



US 20140311027A1

(19) **United States**(12) **Patent Application Publication**
Contillo et al.(10) **Pub. No.: US 2014/0311027 A1**(43) **Pub. Date: Oct. 23, 2014**(54) **PLANT CONTAINMENT SYSTEM HAVING
TWO-POSITION VALVE****Publication Classification**(71) Applicants: **Lawrence J. Contillo**, Weaverville, NC
(US); **Felipe Grablel**, Miami, FL (US);
Michael Rimland, Miami, FL (US);
Anthony Visser, S-Gravendeel (NL)(51) **Int. Cl.**
A01G 27/00 (2006.01)
(52) **U.S. Cl.**
CPC **A01G 27/008** (2013.01)
USPC **47/66.7**(72) Inventors: **Lawrence J. Contillo**, Weaverville, NC
(US); **Felipe Grablel**, Miami, FL (US);
Michael Rimland, Miami, FL (US);
Anthony Visser, S-Gravendeel (NL)(57) **ABSTRACT**

A plant growing, transportation, display, and maintenance system including a plant pot and corresponding container having a selectable valve that controls the flow of liquid into and out of the container. In the "open" position, the valve allows water to pass into and out of the container in order to provide water to the contents of the plant pot resting in the container. In the "closed" position, the valve prevents any water flow into or out of the container.

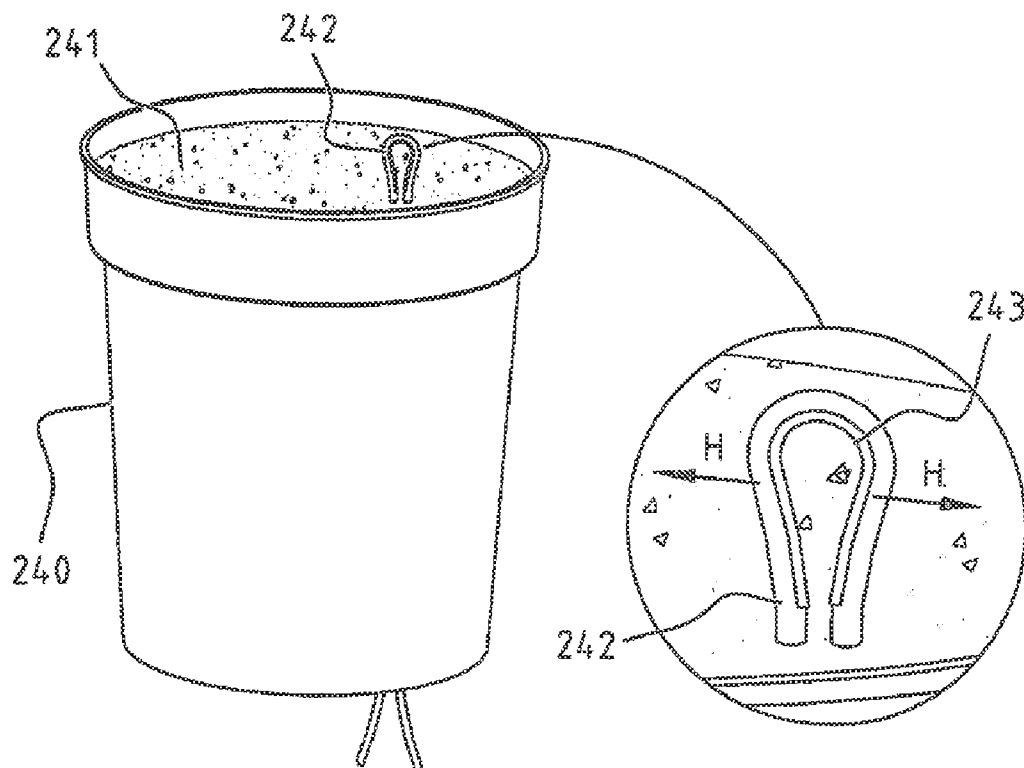
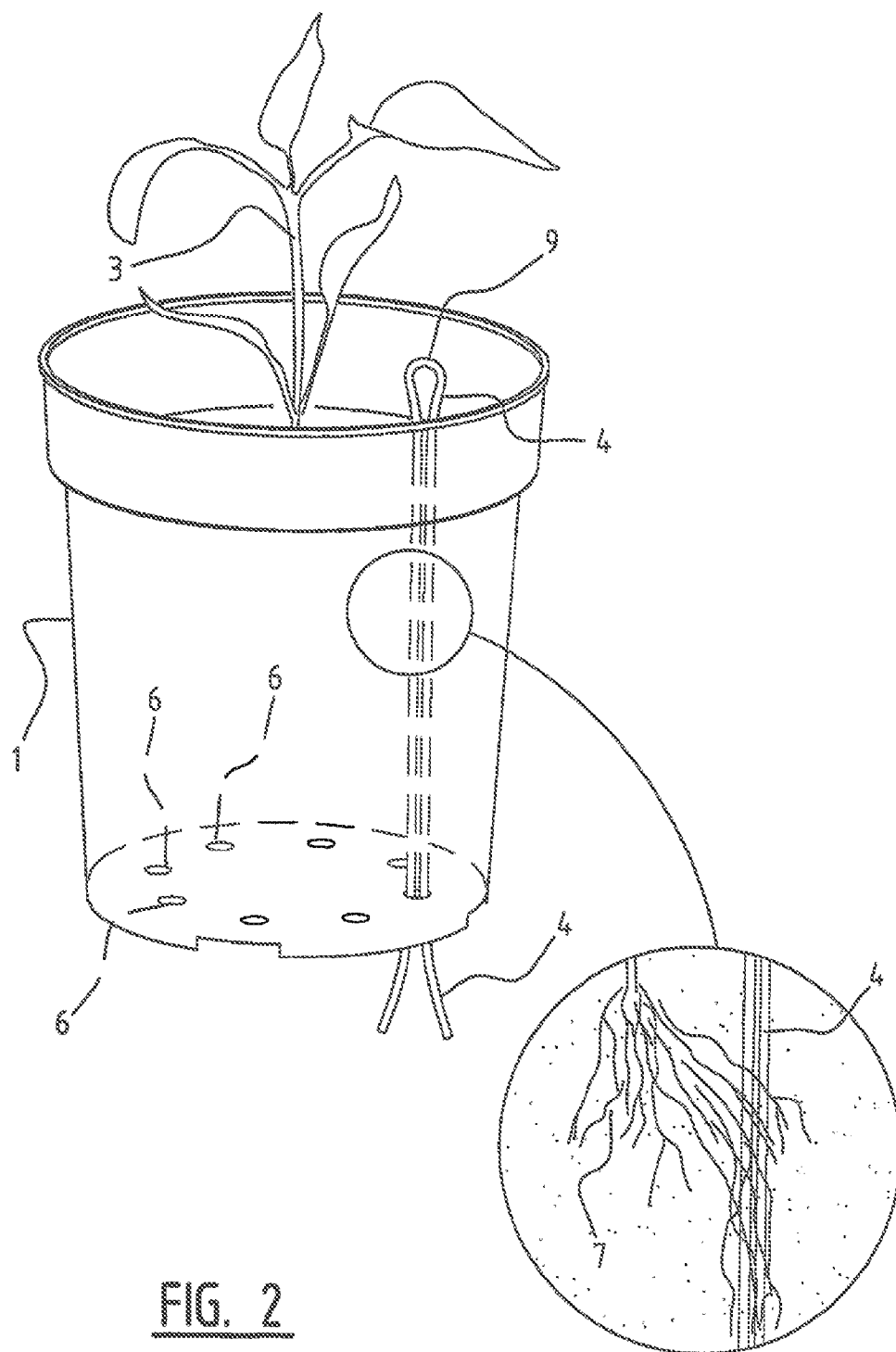
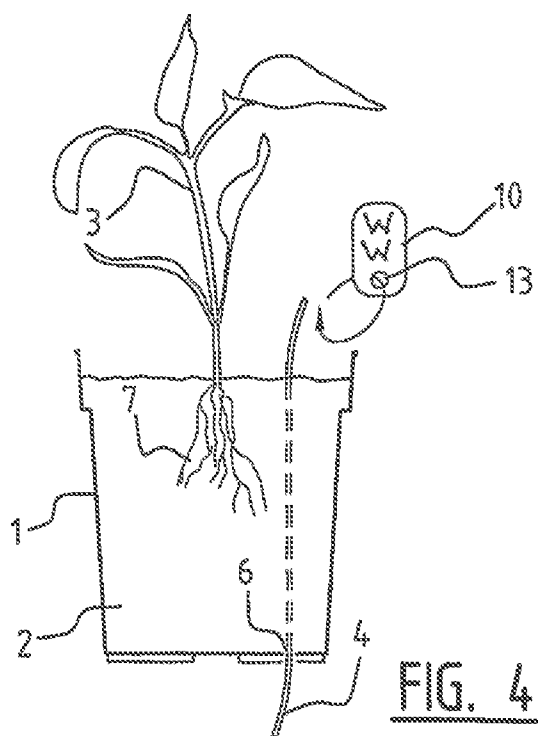
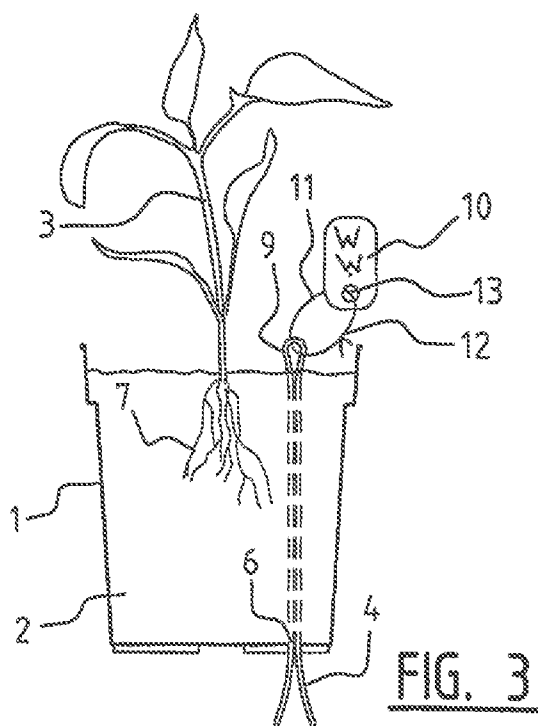
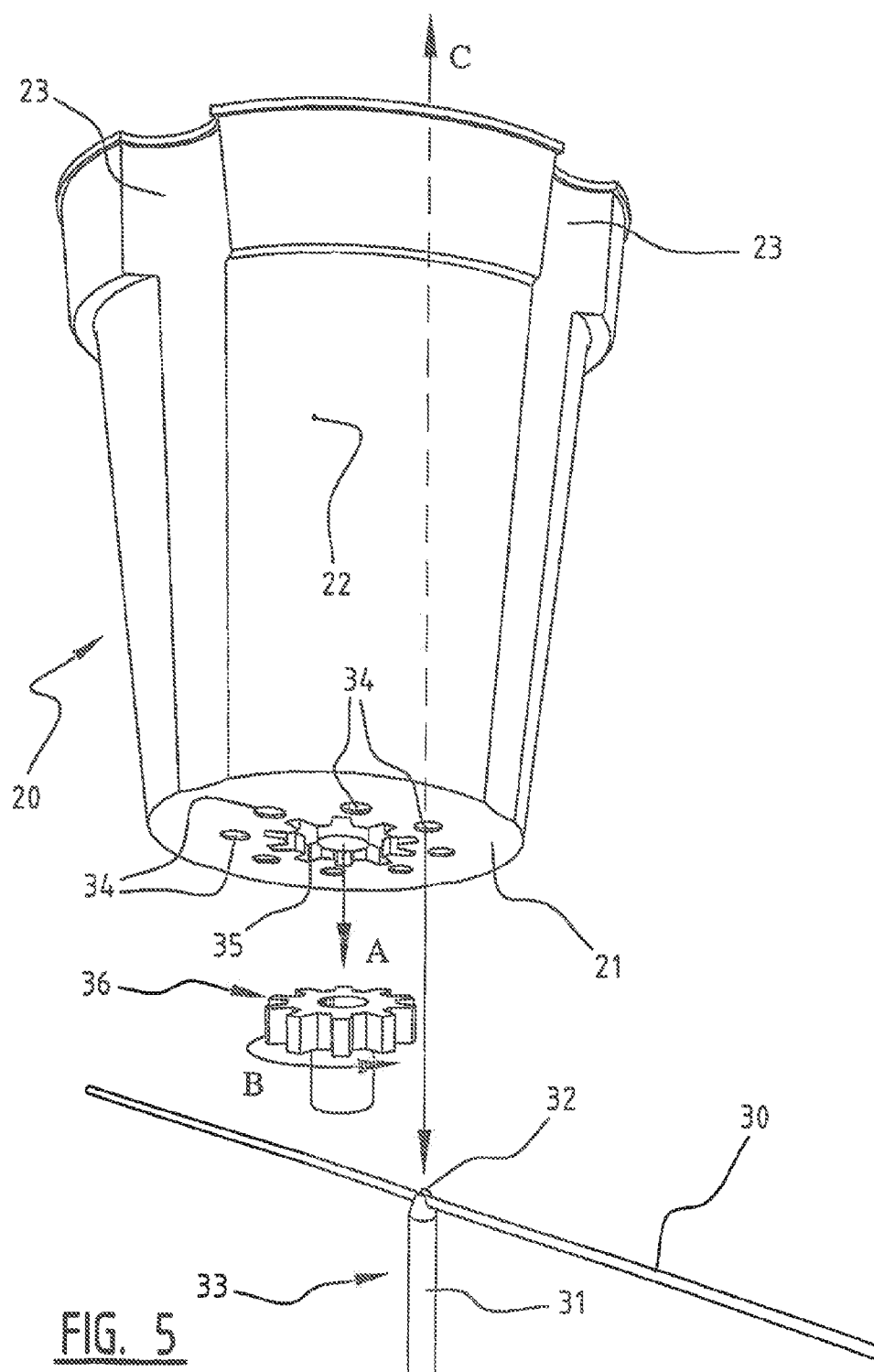
(21) Appl. No.: **13/868,606**(22) Filed: **Apr. 23, 2013**

