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(71) Applicant: ARCELIK ANONIM SIRKETI [TR/TR]; E5
Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR).

Inventors: **APAYDIN, Tolga;** E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR). **TAKIL, Ilker;** E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR). **KARAKAYA, Erkan;** E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR). **TUYSUZ, Seckin;** E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR). **TASKIN, Mert Can;** E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR).

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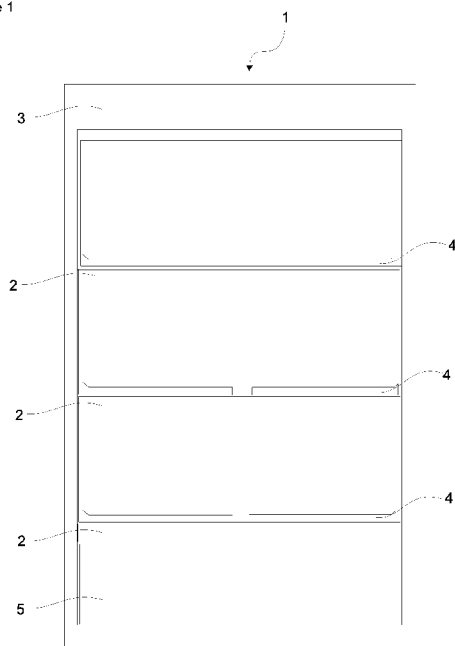
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(54) Title: A PLANT CULTIVATION CABINET

Figure 1



(57) Abstract: The present invention relates to a plant cultivation cabinet

(1) comprising a body (3) wherein at least one plant cultivation unit (2) is disposed; a plant cultivation tray (4) with a perforated base, that is disposed on the plant cultivation unit (2) and that receives the mixture for growing the plants to be cultivated; a liquid receptacle (5) that is disposed in the body (3) and wherein the liquid solution required by the plants is stored; a liquid pump (6) that pumps the liquid solution in the liquid receptacle (5); a delivery pipe (7) that delivers the pumped liquid solution from the liquid receptacle (5) to the plant cultivation unit (2); an air pump (8) that is disposed in the body (3) and that pumps air into the liquid receptacle (5); an air delivery line (9) that connects the air pump (8) and the liquid receptacle (5) in fluid communication, and an airstone (10) that is disposed at the end of the air delivery line (9) that opens into the liquid receptacle (5).

Description**A PLANT CULTIVATION CABINET**

- [0001] The present invention relates to a plant cultivation cabinet for growing plants. The present invention more particularly relates to a domestic plant cultivation cabinet.
- [0002] Hydroponic agriculture based on growing plants without soil is a type of agriculture based on providing water and nutrients required by the plants to the roots in required amounts, that is applied in liquid or solid environment culture. In hydroponic practices, the plants to be grown are cultivated in a closed environment where the rates of water, light, humidity and carbon dioxide, which has a critical role in the growth of the plant, are kept fixed. During the growth of the plant, all these factors are optimized according to the growth stage of the plant and the plants are enabled to grow fast and protected against harmful external factors (high humidity, light intensity). Micro particles present in mixtures such as peat, etc. used in the plant cultivation cabinets may pass, during the watering, through the holes used for receiving the nutrition liquid into the plant cultivation tray from the plant cultivation tray to the plant cultivation unit that is positioned under the plant cultivation tray wherein the plant and the peat mixture are placed, wherein said micro particles may accumulate at the base of the plant cultivation unit. After the liquid is discharged back to the liquid receptacle, the micro particles present in the mixtures such as peat, etc. cause clogging in the liquid receptacle, delivery pipes and filters. Another problem is encountered while fixing to the base the airstones that are used in the liquid receptacle to enrich the liquid solution with oxygen. The airstones may dislodge in the course of time, causing an unpleasant appearance and preventing the airstones from carrying out their functions.
- [0003] In the state of the art United States Patent Document No. US2014190078, a domestic plant factory is disclosed.
- [0004] The aim of the present invention is the realization of a plant cultivation cabinet wherein the filter and the airstones disposed in the liquid receptacle are fixed as rigidly grouped and maintain their positions and serve for a long time without the need for maintenance.

