



- (51) International Patent Classification:  
A01G 31/02 (2006.01)
- (21) International Application Number:  
PCT/EP2014/057743
- (22) International Filing Date:  
16 April 2014 (16.04.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
1307000.8 17 April 2013 (17.04.2013) GB  
1316699.6 20 September 2013 (20.09.2013) GB
- (71) Applicant: **HANGING GARDEN (UK) LIMITED**  
[GB/GB]; 46 Charlotte Road, Stirchley, Birmingham, West  
Midlands B30 2BL (GB).
- (72) Inventor: **FINCH, Andrew**; 46 Charlotte Road, Stirchley,  
Birmingham, West Midlands B30 2BL (GB).
- (74) Agent: **JACKSON, Derek Charles**; Derek Jackson Asso-  
ciates, The Old Yard, Lower Town, Claines, Worcester  
Worcestershire WR3 7RY (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, 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, KM, ML, MR, NE, SN, TD, TG).

**Published:**

— with international search report (Art. 21(3))

(54) Title: HYDROPONIC PLANT AND ROOT SUPPORT

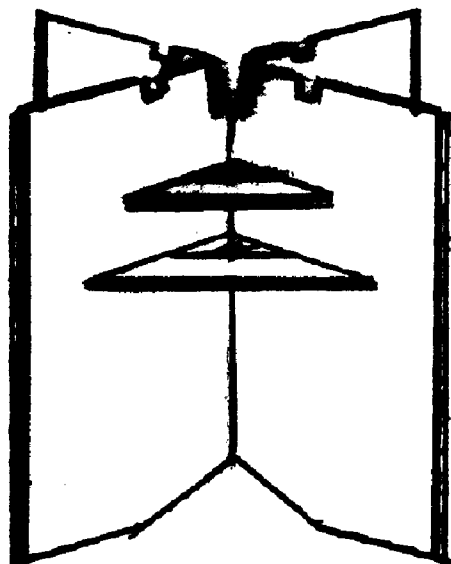


Fig. 7

(57) Abstract: A hydroponic plant and root support comprises receiving means (13, 29, 49, 63), such as a recess, for a growing medium. At least one shelf (5, 7, 51, 53, 57, 59) is provided for plant roots protruding from the growing medium to extend over. Supporting means (1, 3, 45, 47, 61), such as two interlocking sheets, is provided for supporting the receiving means (13, 29, 49, 63) and the at least one shelf (5, 7, 51, 53, 57, 59) in spaced relationship with the receiving means (13, 29, 49, 63) at a level above the shelf and with the shelf extending substantially laterally.

**Description****HYDROPONIC PLANT AND ROOT SUPPORT****Technical Field**

[0001] This invention relates to a hydroponic plant and root support.

**Background Art**

[0002] Hydroponic plants are generally grown in net pots containing media such as clay balls, perlite or coco fibre. When grown in net pots filled with hydroponic media, the plant roots are initially confined within the pot which inhibits exposure of the roots to air and correspondingly inhibits growth. Thereafter, as the roots grow they suffer abrasions and damage from the surface of certain media and this can encourage unwanted pathogens. Eventually, the roots grow through the holes in the net pots, but in the process of doing so the side shoots are stripped off the main root as a result of the constriction imposed by the hole through which the root penetrates.

[0003] It is therefore an object of the present invention to provide a hydroponic plant and root support which overcomes, or at least ameliorates, the above disadvantages.

**Disclosure of Invention**

[0004] According to the present invention there is provided a hydroponic plant and root support comprising: receiving means for a growing medium; at least one shelf for plant roots protruding from the growing medium to extend over; and means for supporting the receiving means and the at least one shelf in spaced relationship with the receiving means at a level above the shelf and with the shelf extending substantially laterally.

[0005] In one embodiment of the invention, the supporting means comprises two interlocking sheets. The sheets may be made of a suitable water-resistant planar material, such as corrugated plastics board. The sheets may be substantially square or substantially rectangular.

[0006] The interlocking sheets may be provided in the region of the top thereof with a recess, for example substantially midway along the length of the top, for receiving growing medium. The recess may be in two parts, an upper part with relatively large dimensions and a lower part with relatively

small dimensions. In this way the recess is able to accommodate two sizes of growing medium.

- [0007] The interlocking sheets may be provided with slits which allow the sheets to interlock. One sheet may be provided with a slit extending from the base thereof in a direction towards the top, while the other sheet may be provided with a slit extending from the top thereof in a direction towards the base. The combined length of the slits may correspond at least to the distance between the base and the top of one of the sheets.
- [0008] The base of the sheets may be provided substantially midway therealong with a recess for receiving an air stone.
- [0009] The top of at least one of the sheets may be provided with one or more recesses for receiving a top feed hose.
- [0010] The interlocking sheets may each be provided with a lateral slit for receiving the at least one shelf. Where more than one slit is provided the slits may be spaced between the top and base of the sheet and located substantially midway between edges of the sheet.
- [0011] One or both of the interlocking sheets may be provided with openings therethrough (such as holes or slits) to allow the passage of roots.
- [0012] In another embodiment of the invention, the supporting means comprises at least one upright support on which the or each shelf is mounted. The upright support may comprise a single central support extending upwardly from a base and provided with a holder for the growing medium at the top of the support. The holder may be in the form of a basket. Where the shelf, or at least one of the shelves, has a central opening, the shelf may include inwardly extending spokes to mount the shelf on the central support. Alternatively, the upright support may comprise a plurality of legs which may be upright, or may taper toward a point at the top where the growing medium is supported, or may be inclined outwardly towards the top. In such a case, the holder for the growing medium may be supported, for example, on diametral wires.
- [0013] In another embodiment of the invention, the supporting means may be mounted on or integrally formed with a container for the plant, such as a tank or a pot. In this case the container may be provided with means to

support the at least one shelf by way of a frame supported relative to the container, for example over a rim of the container, and extending into the container. Alternatively, the means to support the at least one shelf may comprise shelf supports mounted on a wall of the container.

