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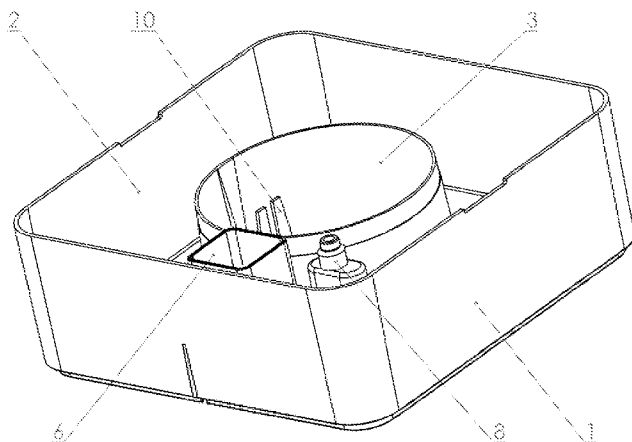


FIG 3

(57) Abstract: Plant growing pot comprises a liquid vessel, comprising a slot for a plant growth cartridge, removably containing a plant growth cartridge. Plant growing pot is equipped with automatic control block, comprising an electronic control block and sensors and actuators for providing conditions necessary for growing a particular plant. For each plant, the cartridge has a coding corresponding to the particular plant, e.g., an ID code identifying the particular plant, or code for controlling the operation of the automatic control block.



PLANT GROWING POT AND PLANT GROWING CARTRIDGE

TECHNICAL FIELD

The invention belongs among automatic plant growing devices and systems, in particular among plant growing pots suitable for home use (suitable for living spaces) where the growing conditions appropriate for the plant are adjusted automatically according to the plant in the plant growing pot.

BACKGROUND ART

Various plant growing systems providing automatic water and nutrient supply for plants are known. Systems where water supply is controlled based on the water level in the appropriate vessel or according to a pre-set schedule are known.

On the other hand a probe is known from US patent No 7400975, comprising a controller having a processor adapted to process the environmental data received from several sensors, and a communication module set up to send the environment data to a computer. Using a probe enables finding plants suitable for growing, or possibilities for improving soil properties from a database, or recommendations for growing a particular plant are found from the database based on the soil properties.

A hydroponic or aeroponic horticultural device is known from US published patent application No US2008/0276534, comprising a vessel having a closed lower section for holding liquid, and a growing surface covering the vessel, whereas the growing surface has been adjusted to support at least one seed cartridge containing a seed or plant; a light source placed above the plant, and adjusted to light the seed cartridge; a measuring device located either in the vessel or near the vessel and adjusted to measure the water level; a controller connected to the measuring device, and a timer, whereas the controller has been adjusted to calculate the liquid consumption rate in the vessel, and perform at least one of the following functions: controlling the timing of the illumination cycle, adding nutrition in the liquid, and switching the nutritional adding indicator light.

A device and method for determining the state and condition of the potted plant, and notifying the owner is described in published patent application No WO2010/097689. The device does not include growing programs for maintaining of a particular plant.

5 The purpose of the invention is to provide a simple and universal plant growing pot suitable for home use (for using in a living space), comprising an exchangeable plant growing cartridge, and enabling different plants to be grown in the conditions most suitable for these particular plants, either completely or virtually without the user's intervention.

DISCLOSURE OF INVENTION

10 The purpose of the invention is achieved with a plant growing pot comprising a nutritional liquid vessel, and a compartment for a plant growing cartridge, containing a removable plant growing cartridge. The plant growing pot is equipped with an automatic control block, comprising an electronic control block, and having at least one sensor and at least one actuator for providing conditions necessary for growing a plant connected to it, e.g. sensors and actuators for determining and controlling water and nutritional content, and for
15 specifying and controlling the light and temperature conditions. Additionally, to determine the conditions suitable for growing each particular plant, the plant growing cartridge is equipped with a coding corresponding to the plant contained in it, for example with an identification code (ID code) stored on the plant growing cartridge, and read by the automatic control block of the plant growing device, or a plant growing instruction code.

20 BRIEF DESCRIPTION OF THE DRAWINGS

The plant growing pot and plant growing cartridge are depicted in Fig. 1 to Fig. 10, whereas the plant growing pot is depicted in Fig. 1 to Fig. 4, and the plant growing cartridge is depicted in Fig. 5 to Fig. 10.

EXAMPLES OF THE EMBODIMENTS OF THE INVENTION

25 The embodiments of the invention have been described with references to accompanying Figures. Fig. 1 to Fig. 4 depict the plant growing pot. Within the plant growing pot 1 comprising a nutritional liquid vessel 2 is a compartment 3 for a plant growing cartridge, with a removable plant growing cartridge 4 placed in it. The plant growing pot is equipped with a cover 5 that according to the embodiment depicted in Fig. 1 has been made of two parts.

The plant growing pot is equipped with a power supply compartment 6, pump 7, water pipe 8, with an automatic control block, comprising a control circuit on a printed circuit board 9, with sensors 10, and supporting ribs 11 and 12 for supporting the plant growing cartridge.

5 The sensor 10 is integrated with the printed circuit board 9, and is projecting into the interior of the plant growing cartridge 3 through the openings in the supporting rib 12. The sensor 10 could be a resistance sensor determining the characteristics, and humidity in particular, of the growing environment present in the plant growing cartridge based on the resistance dependence.