[0005] The plant cultivation cabinet realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises plant cultivation units that are positioned in a body. Plant cultivation trays wherein the peat mixture for growing plants is placed and the plants are cultivated are disposed into said plant cultivation units. By means of a liquid pump, liquid solution is delivered to the plant cultivation unit from the liquid receptacle disposed in the plant cultivation cabinet according to the humidity rate of the peat mixture. The liquid solution is pumped into the plant cultivation unit and is accumulated here. The bases of the plant cultivation trays that are placed into the plant cultivation trays are perforated and structured so as to deliver the liquid accumulated in the plant cultivation unit to the peat mixture therein. If the humidity of the peat mixture reaches a predetermined level, residual liquid solution in the plant cultivation unit is discharged to the liquid receptacle. Said discharged liquid solution contains micro particles coming off from the peat mixture. In order to prevent said particles from entering back to the liquid solution delivery or discharge line, a filter is provided at the end of the delivery line in the liquid receptacle. While the liquid solution is pumped from the liquid receptacle to the plant cultivation unit by the liquid pump, the liquid solution passing through the filter is filtered and residual particles are retained. Peat particles such as dust, soil, fiber, etc. accumulate on the filter in the course of time and may render the filter unusable. In order to prevent this, an airstone is used so as to be positioned under the filter. An air pump delivers air to the airstone by means of the air delivery line. Air bubbles leaving the airstone pass through the filter disposed on the airstone and move the peat particles such as dust, soil, fiber, etc. accumulated on the filter away from the filter. Due to the bubbles leaving the airstone and buoyancy force of the liquid, the filter or the airstone may dislodge in the course of time, thus fail to perform their functions. By means of a holder providing the rigid grouping of the filter and the airstone, the filter and the airstone are fixed to the base of the liquid receptacle. Thus, the filter is continuously cleaned with the air leaving the airstone, the path the air bubbles traverse in the liquid

receptacle is lengthened, thus the liquid solution and the filter are kept clean for a long time.

- [0006] In the plant cultivation cabinet of said embodiment of the present invention, the airstone is in the form of a reverse T while the filter is in the form of a U. Thus, the airstone is placed into the filter in a form-fitting manner. By means of the forms of the filter and the airstone, both components are enabled to engage with each other in a form-fitting manner. Afterwards, the filter and the airstone placed into the holder are immovably grouped. Consequently, the plant cultivation cabinet is enabled to operate for a long time without requiring the user to carry out maintenance on the plant cultivation cabinet, providing ease of maintenance for the user.
- [0007] In said embodiment of the present invention, the plant cultivation cabinet comprises a pump suction line through which the liquid solution in the liquid receptacle is sucked. The liquid solution is sucked by the liquid pump through the pump suction line and delivered to the plant cultivation unit by means of the delivery pipe. The pump suction line is in the form of a protrusion and extends towards the filter. The pump suction line is fitted into a cavity on the filter. Thus, all the liquid solution that is pumped is enabled to be passed through the filter before entering the delivery pipe. Consequently, the peat particles are removed from the liquid solution, and problems of clogging and liquid leaks are prevented in the plant cultivation cabinet.
- [0008] In the plant cultivation cabinet of said embodiment of the present invention, the holder is fixed to the base of the liquid receptacle. Thus, the holder-filter-airstone group cannot leave the base of the liquid receptacle due to the buoyancy force of the liquid. Consequently, the path the air bubbles leaving the airstone and enriching the liquid solution with oxygen traverse in the liquid solution is increased. Moreover, the filter-airstone-holder group in the liquid solution is prevented from creating an unpleasant appearance, thus improving the quality perception of the user.
- [0009] The present invention is advantageous in that the filter used for filtering the

liquid solution placed into the liquid receptacle and delivered to the delivery pipe is coupled with the airstone and thus, cleaned with the air bubbles leaving the airstone.

[0010] A plant cultivation cabinet appliance realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0011] Figure 1 - is the front view of the plant cultivation cabinet.

[0012] Figure 2 - is the rear view of the plant cultivation cabinet.