FIG. 1







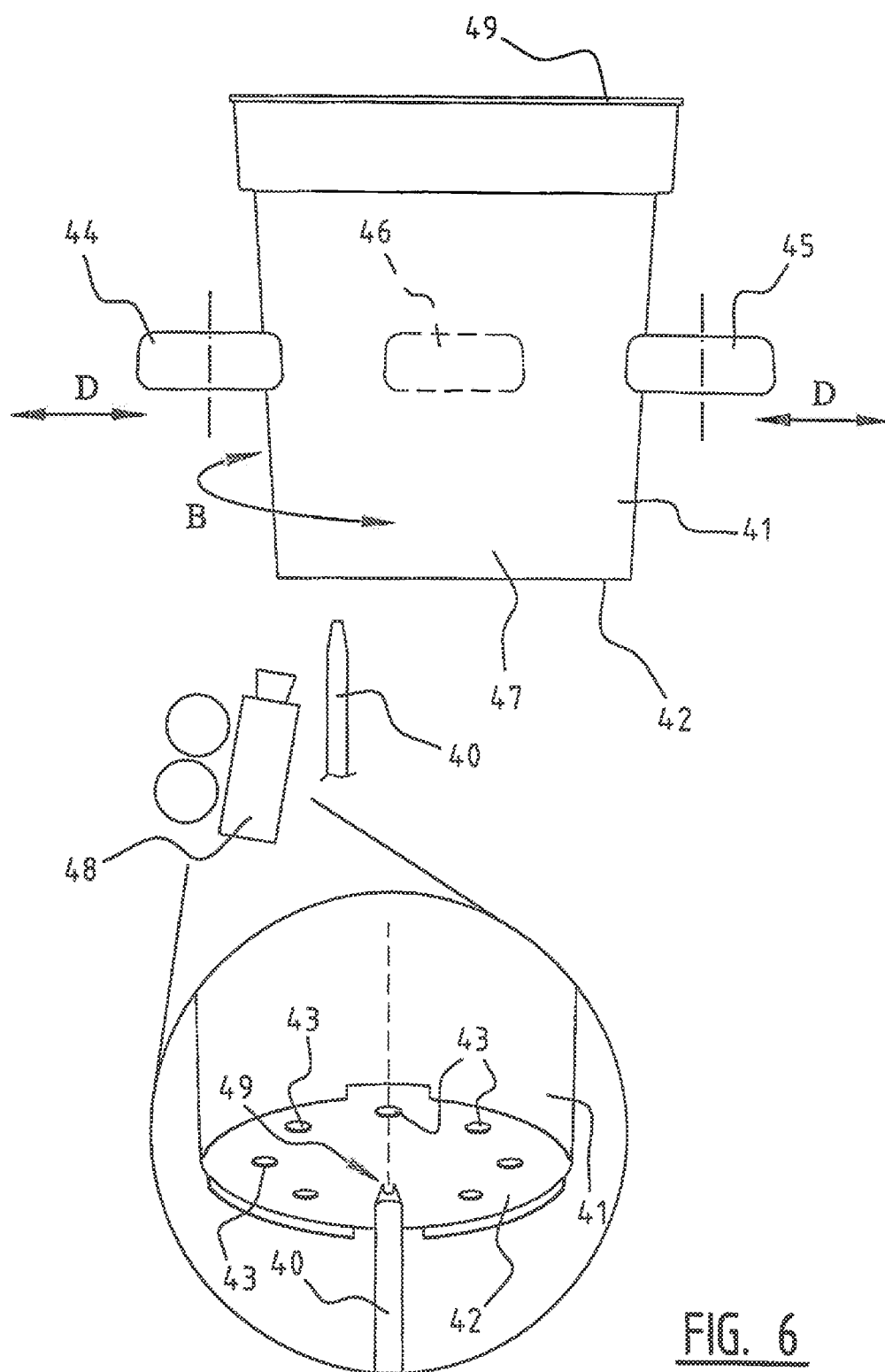


FIG. 6

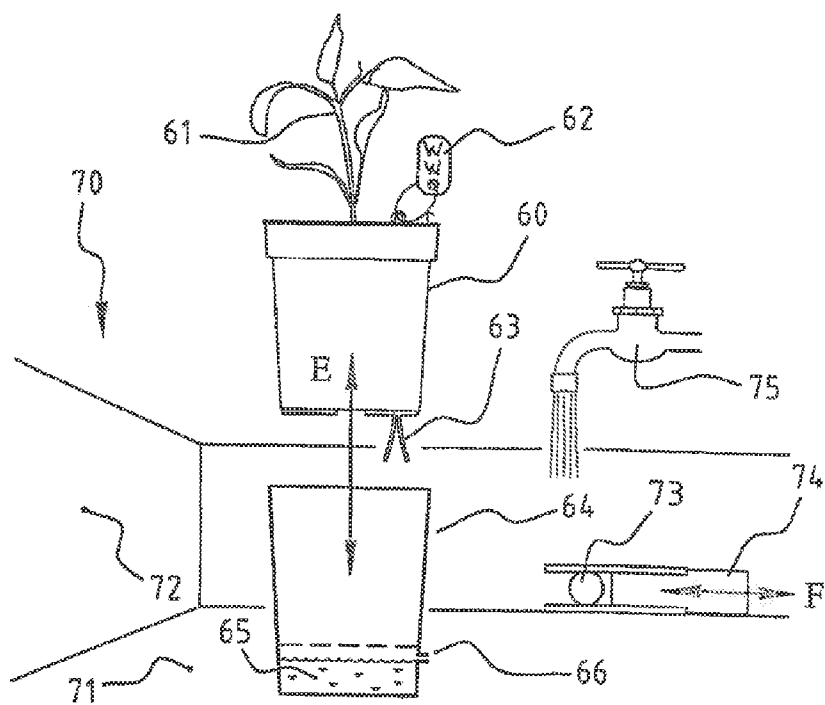


FIG. 7

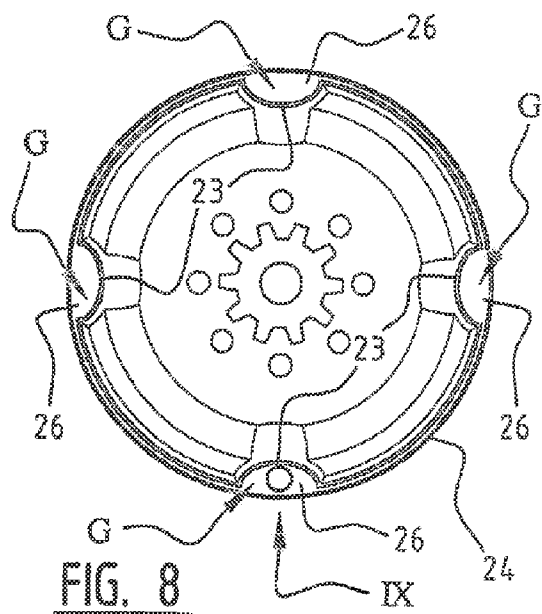


FIG. 8

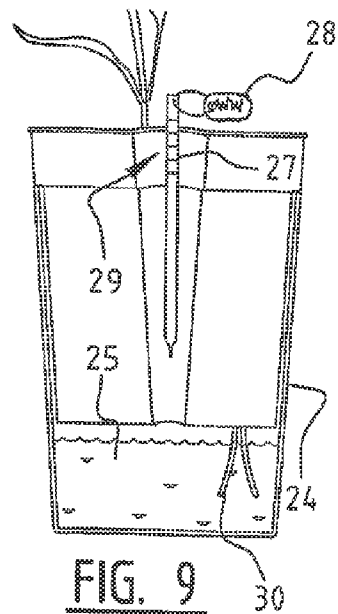
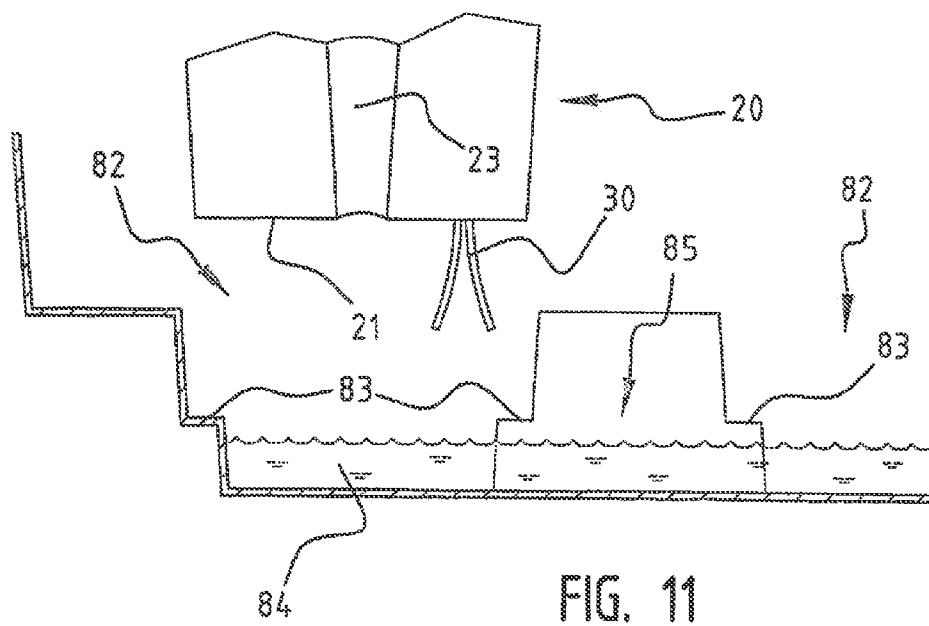
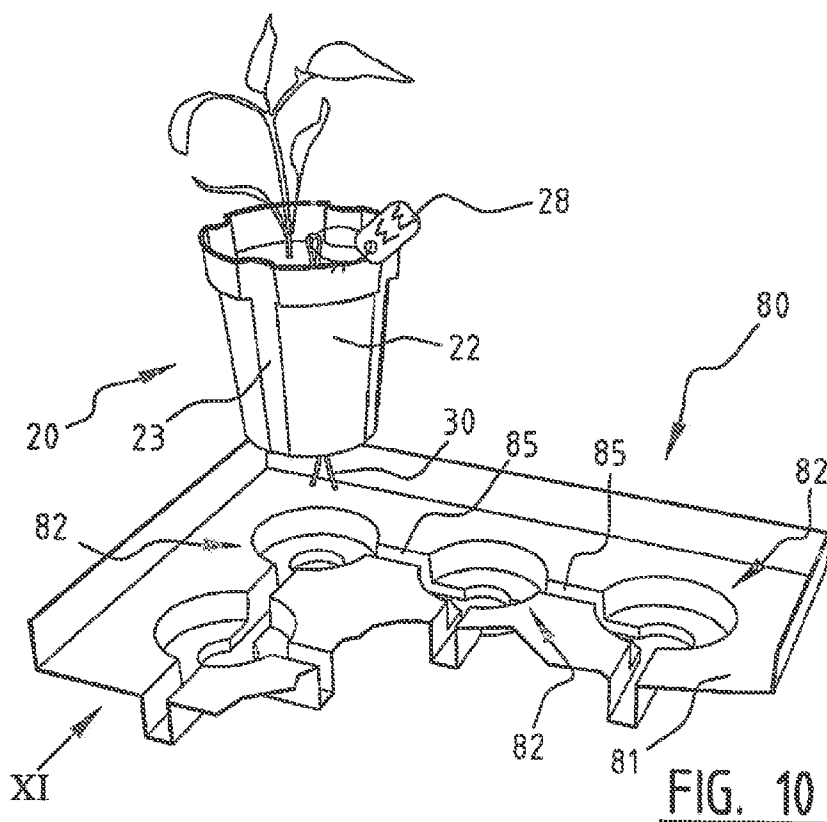