10 The sensor could also be a dielectric sensor, determining the characteristics of the environment, e.g. humidity, based on the change of the dielectric characteristics of the environment.

The embodiment of the plant growing cartridge is depicted in Fig. 5 to Fig. 10. The plant growing cartridge 4 comprises a body 13 holding a suitable growing substance (soil, soil substituent). The growing substance may contain the seed (seeds), cutting, mycelium or
15 spawn of a plant. The plant growing cartridge is equipped with a cover 14 with openings 15 for the plants contained in it. The cover of the plant growing cartridge helps to control and reduce evaporation of liquid from the plant growing cartridge. A higher section 16 located above the supporting ribs 11 projects from the bottom of the plant growing cartridge. The higher section includes air inlet openings 17. Another higher section 18 with openings 19
20 for a sensor is also located at the bottom of the plant growing cartridge. Under the bottom of the plant growing cartridge at the centre of it is located a depression for a chip 20. A collar 21 with an opening 22 for water piping is located in the upper part of the body. The collar is also designed for fixing the position of the plant growing cartridge in the compartment for the
plant growing cartridge.

25 The plant growing pot and plant growing cartridge depicted in Fig. 1 to Fig. 10 are used as follows. The cover 5 is removed from the device. The plant growing cartridge 4 is placed into the compartment 3 for the plant growing cartridge, and fixed in the correct position defined by the positions of the sensor and sensor openings, and the water pipe and water pipe opening. The nutritional liquid vessel 2 is filled with water, a power supply is installed
30 in the device, and the cover 5 is mounted.

The plant growing pot could also have any other shape besides the shape of a cuboid with rounded corners, e.g. the shape of a conventional flowerpot. Therefore, the plant growing cartridge itself preferably has the shape of a cylinder or another solid of revolution, to also enable installation in a flowerpot of conventional shape.

- 5 According to the embodiment the power source is either an accumulator or a battery but a solar cell, mains power supply unit or another source could also be used as the power source. Alternatively the cartridge could be equipped with a power source, preferably an accumulator or a battery but also any other previously mentioned power source – in that case the plant growing pot does not require a separate power source compartment.
- 10 In addition to the nutritional liquid vessel 2 the plant growing pot could also comprise a nutritional adding system that could comprise a nutritional vessel connected to the water pipe 8 via a controlled valve and mixing valve, or directly to the plant growing cartridge through a separate pipe. According to the preferred embodiment the nutrition is included in the plant growing cartridge.
- 15 According to the embodiment the plant growing cartridge includes either soil or soil substitute (various soil substitutes are known from the state of the art). The plant growing cartridge could be customised for a hydroponic or aeroponic growing system.

The plant growing pot is equipped with a sensor for determining the humidity and water level. The plant growing pot could also be equipped with additional sensors, e.g. a pH sensor,
20 temperature sensor, light sensor, etc. In case of a hydroponic growing system the plant growing cartridge also comprises a valve 31 controlling the outflow of nutrition and water.

The plant growing pot could be equipped with a light source for providing illumination suitable for growing the plant.

- 25 The plant growing cartridge is equipped with an identification device corresponding to the seeds contained in it, that could be either mechanically, electronically or optically read by the plant growing pot. The plant growing pot is equipped with a reading device appropriate for the type of the identification device. The mechanically readable identification device could be a pair of a mechanically encoded matrix of the plant growing cartridge, and a switch matrix
30 of the plant growing pot, whereas different matrices correspond to different seeds, and a code

corresponding to the position of switches is entered in the automatic control block by pressing the matrix against the switch matrix of the plant growing pot. A bar code could be used as the optically readable identification device. The identification device is used to determine a growing program suitable for growing the plant. The growing program could be stored in the electronic control block, or enable insertion in the electronic control block, e.g. via a computer network or data medium. The growing program could be included in the identification device that could be a radio frequency identification chip (RFID chip). The memory capacity of a standard RFID chip is sufficient for storing a plant growing program (using an appropriate coding or encipherment method, if required). If the growing program is stored or can be stored in the electronic control block then the electronic control block has to comprise an appropriate storage device, and therefore the design of the plant growing vessel becomes more complicated and expensive. If, however, the plant growing program is stored on the identification device of the plant growing cartridge then the electronic control block could be implemented as a simple compact controller reading and fulfilling standard instructions stored on the identification device of the plant growing cartridge. In that case the plant growing vessel itself is cheap, whereas the cost and complicity do not increase significantly.

According to the second embodiment the plant growing cartridge has the shape of an open-top cylinder having a bottom. The plant growing cartridge could be made of plastics or waterproof cardboard or paper. Suitable materials are known in case of disposable drinking vessels. Such a plant growing cartridge is produced using a sufficiently thin material penetrable by the electric field, enabling its usage along with the dielectric sensor installed on the walls of the compartment for the plant growing cartridge. Optically, electrically, electromagnetically or magnetically readable coding is printed, painted or glued or attached using other suitable methods on such a plant growing cartridge. A suitable growing environment, e.g. soil, soil substituent or another material suitable for growing the plant is present in the plant growing cartridge. The nutrition required for growing the plant could be included in the plant growing cartridge.

According to another embodiment the plant growing cartridge is a sack of suitable material, e.g. textile, containing the growing environment and seeds. The coding is again either attached to this sack (e.g. a RFID chip attached to it) or printed on it.

