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EUROPEAN QUALIFYING EXAMINATION 2026

PAPER C

Part 1

This paper contains :

Encrypted email from:
Ms Claire Ventoux
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To: Mr Art Vandelay
European patent attorney
Van Nostrand & Varnsen LLP
27 Montpellier Terrace
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United Kingdom
Sent: Thursday, 12 March 2026 08.30
Subject: Opposition against EP 4 150 561 B1

Dear Mr Vandelay,

We kindly request your assistance in filing a notice of opposition on behalf of our company, BreezyPeasy SARL, against European patent EP 4 150 561 B1 (Annex 1). I have enclosed Annexes 2 to 5 with this email, which I hope might be of use to you in preparing this opposition.

I have only part of Annex 1 currently available, namely paragraphs [0001] to [0017] of the description, figures 1 to 3, and claims 1 to 3. I will provide the remainder of Annex 1 later today.

Annex 1 was granted in respect of European patent application EP 20021202.1. The application as filed contained the entirety of the part of Annex 1 that is currently available.

The patent to be opposed claims priority from an earlier application (ES2732945). We have found that ES2732945 contains only paragraphs [0001] to [0011], figure 1 and claim 1 of Annex 1.

Kind regards,

Claire Ventoux

Enclosures

Annex 1: EP 4 150 561 B1

Annex 2: Article in "Clean Air Monthly", February 2020

Annex 3: US 2020/0143950 A1

Annex 4: EP 3 021 221 A1

Annex 5: WO/2017/066987 A2

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European Patent Office
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(11) **EP 4 150 561 B1**

(12) # EUROPEAN PATENT SPECIFICATION

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(21) Application number: **20021202.1**

(22) Date of filing: **08 October 2020**

(54) **Device for Purifying Air**
Dispositif pour la Purification de l'Air
Vorrichtung zur Luftreinigung

(84) Designated Contracting States:
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(43) Date of publication of application:
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[0001] The present invention relates to the field of air treatment, specifically to a mobile device designed for autonomous air purification. Such a device can be used in a variety of sectors, including industrial, commercial, agricultural and domestic environments. However, it is particularly well suited for use in the healthcare sector.

[0002] A device for purifying air, such as an air purifier, is any device that draws in polluted air and discharges clean air by removing pollutants such as bacteria, viruses, dust, etc. from drawn-in air and thereby purifies it.

[0003] Such a device typically includes a fan that propels the air through an air purifying unit, which is typically a filter. The device may also incorporate an integrated humidification unit to counteract the dryness of the indoor air experienced during the winter months, as well as additional electrical components such as sensors.

[0004] Fixed air purifiers, whether mounted on a wall or placed on the floor, have proven effective in reducing pollutants thereby improving air quality within both industrial and residential settings. This contributes to better health for workers and residents.

[0005] Recently, enhanced insulation has led to reduced air renewal in buildings, increasing the need for more effective air purifiers. Fixed air purifiers are, however, confined to purifying air within a specific, limited area.

[0006] The present invention addresses this disadvantage by providing a device for purifying air according to the appended claims. The invention is further illustrated with reference to the accompanying figures.

[0007] Fig. 1 shows a cross-section of the device for purifying air according to the invention, which in this specific embodiment is an air purifier 100.

[0008] The air purifier 100 is equipped with rotating means 101 for its displacement. It also comprises a casing 102, the inner surface of which is coated with sound insulation material 103. This reduces the maximum operational noise to a level of 45 dB.

[0009] Such a low noise level is particularly advantageous for use in the healthcare sector and, more generally, for use in noise-sensitive environments.

[0010] The casing also includes a means for purifying air 104 as well as a means for measuring air quality 105. In a preferred embodiment, the means for purifying air 104 is a filter and the means for measuring air quality 105 is a sensor, preferably a dust sensor.

[0011] The means for measuring air quality 105 transmits dust concentration data to a control unit 106 housed within the casing. Based on the dust concentration data, the control unit 106 adjusts the speed of a fan 107 and selects the most suitable operating mode of the air purifier. Fan 107 is large enough to achieve airflow rates of up to 500 m^3/h, enabling the air in even large spaces to be quickly purified.

[0012] Fig. 2 shows a bottom view of the air purifier 100. The inventors have found that wheels provide the best rotating means 101 for the displacement of the air purifier, offering both support and mobility. The air purifier of the invention is fitted with two wheels operated by a driving unit 108, while a support element 109 further stabilises the device.

[0013] Mass loaded vinyl (MLV) is a known sound insulating material that consists of polyvinylchloride (often abbreviated as vinyl or PVC) loaded with particles. Typically, calcium carbonate or barium sulfate are used as particles because they provide very effective sound insulation.

[0014] MLV provides not only sound insulation but also low thermal insulation. Thereby, optimal soundproofing without impairing the dissipation of the heat generated by the fan motor is achieved.

[0015] The inventors have found that superior sound insulation with improved thermal conductivity is obtained when the sound insulating material contains particles of barium sulfate in a range from 19 to 27 weight percent based on the total weight of MLV. The operational noise of the air purifier is thus lowered to 35 dB without impairing the dissipation of heat.

[0016] Fig. 3 shows a perspective view of the air purifier of the invention. A significant advantage of the invention is its enhanced navigation, which is made possible by an optical navigation unit 110. The optical navigation unit 110 comprises a laser scanning the surroundings of the purifier thereby identifying obstacles and sending information to the driving unit.