FIG. 9



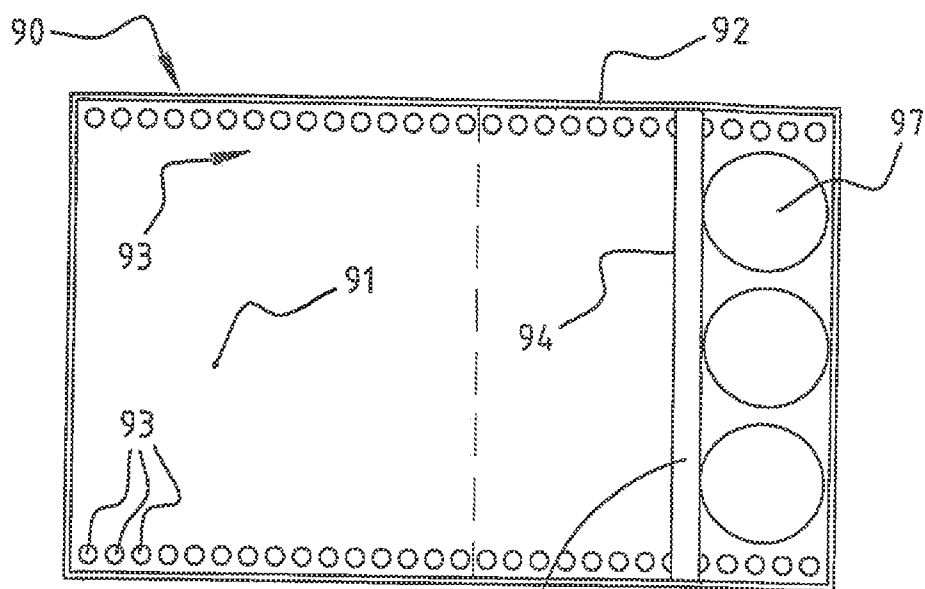


FIG. 12

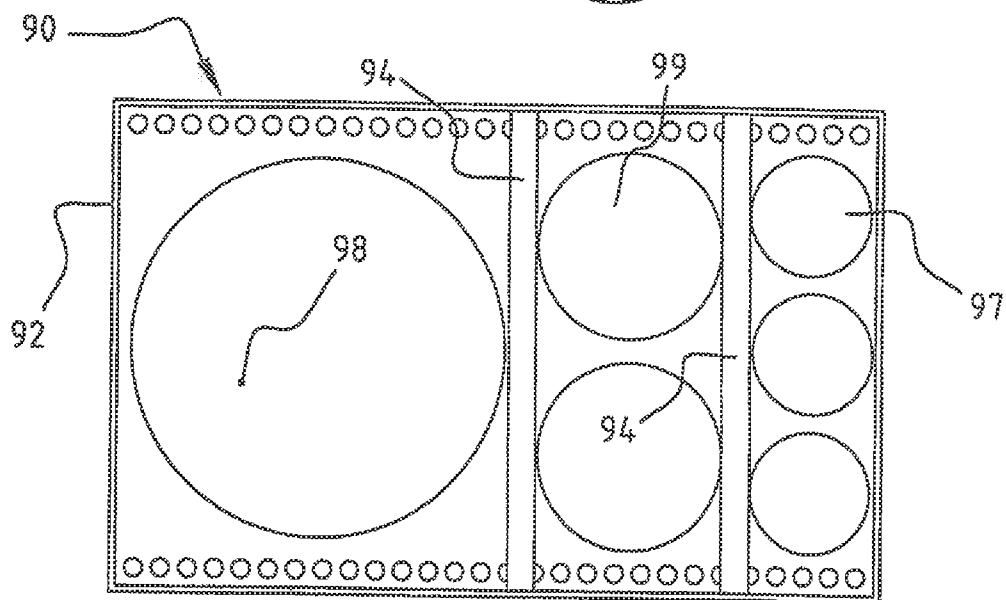
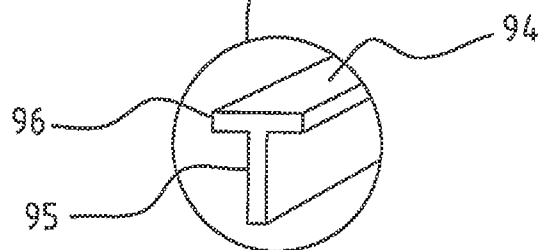
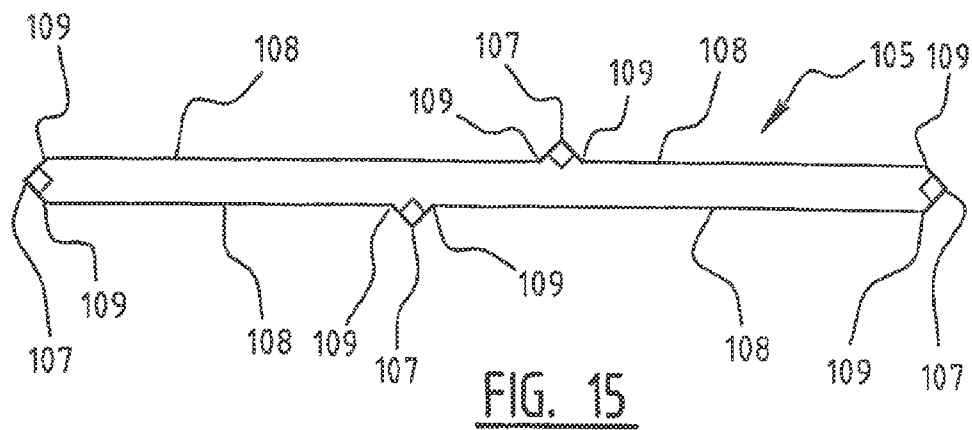
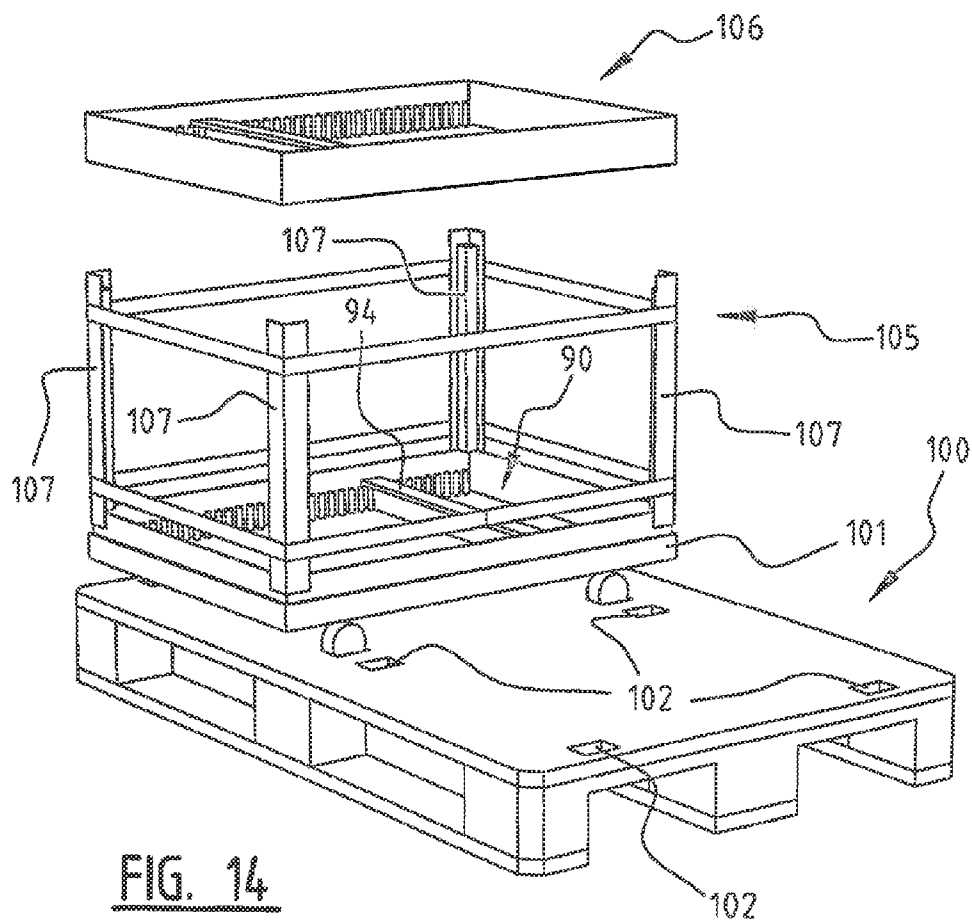
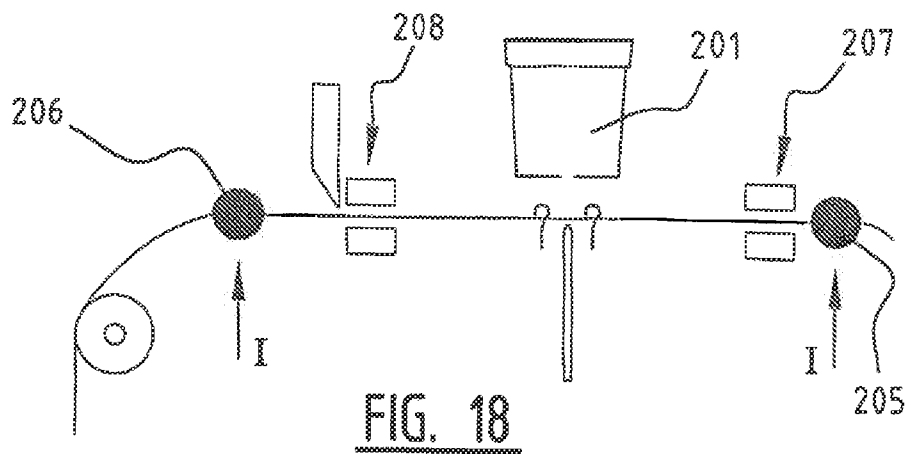
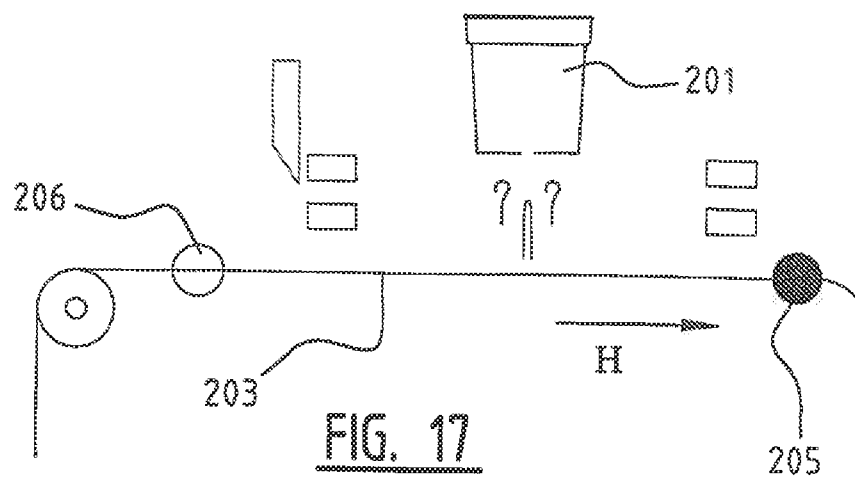
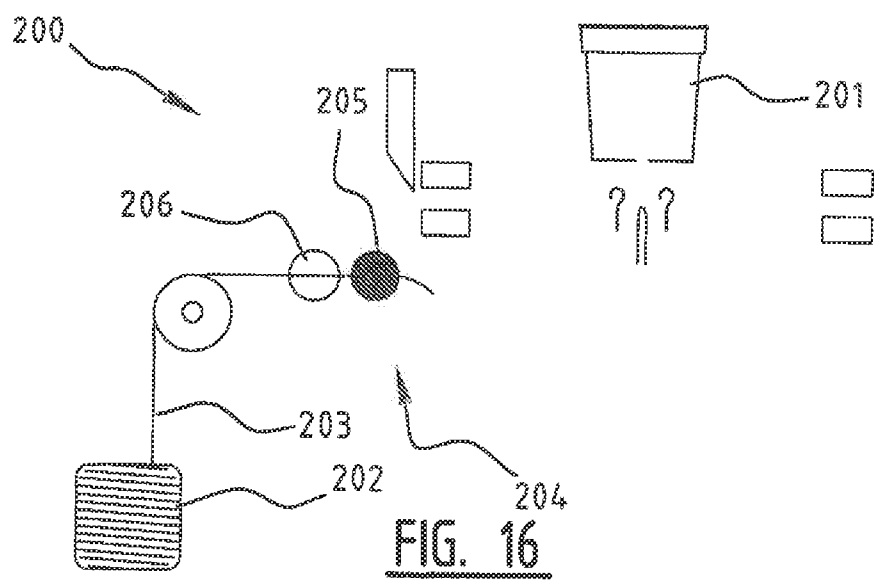
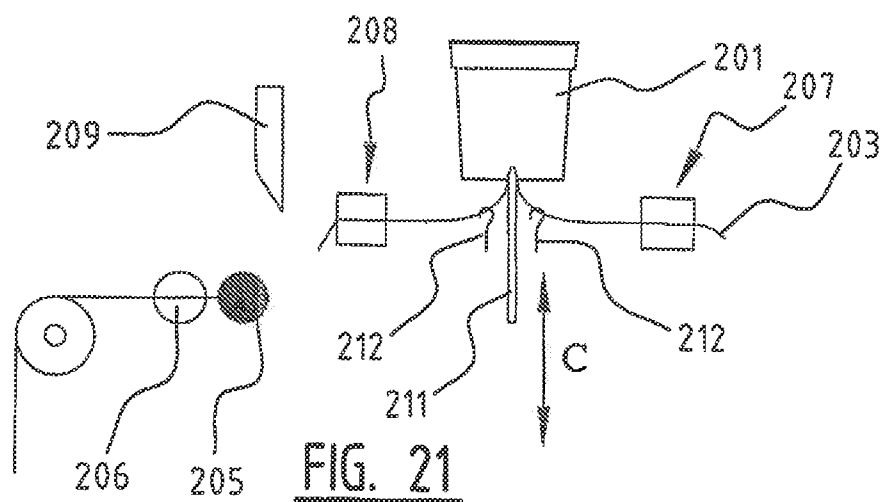
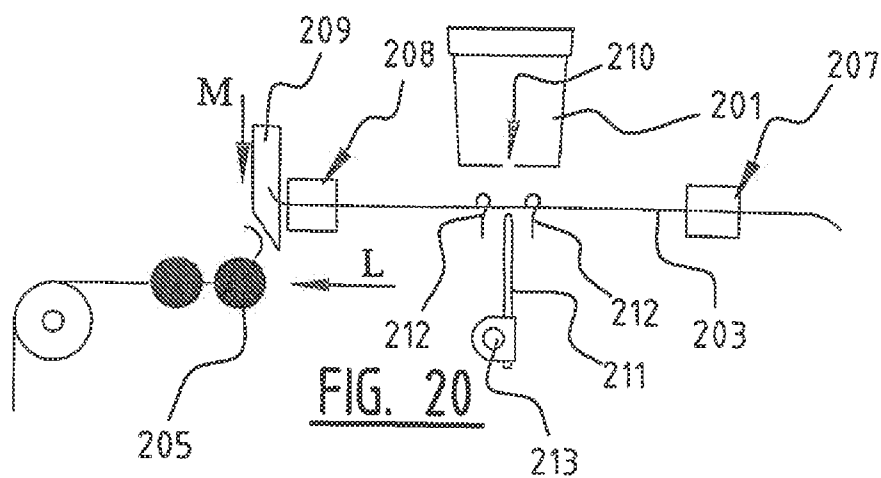
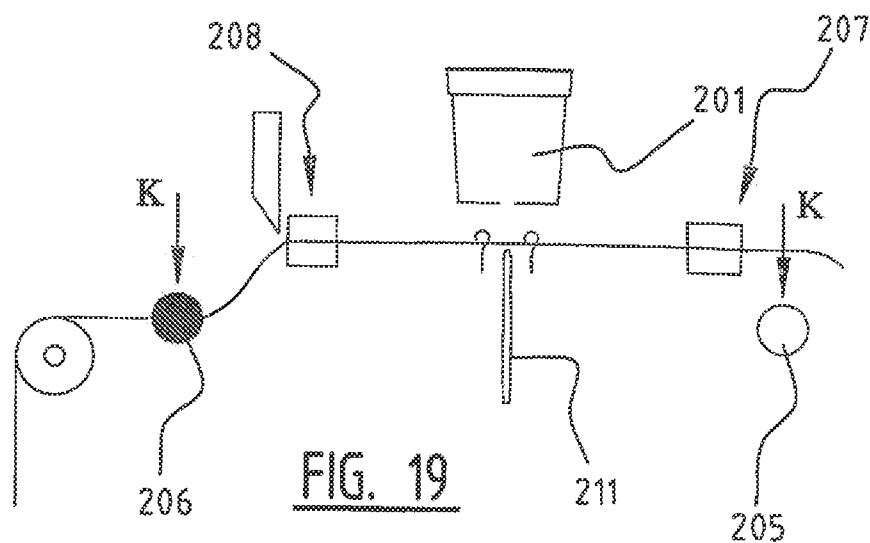
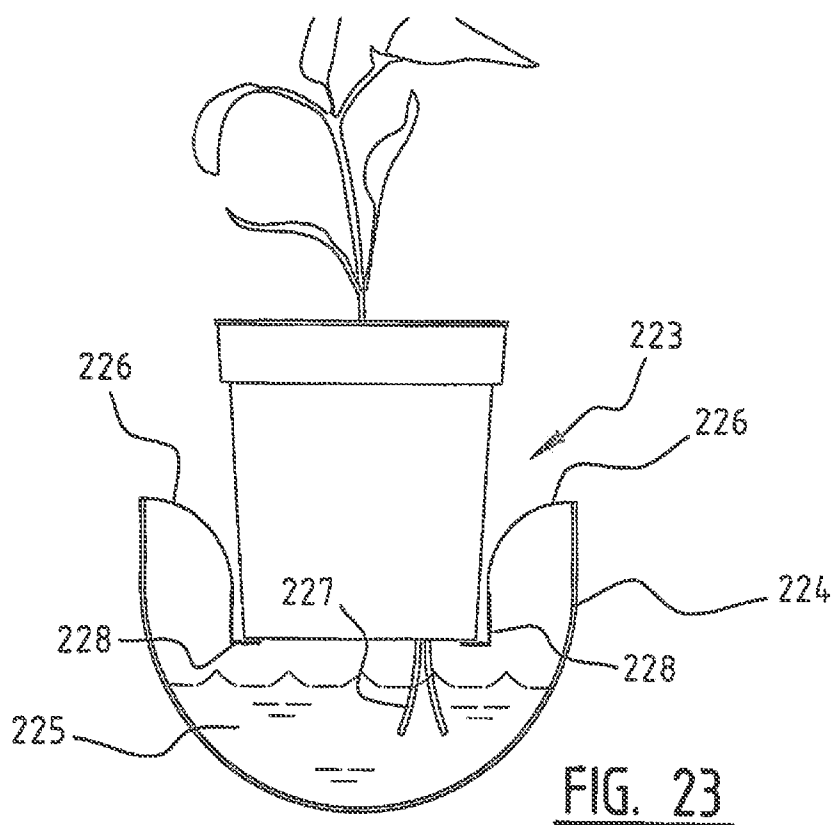
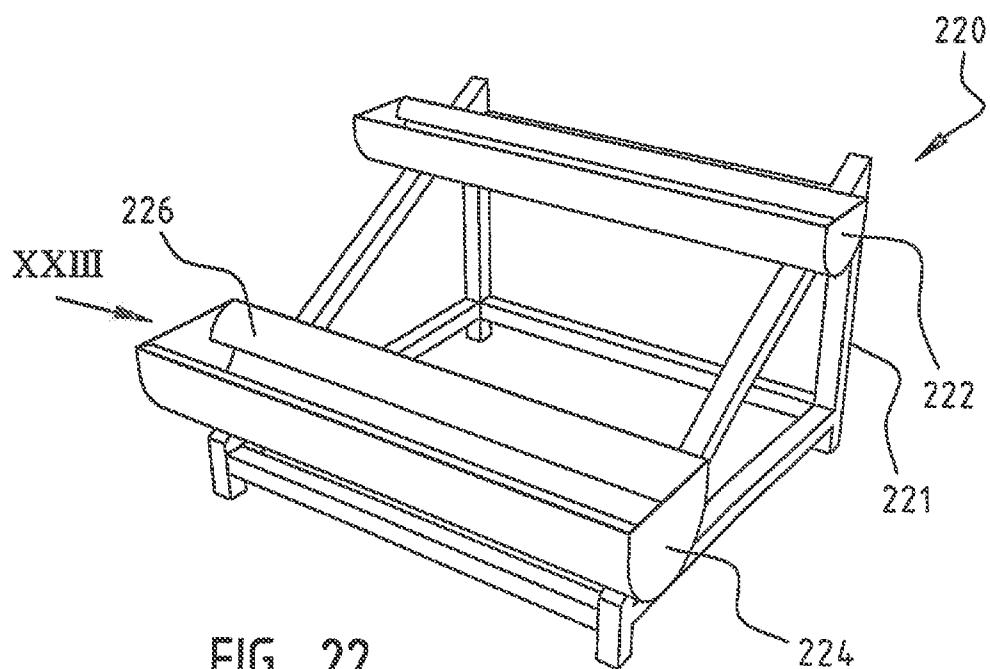