The plant growing program ensures the conditions required for growing the plant by measuring the required parameters (humidity content, pH level, illumination level, temperature, etc.), and the water and nutritional supply, temperature and illumination intensity are controlled according to the measured parameters (or the user is notified using, e.g. a pilot light of insufficient or extensive illumination or temperature).

Although the device is fully automated according to the preferred version, ensuring conditions suitable for growing the plant without any intervention from the user, according one of the embodiments the device is implemented to instruct the user to perform actions appropriate for ensuring growing conditions for the plant (e.g. add water, add nutrition, change the temperature or illumination). For this purpose the device is equipped with appropriate indicator lights, information display or a device outputting sound signals (alarm signal, voice commands). Such a device is first of all suitable for teaching children how to take care of and grow plants. The device could also be equipped with communications devices for transferring the information related to plant growing over a communications network (e.g. WiFi network, Bluetooth or another communications channel) to the information processing device of the user, e.g. smart phone, computer, telephone or another device.

CLAIMS

1. A plant growing pot comprising a nutritional liquid vessel equipped with a compartment for a plant growing cartridge with a removable plant growing cartridge inserted in it, whereas the plant growing pot is equipped with an automatic control block including an electronic control block, and the plant growing pot is equipped with sensors, and actuators for ensuring the conditions required for growing a plant,
5
10
characterised in that the plant growing cartridge is equipped with coding corresponding to the plant contained in it, and readable by the control block of the plant growing pot, to ensure conditions suitable for growing the plant contained in the plant growing pot.
2. A plant growing pot according to claim 1, **characterised in that** the identification code of the plant growing cartridge is used as the coding.
3. A plant growing pot according to claim 1, **characterised in that** an instruction code for controlling the automatic control block of the plant growing device stored on the
15
plant growing cartridge is used as the coding.
4. A plant growing pot according to claims 1 to 2, **characterised in that** the coding is optically readable.
5. A plant growing pot according to claims 1 to 2, **characterised in that** the coding is mechanically readable.
- 20
6. A plant growing pot according to claims 1 to 2, **characterised in that** the coding is electrically, electromagnetically or magnetically readable.
7. A plant growing pot according to claims 1 to 6, **characterised in that** the plant growing pot comprises a humidity sensor electrically connected to the control block, and inserted in the plant growing cartridge through the openings in the wall of the
25
plant growing cartridge.
8. A plant growing pot according to claims 1 to 6, **characterised in that** the plant growing pot comprises a dielectric humidity sensor, including at least two strips made of conductive material attached on the inside wall of the compartment for the plant growing cartridge, and electrically connected to the automatic control block, whereas

the plant growing cartridge is made of material with small resistance to the electric field.

- 5 9. A plant growing cartridge for the plant growing pot comprising a nutritional liquid vessel including a compartment for the plant growing cartridge, whereas the plant growing pot is equipped with an automatic control block including an electronic control block and sensors, and actuators for ensuring the conditions required for growing a plant, **characterised in that** for the purpose of determining the conditions suitable for growing the plant contained in the plant growing pot the plant growing cartridge is equipped with coding corresponding to the plant contained in it, and
- 10 readable by the plant growing pot.
10. A plant growing cartridge according to claim 9, **characterised in that** the identification code of the plant growing cartridge is used as the coding.
11. A plant growing cartridge according to claim 9, **characterised in that** an instruction code for controlling the automatic control block of the plant growing device stored on
- 15 the plant growing cartridge is used as the coding.
12. A plant growing cartridge according to claims 9 to 11, **characterised in that** the coding is optically readable.
13. A plant growing cartridge according to claims 9 to 11, **characterised in that** the coding is mechanically readable.
- 20 14. A plant growing cartridge according to claims 8 to 11, **characterised in that** the coding is electrically, electromagnetically or magnetically readable.
15. A plant growing cartridge according to claims 9 to 14, **characterised in that** the plant growing cartridge is a sack made of textile material.