[0013] Figure 3 - is the top view of the holder and the filter and the airstone that are placed into the holder.

[0014] Figure 4 - is the exploded view of the holder, the filter and the airstone.

[0015] The elements illustrated in the figures are numbered as follows:

[0016] 1. Plant cultivation cabinet

[0017] 2. Plant cultivation unit

[0018] 3. Body

[0019] 4. Plant cultivation tray

[0020] 5. Fluid receptacle

[0021] 6. Fluid pump

[0022] 7. Delivery pipe

[0023] 8. Air pump

[0024] 9. Air delivery line

[0025] 10. Airstone

[0026] 11. Filter

[0027] 12. Pump suction line

[0028] 13. Holder

[0029] 14. Cavity

[0030] The plant cultivation cabinet (1) of the present invention comprises a body (3) wherein at least one plant cultivation unit (2) is disposed; a plant cultivation tray (4) with a perforated base, that is disposed on the plant cultivation unit (2) and that receives the mixture for growing the plants to be cultivated; a liquid receptacle (5) that is disposed in the body (3) and wherein the liquid solution required by the plants is stored; a liquid pump (6) that pumps the liquid solution in the liquid receptacle (5); a delivery pipe (7) that delivers the pumped liquid solution from the liquid receptacle

(5) to the plant cultivation unit (2); an air pump (8) that is disposed in the body (3) and that pumps air into the liquid receptacle (5); an air delivery line (9) that connects the air pump (8) and the liquid receptacle (5) in fluid communication, and an airstone (10) that is disposed at the end of the air delivery line (9) that opens into the liquid receptacle (5).

[0031] The plant cultivation cabinet (1) of the present invention comprises a filter (11) that is disposed on the airstone (10) in a form-fitting manner so as not to move relative to the airstone (10); a pump suction line (12) that is disposed at the end of the delivery pipe (7) that opens to the liquid receptacle (5) and that applies pressure onto the filter (11), and a holder (13) wherein the filter (11) and the airstone (10) are placed as grouped.

[0032] In order to save space in the plant cultivation cabinet (1) of the present invention, a plurality of plant cultivation units (2) are positioned in the body (3) successively in the vertical direction. The plant cultivation trays (4) placed into the plant cultivation units (2) act as the container wherein mixtures such as peat, etc. required by the plants to grow and take root are placed. The base of the plant cultivation tray (4) is perforated. Thus, the liquid solution delivered from the liquid receptacle (5) to the plant cultivation unit (2) by means of the delivery pipe (7) and the liquid pump (6) can enter the plant cultivation tray (4) so as to be absorbed by the peat mixture to reach the plants. After the peat mixture absorbs sufficient amount of liquid solution, the remaining liquid solution is discharged to the liquid receptacle (5). During said discharge process, materials such as dust, soil, fiber, etc. separated from the peat reach the liquid receptacle (5) by means of the discharge line. The air pump (8) is connected to the liquid receptacle (5) by means of the air delivery line (9). The airstone (10) positioned at the end of the air delivery line (9) aerates the liquid solution in the liquid receptacle (5). Thus, molecules that positively affect the growth of the plants dissolve in the liquid solution and by means of the oxygen in the air, anaerobic bacteria in the liquid solution, that may be harmful to the plant roots are removed. The filter (11) is disposed onto the airstone (10). The air bubbles leaving the airstone (10) pass through the filter (11) and remove materials such as dust, soil, fiber, etc. accumulated

on the filter (11) from the filter (11), thus providing the cleaning of the filter (11). The pump suction line (12) is positioned so as to apply pressure onto the filter (11). The end of said line (12) is in the form of a thin pipe that bears against the filter (11). During the operation of the liquid pump (6), the pump suction line (12) sucks and delivers the liquid solution to the plant cultivation unit (2). Due to the flow of the liquid solution, peat particles get stuck onto the filter (11). While passing through the filter (11), the air bubbles leaving the airstone (10) separate some of these peat particles from the filter (11) and thus, cleans the filter (11). Thus, the filter (11) is continuously kept clean and prevented from clogging. The filter (11) and the airstone (10) are placed in a form-fitting manner so as not to move relative to each other. The airstone (10) and the filter (11) placed onto the airstone (10) are disposed into the holder (13) as a single piece. The holder (13) partially covers the filter (11) and has a structure so as to allow the air bubbles leaving the airstone (10) to pass first through the filter (11) and then through an opening arranged on the holder (13). By means of the holder (13), the filter (11), the airstone (10) and the pump suction line (12) are rigidly grouped. Consequently, the filter (11) is continuously cleaned by the air leaving the airstone (10) and the maintenance of the plant cultivation cabinet (1) is facilitated.