- [0014] At least two shelves may be provided, the supporting means being adapted to support the shelves in spaced relationship one above the other. A lower shelf may be larger in size than an upper shelf. The shelf or at least one of the shelves may be provided with a substantially central opening. Alternatively, the top shelf may be continuous and the lower shelf or shelves may be provided with a substantially central opening. Alternatively or additionally, the shelf or at least one of the shelves may be slatted and/or provided with a plurality of apertures. A perimeter of the shelf or at least one of the shelves may be serrated. The shelf or at least one of the shelves may be at a higher or lower level in a central region compared with an outer region thereof. The shelf or at least one of the shelves may be substantially horizontal. The or each shelf may be selected from a square or circular configuration.
- [0015] All or part of the material of the supporting means may be porous. In such a case a compressor may be provided to pass air through the supporting means.
- [0016] Thus the hydroponic plant and root support according to the present invention overcomes or at least ameliorates the disadvantages of previous hydroponic systems, allowing healthier and more vigorous growth. The roots grow over one or more separated layers as a result of the presence of the one or more shelves which opens up and separates the root mass, giving the roots more surface area to absorb nutrients and oxygen and allowing air to circulate more freely throughout the entire root mass. The supports according to the invention can be used in most hydroponic systems including flood, drain and deep water, n.f.t., drip feed (by using a feed hose placed in cut-outs in the support for the top hose) and even aeroponic systems.
- [0017] For a better understanding of the present invention and to show more clearly how it may be carried into effect reference will now be made, by

way of example, to the accompanying drawings in which:

#### **Brief Description of Drawings**

- [0018] Figure 1 shows a first component of one embodiment of a hydroponic plant and root support according to the present invention;
- [0019] Figure 2 shows a second component of a hydroponic plant and root support for use with the first component shown in Figure 1;
- [0020] Figure 3 shows a plan view of a first shelf for use with the first and second components of Figures 1 and 2;
- [0021] Figure 4 shows a plan view of a second shelf for use with the first and second components of Figures 1 and 2;
- [0022] Figure 5 is a side view of the components of Figures 1 to 4 assembled into a hydroponic plant and root support;
- [0023] Figure 6 is a plan view of the hydroponic plant and root support shown in Figure 5;
- [0024] Figure 7 is a perspective view of the hydroponic plant and root support shown in Figures 5 and 6;
- [0025] Figure 8 shows how the first component may be modified to accommodate two alternative sizes of growing medium;
- [0026] Figure 9 shows an alternative embodiment of a hydroponic plant and root support according to the present invention; and
- [0027] Figure 10 shows a further alternative embodiment of a hydroponic plant and root support according to the present invention.

#### **Mode(s) for Carrying Out the Invention**

- [0028] Figures 1 to 4 show the components of one embodiment of a hydroponic plant and root support according to the present invention. Figures 1 and 2 show two interlocking sheets 1 and 3, while Figures 3 and 4 show first and second shelves 5 and 7 which serve to lock the sheets 1 and 3 in position as well as providing an architectural shape around which the roots can grow while allowing air movement through the roots.
- [0029] The components 1, 3, 5 and 7 may be made of any suitable water resistant planar material, such as corrugated plastics board.
- [0030] The first component 1, shown in Figure 1, is substantially square or rectangular in outline, although the overall shape is not important and

other shapes may be used if desired. The component 1 provides a base 9 for supporting the support after assembly and a top 11 provided with a recess 13 (for example substantially midway along the length of the top 11) for receiving growing medium (not shown, but for example in the shape of a cube). The base 9 is provided with a slit 15 extending from the base in a direction towards the top 11, the slit extending substantially from a mid-point of the base substantially towards the mid-point of the top 11 and having a length such that it terminates substantially midway between the base and the top. The base 9 may also be provided substantially midway therealong with a recess 17 for receiving an air stone (not shown) conventionally used for oxygenation.

- [0031] The top 11 may also be provided with one or more recesses 19, for example one either side of the recess 13 for receiving growing medium, for receiving a top feed hose (not shown).
- [0032] The first component 1 is also provided with two lateral slits 21 and 23 for receiving the first and second shelves 5 and 7, the slits being spaced between the top and base of the sheet and being located substantially midway between edges of the sheet.
- [0033] The second component 3, shown in Figure 2, has substantially the same outline as the first component 1 (although this is not essential). That is, as illustrated, the second component 3 is substantially square or rectangular in outline. As with the first component, the overall shape is not important and other shapes may be used if desired. The component 3 provides a base 25 for supporting the support after assembly and a top 27 provided with a recess 29 (for example substantially midway along the length of the top 27) for receiving growing medium (not shown, but for example in the shape of a cube). In contrast to the first component 1, the top 27 of the second component 3 is provided with a slit 31 extending from the top in a direction towards the base 25, the slit extending substantially from a mid-point of the top substantially towards the mid-point of the base 25 and having a length such that it terminates substantially midway between the base and the top. The base 25, if desired, may also be provided substantially midway therealong with a recess 33 for receiving an air stone

(not shown) conventionally used for oxygenation.

- [0034] It should be noted that the lengths of the slits 15 and 31 which extend between the top and base of each of the first and second component may have different lengths provided the lengths of the two slits allow the first and second components to be assembled together. That is the combined lengths of the slits corresponds to the distance between the top and the base of the components.
- [0035] The top 27 may also be provided with one or more recesses 35, for example one either side of the recess 29 for receiving growing medium, for receiving a top feed hose (not shown).
- [0036] The second component 3 is also provided with two lateral slits 37 and 39 for receiving the first and second shelves 5 and 7, the slits being spaced between the top and base of the sheet and being located substantially midway between edges of the sheet. The slits 37 and 39 in the second component 3 are aligned with the slits 21 and 23, respectively, in the first component 1.
- [0037] One or both of the first and second components may be provided with openings therethrough (such as holes or slits) to allow the passage the passage of roots and to facilitate circulation of air and/or water.
- [0038] The first shelf 5 is shown in Figure 3 as being substantially square with a substantially square opening 41. However, the shelf need not be square and could have other shapes such as circular (or annular). The opening in the shelf is not essential.
- [0039] The second shelf 7 is shown in Figure 4 as having the same configuration as the first shelf 1, that is the second shelf substantially square with a substantially square opening 43, but the dimensions of the second shelf are greater than the dimensions of the first shelf, although this is not essential. In practice, a larger opening in the second (lower) shelf helps to open up the root mass inasmuch as the roots from the opening in the first shelf tend to pass through the opening in the second shelf, while the roots passing over the perimeter of the first shelf then divide at the second shelf, with some roots passing within the opening and other roots passing over the perimeter. It should be noted, the second shelf need not be square and

could have other shapes such as circular (or annular). The opening in the shelf is not essential. Moreover, the second shelf need not have the same configuration as the first shelf. Indeed, ideally the first shelf may be continuous and the second shelf may be provided with a central opening.