[0017] Conventional navigation units use ultrasound waves and thereby detect only large obstacles such as walls. The optical navigation unit of the invention offers higher resolution and can detect also smaller objects such as toys on the floor. This enables a more detailed mapping of the environment and more accurate movement.

Further paragraphs available only in part 2

Further paragraphs available only in part 2

Further paragraphs available only in part 2

Claims

1. Device for purifying air (100) comprising:
   - rotating means (101) for displacing the device; and
   - a casing (102) coated with a sound insulation material (103),
   the casing (102) further comprising:
      - a means for measuring air quality (105);
      - a means for purifying air (104); and
      - a control unit (106) configured to control the device (100) based on data received from the means for measuring air quality (105).

2. Device for purifying air according to claim 1, wherein the rotating means (101) comprises two wheels and a wheel driving unit (108).

3. Device for purifying air according to claim 2, wherein the sound insulation material (103) is a mass loaded vinyl comprising barium sulfate in a range from 19 to 27 weight percent based on the total weight of the mass loaded vinyl, the device further comprising an optical navigation unit (110).

Further claims available only in part 2

Further claims available only in part 2

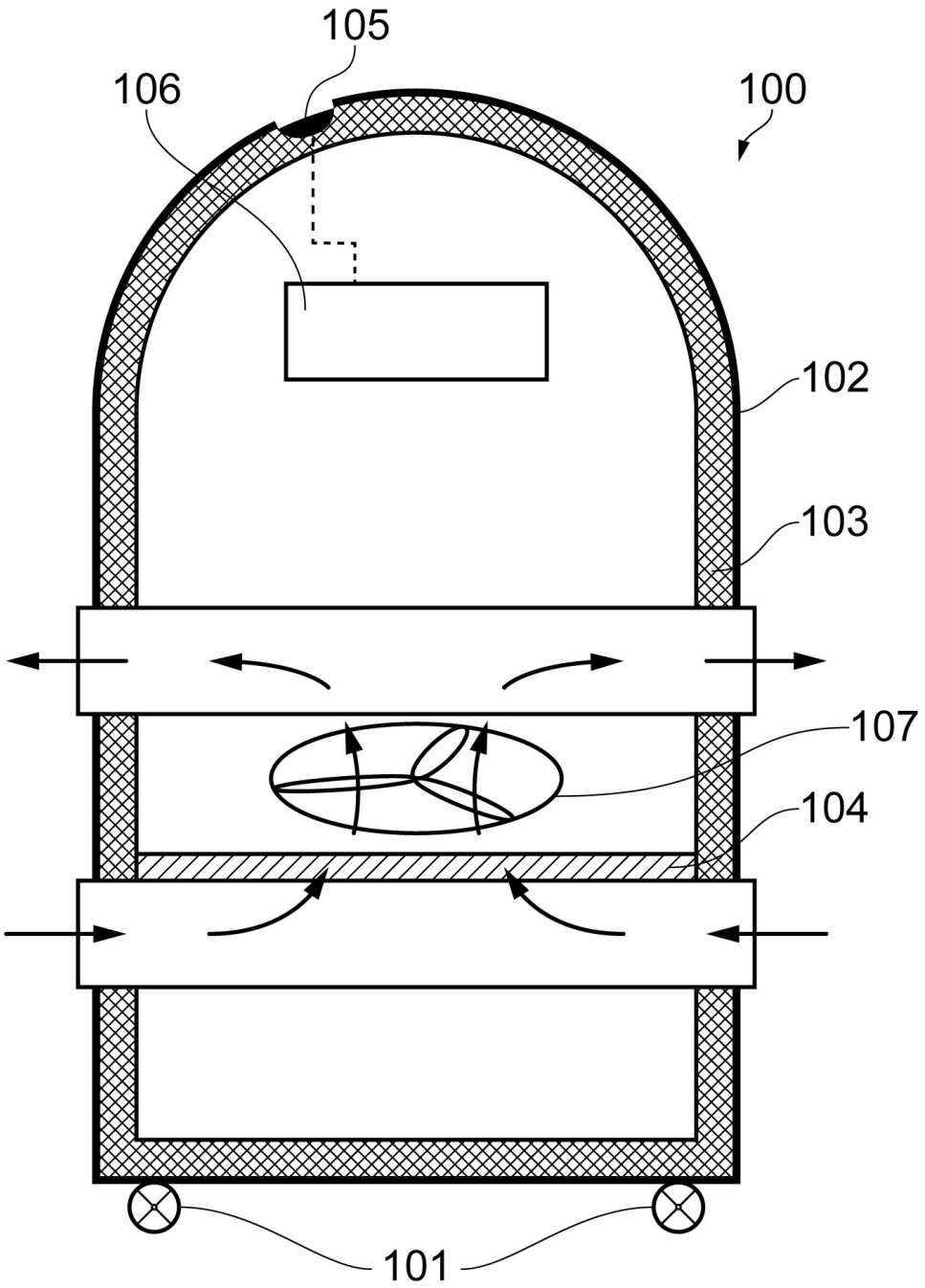

FIG. 1

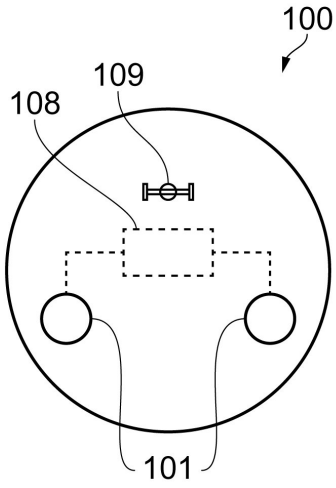

FIG. 2

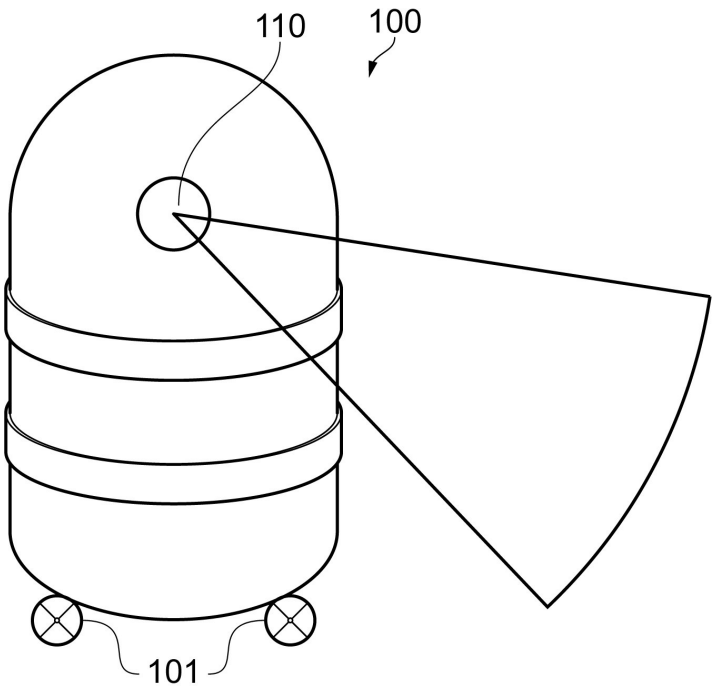

FIG. 3

Article in "Clean Air Monthly", February 2020

Sondy Purifier Cool: Breathe Fresh, Stay Cool

[0001] Experience the perfect combination of innovation and comfort with the Sondy Purifier Cool – a sleek, state-of-the-art device that combines advanced air purification with efficient cooling. Launched in the European market last spring, it quickly became a hit, selling over 20 000 items within the first three weeks. With a noise level of 60 dB, it operates relatively quietly. Choose from ten customisable fan speeds to tailor your comfort exactly to your liking.