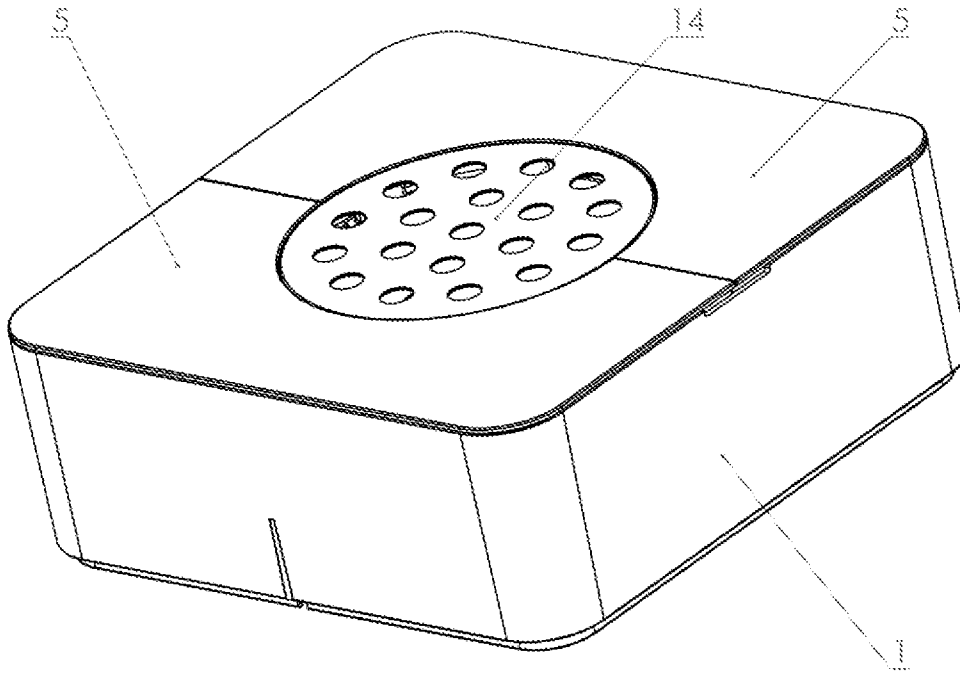


FIG 1

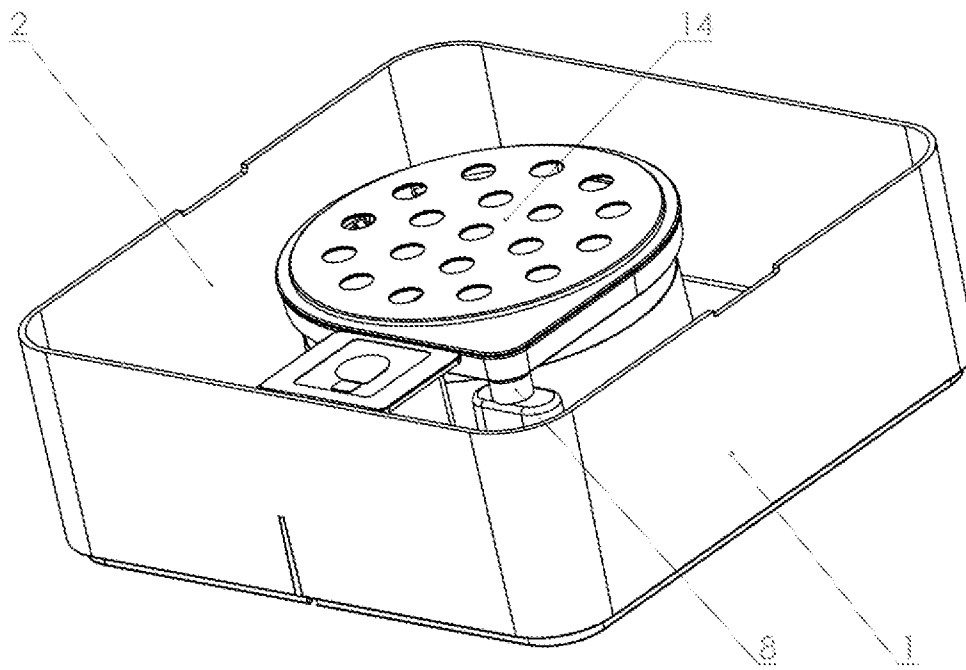