FIG. 13









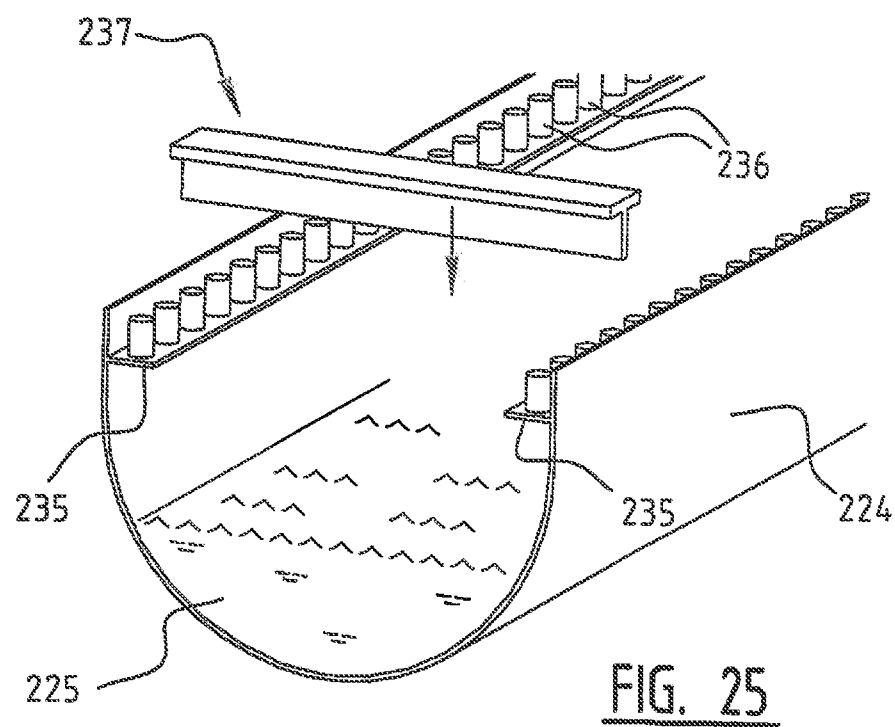
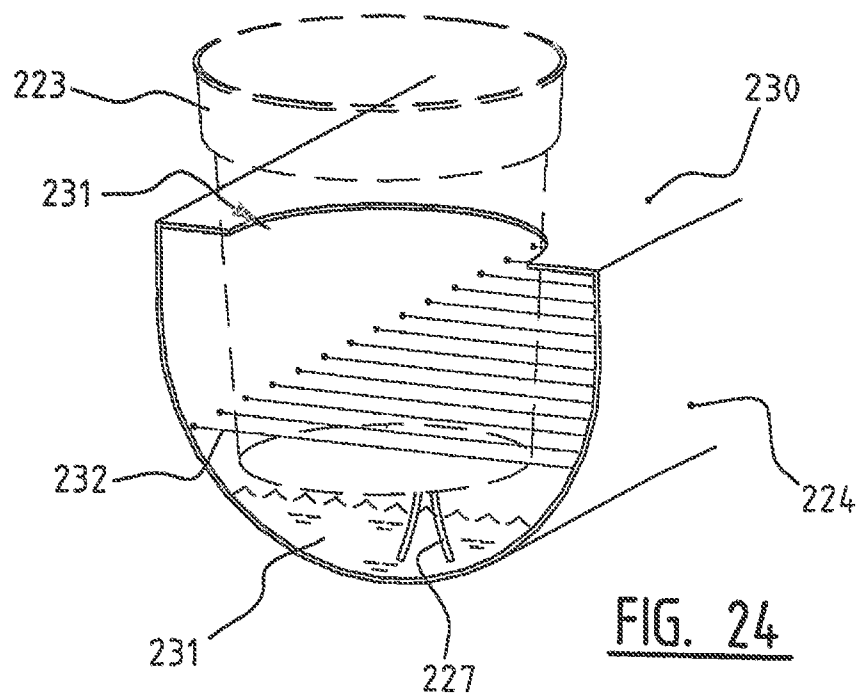