[0002] Unlike ordinary air purifiers, the Sondy Purifier Cool doesn't just clean the air – it cools it too, ensuring a refreshing and clean atmosphere. Built with a robust aluminium casing which defines its external appearance and protects all its components, Sondy Purifier Cool is engineered to last.

[0003] Equipped with a solid-state formaldehyde sensor, the Sondy Purifier Cool detects formaldehyde, a pollutant whose molecules are 500 times smaller than 0.1 microns.

[0004] Sondy Purifier Cool's removable catalytic filter breaks down the formaldehyde molecules, leaving just water and CO_2 behind. The removable catalytic filter is easy to clean, thereby not only maintaining the device's efficiency but also extending its lifespan.

[0005] Each Sondy Purifier Cool comprises a smart unit which offers remote support, sending you information to be displayed on your smartphone and letting you manage and monitor your device from anywhere. You can choose between automatic mode, in which the smart unit controls the device based on sensor readings, and manual mode, where you take full control directly from your smartphone. Plus, enjoy the added convenience of voice control for hands-free operation.

[0006] Despite its powerful performance, the Sondy Purifier Cool is energy-efficient, with a maximum power consumption of just 100 W.

[0007] The overall dimensions are 400 mm in width, 240 mm in depth, and 1750 mm in height. Although it weighs 40 kg, it is effortlessly moved by our patented tilt-and-go functionality, which comprises two wheels and one support element to stabilise it once in place.

[0008] Moving the Sondy Purifier Cool is a breeze: simply tilt the device using its ergonomic handle, roll it smoothly on its two wheels to the desired location and plug it in using the convenient 1.8-meter-long power cord. Once in place, the built-in support element ensures it stays securely where you need it, ready to deliver clean air whenever you choose.