FIG 2

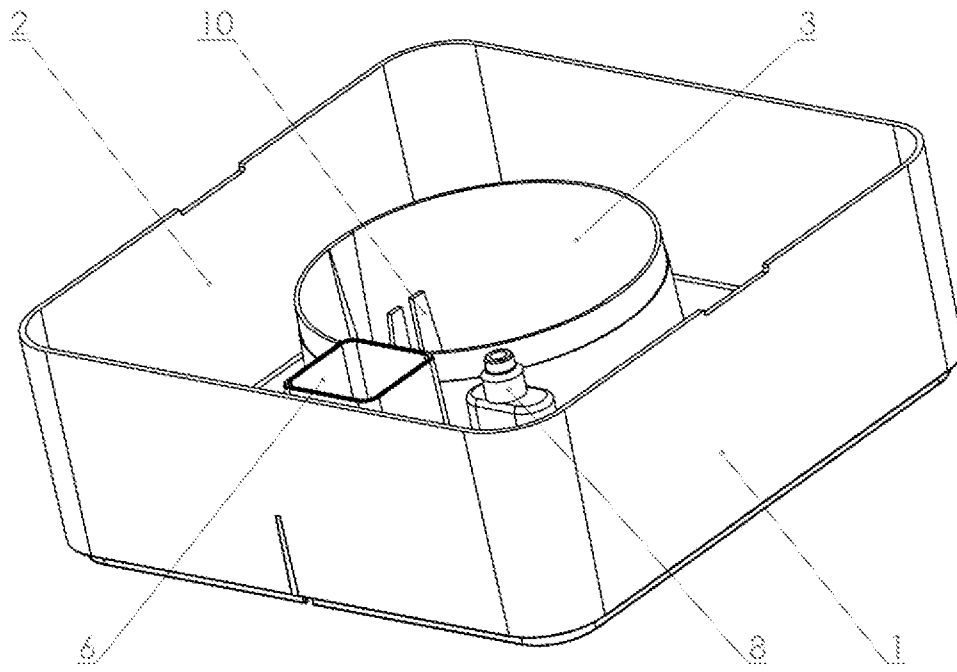


FIG 3

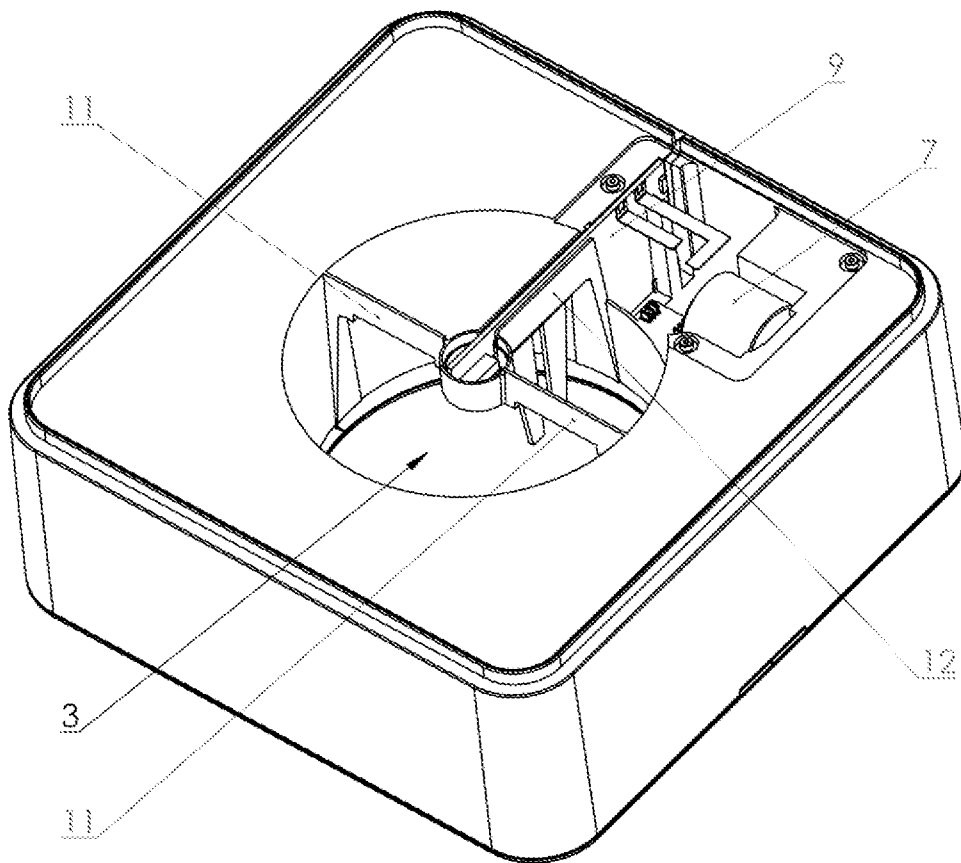