FIG. 27

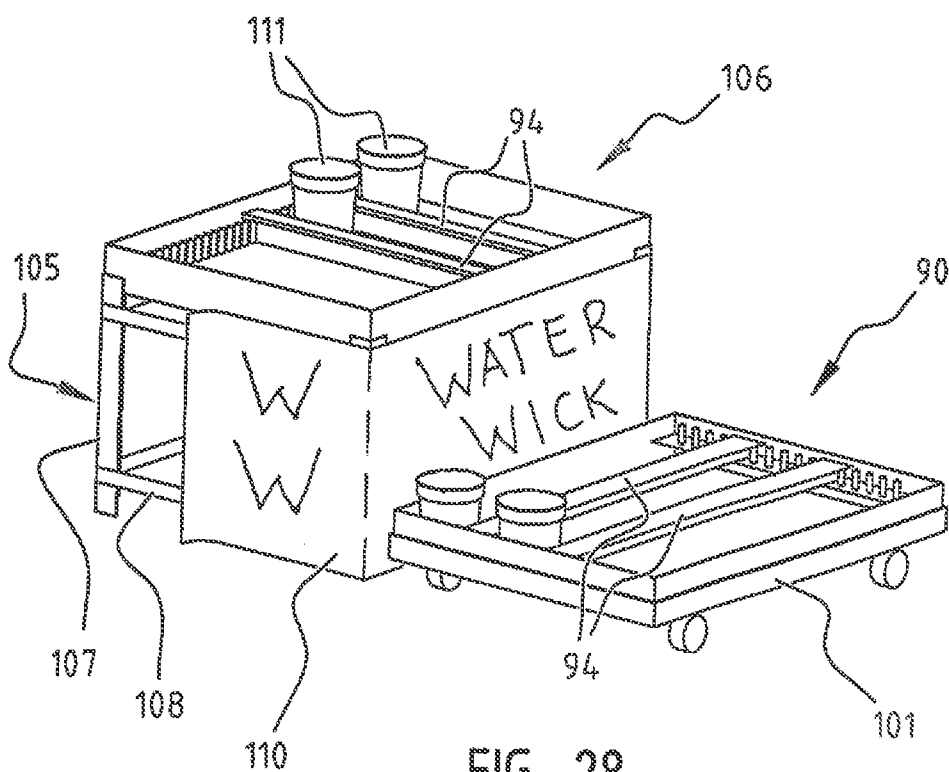


FIG. 28

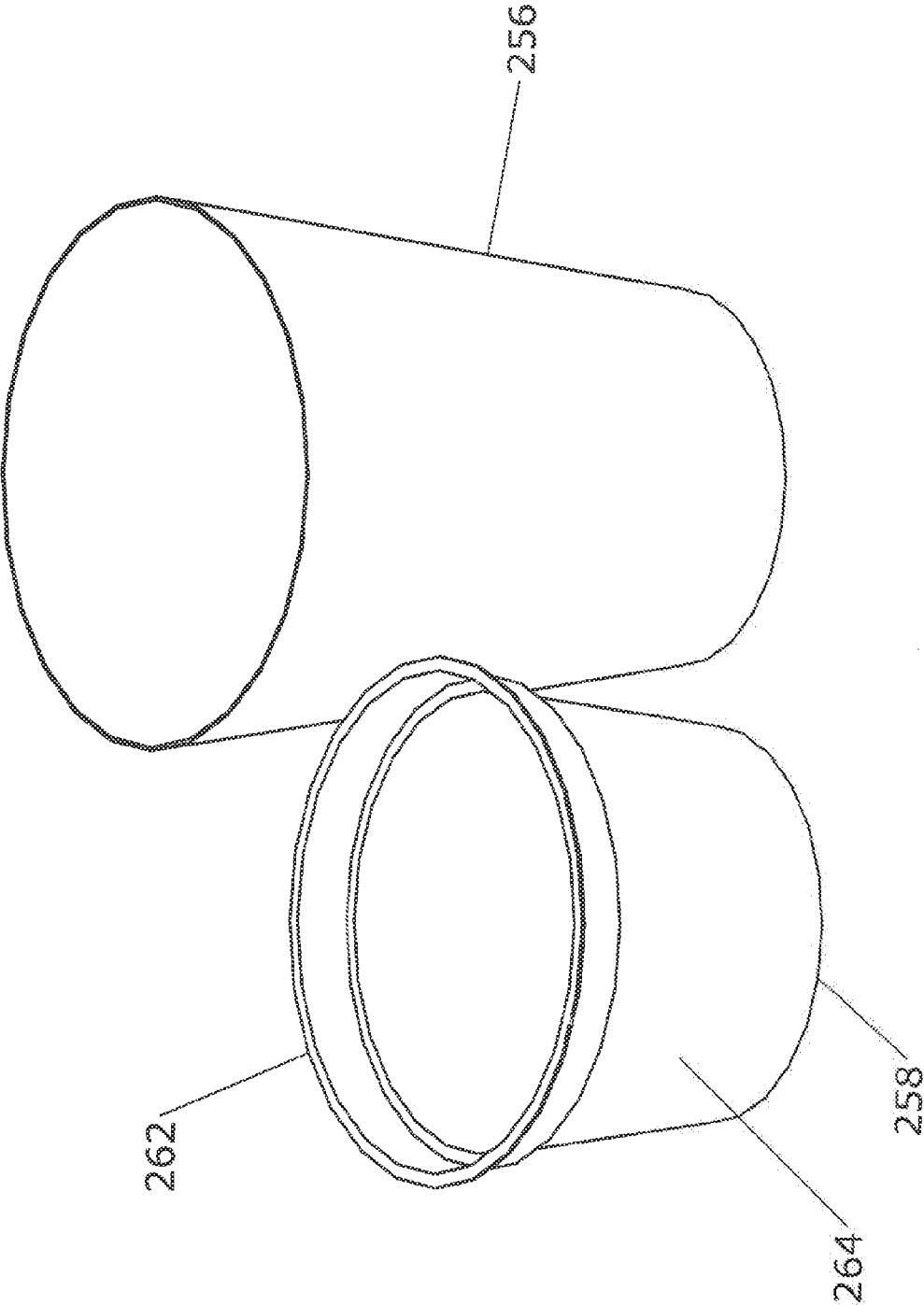


FIG. 29

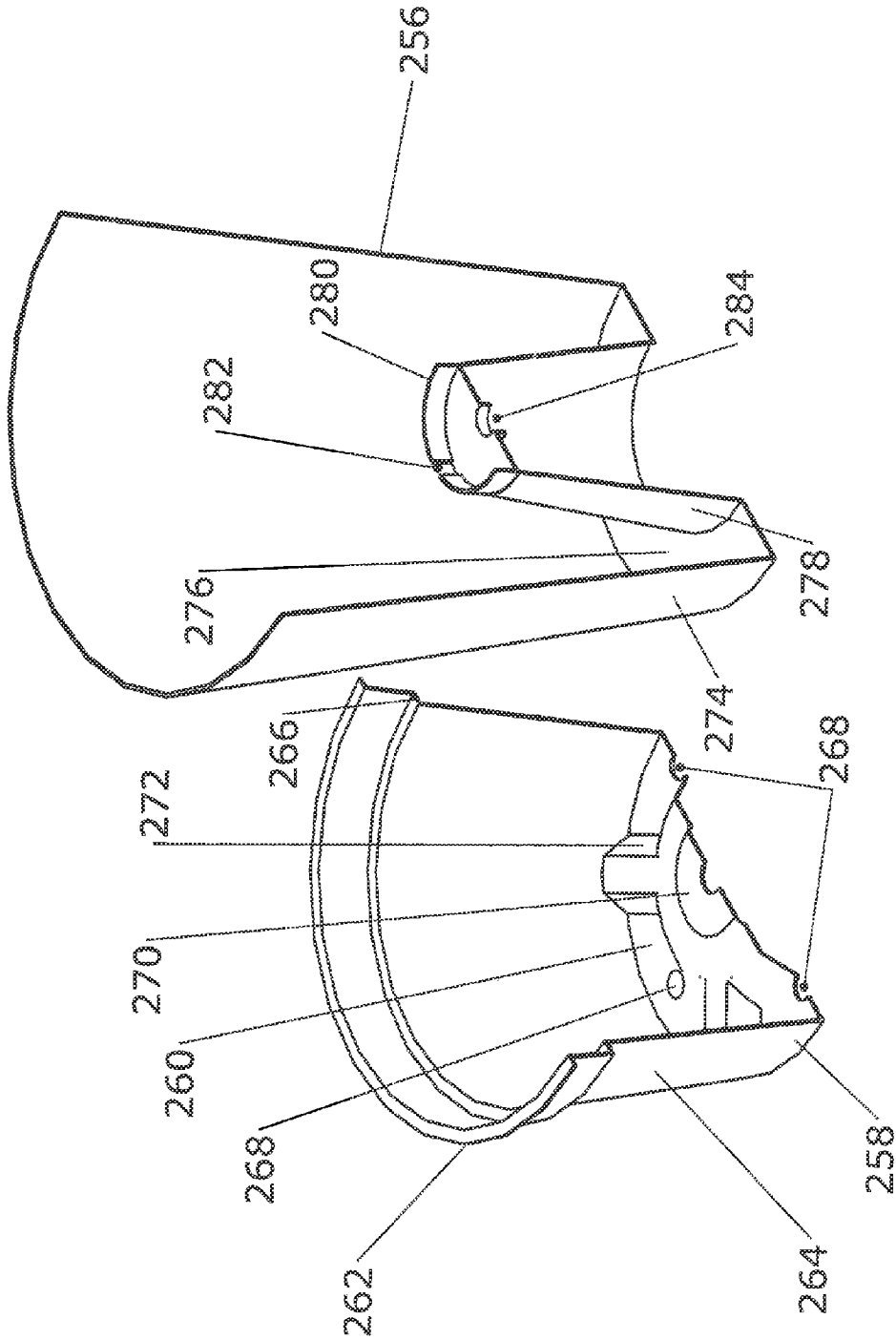


FIG. 30

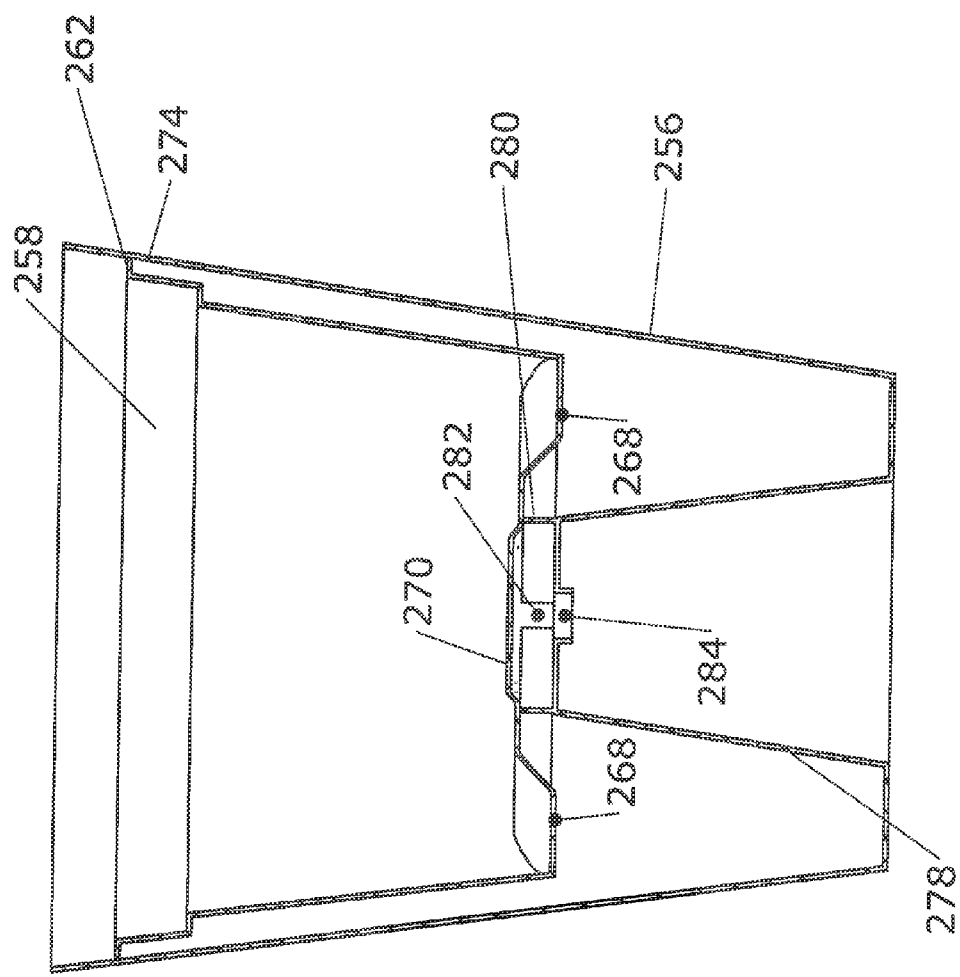


FIG. 31

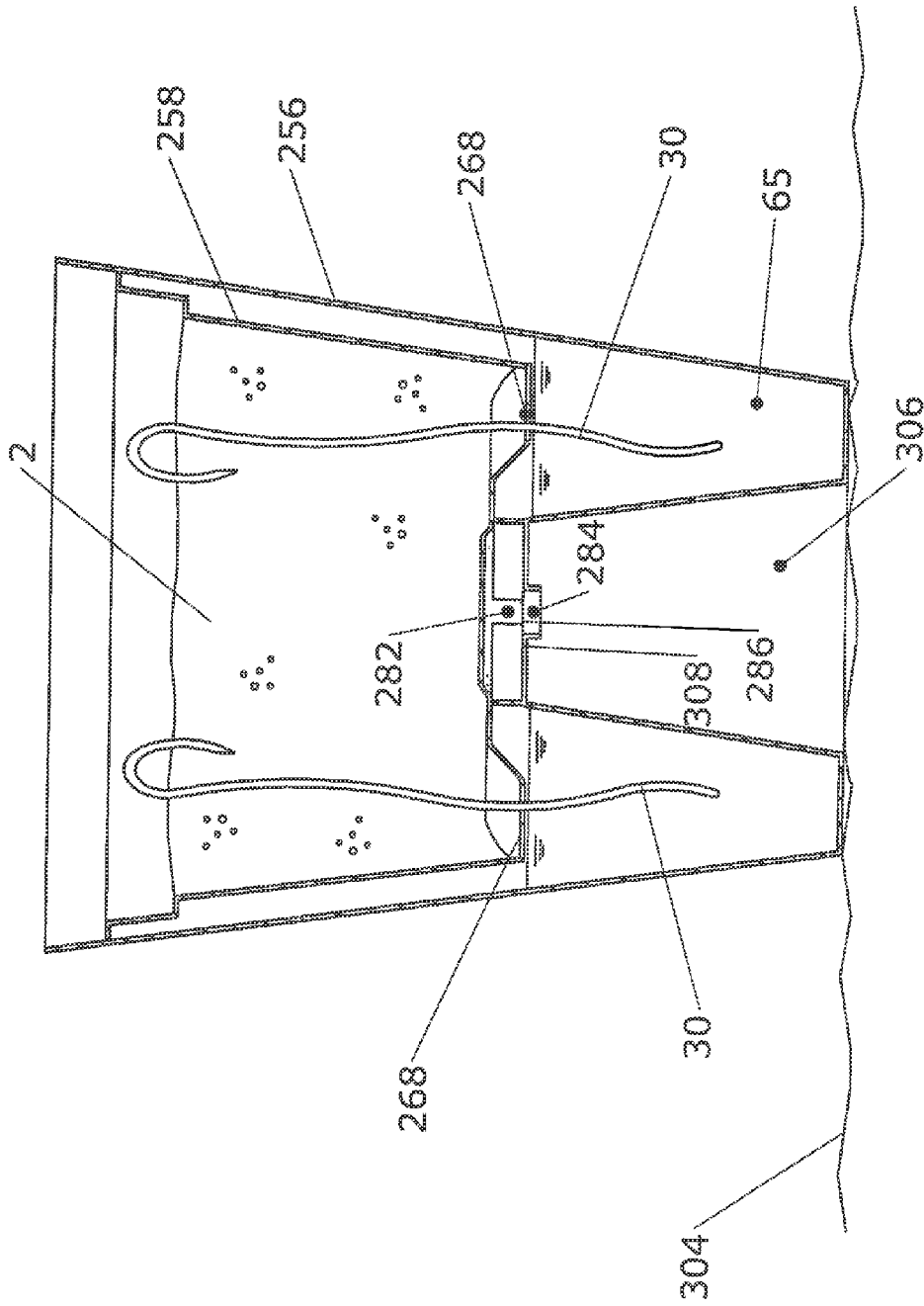


FIG. 32

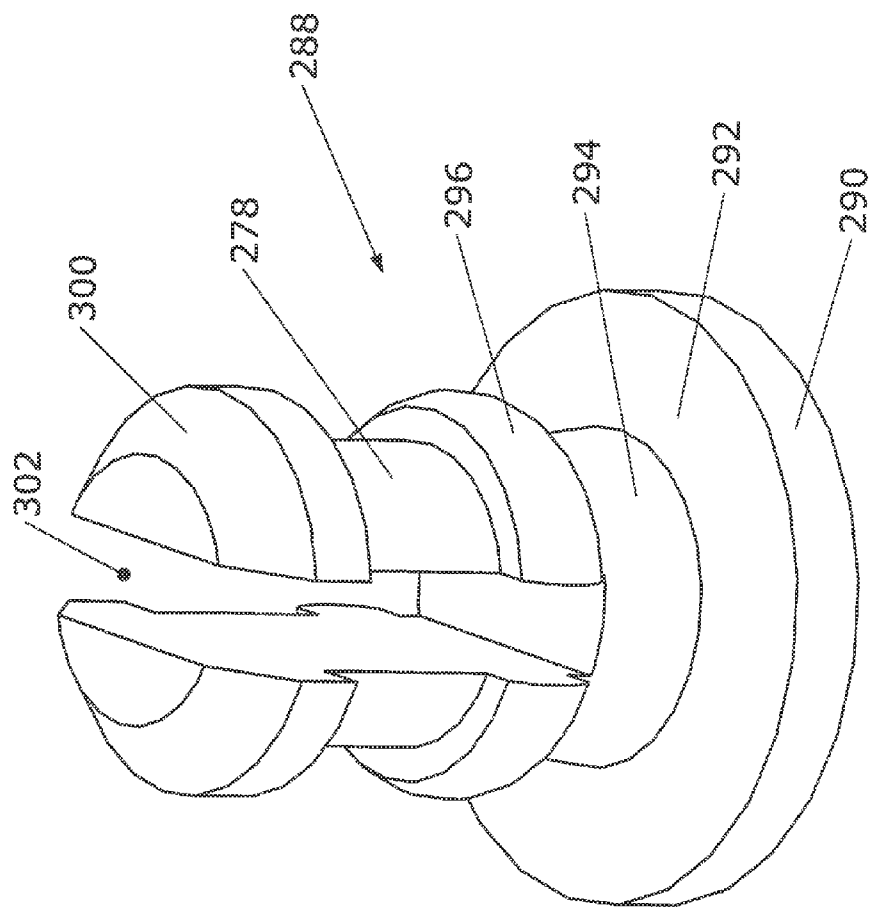


FIG. 33

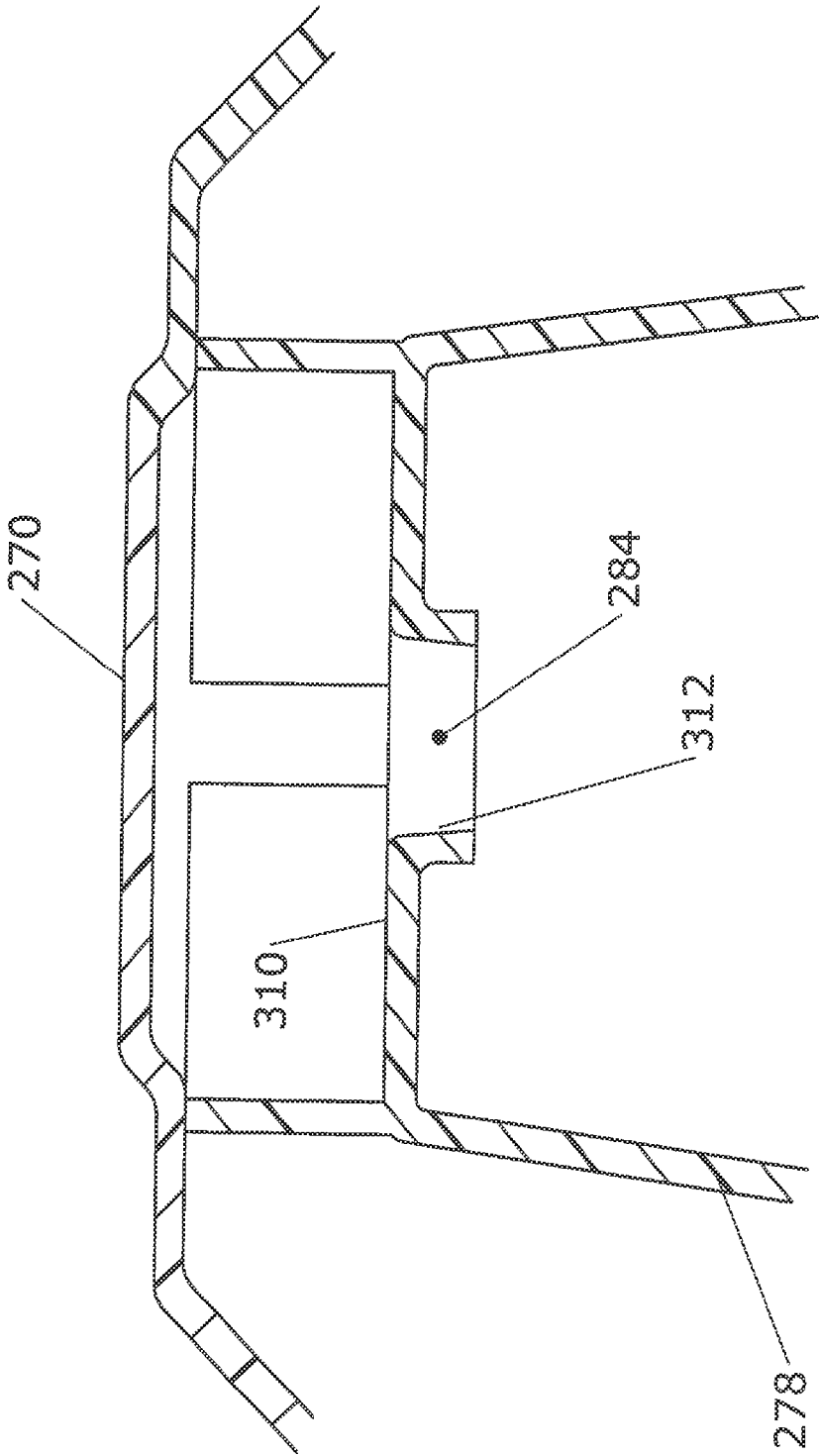


FIG. 34

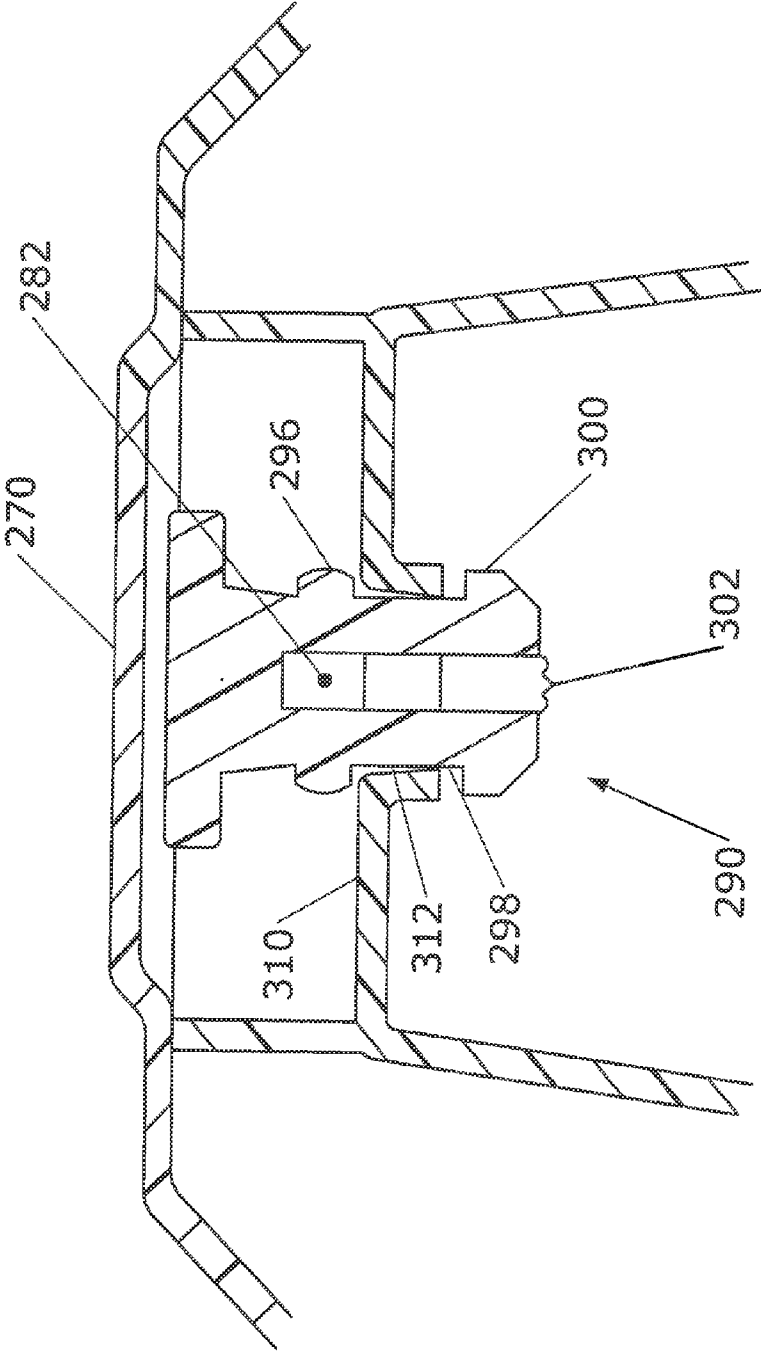


FIG. 35

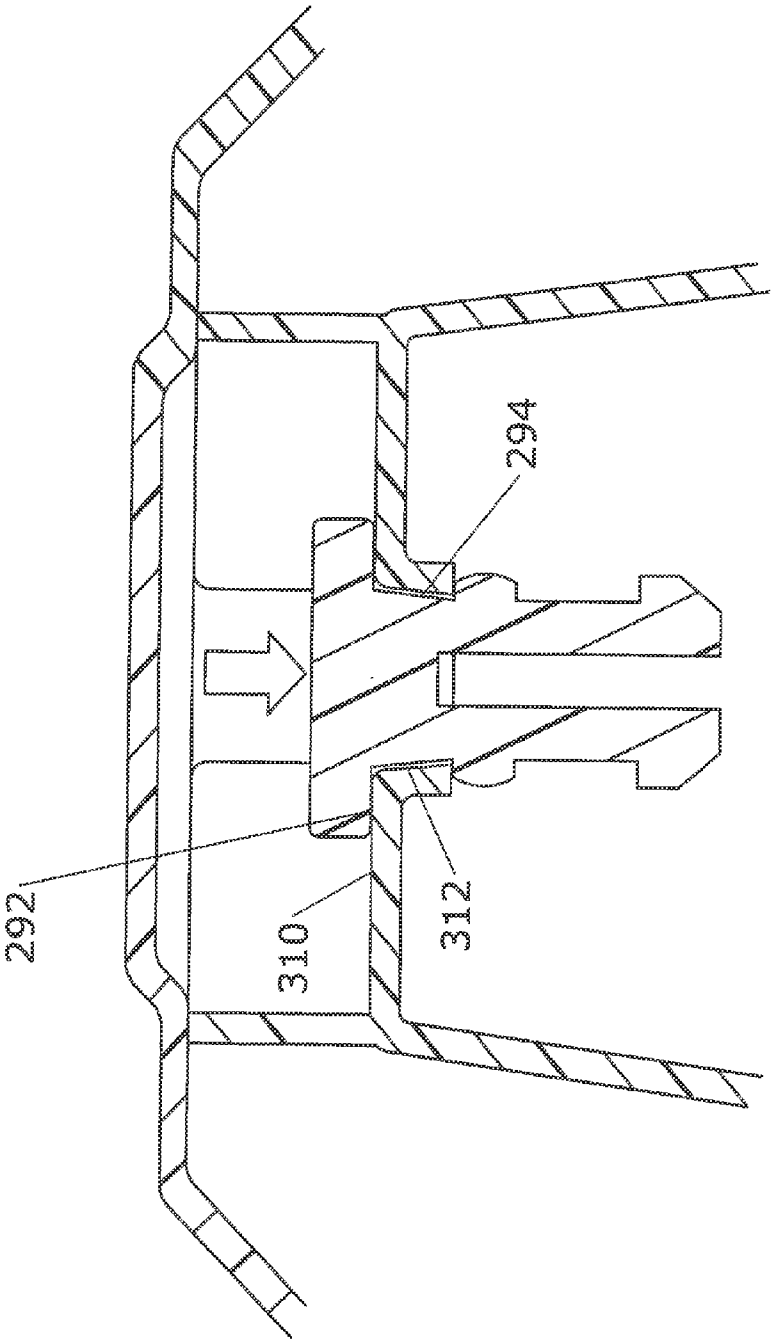


FIG. 36

PLANT CONTAINMENT SYSTEM HAVING TWO-POSITION VALVE

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

MICROFICHE APPENDIX

[0003] Not applicable.

BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention

[0005] The present invention relates to the field of agriculture. More specifically, the invention comprises a method for irrigating, storing, transporting, and displaying a plant growing in a pot. The invention includes a variable valve used to control the flow of liquid into and out of an integrated container and plant pot.

[0006] 2. Description of the Related Art

[0007] The invention is useful in the commercial nursery business where many potted plants are grown in bulk. However, the invention could also be used in a wide variety of agricultural applications and it is by no means limited to any particular portion of the field of agriculture.

[0008] Growing plants require water. The water may be furnished via rainfall, overspraying, drip irrigation, and other known techniques. Some plant species may be watered continuously without fear of damage. Other species are much more sensitive to the amount of water applied and the application must be regulated precisely.

[0009] It is known in the prior art to employ an “ebb and flood” approach to watering (alternatively referred to as an “ebb and flow” approach). In an ebb and flood system, a large amount of water is periodically applied to a group of potted plants (the “flood stage”). It is typical to drain the water so that it does not remain in contact with the potted plants for very long (the “ebb stage”). Drains may be provided in the pots in order to allow excess water to escape.

[0010] One objective of an ebb and flood system is to ensure an adequate water supply to each plant without oversaturating any particular plant. The flow control is efficient in such a system. It is common to provide many plants in a watertight (or mostly watertight) basin. This basin is flooded to a desired level and the water is allowed to stand for an interval in order to soak into the plants residing in the basin. A drain valve is then opened to remove the water.

[0011] In this manner, a large amount of water may be efficiently moved into and out of contact with the plants. The water removed may be pumped to another similar basin to create the “flood” cycle there while the “ebb” cycle is occurring in the original basin.

[0012] While the ebb and flood approach is effective, it does not work well for some plant species. In particular, some plant species that are sensitive to overwatering may not perform well where an ebb and flood system is used. It is known in the prior art to use a wick-based system to provide water to many different types of plant species. In this approach a wick

is inserted into the interior of the pot. One end of the wick extends out of the pot’s interior and is connected to a water source.

[0013] The wick slowly carries water and possibly dissolved nutrients into the interior of the potted plant. This approach is effective in ensuring an appropriate amount of water without fear of overwatering. However, the use of a wick often requires a complex series of connections between a water source and each individual potted plant. The water distribution is much more complex than is possible with an ebb and flood system. Accordingly, it would be desirable to provide a system that combines the advantages of a wick-based system with the advantages of an ebb and flood distribution system. This is an objective of some of the embodiments of the present invention.

[0014] However, as will be seen in the descriptive sections that follow, the present inventive method and system may be used in combination with many known irrigation methods. It is by no means limited to an ebb and flood system.

BRIEF SUMMARY OF THE PRESENT INVENTION

[0015] The present invention comprises a plant growing, transportation, display, and maintenance system including a plant pot and corresponding container having a selectable valve that controls the flow of liquid into and out of the container. In the “open” position, the valve allows water to pass into and out of the container in order to provide water to the contents of the plant pot resting in the container. In the “closed” position, the valve prevents any water flow into or out of the container.

[0016] The valve allows the assembly of plant pot and container to be “open” during irrigation cycles and “closed” when a fixed supply of water is to be maintained—such as for shipping and use purposes. The supply of water resides near and preferably below the bottom of the plant pot. In the preferred embodiments, one or more wicks extend from the interior of the plant pot down into the water supply. Each wick draws water from the water supply up into the interior of the plant pot.

[0017] In the preferred embodiments, the selectable valve is retained in an overflow opening in the container. In the preferred embodiments, the valve may be easily moved between the “open” and “closed” position using a linear motion such as pushing or pulling.

[0018] The assembly of the plant pot and container may preferably be combined with other systems. During the growing phase, the assembly may be combined with an ebb and flood irrigation system. During the display phase, the assembly may be combined with an external water supply such as contained in a trough—with the trough supplying water to the water supply within the container.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0019] FIG. 1 shows a schematic side view of a plant pot and a wick to be inserted in the plant pot;

[0020] FIG. 2 shows a schematic perspective view of the plant pot of FIG. 1 after insertion of the wick;

[0021] FIG. 3 shows a schematic partially cut away view of the plant pot of FIG. 1 and FIG. 2 with additionally a label;

[0022] FIG. 4 shows a schematic partially cut away view of an alternative plant pot with an added label;

[0023] FIG. 5 shows a schematic perspective view of an alternative embodiment of a plant pot and more detailed manner of arranging the wick;

[0024] FIG. 6 shows a schematic view of an alternative embodiment relative to FIG. 5 with respect to aligning and arranging a wick in the plant pot;

[0025] FIG. 7 shows a schematic view of a plant pot and container assembly in use in an ebb and flood based tray;

[0026] FIG. 8 shows a schematic top view of the plant pot and container assembly of FIG. 7;

[0027] FIG. 9 shows a schematic, partially broken away side view of the plant pot and container assembly of FIG. 7 and FIG. 8 with additionally a water level indicator;

[0028] FIG. 10 shows a schematic perspective view of a plant pot much like the one in FIGS. 5, 8 and 9 in an accommodating tray suitable for growing, transporting and displaying for sale of plants;

[0029] FIG. 11 shows a schematic side view along arrow XI in FIG. 10;

[0030] FIG. 12 and FIG. 13 show schematic top views of plant pots in an alternative accommodating tray suitable for growing, transporting and displaying for sale of plants;

[0031] FIG. 14 shows a perspective schematic view of a stack of trays with a collapsible structure between subsequent trays in the stack, wherein the trays are suitable for at least growing plants in pots and the stack is suitable for growing, transporting and displaying for sale of plants;

[0032] FIG. 15 shows a schematic side view of a collapsible structure in a collapsed state;

[0033] FIGS. 16-21 show a succession of steps and parts of a system for inserting a wick into a plant pot as depicted in FIGS. 1, 2 and 3;

[0034] FIG. 22 shows a schematic perspective view of a system adapted to accommodate plant pots with a wick, for instance for display plants for sale;

[0035] FIG. 23 shows a cross sectional schematic side view along arrow XXIII in FIG. 22;

[0036] FIG. 24 shows a schematic perspective view of an alternative configuration relative to FIG. 23;

[0037] FIG. 25 shows a further alternative embodiment exhibiting similar features relative to trays in FIGS. 12 and 13;

[0038] FIG. 27 shows an alternative relative to FIG. 8; and

[0039] FIG. 28 shows an arrangement for display for sale of plants in plant pots that can be formed from the assembly of FIGS. 14 and 15.

[0040] FIG. 29 is a perspective view, showing still another embodiment of a plant pot and corresponding container.

[0041] FIG. 30 is a perspective view with a cutaway, showing internal details of the plant pot and container shown in FIG. 29.

[0042] FIG. 31 is a sectional elevation view, showing an assembly of the plant pot and the container.

[0043] FIG. 32 is a sectional elevation view, showing the assembly of FIG. 31 with the addition of soil and a pair of wicks.

[0044] FIG. 33 is a perspective view, showing a sealing plug made according to the present invention.

[0045] FIG. 34 is a sectional detail view, showing the area of the overflow in the container.

[0046] FIG. 35 is a sectional detail view, showing the area of the overflow with a sealing plug in the "open" position.

[0047] FIG. 36 is a sectional detail view, showing the area of the overflow with a sealing plug in the "closed" position.

[0048]

REFERENCE NUMERALS IN THE DRAWINGS			
1	plant pot	2	soil
3	plant	4	wick
5	lance	6	hole
7	root	8	head
9	loop	10	label
11	string	12	knot
13	hole	14	drive
20	plant pot	21	bottom
22	side wall	23	indentation
24	container	25	water supply
26	channel	27	float
28	label	29	indicators
30	wick	31	needle
32	engaging head	33	lance
34	hole	35	recess
36	wheel	40	lance
41	plant pot	42	bottom
43	hole	44	running wheel
45	running wheel	46	running wheel
47	side wall	48	camera
49	engaging head	60	plant pot
61	plant	62	label
63	wick	64	container
65	water supply	66	overflow
67	rim	70	tray
71	bottom	72	side wall
73	outflow	74	shift plate
75	water tap	80	tray
81	articulated bottom	82	recess
83	shoulder	84	depression
85	channel	90	tray
91	bottom	92	wall part
93	protrusion	94	separator beam
95	upright profile part		
96	crossbar profile part		
97	plant pot	98	plant pot
99	pot	100	pallet
101	wheeled, base	102	hole
105	collapsible frame	106	tray
107	upright	108	strip
109	hinge	110	banner
111	plant pot	200	insertion system
201	plant pot	202	supply
203	wick material	204	grippers
205	right gripper	206	left gripper
207	right holder	208	left holder
209	knife	210	hole
211	lance	212	hook shaped guide
213	drive	220	transport device
221	frame	222	support
223	plant pot	224	support
225	water	226	flap
227	wick	228	carrier element
230	cover	231	hole
232	grating	235	shoulder
236	protrusion	237	T-shaped profile
240	plant pot	241	soil
242	wick	243	stretching element
250	conventional pot	251	soil
252	plant	253	overpot
254	water	255	wick
256	container	258	plant pot
260	bottom	262	top flange
264	side wall	268	hole
270	central portion	272	rib
274	side wall	276	bottom
278	central tower	280	support ring
282	gap	284	overflow
286	overflow level	288	plug
290	sealing plate	292	sealing surface
294	tapered plug	296	rib

-continued

REFERENCE NUMERALS IN THE DRAWINGS			
298	cylinder	300	retaining expansion
302	transverse slot	304	floor
310	horizontal surface	312	tapered side wall

DETAILED DESCRIPTION OF THE INVENTION

[0049] FIG. 1 shows a plant pot 1, containing soil 2 or any suitable substrate, like coco, peat, stone wool or glass wool or the like. Also in plant pot 1 a plant 3 is shown to clarify the purpose of the plant pot. However, at the stage depicted in FIG. 1 more usually a plant 3 will not already be growing in the soil 2.

[0050] Plant pot 1 comprises a number of bottom holes 6 in the bottom thereof. These are customary and pre-arranged or may be drilled in the plant pot 1 at a time just before the step of inserting the wick is to be executed. For instance customary holes 6 may allow a surplus of water to be discharged from the plant pot 1, and/or roots 7 of a plant 3. The plant may also be provided with air through the bottom holes or may be allowed to grow through the holes 6 in the bottom of the plant pot. A newly drilled hole may be provided in a plant pot 1 solely for the purpose of arranging a wick 4. Notwithstanding the method of creating the hole 6 (during production of the plant pot 1 or later, just before inserting the wick), measures need to be taken to allow aligned inserting of the wick 4 through the hole 6.

[0051] In FIG. 1 an inserting lance 5 is shown, forming a part of a system for processing plant pots 1, of which in FIG. 1 only the inserting lance 5 is shown in conjunction with a drive 14. The inserting lance 5 has an engaging head 8, which is hook-shaped in order to engage the wick 4. The wick 4 has a predetermined length, and the engaging head 8 is arranged to engage the wick 4 approximately midway. At this time the wick may be tensioned as shown in and described below referring to FIGS. 16-21. Where in the present specification an inserting lance is referred to, this expression is intended to encompass all possible equivalents, such as a needle, a simple stick or rod, or any other elongate element capable of being aligned to a bottom hole and driven there through, and enabling that the wick is engaged and inserted through the pot's bottom hole.

[0052] The engaging head 8 is to have sufficiently small dimensions to pass the inserting lance 5 with the engaging head 8 through one of the bottom holes 6 of the plant pot 1, when the drive 14 is selectively operated or activated. In order to be driven through a selected one of the bottom holes 6 in the bottom of the plant pot 1, the inserting lance 5 with the engaging head 8 is connected to the drive 14. The drive 14 enables the inserting lance 5 with the engaging head 8 to be inserted into and withdrawn back out of the plant pot 1 through the bottom hole 6 thereof in the direction of double arrow C. Thereby, the inserting lance 5 is driven upwards, taking the wick 4 along to be extended into the soil 2 in the plant pot 1. Thereafter, the inserting lance 5 is retracted by the drive 14 in a downward direction in the schematic representation of FIG. 1, leaving the wick 4 behind. The inserting speed of the inserting lance 5 may vary and depend for instance on the consistency of the soil or other substrate in the plant pot. Speeds of more than 0.2 inches per second up to 6.0 inches per second (0.5 cm/s up to 15 cm/s) may be effective

for inserting the wick 4 using the lance and the drive 14 thereof. For automated applications as envisaged here with the present invention, the inserting speed may vary also and depend on (or at least correspond with) the supply and throughput speed of the plant pots. Preferred inserting speeds may be approximately 0.8-4.0 inches per second (2-10 cm/s).

[0053] The wick 4 can be made from any suitable material that can exhibit a capillary action, such as a fibrous material, a woven or non-woven material, cotton, woven cotton rope, wool, acrylic string, hemp rope, synthetic shoe laces, chamois e.g. 100% rayon, braided polypropylene rope, nylon rope, etc. The wick material may be synthetic and/or natural, and/or designed not to be susceptible to rotting or quite the opposite—be allowed to rot in the course of time.

[0054] It is noted here that one or more than one additional wicks may be inserted into a singular plant pot 1, which is schematically represented with arrow C' and second wick 4', which is shown in a dashed line. This may especially be called for in case of larger diameter pots for relatively large plants and/or if bottom holes 6 are small in relation to a desired wick thickness, where a desired water pull up capacity may be achieved using a plurality of wicks, optionally inserted in or through one bottom hole 6 or through a plurality of separate bottom holes 6.

[0055] Bottom holes may be dimensioned to have a diameter or effective opening (for instance in case of square holes) of 0.015 square inches to 0.775 square inches (0.1 cm²-5 cm²), more preferably a size between 0.031 square inches to 0.630 square inches (2-4 cm²) and even more preferably a size of approximately 0.047 square inches to 0.465 square inches (0.3-3 cm²). The engaging head 8 must be dimensioned to pass through the bottom holes 6, without damage to the plant pots in the vicinity of the bottom holes 6. Either the holes (when designing the plant pot to correspond with the inserting head) of the head of the inserting lance (when designing the inserting lance, for instance to be used with pots of standard sizes) or both must be made to correspond. Also, the choice of wick material must take the size of the bottom hole into account in particular since—as described below—the wick is doubled up in itself. Thus the wick may have dimensions, that are at most equal to half the free or effective opening of the bottom holes, into or through which it is to be inserted.

[0056] The pot may have any suitable and possibly commercially already available size, in non-limiting examples: a height of 4.33 inches (11 cm) and a top rim diameter of 4.72 inches (12 cm); a height of 6.30 inches (16 cm) and a top rim diameter of 6.69 inches (17 cm); or a height of 6.38 inches (16.2 cm) and a top rim diameter of 7.36 inches (18.7 cm), etc. The size of the plant pots in fact does not really matter for the scope of the invention.