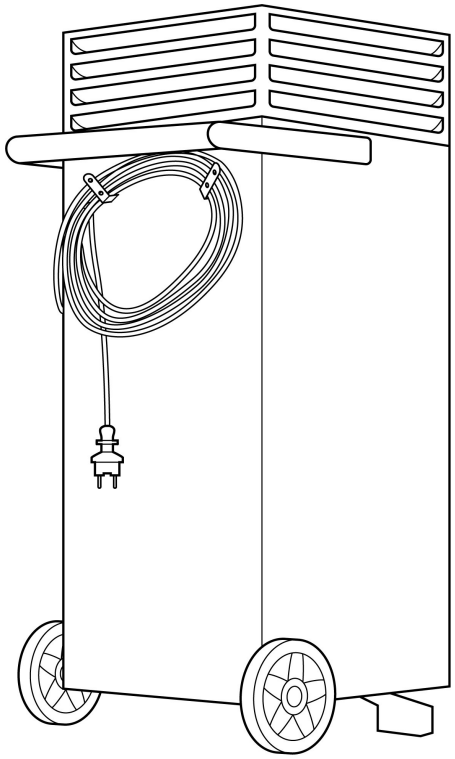

FIG. 1

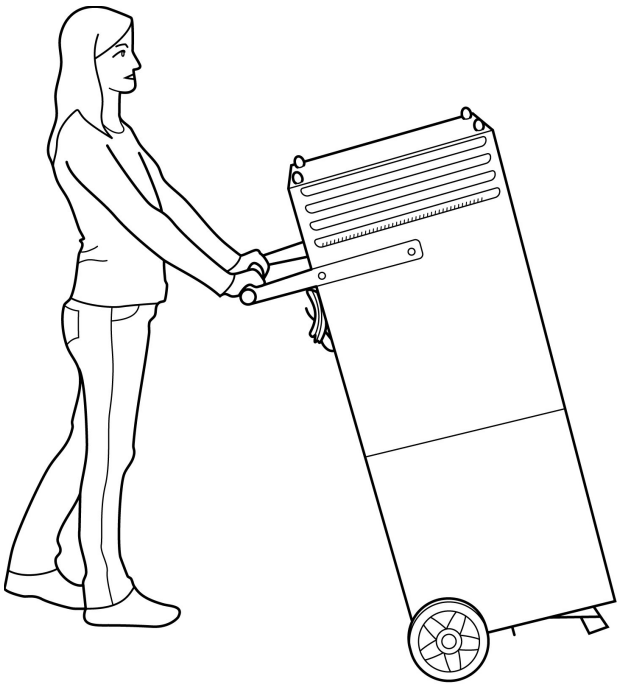

FIG. 2

(19) United States Patent and Trademark Office (USPTO)

(21)	Application number:	**16/987 844**
(11)	Publication number:	**US 2020/0143950 A1**
(40)	Publication date:	**Jul. 29, 2020**
(22)	Filing date:	**Dec. 16, 2019**
(30)	Priority:	**Jan. 28, 2019 IT201900001192A1**
(51)	Int. Cl.:	**A47L5/00, A47L13/00**
(73)	Assignee:	**Megaditta S.p.A.**
(75)	Inventor:	**R. Filini, L. Calboni, U. Fantocci**

Mobile vacuum cleaner

[0001] This invention relates to a vacuum cleaner for cleaning a floor. Vacuum cleaners capable of navigating and cleaning floors autonomously are known. However, these existing technologies often face challenges in efficiently separating dust and effectively navigating spaces.

[0002] The vacuum cleaner according to the present invention addresses these challenges by enhancing dust separation efficiency and incorporating autonomous navigation capabilities.

[0003] Fig. 1 illustrates a bottom view of the vacuum cleaner 300 of the invention. It includes a body 301 which autonomously moves along a floor of a cleaning zone and vacuums up particles such as dust.

[0004] The vacuum cleaner of the invention also includes a navigation unit 302 which is disposed on the front of the body 301. The navigation unit 302 has an ultrasonic component which emits ultrasound waves and detects their reflection from barriers such as sofas and walls. This allows the vacuum cleaner 300 to navigate the space avoiding large obstacles.

[0005] To move, the vacuum cleaner comprises a left wheel 303, a right wheel 304 and one auxiliary wheel 305 for stably supporting the body 301. The vacuum cleaner also comprises a left wheel motor 303a which drives the left wheel 303, and a right wheel motor 304a which drives the right wheel 304.

[0006] The vacuum cleaner is powered by a rechargeable battery and automatically returns to its charging station when the battery level is below 18%. This prevents deep discharges, thereby extending battery lifespan, an important issue for autonomous devices.

[0007] The body 301 of the vacuum cleaner includes a casing 307 and a plurality of brushes 308 which are disposed on a lower surface of the casing 307. Dust is removed from the floor of the cleaning zone by rotation of the brushes 308.

[0008] Fig. 2 shows a cross-sectional view of the vacuum cleaner according to the invention. The vacuum cleaner 300 includes a cyclonic separation chamber 309, which uses the airflow created by a suction fan 310 to generate an air vortex. Once the air containing dust from the floor is sucked into a suction port 311 of the cyclonic separation chamber 309, the dust particles rotate in the air vortex and are pushed towards the walls of the cyclonic separation chamber 309 by centrifugal force. When they reach the walls, the dust particles lose momentum and slide down into a collection tank 313.

[0009] An optical air pollution sensor 314, located in the cyclonic separation chamber 309, provides a pollution level signal based on the amount of light scattered by dust particles. This indicates the quantity of dust drawn into the suction port 311.

[0010] The pollution level signal is transmitted through a wired connection from the air pollution sensor 314 to a smart unit 315 of the suction fan 310, which adjusts the speed of the suction fan 310 based on the sensor readings to achieve an optimal cleaning effect. The clean air current is finally directed towards an air outlet 316.

[0011] For sound insulation, the inner surface of the casing 307 is coated with an MLV 317. The MLV consists of PVC loaded with calcium carbonate in a range from 5 to 50 weight percent based on the total weight of the MLV.

Claims

1. A robotic vacuum cleaner (300) comprising:
a casing (307) that houses a cyclonic separation chamber (309), the cyclonic separation chamber (309) comprising a suction port (311) and a suction fan (310).