FIG 4

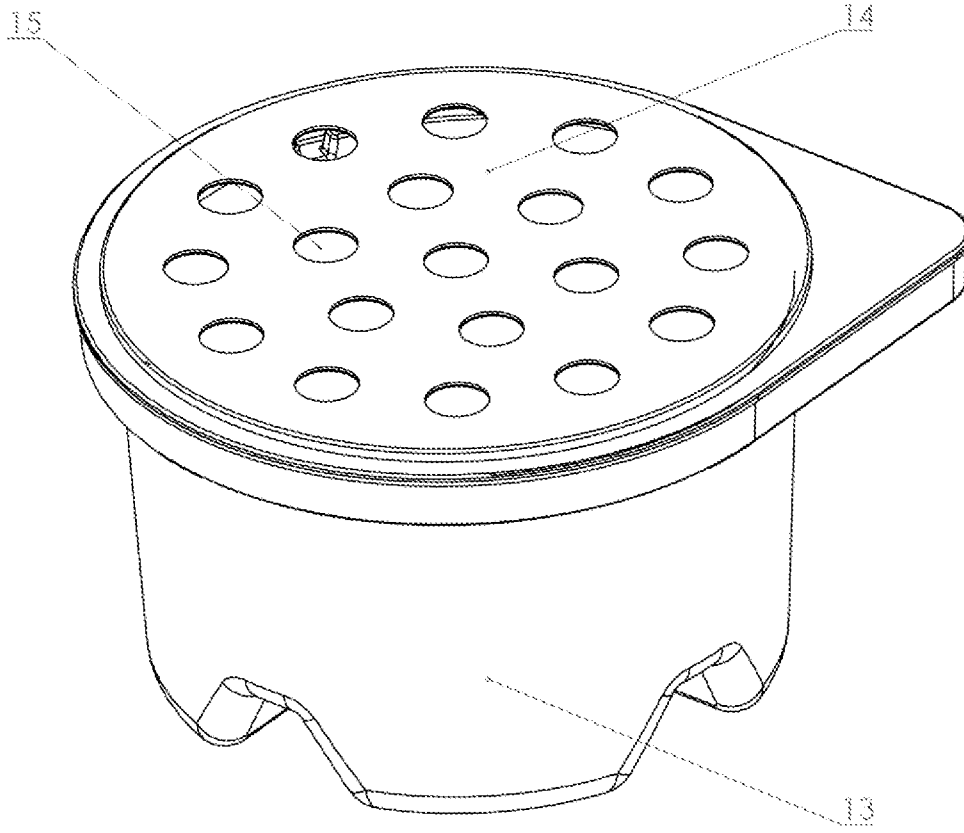
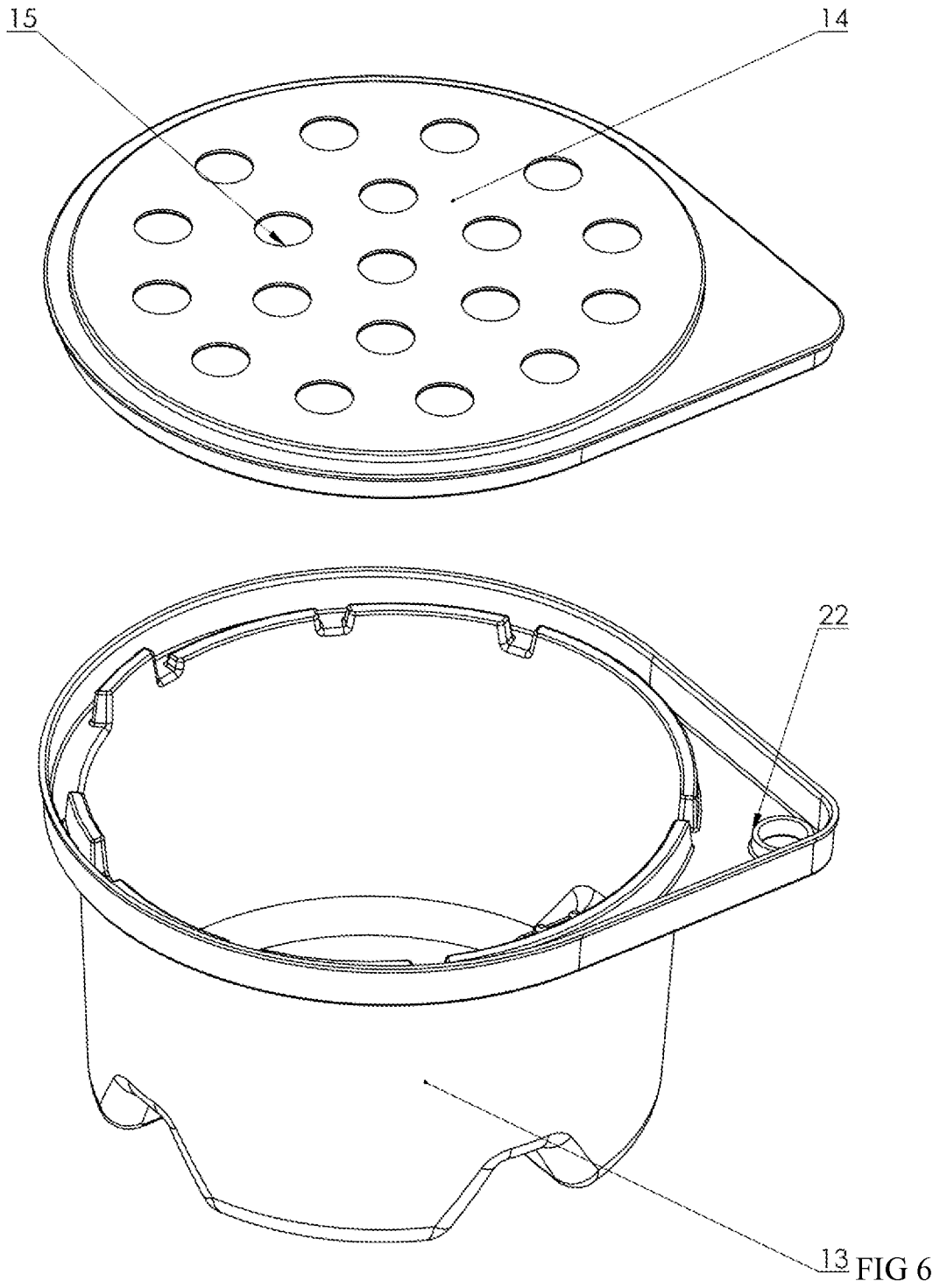