- [0040] It is not essential to provide two shelves 5 and 7. Alternatively, only a single shelf may be provided or more than two shelves may be provided. As an alternative to, or in addition to, an opening, the shelf or shelves may be slatted and/or may be formed with holes to encourage division of plant roots. Additionally or alternatively, the perimeter of the shelf, or at least one of the shelves, may be serrated to encourage root division. The shelf or shelves may be sloping, either at a higher or lower level in a central region compared with a peripheral region, in order to encourage run off of water.
- [0041] The components 1, 3, 5 and 7 are assembled together to produce the hydroponic plant and root support shown in Figures 5, 6 and 7, the components 1 and 3 being interconnected as shown by the arrows in Figures 1 and 2.
- [0042] In use of the hydroponic plant and root support, the support can be made of any suitable size for the width and depth of a chosen container (not shown). Roots will grow from the cube of growing medium onto the top shelf 5 and they will divide with some roots passing through the aperture in the shelf and other roots passing around the edge of the shelf. The roots will then grow to the second shelf 7 and will again divide with some roots passing through the aperture and other roots passing around the edge of the shelf. Thus, the support provides secure support for a plant and gives rise to an open root mass generally in the form of a bell which can be effectively aerated with an air-stone. The open root mass is able to absorb more oxygen than is the case with conventional hydroponic systems.
- [0043] If desired, all or part of the material of the support may be porous. This enables air to be passed by a compressor (not shown) through the support and into the root mass in order better to aerate the root mass.
- [0044] Further modifications may be made to the hydroponic plant and root support shown in Figures 1 to 7. For example, as shown in Figure 8, the

recess for receiving the growing medium may have alternative configurations. As illustrated in Figure 8, the recess 13, 29 may be in two parts, with a recess of relatively smaller dimensions being located at the base of a recess of relatively larger dimensions. Such an arrangement facilitates the support of blocks or cubes of growing medium of different sizes, with smaller blocks being located in the smaller recess and larger blocks being accommodated in the larger recess. A larger recess/block combination allows more space for the trunk or stem of a plant to grow thicker and provides a wider base for the roots to start from. Also, some plants grow better with either a larger or a smaller block of growing medium.

- [0045] As a further alternative, Figure 9 shows an arrangement with a single central support 45 extending upwardly from a base 47 and provided with a holder 49 for the growing medium at the top of the support, the holder 49 for example being in the form of an arrangement of radial and then upstanding wires in the manner of a basket. Two shelves 51, 53 are mounted on the central support 45 in spaced apart manner, the shelves being annular in configuration with inwardly extending spokes to mount the shelves on the central support. Instead of a single central support, the hydroponic plant and root support of Figure 9 may be modified so as to have a plurality (i.e., at least three) of legs which may be upright, or may taper toward a point at the top where the growing medium is supported, or may be inclined outwardly towards the top with the holder for the growing medium being supported, for example, on diametral wires or the like.
- [0046] Figure 10 shows yet another alternative in which the hydroponic plant and root support is mounted on a container for the plant, such as a tank or a pot, or is formed integrally with the container. In this case the container 55 is provided with means to support shelves 57 and 59, for example by way of a frame 61 having a recess 63 and supported over a rim of the container and extending into the container or alternatively by way of shelf supports (not shown) mounted on a wall of the container.

## Claims

1. A hydroponic plant and root support comprising: receiving means (13, 29, 49, 63) for a growing medium; at least one shelf (5, 7, 51, 53, 57, 59) for plant roots protruding from the growing medium to extend over; and supporting means (1, 3, 45, 47, 61) for supporting the receiving means and the at least one shelf in spaced relationship with the receiving means at a level above the shelf and with the shelf extending substantially laterally.
2. A hydroponic plant and root support as claimed in claim 1, wherein the supporting means comprises two interlocking sheets (1, 3).
3. A hydroponic plant and root support as claimed in claim 2, wherein the sheets (1, 3) are made of a suitable water-resistant planar material, such as corrugated plastics board.
4. A hydroponic plant and root support as claimed in claim 3, wherein the sheets (1, 3) are substantially square or substantially rectangular.
5. A hydroponic plant and root support as claimed in claim 2, 3 or 4, wherein the interlocking sheets (1, 3) are provided in the region of the top thereof with a recess (13, 29), for example substantially midway along the length of the top, for receiving growing medium.
6. A hydroponic plant and root support as claimed in claim 5, wherein the recess (13, 29) is in two parts, an upper part with relatively large dimensions and a lower part with relatively small dimensions.
7. A hydroponic plant and root support as claimed in any one of claims 2 to 6, wherein the interlocking sheets (1, 3) are provided with slits (15, 31) which allow the sheets to interlock.
8. A hydroponic plant and root support as claimed in claim 7, wherein one sheet (1) is provided with a slit (15) extending from the base (9) thereof in a direction towards the top (11), while the other sheet (3) is provided with a slit (31) extending from the top (27) thereof in a direction towards the base (25).
9. A hydroponic plant and root support as claimed in claim 7 or 8, wherein the combined length of the slits (15, 31) corresponds at least to the distance between the base (9, 25) and the top (11, 27) of one of the sheets (1, 3).
10. A hydroponic plant and root support as claimed in any one of claims 2 to 9, wherein the base (9, 25) of the sheets (1, 3) is provided substantially midway

therealong with a recess (17, 33) for receiving an air stone.