2. The robotic vacuum cleaner of claim 1 wherein the casing (307) is coated on its inner side with an MLV (317), wherein the MLV consists of PVC loaded with calcium carbonate in a range from 5 to 50 weight percent based on the total weight of the MLV.

3. The robotic vacuum cleaner of claim 1 further including an ultrasound obstacle sensing unit (302).

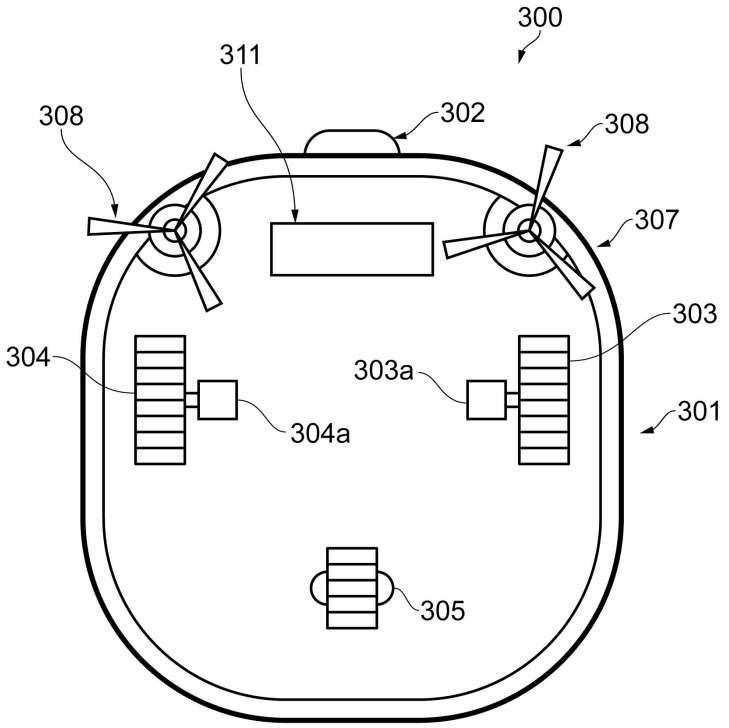
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FIG. 1

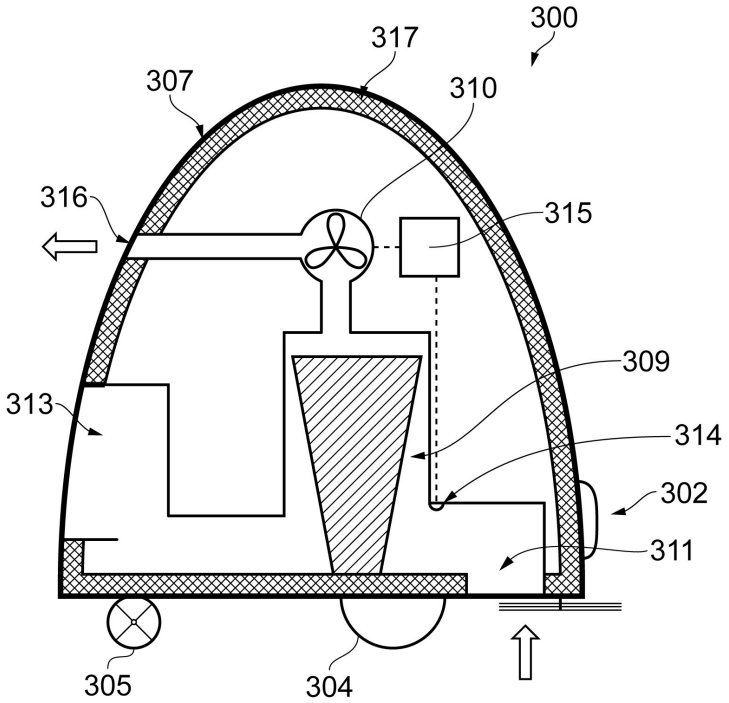
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FIG. 2

(19) European Patent Office

(12) European Patent Application

(21)	Application number:	**15159875.3**
(11)	Publication number:	**EP 3 021 221 A1**
(43)	Publication date:	**2 November 2016**
(22)	Filing Date:	**27 April 2015**
(51)	Int. Cl.:	**F24F11/63**
(71)	Applicant**:**	**WhiffWhiz**
(72)	Inventor:	**J. Erme**

Air conditioning system

[0001] The present invention relates to the field of air conditioning systems, particularly to a system comprising a plurality of fixed air conditioning units co-operating with a smart unit and a pet robot for sensing environmental parameters.

[0002] In the system according to the invention, a plurality of air conditioning units and a pet robot equipped with sensors operate interdependently to maintain optimal environmental conditions within an indoor space. The system is specifically intended for use in environments such as hospitals and clinics, where strict requirements govern noise levels, air quality and hygiene.

[0003] Fig. 1 illustrates the system 400 according to the invention, Fig. 2 is a cross-section of the air conditioning unit 410 and Fig. 3 shows the pet robot 420.

[0004] The air conditioning units 410 according to the invention are mounted on walls at various locations within the indoor space and are dimensioned according to the volume of the indoor space they are intended to treat. Each air conditioning unit 410 includes a casing 411, an air inlet 412, an air outlet 413, and an air duct 414 that connects the air inlet 412 to the air outlet 413.