FIG 5



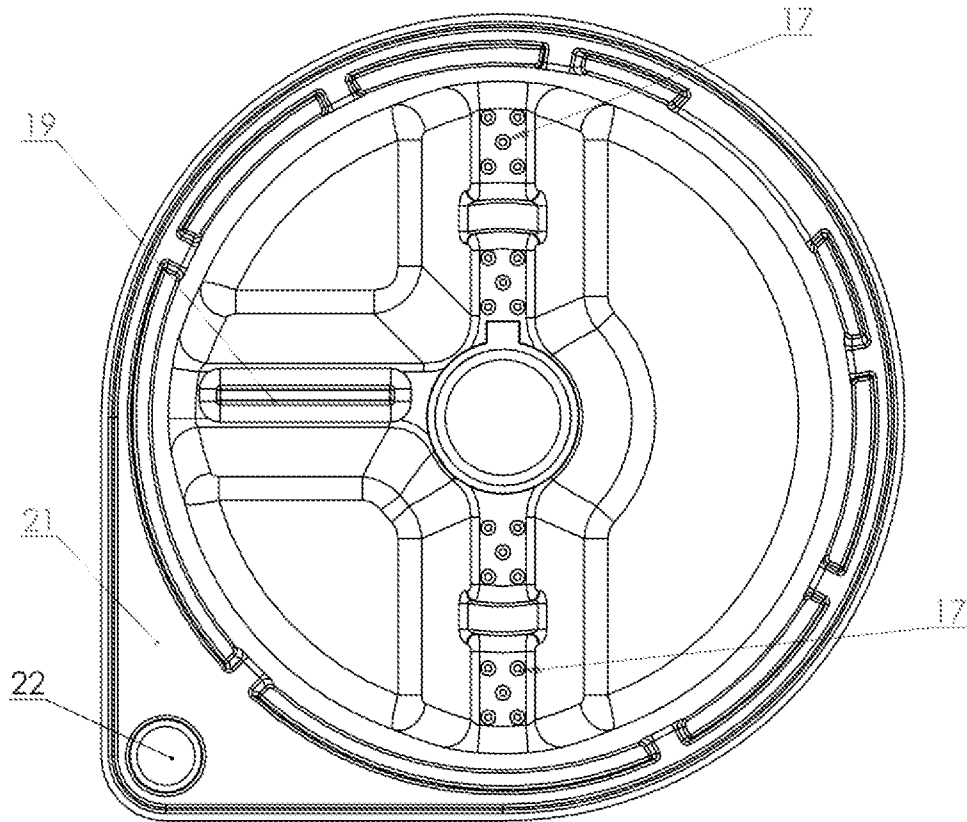


FIG 7

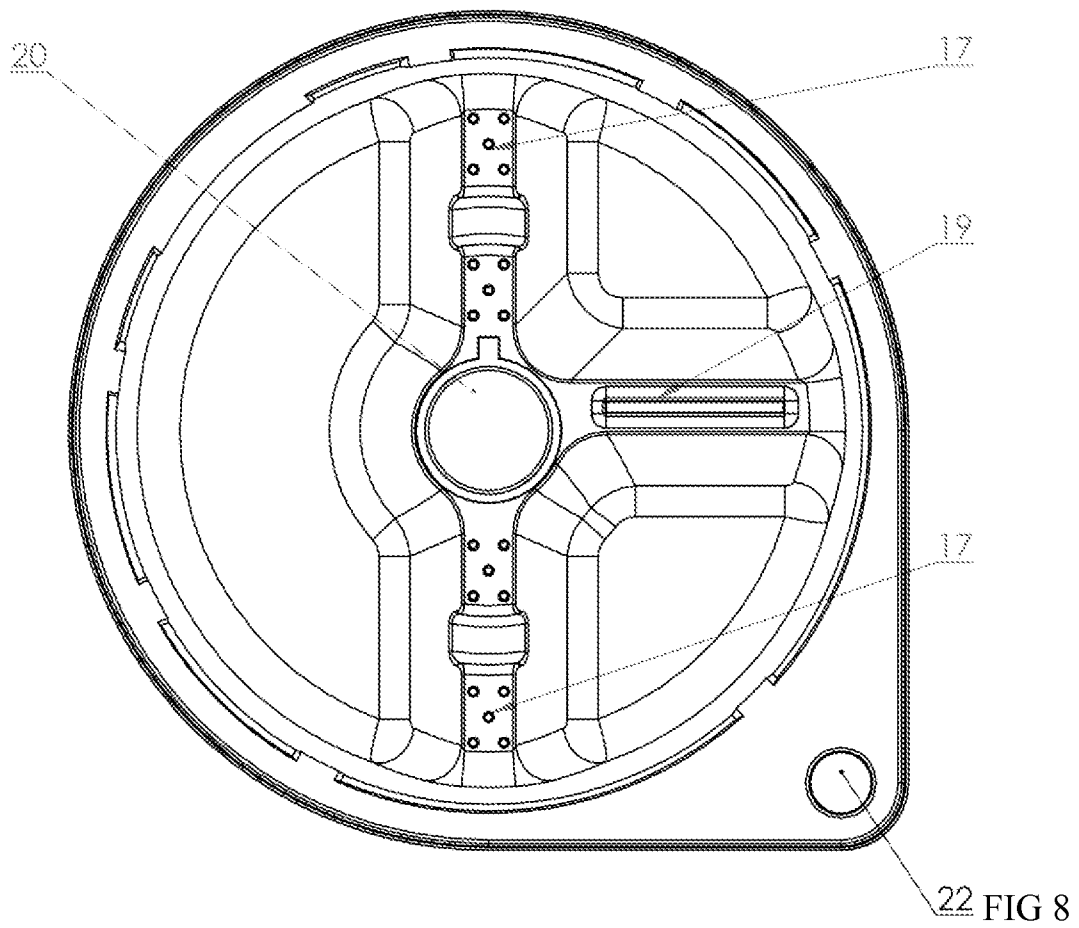


FIG 8

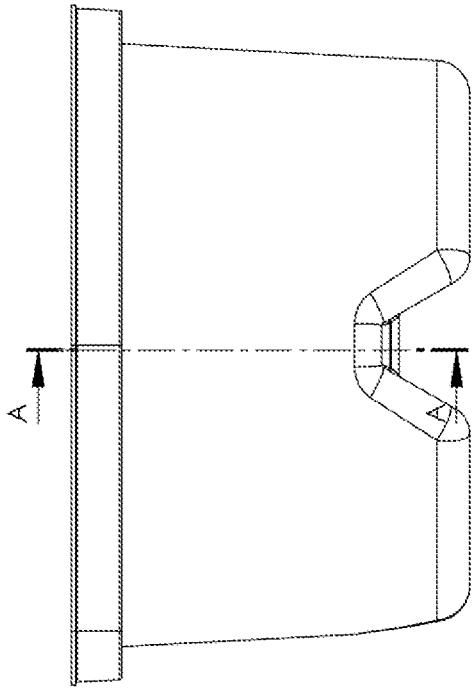


FIG 9

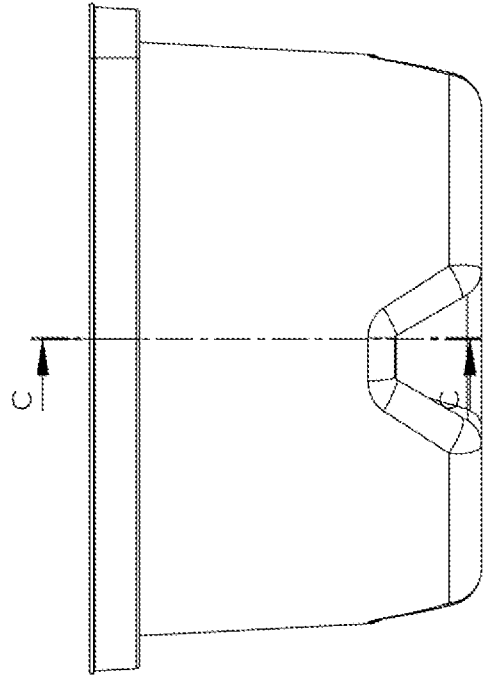
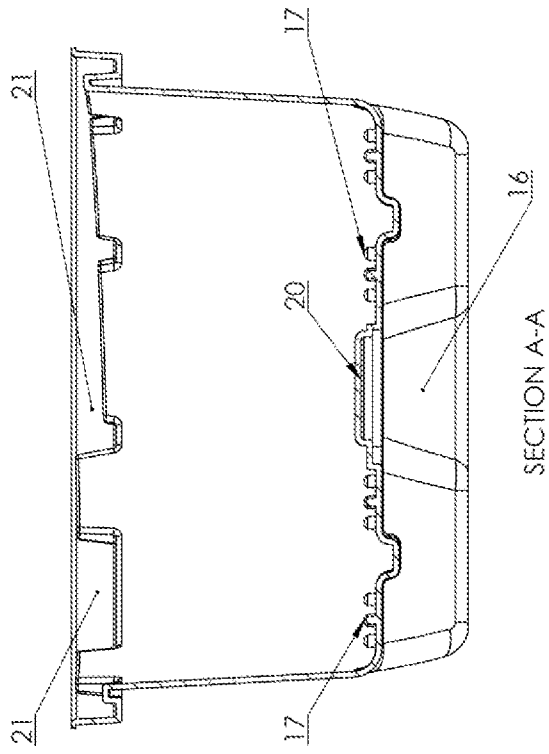
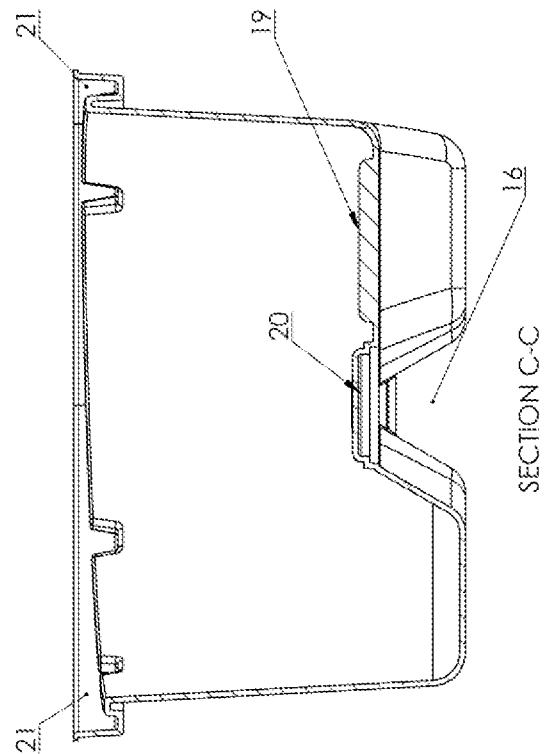


FIG 10



SECTION A-A



SECTION C-C

INTERNATIONAL SEARCH REPORT

International application No PCT/IB2012/050457

A. CLASSIFICATION OF SUBJECT MATTER INV. A01G27/00 A01G9/02 ADD.				
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B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) A01G				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	EP 2 108 250 A1 (MINAQUA APS [DK]) 14 October 2009 (2009-10-14) page 2, paragraphs 1,4 page 3, paragraphs 16,18-21,23 page 4, paragraphs 31,32,33 page 5, paragraph 42 page 6, paragraphs 44,50 - page 7, paragraph 52 page 8, paragraph 55-57; figures -----	1-15		
X	US 2002/088177 A1 (GERGEK FRANC [CA]) 11 July 2002 (2002-07-11) page 5, paragraph 57 - page 6, paragraph 62 page 8, paragraph 76 - page 9, paragraph 85; figure 5 ----- -/--	1-3,6,7, 9-11,14		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.				
* Special categories of cited documents : <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; border: none; vertical-align: top;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
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Date of the actual completion of the international search	Date of mailing of the international search report			
25 May 2012	05/06/2012			
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INTERNATIONAL SEARCH REPORT

International application No PCT/IB2012/050457

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2009/072868 A1 (E VAN ZANTEN HOLDING B V [NL]; VAN ZANTEN EVERT [NL]; DIJKSHOORN LARS) 11 June 2009 (2009-06-11) abstract -----	1,4,9,12
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2012/050457

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