11. A hydroponic plant and root support as claimed in any one of claims 2 to 10, wherein the top (11, 27) of at least one of the sheets (1, 3) is provided with one or more recesses (19, 35) for receiving a top feed hose.
12. A hydroponic plant and root support as claimed in any one of claims 2 to 11, wherein the interlocking sheets (1, 3) are each provided with at least one lateral slit (21, 23, 37, 39) for receiving the at least one shelf (5, 7).
13. A hydroponic plant and root support as claimed in claim 12, wherein, where more than one lateral slit (21, 23, 37, 39) is provided, the slits are spaced between the top (11, 27) and base (9, 25) of the sheet (1, 3) and located substantially midway between edges of the sheet.
14. A hydroponic plant and root support as claimed in any one of claims 2 to 13, wherein one or both of the interlocking sheets (1, 3) is provided with openings (41, 43) therethrough to allow the passage of roots.
15. A hydroponic plant and root support as claimed in claim 1, wherein the supporting means comprises at least one upright support (45) on which the or each shelf (51, 53) is mounted.
16. A hydroponic plant and root support as claimed in claim 15, wherein the upright support (45) comprises a single central support (45) extending upwardly from a base (47) and provided with a holder (49) for the growing medium at the top of the support.
17. A hydroponic plant and root support as claimed in claim 16, wherein the holder (49) is in the form of a basket.
18. A hydroponic plant and root support as claimed in claim 16 or 17, wherein, where the shelf (51, 53), or at least one of the shelves, has a central opening, the shelf includes inwardly extending spokes to mount the shelf on the central support (45).
19. A hydroponic plant and root support as claimed in claim 15, wherein the upright support comprises a plurality of legs which are upright, or taper toward a point at the top where the growing medium is supported, or are inclined outwardly towards the top.
20. A hydroponic plant and root support as claimed in claim 19, wherein the holder for the growing medium is supported on diametral wires.

21. A hydroponic plant and root support as claimed in claim 1, wherein the supporting means (61) is mounted on or integrally formed with a container (55) for the plant.
22. A hydroponic plant and root support as claimed in claim 21, wherein the container (55) is provided with means to support the at least one shelf (57, 59) by way of a frame (61) supported relative to the container, for example over a rim of the container, and extending into the container.
23. A hydroponic plant and root support as claimed in claim 21, wherein the means to support the at least one shelf comprises shelf supports mounted on a wall of the container.
24. A hydroponic plant and root support as claimed in any preceding claim, wherein at least two shelves (5, 7, 51, 53, 57, 59) are provided, the supporting means (1, 3, 45, 47, 61) being adapted to support the shelves in spaced relationship one above the other.
25. A hydroponic plant and root support as claimed in claim 24, wherein a lower shelf (7, 53, 59) is larger in size than an upper shelf (5, 51, 57).
26. A hydroponic plant and root support as claimed in any preceding claim, wherein the shelf (5, 7, 51, 53, 57, 59) or at least one of the shelves is provided with a substantially central opening.
27. A hydroponic plant and root support as claimed in claim 24 or 25, wherein the top shelf (5, 51, 57) is continuous and the lower shelf or shelves (7, 53, 59) is or are provided with a substantially central opening.
28. A hydroponic plant and root support as claimed in any preceding claim, wherein the shelf or at least one of the shelves (5, 7, 51, 53, 57, 59) is slatted and/or provided with a plurality of apertures.
29. A hydroponic plant and root support as claimed in any preceding claim, wherein the perimeter of the shelf or at least one of the shelves (5, 7, 51, 53, 57, 59) is serrated.
30. A hydroponic plant and root support as claimed in any preceding claim, wherein the shelf or at least one of the shelves (5, 7, 51, 53, 57, 59) is at a higher or lower level in a central region thereof compared with an outer region thereof.
31. A hydroponic plant and root support as claimed in any preceding claim,

wherein the shelf or at least one of the shelves (5, 7, 51, 53, 57, 59) is substantially horizontal.

32. A hydroponic plant and root support as claimed in any preceding claim, wherein the or each shelf (5, 7, 51, 53, 57, 59) is selected from a square or circular configuration.
33. A hydroponic plant and root support as claimed in any preceding claim, wherein all or part of the material of the supporting means (1, 3, 45, 47, 61) is porous.
34. A hydroponic plant and root support as claimed in claim 33, wherein a compressor is provided to pass air through the supporting means (1, 3, 45, 47, 61).