[0005] The size of each air conditioning unit 410 is adapted to the volume it is intended to treat; this ensures responsive climate control, even in large areas, whilst avoiding unnecessary energy consumption. The outer surface of the casing 411 might optionally include a screen displaying the current settings or sensor data measured by and received from the pet robot 420.

[0006] The air duct 414 is equipped with a HEPA (high efficiency particulate air) filter 415, a heat exchanger 416 and a fan 417. HEPA filters are particularly effective in reducing dust concentration. Dust refers to particles of matter with a size range from 1 to 500 µm.

[0007] The air conditioning units 410 are designed to operate in multiple modes, including cooling, heating, purification and dehumidification.

[0008] To render the air conditioning units 410 suitable for use in hospitals and clinics, where a maximum noise level of 45 dB is required by law, the inner surface of the casing 411 is coated with a sound-absorbing material 418 to reduce the noise generated by the fan 417 during operation. Although structured polymer foams are commonly used for this purpose, they have the disadvantage of being thermally insulating, which can impede the dissipation of heat generated by the fan motor.

[0009] To overcome this issue, in a preferred embodiment of the present invention, a mass loaded vinyl (MLV) is used as sound-absorbing material. MLV is known for its sound insulation properties while exhibiting low thermal insulation characteristics.

[0010] The MLV used by the present invention consists of vinyl loaded with particles selected from calcium-magnesium carbonate ($CaMg(CO_3)_2$), calcium carbonate ($CaCO_3$), calcium sulfate ($CaSO_4$) and barium sulfate ($BaSO_4$). Among these, barium sulfate, in a concentration ranging from 20 to 25 weight percent based on the total weight of the MLV, provides the optimal compromise of sound and thermal insulation.

[0011] The pet robot 420 is designed to have a pleasing exterior with eyes and a mouth. An ultrasound detection system 421 which resembles eyes is used to identify obstacles in its path. The mouth of the pet robot is equipped with a temperature sensor 422, a humidity sensor 423 and a dust sensor 424, which are the three types of sensors commonly employed in air conditioning systems to monitor environmental conditions. These sensors enable the pet robot to collect and transmit environmental data as it moves.

[0012] The dust sensor 424 of the invention is based on an advanced sensing technology that requires a stable air environment with low turbulence. It is therefore unsuitable for installation in any kind of air treatment unit, as this would necessitate frequent recalibration. The invention overcomes this constraint by integrating the dust sensor 424 into the pet robot 420, which remains separate from the air treatment components. In return, greater accuracy is achieved than with standard dust sensors used in conventional air treatment systems.

[0013] The pet robot is mounted on two legs 425, each moved by a dedicated driving unit. Preferably, the driving units are motors. Maintaining compact dimensions is essential, particularly in healthcare environments, to facilitate unobstructed movement within tight spaces and to ensure the robot can access areas that are critical for maintaining hygiene standards. To achieve this, the casing is specifically designed to accommodate only the two driving units, the ultrasound detection system 421 and the three sensors. Consequently, the robot has a height of just 10 cm, enabling it to navigate freely within various environments and access all areas.

[0014] The system also includes a smart unit. A smart unit is a type of control unit which is configured to exchange data with external devices and networks.

[0015] The smart unit comprises a computer program for controlling the movement of the pet robot which, when executed:

- divides the indoor space into a plurality of regions;
- receives environmental data from the pet robot for each region while it moves; and
- based on the environmental data and the positions of the air conditioning units, controls each air conditioning unit to operate in the most appropriate mode.

[0016] For those regions wherein purification mode is determined to be the most appropriate, the smart unit ranks these regions based on dust concentration level, thereby establishing a hierarchy of purification priority. The pet robot is then directed to the highest-priority region to monitor the purification process.

Claim

1. An air conditioning system (400) for an indoor space comprising:
   a plurality of air conditioning units (410) configured to be fixed to the walls of the indoor space;
   a pet robot (420) for sensing environmental parameters and including sensors (422, 423, 424);
   a smart unit configured to control the air conditioning units (410) based on data received from the sensors (422, 423, 424).

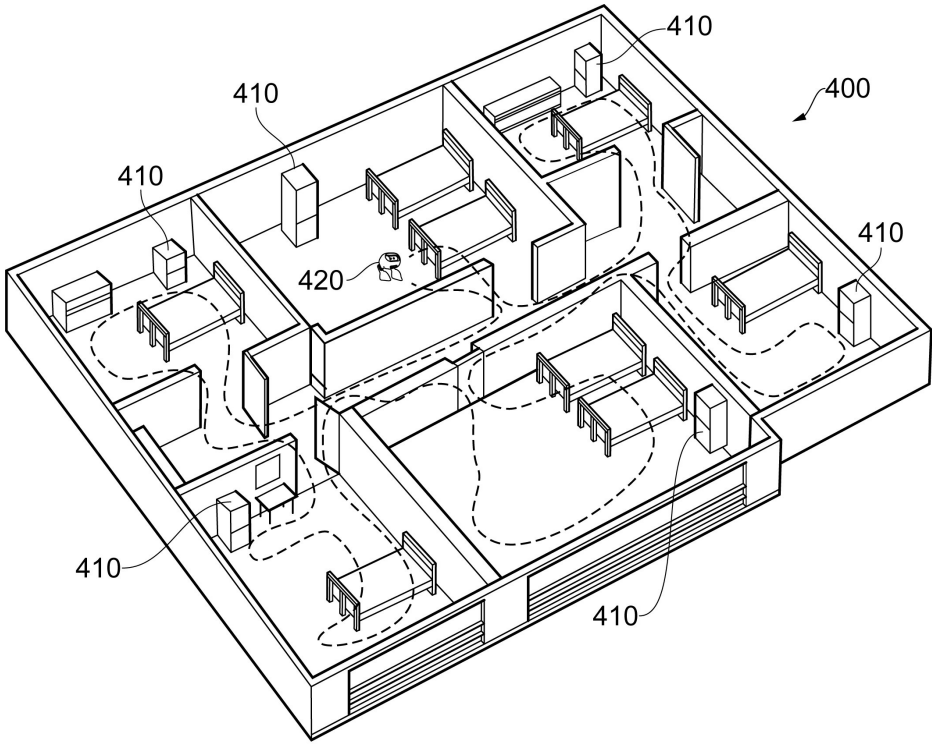
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FIG. 1