- [0033] The plant cultivation cabinet (1) of the present invention comprises the airstone (10) in the form of a reverse T.
- [0034] The plant cultivation cabinet (1) of the present invention comprises the filter (11) in the form of a U. By means of the reverse T-shaped airstone (10) and the U-shaped filter (11), the filter (11) and the airstone (10) interlock, and thus, the filter (11) and the airstone (10) are enabled to be placed into the holder (13) with a grouping occupying a small amount of space, thereby obtaining a rigid structure and providing ease of use.
- [0035] The plant cultivation cabinet (1) of the present invention comprises the filter (11) having a cavity (14) wherein the pump suction line (12) is fitted. The surface of the filter (11) in contact with the pump suction line (12) has the recess-shaped cavity (14). Thus, the pump suction line (12) is enabled to be partially inserted into the filter (11). Consequently, the pump suction

line (12) is prevented from directly sucking liquid from inside the liquid receptacle (5). In other words, all of the liquid to be sucked first passes through the filter (11), and the liquid solution passing through the filter (11) is cleansed of the peat residues and thus, the peat residues do not enter the delivery pipe (7). Consequently, problems of clogging and liquid leaks are prevented in the plant cultivation cabinet (1).

- [0036] The plant cultivation cabinet (1) comprises the holder (13) that is fixed to the base of the liquid receptacle (5). Thus, the airstone (10) is positioned at the base of the liquid receptacle (5), the path the air bubbles leaving the airstone (10) traverse in the liquid receptacle is lengthened, and molecules that positively affect the growth of the plants dissolve in the liquid solution and by means of the oxygen in the air, anaerobic bacteria in the liquid solution, that may be harmful to the plant roots are removed.
- [0037] The plant cultivation cabinet (1) of the present invention comprises the filter (11) that is produced from a porous material. The porous structure provides a good filtration and moreover, enables the air bubbles leaving the airstone (10) to penetrate into the filter (11), facilitating the cleaning of the filter (11).
- [0038] By means of the present invention, in the plant cultivation cabinet (1), the filter (11) and the airstone (10) that are used in the liquid receptacle (5) are rigidly grouped in the holder (13) and the filter (11) is cleaned with the air bubbles generated by the airstone (10).

Claims

1. A plant cultivation plant (1) comprising
 - a body (3) wherein at least one plant cultivation unit (2) is disposed;
 - a plant cultivation tray (4) with a perforated base, that is disposed on the plant cultivation unit (2) and that receives the mixture for growing the plants to be cultivated;
 - a liquid receptacle (5) that is disposed in the body (3) and wherein the liquid solution required by the plants is stored;
 - a liquid pump (6) that pumps the liquid solution in the liquid receptacle (5);
 - a delivery pipe (7) that delivers the pumped liquid solution from the liquid receptacle (5) to the plant cultivation unit (2);
 - an air pump (8) that is disposed in the body (3) and that pumps air into the liquid receptacle (5);
 - an air delivery line (9) that connects the air pump (8) and the liquid receptacle (5) in fluid communication, and
 - an airstone (10) that is disposed at the end of the air delivery line (9) that opens into the liquid receptacle (5), **characterized by**
 - a filter (11) that is disposed on the airstone (10) in a form-fitting manner so as not to move relative to the airstone (10); (sponge dependent claim)
 - a pump suction line (12) that is disposed at the end of the delivery pipe (7) that opens to the liquid receptacle (5) and that applies pressure onto the filter (11), and
 - a holder (13) wherein the filter (11) and the airstone (10) are placed as grouped.
2. A plant cultivation cabinet (1) as in Claim 1, **characterized by** the airstone (10) in the form of a reverse T.
3. A plant cultivation cabinet (1) as in any one of the above claims, **characterized by** the filter (11) in the form of a U.
4. A plant cultivation cabinet (1) as in any one of the above claims, **characterized by** the filter (11) that has a cavity (14) wherein the pump suction line (12) is fitted.
5. A plant cultivation cabinet (1) as in any one of the above claims, **characterized by** the holder (13) that is fixed to the base of the liquid receptacle (5).