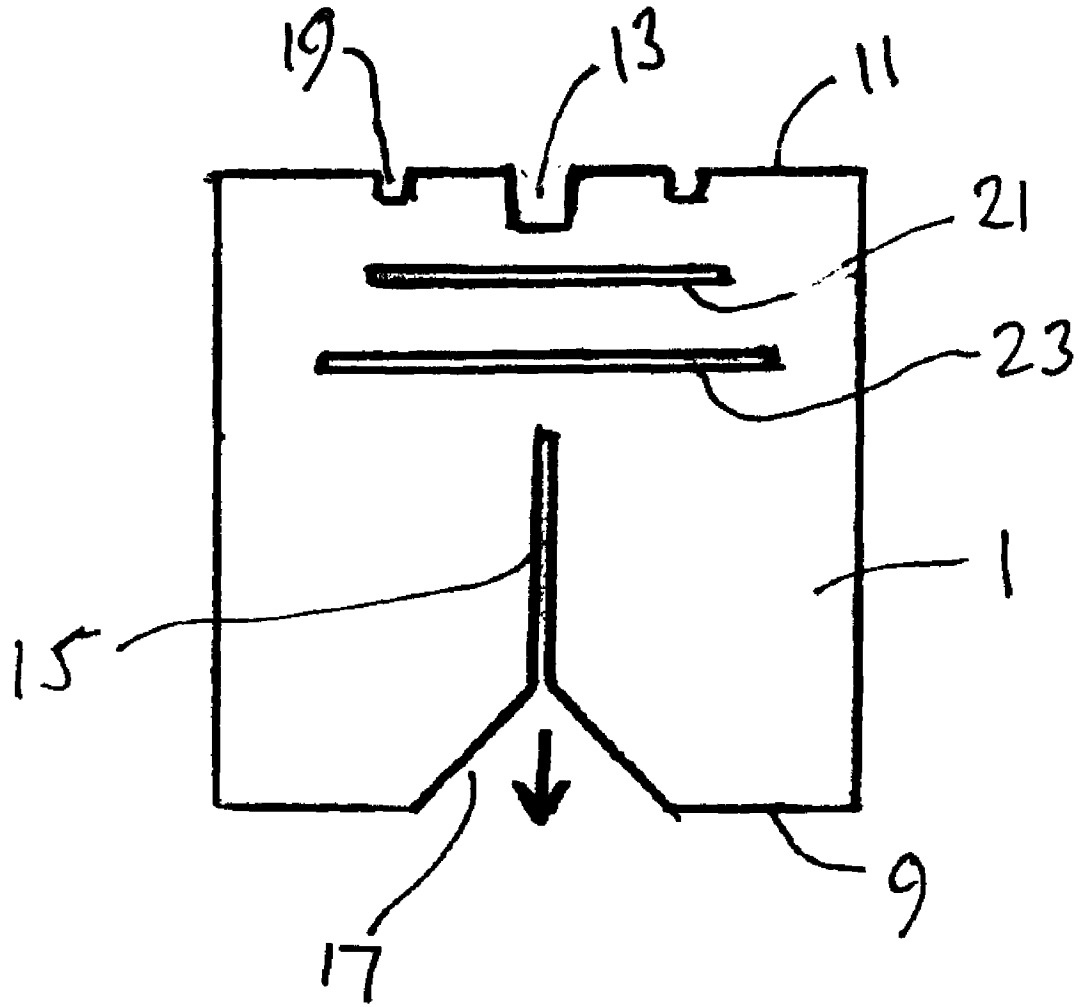


Fig. 1



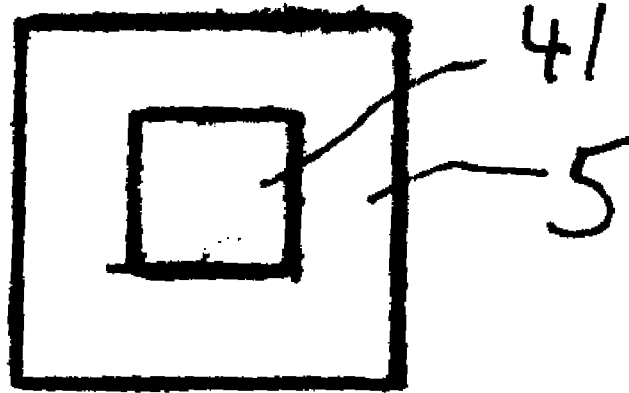


Fig. 3

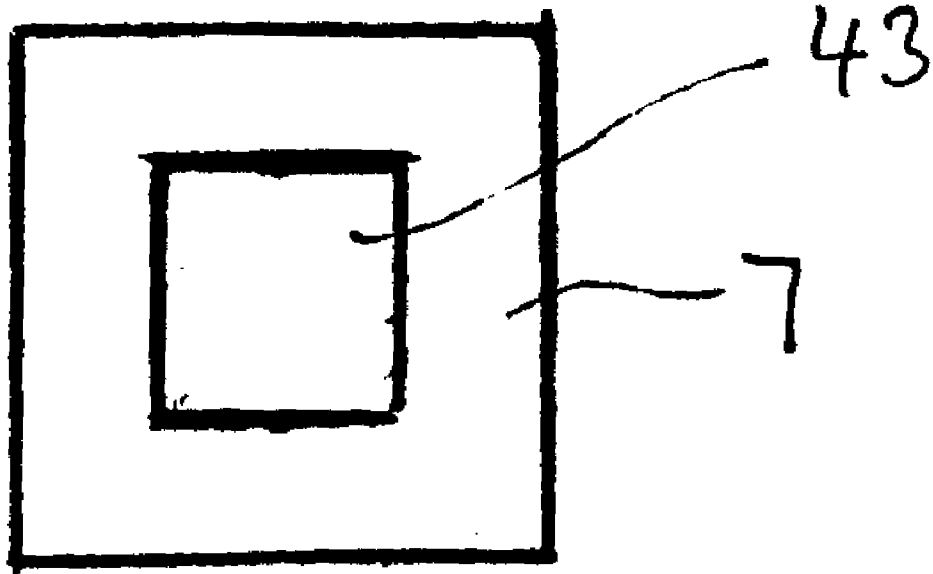


Fig. 4

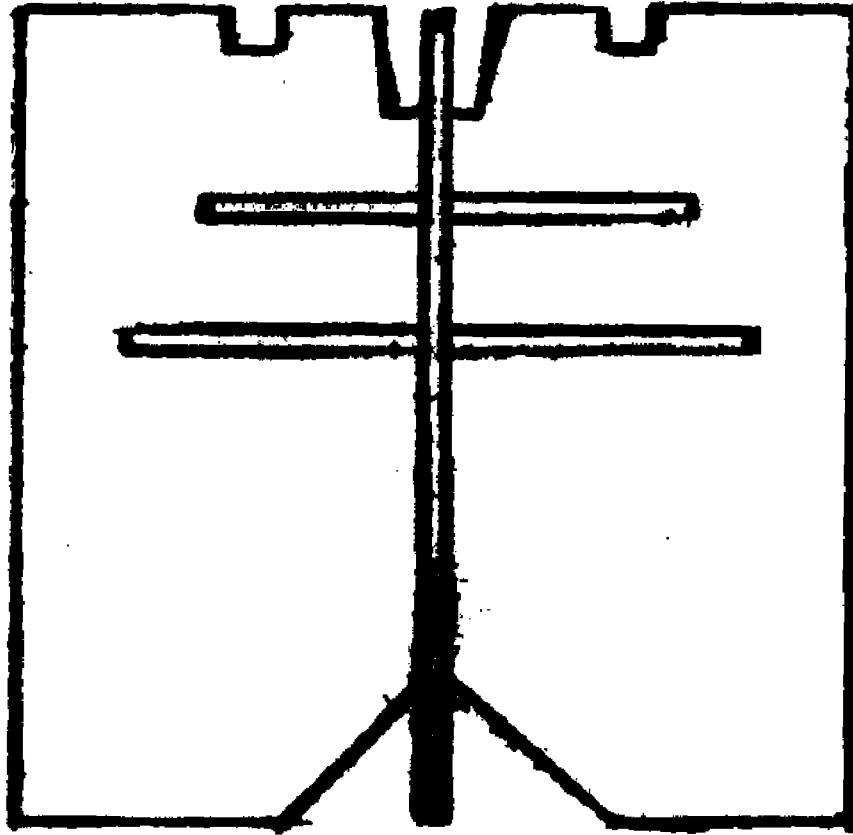


Fig. 5

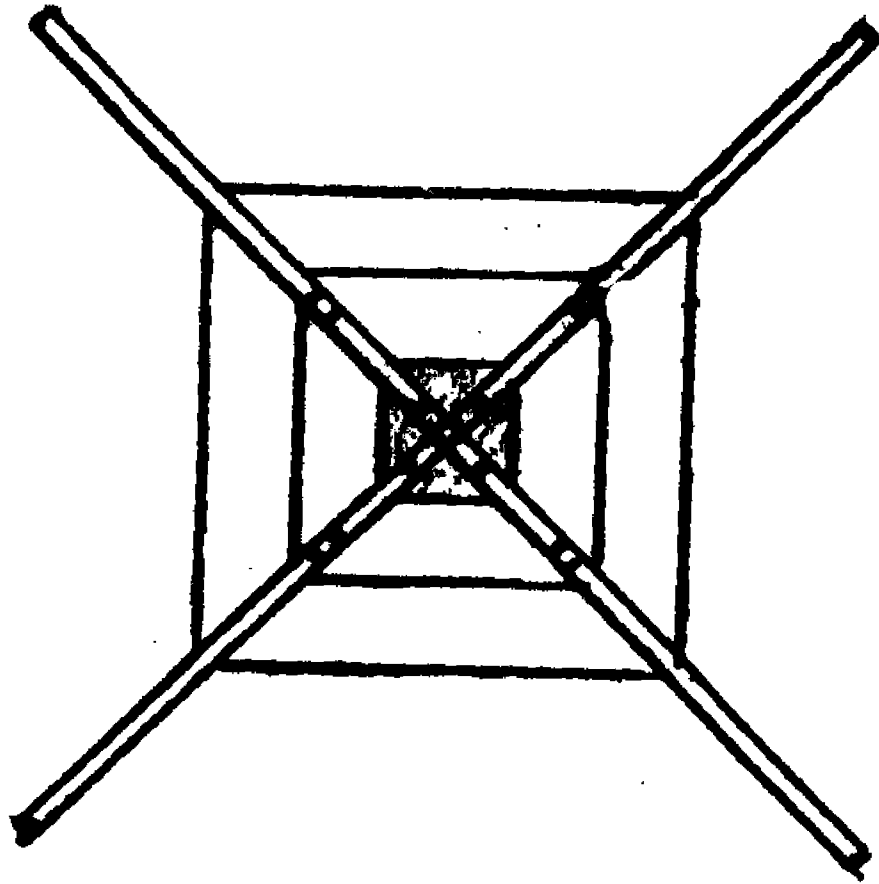


Fig. 6

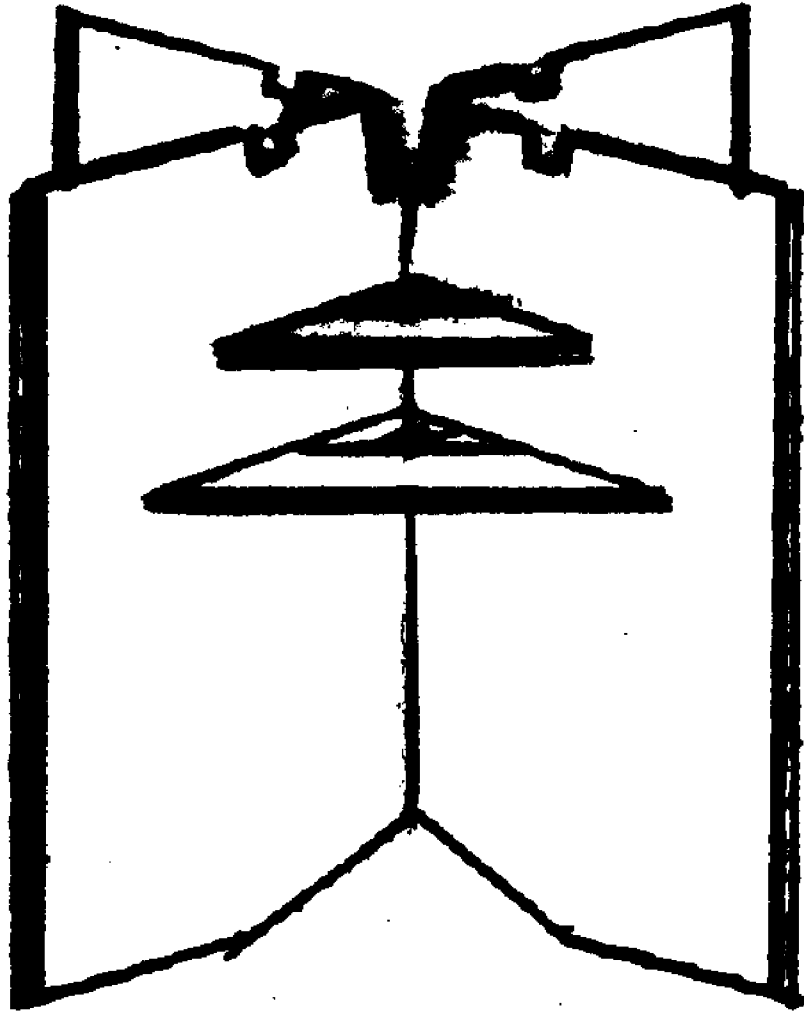


Fig. 7

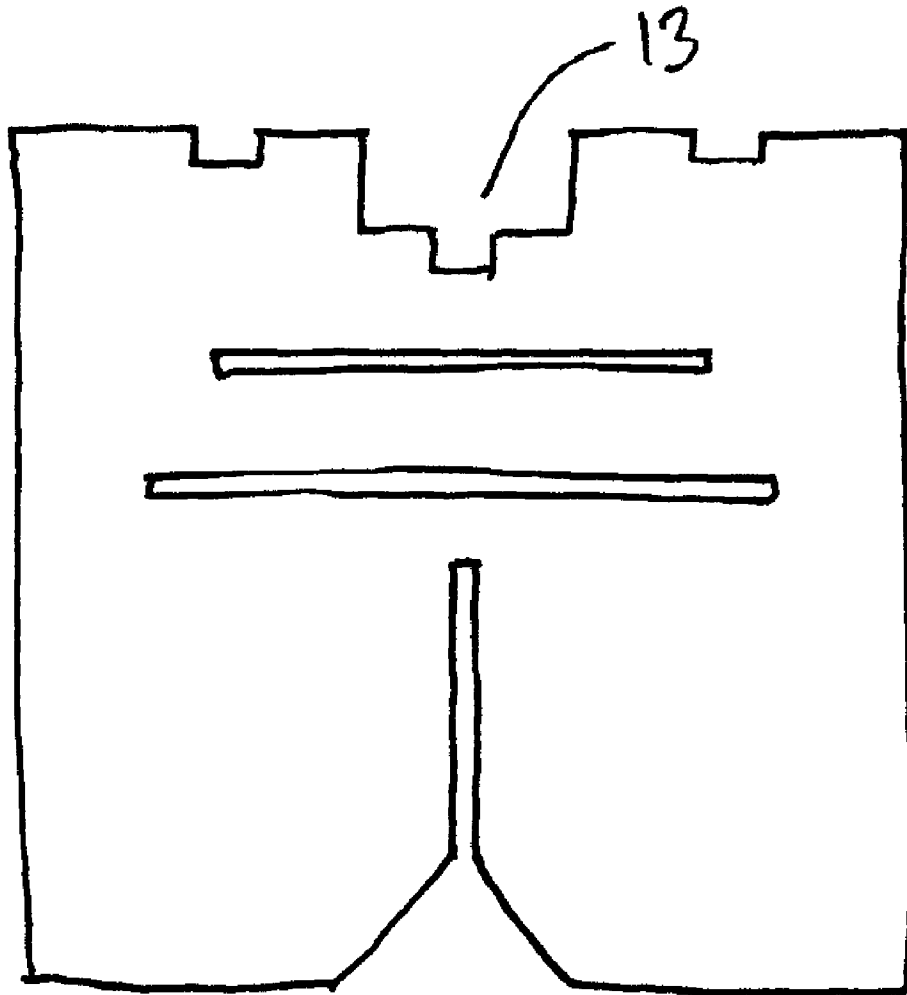


Fig. 8

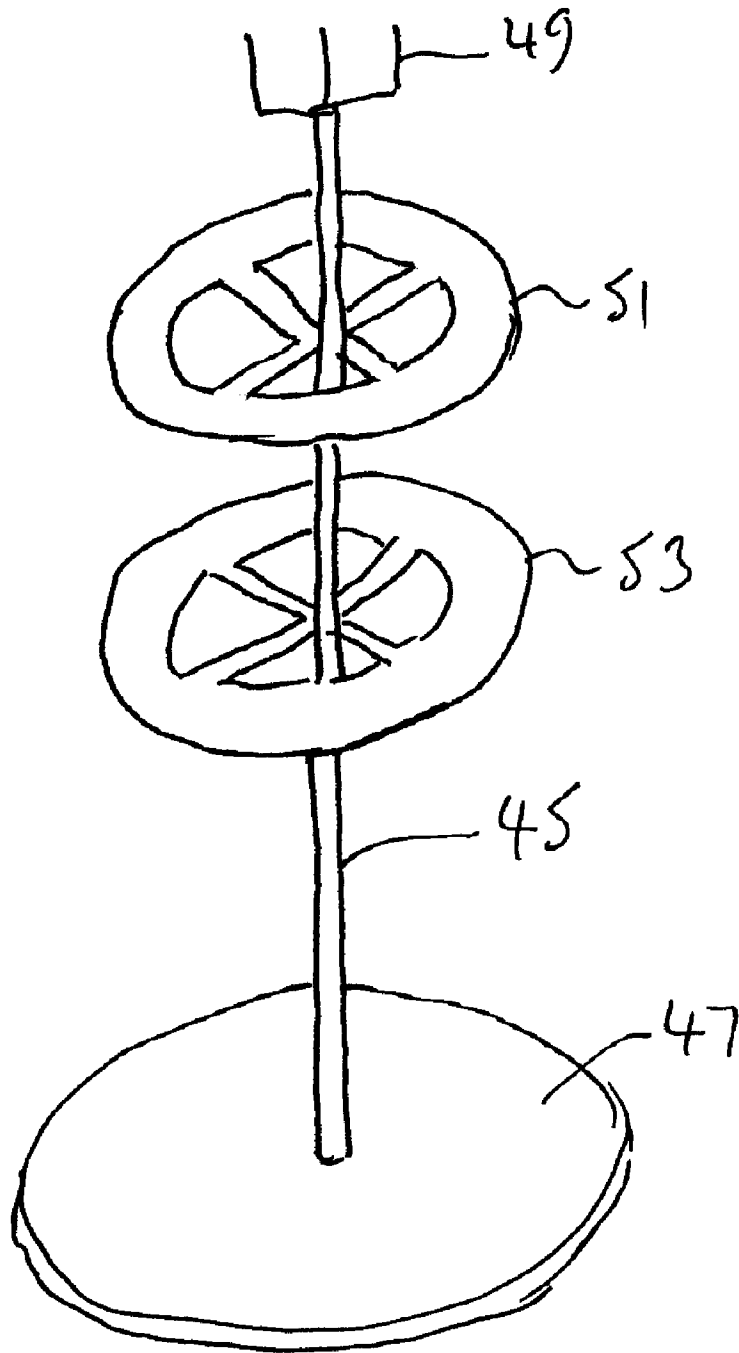


Fig. 9

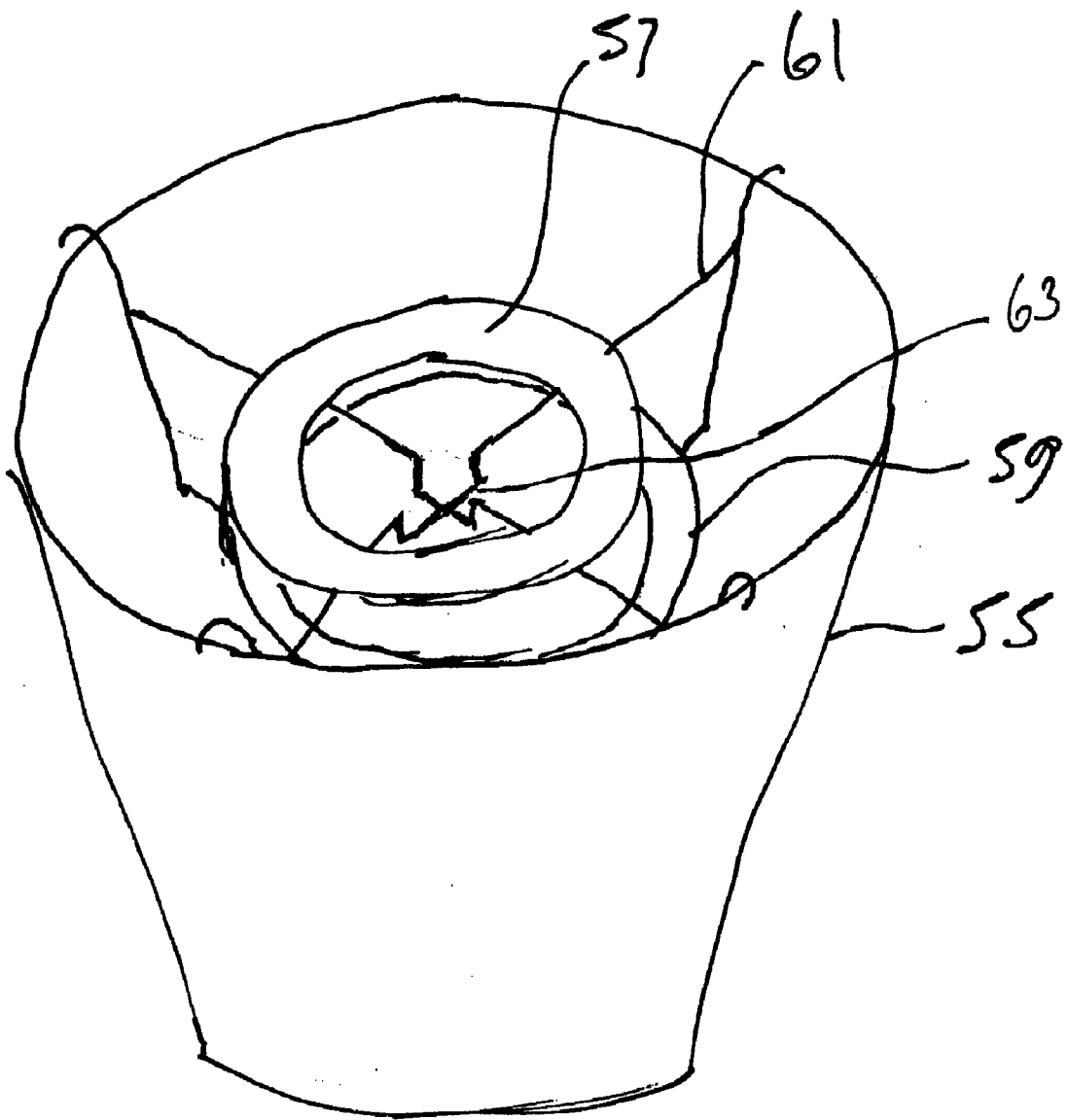


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2014/057743