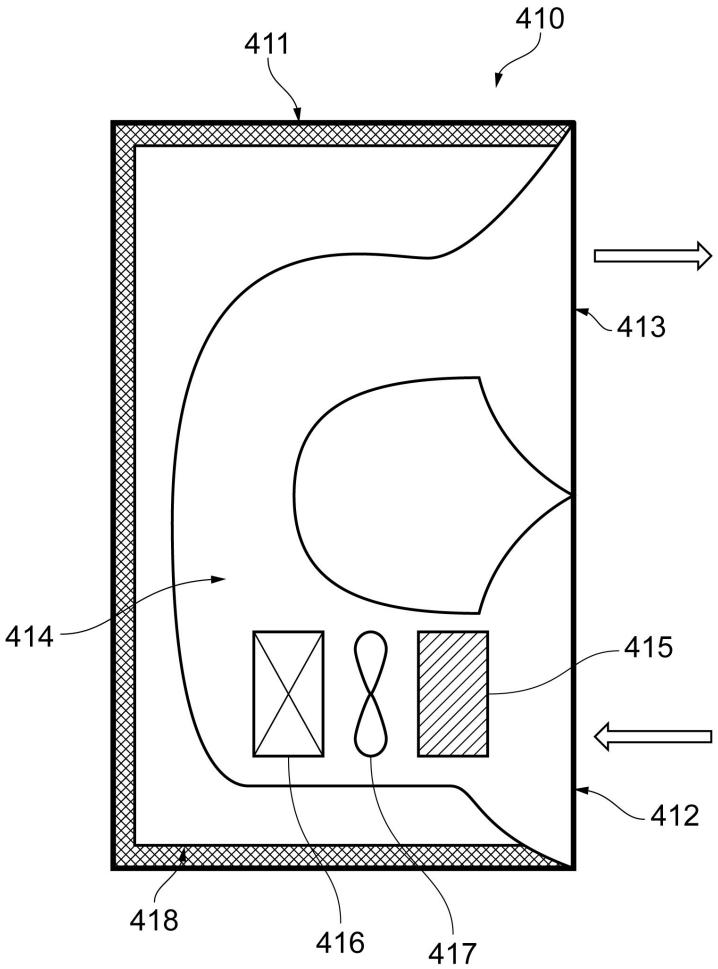
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FIG. 2

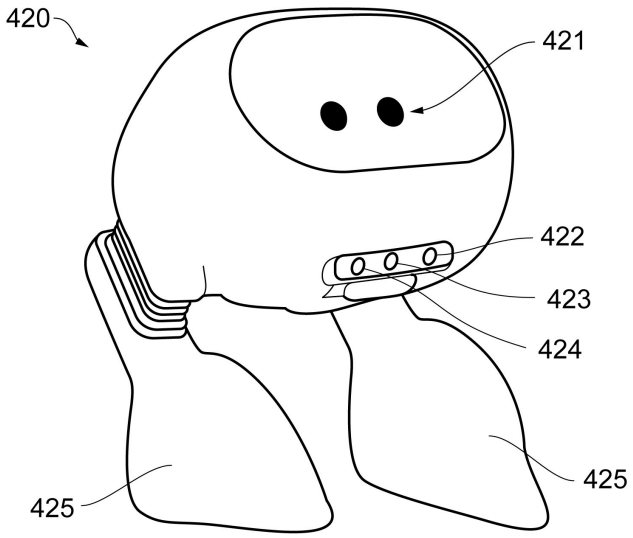

FIG. 3

(19) World Intellectual Property Organization

(12) International Application published under the Patent Cooperation Treaty (PCT)

(21) International Application Number: PCT/GB2016/05416

(11) International Publication Number: WO/2017/066987 A2

(22) International Filing Date: 16.08.2016

(30) Priority: 17.08.2015 GB1505196.1

(43) International Publication Date: 18.02.2017

(51) International Patent Classification: A01G9/24, F24F6/12

(71) Applicant (for all designated states except US): TropiTech Ltd.

(75) Inventors/Applicants (for US only): Drizz, L.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*):
ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Humidifying robot

[0001] The present invention relates to the field of air treatment, and more specifically to a humidifying robot designed to regulate humidity levels within large spaces, particularly greenhouses used for cultivating tropical fruits.