[0057] In FIG. 16, a more detailed representation is shown of a system 200 for inserting a wick into a plant pot 201. The system comprises a storage and supply 202 containing an uncut length of wire, cable, fabric or other wick material 203, which is fed to a pair of grippers 204. Alternatively, a pre-cut length of wick can be provided for inserting into the pot 201. The right most gripper 205 engages the uncut wick material 203, whereas the left gripper 206 does not engage the uncut wick material, in the representation of FIG. 16. The right gripper 205 then is moved to the right in FIG. 17, in the direction of arrow H, pulling the uncut wick material 203 through the open left gripper 206.

[0058] Thereafter, the left gripper 206 is driven to engage the uncut wick material 203, and the combination of the right

gripper 205 and the left gripper 206, both engaging the uncut wick material 203, are moved in the direction of arrows I toward a pair of holders 207, 208, which can, just like the grippers 205, 206, be selectively activated to engage the uncut wick material 203. Moving from FIG. 18 to FIG. 19, the holders 207, 208 have been activated to engage the uncut wick material 203, whereafter the grippers 205, 206 can be moved back in the direction of arrows K, after the right gripper 205 has disengaged the uncut wick material 203. The left gripper 206 keeps engaging the wick material 203. Thereafter, moving from FIG. 19 to FIG. 20, the right gripper 205 is brought back to the vicinity of the left gripper 206 in the direction of arrow L and made to engage the uncut wick material 203. Thereafter, a knife 209 is brought down on the uncut wick material 203, which is tensioned between engaging left holder 208 and the right gripper 205 as a result a desired length of wick material 203 is made available for inserting thereof through hole 210 in plant pot 201, which predetermined length of wick material 203 is at that point of progress as shown in FIG. 20 still engaged by the right holder 207 and the left holder 208. The wick material may also be severed or cut using alternative means for the knife, such as a laser or heat source, a saw, scissors or a cutting clamp, and the like.

[0059] Hook shaped guides 212 are arranged on opposite sides relative to one another and the intermediate inserting lance 211, to guide the wick material 203 during an upward movement of the lance 211 when the drive 213 is activated or operated to move the lance 211 in the direction of arrow C (and back).

[0060] Once the determined and pre-cut length of wick material 203 is engaged by the tip of the inserting lance 211, the left holder 208 and the right holder 207 may disengage the cut length of wick material 203. Alternatively, the holders 207, 208 may keep their engagement on the cut length of wick material 203 during the inserting movement in the direction of arrow C of the inserting wick 211, as a consequence of which the holders 207, 208 must be arranged in a movable fashion to move towards and away from the inserting lance 211 in a horizontal direction in the representation of FIG. 21. After the wick has been introduced sufficiently, the holders should disengage the cut length of the wick so as not to pull the wick out of the plant pot.

[0061] In the meantime, in FIG. 21, the left gripper 206 will have disengaged the uncut wick material 203, so that after withdrawal of the inserting lance 211 from the plant pot 201, the starting configuration of FIG. 16 is reestablished. Thereafter, a new plant pot 201 can be subjected to the operations of a system which schematically functions in accordance with the representation of FIGS. 16-21.

[0062] In FIG. 2 an intermediate configuration is shown, which results from the actions in FIG. 1 and described herein above.

[0063] As a consequence of the feature that the engaging head 8 of the inserting lance 5 engages the wick 4 about midway, after inserting the inserting lance 5 through the bottom hole 6 all the way up to above the top level of the soil 2 and retracting the inserting wick 5 again, a loop 9 in the wick 4 results. This loop 9 is shown in FIG. 2, and entails that the wick 4 is folded double—back on itself.

[0064] Moreover, in the insert detail in FIG. 2, the practical use of a wick 4 in a plant pot 1 is depicted. The wick 4 is designed for and intended to suck up fluid, such as water, into the soil in the plant pot 1. To this end, a supply of water can be provided underneath the plant pot, in a growing situation

following arranging of the wick 4. It has been detected that growth of roots 7, as shown in the insert detail in FIG. 2, is drawn towards the wick 4 and the supply of water, provided thereby. Consequently, providing additional wicks (as schematically shown in FIG. 1) may be beneficial to obtain a more homogeneous distribution of roots 7 through the soil 2 in the plant pot 1. However, as a contrary consideration, provision of water to the insides of the plant pot 1 should not be excessive for any specific species of plant. Some species of plants can be provided with practically unlimited amounts of water, whereas other plants can exhibit deterioration of the roots 7, for instance a rotting process, if an excess of water is furnished.

[0065] In FIG. 3 a further feature according to the present invention is shown. The feature relates to a label 10 forming an anchor in the sense of specific embodiments of the present invention, which is arranged on or to the loop 9 in the wick 4. In FIG. 3 the label 10 is connected to the loop 9, using a string 11, which may be tied into a knot 12. The string 11 may be arranged through the loop 9 and a hole 13 in the label 10. Alternatively, an incision can be arranged in the label from an outside edge thereof to extend through the hole 13. In such an alternate embodiment, the loop 9 of the wick 4 can be forced through the incision to arrange the loop 9 in the hole 13 to connect the label 10 to the wick 4.

[0066] In FIG. 4 yet another alternate embodiment is shown, wherein a single strand of the wick 4 is inserted, for instance, though not exclusively, through the bottom hole 6 of the plant pot 1 to extend to a height above the top level of the soil 2 in the plant pot 1. The free end of the wick 4 may then be inserted through the hole 13 in the label 10 and doubled back upon itself in order to tie a knot or otherwise close a loop.

[0067] With a label, attached to a wick 4 in at least one of the above described manners or any alternative configuration, a double function can be achieved. Information about the plant 3 in the plant pot 1 can be furnished to an end user or consumer on the label 10. Simultaneously, since the label at least also extends in a direction across the slender wick, it may be prevented that the wick 4 in a doubled or singular configuration can sink through the soil 2. In this sense the label—or any alternative element—is referred to as an anchor. As a consequence the beneficial effects of such a wick 4, as depicted in the inserted detail in FIG. 2, could be lost. Providing the label 10 to thus form an anchor and arranging the anchor forming label to or on the wick 4 can ensure continued beneficial effect of the wick and simultaneously present an end user or consumer with information about the plant.

[0068] FIG. 26 shows a plant pot 240 with soil 241 or any other suitable substrate and a wick 242 inserted therein, for instance in the above described manner. The wick 242 forms a loop above the top level of the soil 241. To avoid the wick from sinking back down through the soil 241, an anchor forming stretching element 243 is provided. The stretching element exerts a spreading force in the direction of arrows H on the loop in the wick 242 (across the direction of the wick and the loop therein), to stretch the loop open and thus prevent the wick 242 from sinking down into the soil 241. Any similar and even non-stretching element may be employed in this manner, and may even for instance provide an attachment for a label. For instance the element 243 may be a locking medalion adapted to prevent the wick from sinking down into the soil 241 and provide a universal base for attaching differing labels thereto. Any element or component that is suitable or intended for keeping the wick 242 from sinking down into the

soil **241** or other substrate in the plant pot, can and will be referred to as an anchor in the sense of the present invention.

[0069] In FIG. 5 a specific plant pot **20** is shown in an embodiment according to the present invention. The plant pot **20** has a bottom **21** and side walls **22**. In a top view, such as for instance shown in FIG. 8, the side walls **22** are essentially circular, but exhibit inward oriented indentations **23**. Plant pot **20** is designed and intended to be arranged in a container, such as shown in for instance FIGS. 8 and 9. The container **24** can have the appearance, shape and form of essentially a plant pot itself. However, the container would in use normally serve the purpose of providing a water supply, as more specifically depicted in FIG. 9. In the bottom of the container **24** a supply **25** of water is arranged. The water supply **25** in the container **24** can be supplemented via the channels **26** that are defined between the inner wall of the container **24** and the indentations **23** in the side walls **22** of the plant pot **20**. Administering additional water for the water supply **25** can be achieved in the direction of arrows G in FIG. 8.

[0070] Any one or more than one of the channels **26** can also accommodate a float or straw **27**, of which at least a portion extends into the water supply **25**, and which exhibits a desired degree of buoyancy. A straw may be closed at bottom end thereof to impart said desired degree of buoyancy to the straw. A label **28** can be attached to the free end of the float or straw **27**, on which label **28** information about the plant can be printed for the end user or consumer. Moreover, the height of the float or straw **27** at any given time is an indication of the water level of the water supply **25** in the container **24**. Consequently, during growth, production, transport, offer for sale, or at the home of the end user or consumer, a clear indication can be obtained from the height of the float or straw **27** about the need for supplementing water into the water supply **25** in the container **24**.

[0071] It is to be noted that specific indicators **29** can be printed or otherwise arranged on the float or straw **27** to furnish a more specific indication of an amount of water needed to bring the water supply **25** up to a desired level. The indicators **29** can be dependent on the type of plant in the plant pot **20**. It is to be noted that also in the configuration according to FIG. 9 a wick **30** is arranged in the plant pot **20**, more in particular the wick **30** is arranged in the plant pot **20** before the plant pot **20** is accommodated in the container **24**.

[0072] In FIG. 5 additional or alternative features for arranging a wick **30** into plant pot **20** are shown, in relation to the description of FIG. 1. Herein, the inserting lance **33** comprises a needle **31** having a U-shaped engaging head **32**, which is U-shaped in side view. The wick **30** is to be accommodated in the U-shaped engaging head **32** prior to the needle **31** being driven through any one of the holes **34** in the bottom **21** of the plant pot **20**. Again, the inserting lance **33** is driven up through a selected one of the holes **34** in the bottom **21** of the plant pot **20** and retracted after having extended up to at least the top level of the soil **2** in the plant pot **20**. Thereafter, the inserting lance **33** is retracted, again following the movements indicated in FIG. 5 with double arrow C.

[0073] According to the present invention aligning the inserting lance **33** with a selected one of the holes **34** is achieved in the following manner.

[0074] In the embodiment of FIG. 5 the bottom **21** of the plant pot **20** comprises an essentially star-shaped recess **35**, which is surrounded by the holes **34**, through which the inserting lance **33** may be inserted. The shape of the star-shaped recess **35** corresponds with that of a toothed wheel **36**.

The toothed wheel **36** is arranged at a stationary height that is simultaneously arranged for rotation in the direction of arrow B (or an opposite direction). Plant pot **20** can be arranged in the direction of arrow A on top of toothed wheel **36**, whereby the recess **35** may accommodate the toothed wheel **36**. Consequently, the toothed wheel **36** can be driven in the direction of arrow B (or an opposite direction) such that a selected one of the holes **34** will be aligned with the movement in the direction of double arrow C of the inserting lance **33**. Due to the correspondence of the shape of the recess **35** and that of the toothed wheel **36**, rotation of the toothed wheel **36** will also result in rotation of the plant pot **20** to bring any one of the holes **34** into alignment with the inserting direction of arrow C of the inserting lance **33**. Consequently, any one of the holes **34** may be a selected hole, if it can be aligned with the inserting lance **33** in the above described manner first.

[0075] The holes **34** in the bottom **21** of the plant pot **20** are arranged in a predetermined configuration relative to the shape and position of the recess **35**. Consequently, in this embodiment, a plurality of rotational movements in the direction of arrow B (or in the opposite direction) can be executed to align any one of the holes **34** with the inserting lance **33**. Thus the amount of rotation may be minimized to align an arbitrary one of the holes and the inserting lance, where the position of each hole is known beforehand through a predefined relation between the toothed wheel **36** and the recess **35** on the one hand and the positions of the holes **34** on the other hand. In the case of a regular shape of the toothed wheel **36** and recess, for instance, the holes may each be arranged between points of the star shape in FIG. 5 and at a predefined distance from the centre of the bottom of the plant pot (or this may be the case for at least some of the holes). If this relationship is known, the position of each hole and alignment of any hole with the lance will be known to have been achieved at a reached rotational position of the wheel **36** and therewith the plant pot **20**.

[0076] The shape of the recess **35** and that of the toothed wheel **36** can be arbitrarily chosen by the skilled person. Of importance in such a choice of shape is the ability to drive the plant pot **20** in a rotational movement in accordance with arrow B in FIG. 5, and simultaneously define positions of the holes **34** in the bottom **21** of the plant pot **20** in order to achieve alignment of any one of these holes **34** with the inserting lance. For instance, the shape of the recess **35** and that of the wheel **36** could be oval, triangular, a pentagram, etc.

[0077] It is to be noted that the present embodiment according to FIG. 5 requires some adaptation to the bottom **21** of the plant pot **20**. Some plant pots may have central recesses in the bottom thereof, and a specialized wheel can be configured to engage these central recesses. Upright walls of such recesses may also have slits, which can be engaged by a specific embodiment of a wheel that can be comparable with the toothed wheel **36** to engage the plant pot in the slits of the central recess rather than to provide a special star-shaped or other particular recess like the one **35** in FIG. 5.

[0078] As yet another alternative embodiment, as shown in FIG. 6, an inserting lance **40** can be aligned to holes **43** in a bottom **42** of a plant pot **41**, even without a central recess. In the embodiment that is shown in FIG. 6, running wheels **44**, **45** and **46** are distributed around the circumference of the side wall **47** of the plant pot **41**. After a plant pot **41** is provided, the running wheels **44**, **45** and **46** can be made to abut against the outer service of the side walls **47** of the plant pot **41** by

displacement of the running wheels **44**, **45** and **46** in the direction of arrows D. By subsequently driving the running wheels **44**, **45** and **46**, which are evenly distributed around the circumference of the plant pot **41** in a rotational movement of each singular running wheel **44**, **45** and **46**, a rotation of the plant pot **41** in the direction of arrow B (or the opposite direction) can be achieved. At such a rotational movement in the direction of arrow B of the plant pot **41**, a camera **48** or any suitable imaging or vision means can be oriented at the bottom **42** of the plant pot **41**, the two determine at which rotational position of the plant pot **41** the inserting lance **40** is aligned with any one and more in particular a selected one of the holes **43** in the bottom **42** of the plant pot **41**. When such alignment is detected, the running wheels **44**, **45** and **46** are arrested or halted to allow the inserting lance **40** to be inserted into and through the aligned one of the holes **43**. With a wick (not shown in FIG. 6) accommodated in the U-shaped engaging head **49**, the (not shown) wick can be arranged through the aligned one of the holes **43** and into the soil in the plant pot **41** to achieve a result, much the same as the one shown in FIG. 3. However, in this embodiment, no adaptation of the bottom **42** of the plant pot **41** is required.

[0079] It is to be noted here, that also other rotational drives can be employed that do not necessarily engage the outer surface of the side walls **47** of the plant pot **41**, but may for instance engage the top rim **49** of the plant pot **41**, or yet another alternative, wherein any one of the holes **43** may be engaged to drive the plant pot **41** in a rotational movement to align another one of the holes **43** in the bottom **42** of the plant pot **41**.

[0080] In FIG. 7 an embodiment of use of a plant pot **60** is depicted in a configuration, also according to the present application for growing the plants **61** in a controlled manner. Plant pot **60** is provided with a wick **63**, to which a label **62** is arranged above the top surface of the soil in the plant pot **60**. The plant **61** grows in that soil. The plant pot **60** can be accommodated in a container **64**, containing a water supply **65**. The wick **63** may serve to draw up water from the supply **65** into the soil in the plant pot **60**, after the plant pot **60** is accommodated in the container **64** in the direction of double arrow E, after which a rim **67** of the plant pot **60** rests on the top circumferential edge of the container **64** to keep the bottom of the plant pot **60** above the normal level (depicted in FIG. 7) of the water supply **65**. The plant pot **60** may also be extracted from the container **64**, for which reason the arrow E is double.