6. A plant cultivation cabinet (1) as in any one of the above claims, **characterized by** the filter (11) that is produced from porous material.

Figure 1

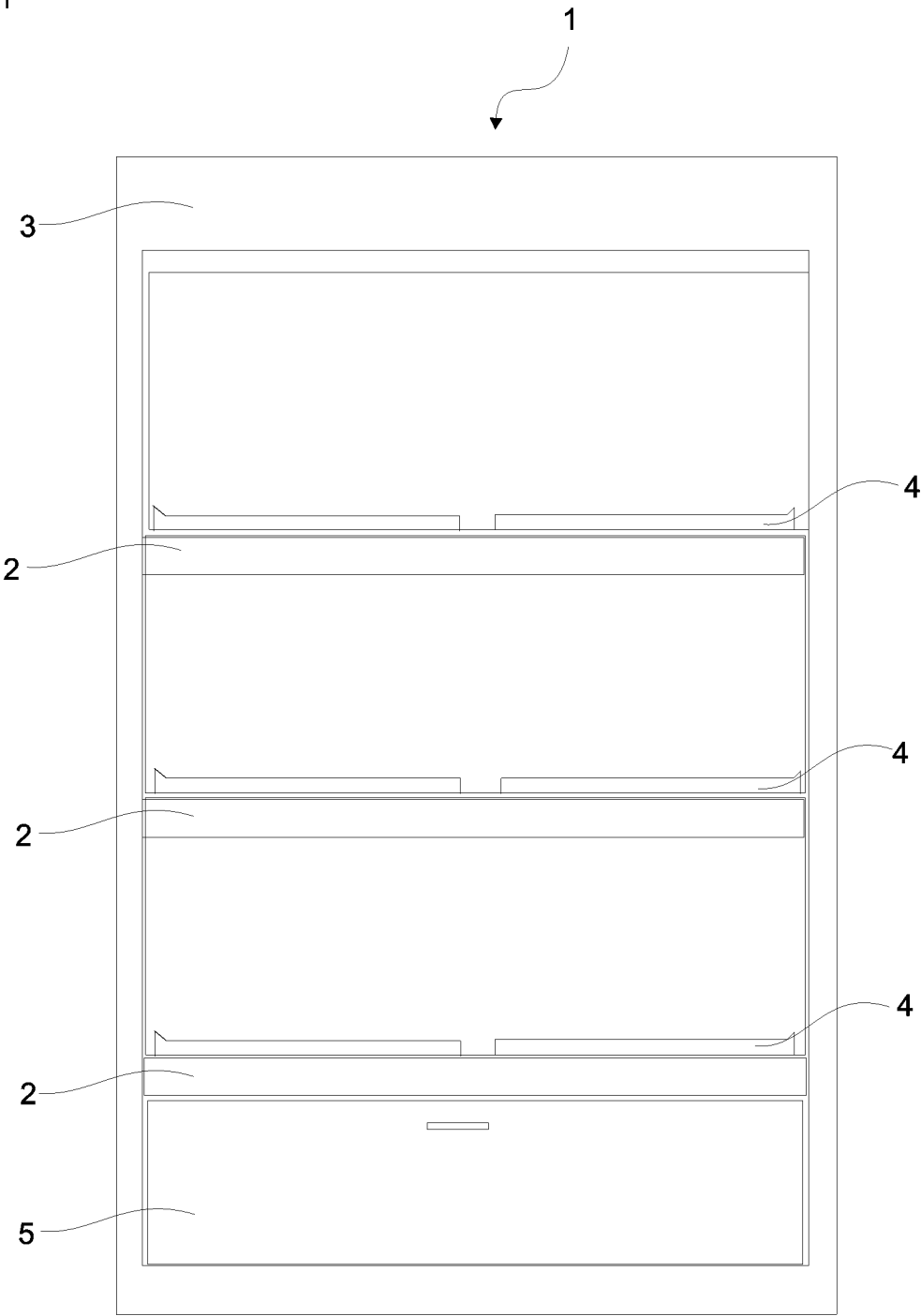


Figure 2

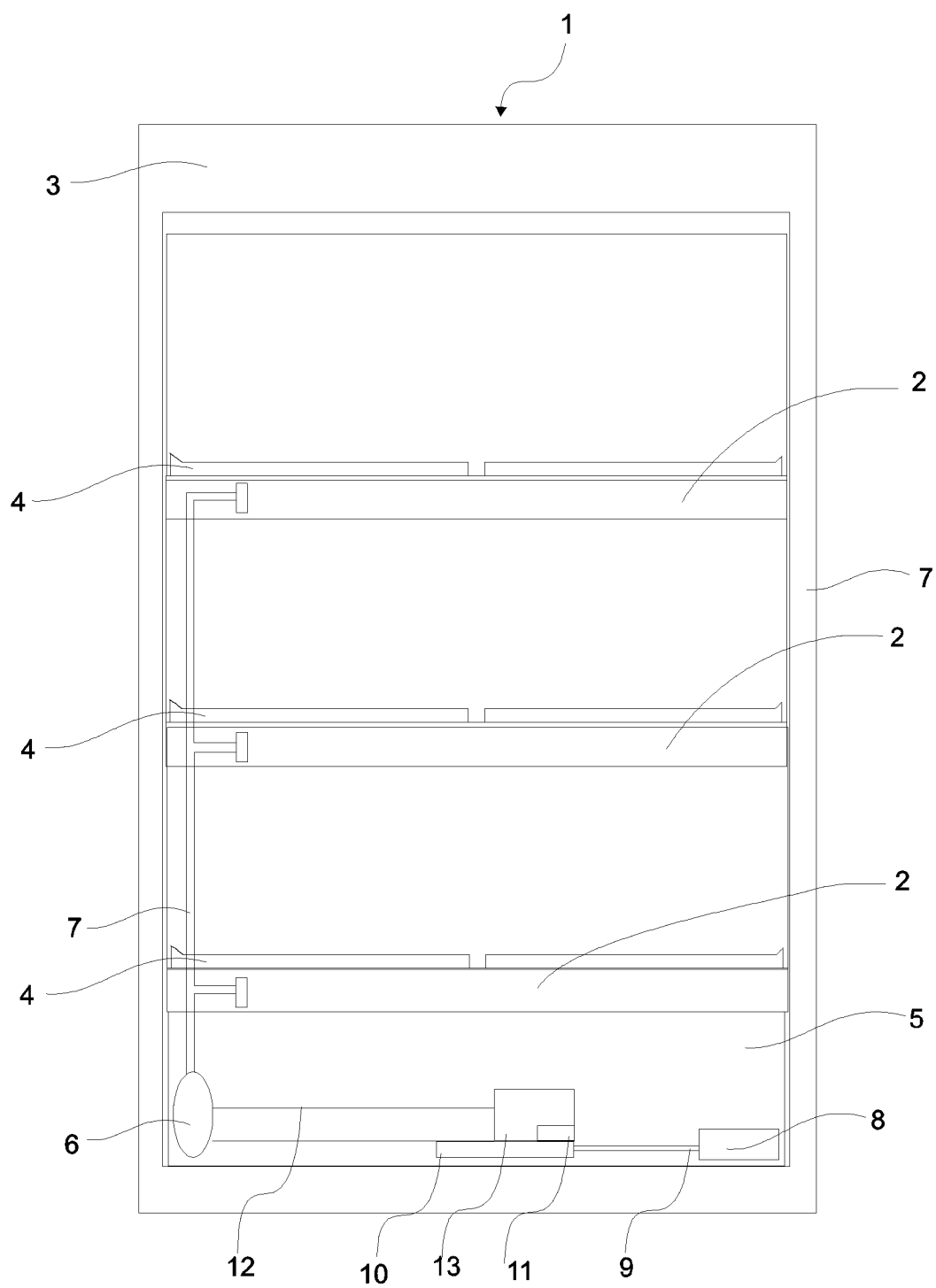


Figure 3

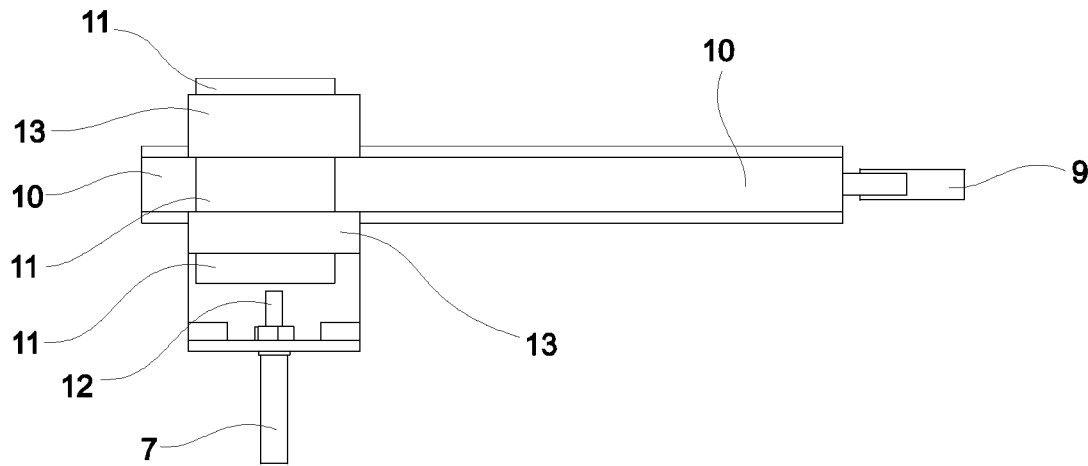
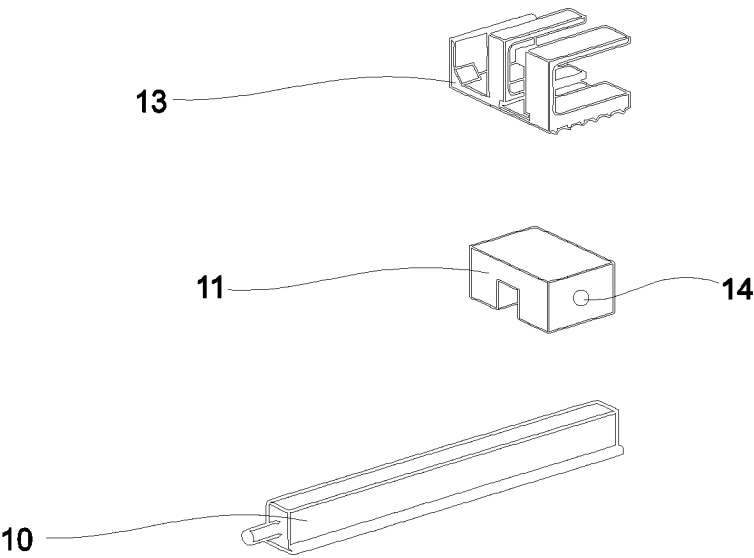


Figure 4



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/069918

A. CLASSIFICATION OF SUBJECT MATTER
INV. A01G31/06 A01G31/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 101 965 790 A (INST BOTANY CAS) 9 February 2011 (2011-02-09) paragraph [0025] - paragraph [0040]; figures 1-4	1-6
A	----- JP H03 117436 A (SANYO ELECTRIC CO) 20 May 1991 (1991-05-20) abstract; figures 1-5	1-6
A	----- JP 2013 034402 A (ESPEC CORP) 21 February 2013 (2013-02-21) paragraph [0029] - paragraph [0058]; figures 1,2	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Vehrer, Zsolt

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2018/069918

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
CN 101965790	A	09-02-2011	NONE	

JP H03117436	A	20-05-1991	JP 2771631 B2	02-07-1998
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