[0002] The demand for tropical fruits has significantly increased in the past decade. However, the transportation of these fruits from tropical regions such as Southeast Asia and Latin America to Europe is environmentally unsustainable. Additionally, to ensure that the fruit arrives in Europe ready for consumption, it is typically harvested while unripe and allowed to ripen during transit. This process often results in fruits that are less flavourful and of inferior quality.

[0003] To address these issues, European farmers have begun cultivating tropical fruits in greenhouses. While greenhouses can maintain tropical temperatures necessary for the growth of these fruits, achieving the high humidity levels characteristic of tropical climates is challenging. Traditionally, humidity within greenhouses is maintained by atomising water from the ceiling. However, this method results in a constant and uniform humidity level throughout the greenhouse, which does not accommodate the variations in humidity requirements of different plant species.

[0004] Known humidifying systems also include robots operating in conjunction with a network of fixed humidity sensors placed at various locations within the greenhouse. These robots typically rely on the sensor network to assess local humidity levels and determine areas requiring additional moisture. While this approach improves humidity distribution compared to ceiling-mounted atomisers, it has limitations. Specifically, these robots are constrained in their operation by the fixed placement of the humidity sensors in the sensor network.

[0005] The present invention overcomes these drawbacks by providing a fully autonomous humidifying robot comprising a humidity sensor, which allows an extremely high autonomy of operation and flexibility of use.

[0006] Figure 1 illustrates a humidifying robot according to the invention. The humidifying robot 500 of the present invention is designed to be light and compact. It is equipped with two rubber tracked treads 501, allowing it to navigate effectively over uneven and muddy terrain commonly found in greenhouses.

[0007] The humidifying robot 500 is further equipped with a highly modern laser navigation unit 502 which surpasses conventional ultrasound units in accuracy. The laser navigation unit 502 enables the robot to detect small objects such as branches and leaves, ensuring that it can navigate the greenhouse without damaging the plants.

[0008] During operation, the robot 500 patrols the greenhouse, periodically capturing images of its surroundings with an optical recognition system 503 such as a camera.

[0009] The type of tropical fruit plant present in each image captured by the optical recognition system 503 is identified using an internal database. Simultaneously, the robot 500 measures the humidity level using an integrated humidity sensor 504. The measured humidity level is compared to the optimal humidity level for the identified plant species. If the measured humidity level is lower than the required level, the robot atomises water through a nozzle 505, effectively humidifying the area within a two-meter radius.

[0010] In addition to the humidity sensor 504, the robot 500 may be provided with one or more sensors of the types commonly employed in air conditioning systems for monitoring environmental conditions and may further be configured to communicate with a network of fixed sensors placed at various locations within the environment. This allows the robot to gather more comprehensive environmental data, thereby enabling a more precise adjustment to the growing conditions of the plants.

[0011] The incorporation of sensors into a stand-alone, compact mobile robot has led to significant improvements in autonomy of operation compared to the prior art in all technical areas related to air treatment. The robot of the invention is fully autonomous and operates on its own, requiring no human intervention during its operation.

Claim

1. A humidifying robot (500) for greenhouses comprising rubber tracked treads (501), a laser navigation unit (502), an optical recognition system (503), a humidity sensor (504) and an atomising nozzle (505).

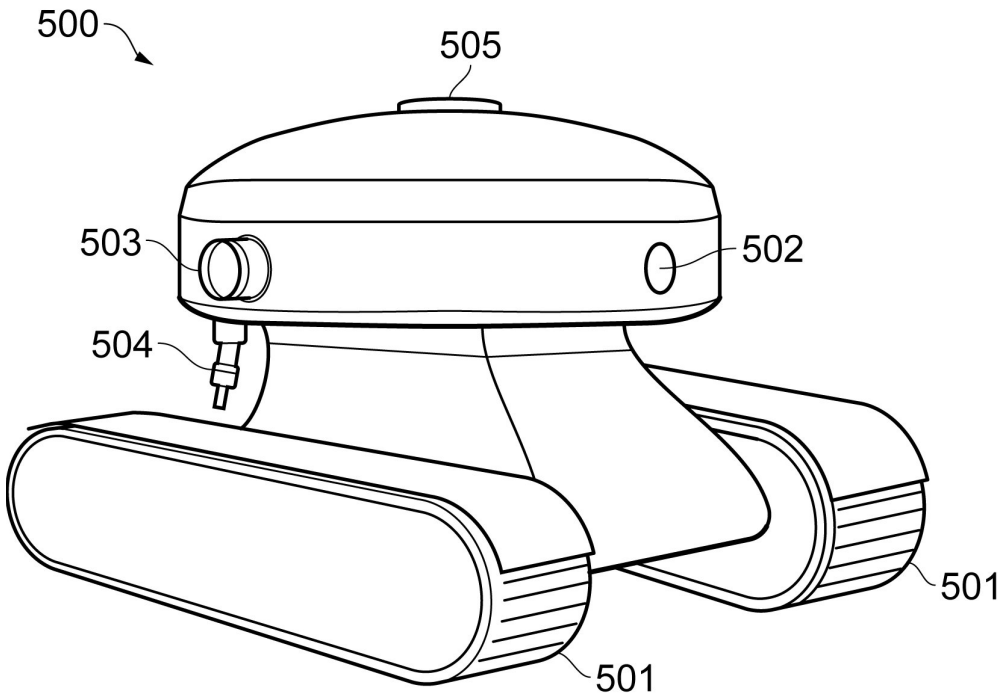

FIG. 1