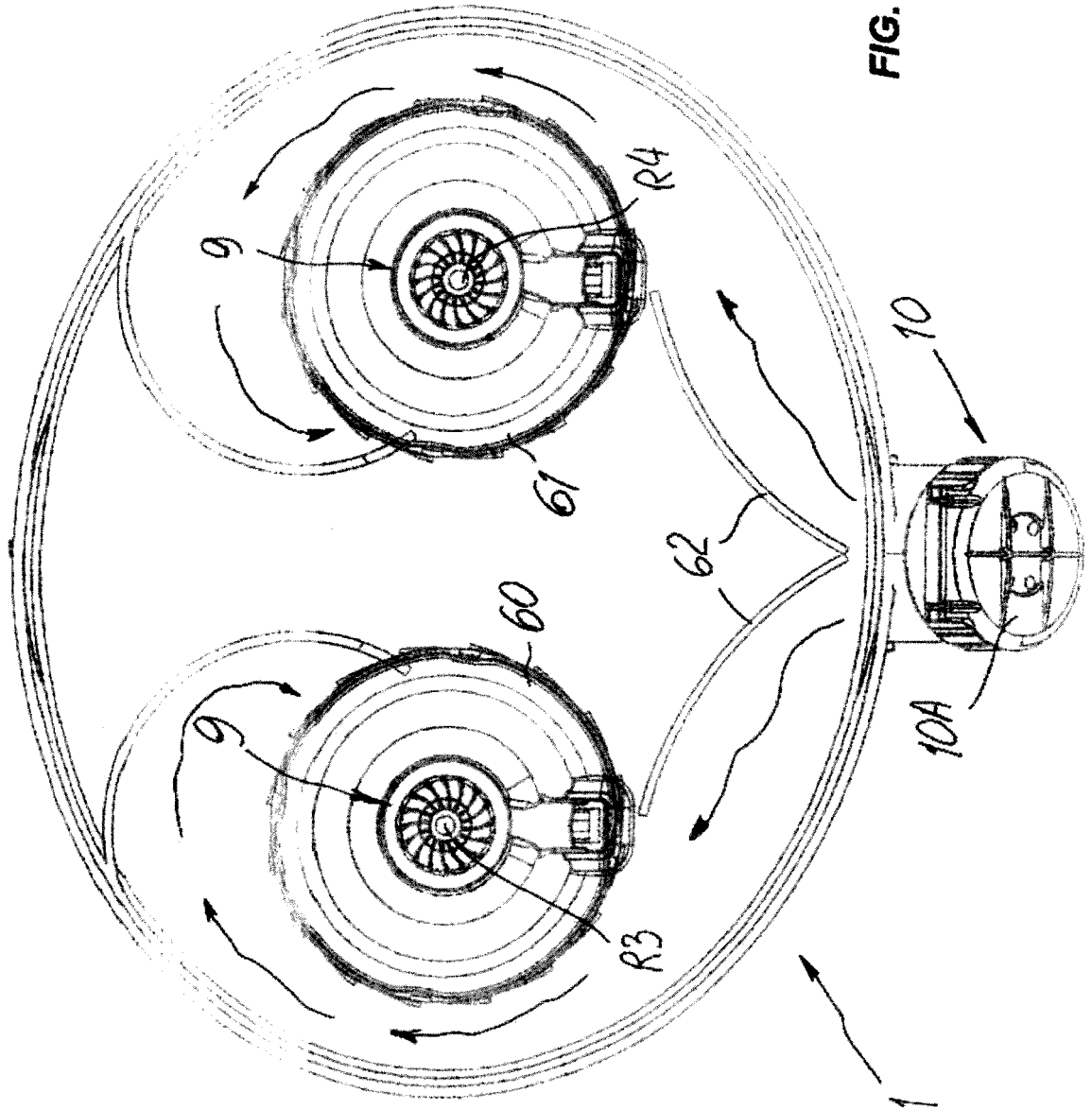
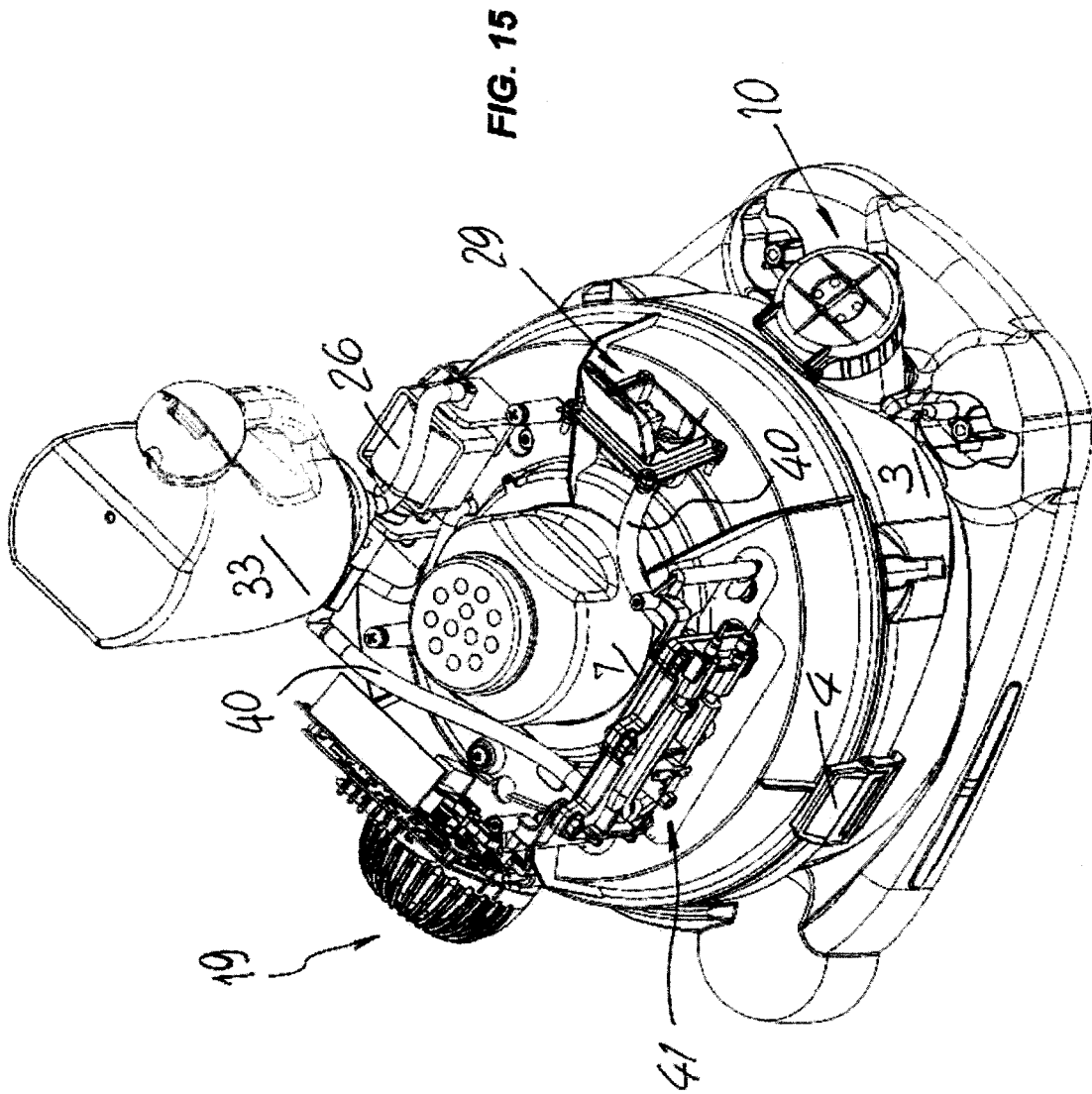


FIG. 14



**REFERENCES CITED IN THE DESCRIPTION**

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