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A01G31/02  
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, 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	US 4 079 547 A (WALKER FRED L) 21 March 1978 (1978-03-21)  abstract; figures 5-8 column 1, line 4 - line 12 column 1, line 23 - line 31 column 1, line 44 - line 49 column 1, line 63 - line 68 column 2, line 56 - line 68 column 3, line 1 - line 17 column 5, line 7 - column 6, line 67 -----	1,15,21, 24,25, 28-34
A	WO 2007/099186 A1 (INSTAIN S L [ES]; BELMONTE NAVARRO LORENZO [ES]) 7 September 2007 (2007-09-07) abstract; figures 1-2 page 5 - page 6 ----- -/--	1-34

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents :

- "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

Date of the actual completion of the international search  6 June 2014	Date of mailing of the international search report  08/07/2014
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  Balzar, Maarten

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2014/057743

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2 005 817 A2 (INSTAIN S L [ES]) 24 December 2008 (2008-12-24) abstract; figure 1 paragraph [0014] - paragraph [0017] -----	1-34

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/EP2014/057743
---

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4079547	A	21-03-1978	NONE
WO 2007099186	A1	07-09-2007	ES 2284378 A1 01-11-2007 WO 2007099186 A1 07-09-2007
EP 2005817	A2	24-12-2008	EP 2005817 A2 24-12-2008 ES 2282044 A1 01-10-2007 NZ 572372 A 30-09-2011 WO 2007113355 A1 11-10-2007