[0081] The container **64** comprises an overflow **66**, defining a free passage for entry and/or outflow of water into and out of the container **64**. The overflow **66** is arranged at a height in the side wall of the container **64** below the bottom of a plant pot **60** accommodated in the container **64**. Thus the bottom of the plant pot **60** is above the level of the water supply **65** inside the container **64**. Thus the remaining height of the container **64** above the overflow **66** corresponds with the height of the plant pot **60**, in that the remaining height of the container **64** exceeds the height of the plant pot **60**. Further the overflow is at such a height, that the water supply **65** in the container **64** suffices for an intended purpose, such as to sustain growth of a plant in the plant pot **60** via the wick **63** for a predetermined period of time during development of the plant or for instance to prevent the plant from withering during transport or display for sale. The overflow **66** may be closed using a plug or the like, for instance during transport, to ensure the availability of the water supply **65** for the plant. The assembly of the con-

tainer **64** and the plant pot **60** would then be transported together in an assembled state thereof.

[0082] The container **64** is, in the embodiment of FIG. 7, arranged in a tray **70** comprising a bottom **71** and side walls **72**. In one of these side walls **72** an outflow **73** is provided, which in a simple embodiment can entail no more than a simple hole. The outflow **73** can be closed, using a shift plate **74** or any suitable means. The shift plate **74** is movable in the direction of double arrow F to either close the outflow **73** or allow free passage of water from the tray **70**. Further, the tray **70** is combined with a water tap **75** to add water into the tray **70**. Using the water tap **75**, the water level in the tray **70** can be increased to above the overflow **66**, and consequently also within the container **64** via the overflow **66**. The soil in the plant pot **60** can thereby be fully saturated. Thereafter, the water tap **75** can be closed and the shift plate **74**, forming a type of valve, can be opened to free the outflow **73** and lower the level of water in the tray **70**. At such a time, also the water level within the container **64** will lower, after which water supply to the soil in the plant pot **60** will be achieved mainly using the wick **63**. This increasing and lowering of a water level within the tray **70** is schematically represented, that is generally referred to as an ebb and flood system, which has proven useful and reliable for regulating humidity of the soil in plant pots, although this has not previously been achieved using a combination thereof with a wick **63** and/or with a container like the container **64** in FIG. 7.

[0083] FIG. 27 shows an alternative with a conventional pot **250** without the indentations **23** of the pot in FIG. 8 but with a wick **255** and an overpot **253** without an overflow instead of the container **24** of FIG. 8. In this alternative of FIG. 27, the pot **250** contains soil **251** for a plant **252**, to which water may be supplied in the direction of arrow I. Since there are no indentations **23**, no channels are available to supply water to lower parts of the overpot **253**. Water then trickles down through the pot **250** and is caught in overpot **253** to form a reservoir at the bottom thereof. At the bottom of the pot **250**, a wick **255** extends into water **254** in the bottom of overpot **253**, to suck or draw up water for the plant **252**. The plant **252** may be transported in the plant pot **250** and in the overpot **253**, but intended and envisaged use is for the plant in the pot **250** to be taken out of the overpot **253** for transport, as a consequence of which the overpot stays at the grower.

[0084] In FIG. 10 and FIG. 11 a tray **80** is shown in combination with a plant pot **20**, which for the sake of the exemplarily embodiment here is the same plant pot as the one depicted in FIGS. 5, 8 and 9. Tray **80** has an articulated bottom, having recesses **82**, which has a shape and form to accommodate the bottom **21** of a plant pot **20** in a preferably close fitting manner. In the context of this disclosure, the term "articulated" means having sections that are joined together into a unified whole. It does not imply that the joints involved are flexible and does not imply that the joints allow significant movement between the sections.

[0085] Each recess **82**, as shown in FIG. 11, comprises a shoulder **83**, which acts as a support for the plant pot **20**, when the bottom **21** of the plant pot **20** is inserted into an intended one of the recesses **82**.

[0086] The shoulder **83** surrounds a further depression **84**, which acts as a reservoir for water when the plant pot **20** is accommodated in the recess **82**, where the wick **30** will extend into this further depression **84** to draw up water from the reservoir formed by the further depression **84**.

[0087] Between neighbouring recesses **82** and further depressions **84** in the articulated bottom **81** of the tray **80** channels **85** are defined. The channels **85** allow for distribution of water over the recesses **82** and further depressions **84**, to which end the channels have a depth corresponding with the lowermost portions of the further depressions **84**, so that water is distributed over the further depressions **84**, even when plant pots **20** are accommodated in the recesses **82**. It is to be noted that the indentations **23** in the side walls **22** of the plant pot **20** in a proper orientation of the plant pot **20** in the recess **82** of the tray **80** allow water to be supplemented into the reservoir formed by the further depression **84**.

[0088] Consequently, water can be administered to the plants directly, using specifically watering means or by simply spraying or sprinkling water into the tray **8**. For such wide spread watering, a watering boom (not shown) can be employed, whereby a considerable simplification for watering plants can be achieved in this embodiment.

[0089] The tray **80** of FIG. **10** or FIG. **11** can be used for growing plants or maybe even for transporting plants in the plant pots **20**. Such trays **80** may even be used for display purposes.

[0090] Likewise, FIG. **12** and FIG. **13** show a further example of a tray **90** having a bottom **91** and upright wall parts **92**, surrounding the bottom **91**. The bottom **91** of the tray **90** is provided with protrusions **93** in two rows along the longer sides of the tray **90**. The protrusions define an intermediate space, into which a separator beam **94** can be inserted. The separator beam **94** is an T-profile, as shown in the insert detail of FIG. **12**. The upright profile part **95** of the T-shaped separator beam **94** can be inserted into the space defined between two neighbouring protrusions **93**, while simultaneously the crossbar profile part **96** of the separator beam **94** defines an intermediate space between neighbouring plant pots on opposite sides of the separator beam **94**. As shown in FIG. **13**, a relatively large plant pot **98** can stably be arranged between a side wall **92** of the tray and a separator beam **94**, inserted therein, whilst smaller pots **99** can be safely and stably arranged between neighbouring separator beams **94**. Even relatively small plant pots **97** can be transported in a stable manner and even displayed at a point of sale, accommodated between a side wall **92** of the tray **90** and an inserted separator beam **94**.

[0091] In order to emphasize the usability of separable types of trays in combination with plant pots for growing plants, transporting the plant pots and offering the plants for sale in the form of a display, FIGS. **14** and **15** show that a wheeled base **101** can be arranged on top of a pallet **100**, more in particular with the wheels of the wheeled base **101** sunk into holes **102** in the top of the pallet **100**. The holes **102** can be arranged cross the top surface of the pallet **100**, but slight depressions may also serve the purpose of immobilizing the wheeled base **101** on top of the pallet **100**.

[0092] The wheeled base **101** forms a support for a tray, for instance the tray of FIGS. **12** and **13**. Such a tray **90** may be embodied from sturdy plastic, which is sufficiently strong to carry a collapsible frame **105** on the corners thereof. The collapsible frame **105** is shown in FIG. **15** in a collapsed state. The collapsible frame **105** comprises four uprights **107**, which correspond in position and orientation with the corners of the tray **90**, to be arranged thereon. The uprights **107** are mutually connected by bands or strips **108**. To achieve the collapsed situation of FIG. **15** in an embodiment where strips **108** are employed to connect uprights **107**, hinges **109** should

be arranged between the uprights **107** and the strips **108**. As an alternative for the hinges **109**, connecting elements of flexible material can also be employed or any other suitable alternative.

[0093] With the collapsible frame in an expanded configuration as shown in FIG. **14**, the collapsible frame **105** forms a support for a further or additional tray **106** which can essentially be a tray as the one on the wheeled base **101** or at least of the same type.

[0094] The length of the uprights of the collapsible frame **105** may be selected in accordance with the expected height of plants to be transported in plant pots to be arranged on the bottom of the trays **90**, **106**. A further collapsible frame **105** can be added on top of the further tray **106**, to continue stacking trays and increasing the height of the thus created assembly.

[0095] It is to be noted that plants can be grown in pots, arranged in trays **106**, to be stacked using collapsible frames **105** (or similar devices) for transport. After reaching a destination or point of sale, an assembly comprising a wheeled base **101** and the stack of trays **90**, **106** and intermediate collapsible frames **105** can be taken off the pallet **100** to be driven to a display position. Consequently, end users or consumers can take plants in plant pots out of the trays **90**, **106** to the checkout counter for payment thereof. Such a display using grow trays **90**, **106** can then be returned to a grower to be re-used. For this purpose, the frames **105** are preferably collapsible or can at least, to some degree, be disassembled to save transport space during a return journey.

[0096] In FIG. **28**, the assembly of FIG. **14** is used to display plants on offer for sale. Plant pots **111** are arranged in trays **90**, **106**, and held upright in a sturdy manner, for instance using the separator beams in FIG. **14**. The collapsible frame **105** with the higher tray **106** thereon has been taken off the lower tray **109**, and been set down on the ground besides the wheeled base **101** carrying the lower tray **90**. A banner **110** is then optionally wrapped around and arranged on the collapsible frame **105** (for instance using VELCRO connections or the like) to enhance the attractive appeal of the thus formed configuration. The banner **110** may be printed with plant information, grower information, a picture of the plants on offer for sale, a solid color or the like. Although no plants are shown in FIG. **28**, the plant pots **111** will contain plants in practice.

[0097] In FIGS. **22**, **23** and **24** a display and transport device **220** is shown, comprising a preferably collapsible frame **221** and a plurality of trough-like supports **222**, **224** for accommodating plant pots **223**. On the frame **221**, trough-like supports of different dimensions can be arranged. For instance, the higher trough-like support **222** can be relatively small, especially in relation to the lower arranged trough-like support **224**, where the higher support **222** is intended for smaller plant pots **223** and consequently also smaller plants, than the bigger, wider and deeper trough-like support **224**, which is lower down on the frame **221**.

[0098] At a point of sale, water **225** can be added to the support **222** or **224**, to accommodate a plant pot **223** with the bottom thereof submerged, or at least a wick extending from the bottom of the plant pot **223** into the water **225**.

[0099] The supports **222**, **224** are provided with resilient flaps along the edges thereof, which resiliently press against a plant pot **223**, when inserted into or on the supports **222**, **224**. The resilient forces exerted by these flaps **226** serve to keep the plant pot **223** in FIG. **23** upright. In FIG. **23**, at the

free ends of the resilient flaps 226 angled carrier elements 228 are provided to support plant pots 223 above the level of water 225.

[0100] The resilient flaps 226 may be replaced by configurations that could resemble cup holders or the like, to insert the bottom of plant pots 223 therein to submerge only the wick 227 extending from the bottom of the plant pots 223 in the water 225, or to at least allow the wick 227 to be in contact with the water 225. In FIG. 24 a cover 230 is arranged over the trough like support 224, where holes 231 are arranged in the cover 230. Additionally or alternatively, the trough like support 224 as shown in FIG. 24 may comprise a grating 232 or the like to support above the top level of the water 225 the bottoms of plant pots 223 arranged therein. In FIG. 25, and embodiment is shown exhibiting similar features as a tray in FIGS. 12 and 13, where the trough like support 224 comprises shoulders 235 carrying protrusions 236, between which T-shaped profiles 237 can be inserted to define there between a predetermined distance corresponding with plant pot sizes, to support plant pots of differing or varying sizes adjustably, in particular under a rim thereof.

[0101] FIGS. 29-36 illustrate still another embodiment of a plant containment system that is well-suited for use with an ebb and flood system or other watering arrangement. FIG. 29 shows plant pot 258 and corresponding container 256. FIG. 30 shows a cutaway view in which the plant pot and container of FIG. 29 have been cut in half to reveal internal details. The embodiments of the plant pot and container shown in FIGS. 29 and 30 share many features in common with the embodiments shown in FIGS. 7-9.

[0102] For example, plant pot 258 includes bottom 260, side wall 264, side step 266, and circumferential top flange 262. It may or may not include channels 26, and in fact the particular version shown in FIG. 30 does not include these channels. Bottom 260 opens into a series of holes 268. Stiffening ribs 272 are preferably added between raised central portion 270 and side wall 264 in order to stiffen the bottom.

[0103] Container 256 includes bottom 276 joined to side wall 274. It also includes an overflow that allows water into and out of the container. The flow of water through the overflow is controlled in the invention by a valve (described in more detail subsequently). The presence of this valve is in fact a significant component in the present invention.

[0104] The overflow and valve may be located in any suitable position in the container. In the embodiment of FIG. 30, the overflow 284 is located in central tower 278. Central tower 278 extends upward from bottom 276, and overflow 284 is located in the upper portion of this central tower.

[0105] Support ring 280 surrounds overflow 284. It opens into one or more gaps 282, through which water can flow. In reviewing the geometry shown in FIG. 30, those skilled in the art will realize that the position of overflow 284 and gap 282 define a reservoir of retained water within container 256. Once the water in the container reaches this level, any additional water will flow out through overflow 284. Overflow 284 may also be used to admit water to the container, such as when the container is placed in an ebb and flow irrigation system.

[0106] FIG. 31 shows a sectional elevation view through an assembly of plant pot 258 and container 256. The reader will observe how raised central portion 270 rests on support ring 280. The reader will also note how top flange 262 fits inside the tapered side wall 274 of container 256.

[0107] The result is a stable assembly of the plant pot within the container. The height of central tower 278 determines the height of overflow 284 and ultimately the amount of water that will be retained within container 256.

[0108] FIG. 32 shows the same assembly of plant pot and container in a configuration that is actually used for growing a plant. Soil 2 has been added to plant pot 258. One or more wicks 30 are preferably added as well. As for the prior examples, a portion of each wick lies within the plant pot and a portion extends through a particular hole 268 and down into water supply 65 contained in container 256.

[0109] Container 256 sits on floor 304, which is typically rough concrete. The operation of the assembly in an ebb and flood system may be understood with respect to FIG. 32. The assembly shown will often be one of many such assemblies placed in a tray 70 such as shown in FIG. 7. The tray surrounding the assembly is flooded to a level above overflow 284 and the lowest portion of gap 282 (The bottom of gap 282 is actually coplanar with the upper portion of horizontal wall 308 in the example shown). Water seeps under the bottom of container 256 and floods central cavity 306 (This is true even when the container is placed on a smooth metal surface, as even in that case the water will seep through into central cavity 306). The water then flows in through overflow 284 and gap 282. The water then floods the annular recess in the container surrounding central tower 278.

[0110] The water level within the assembly will continue to rise until it reaches the level within the surrounding tray of the ebb and flood system. An outflow opening for the ebb and flood tray will be opened at some point and the water surrounding the plant pot and container will recede. Excess water within the assembly will flow out through gap 282 and overflow 284 until the water within water supply 65 is level with the lowest portion of gap 282 (which, in this example, is coplanar with horizontal wall 308 and overflow 284). The lowest obstruction between the water in water supply 65 and the overflow is labelled as overflow level 286.

[0111] Overflow level 286 constitutes a “defined overflow level” for the assembly shown. The term “defined overflow level” means a level of water resulting in the container when the container is flooded to a level above that shown in FIG. 32 and the water surrounding the container recedes. The excess water in the container will flow out until it reaches overflow level 268, at which point it will stop flowing out.

[0112] Water within water supply 65 is wicked up into soil 2 by one or more wicks 30, as described previously. The reader will thereby appreciate that water added to the assembly will eventually come to the defined overflow level (overflow level 286). If more water is added, it will simply run out overflow 284.

[0113] The operation of the assembly has been described with respect to an ebb and flood system. However, it will function well with many other types of watering systems. For instance, the assembly functions well where a user simply pours water into the open top of the plant pot. If too much water is added, the excess will run out overflow 284 and overflow level 286 will be established. The same level would be established by using a tube-based irrigation system.

[0114] The reader will thereby appreciate the advantages of locating overflow 284 in a central tower in the container. The aesthetic appeal of the assembly is not diminished by the overflow since it is not visible, yet the functionality of the overflow remains intact.

[0115] In some instances, however, the overflow is undesirable. One example is during the shipment of the assembly to a point of sale. The grower fills water supply 65 to a level as shown in FIG. 32. This level is preferably calculated to provide the plant with a suitable water supply for the anticipated duration of shipment. However, during the motion inherent in the shipping, a significant percentage of the water may “slosh” out through overflow 284. It is therefore desirable to provide a seal for the overflow.

[0116] FIGS. 33-36 depict an embodiment including a valve placed in the overflow. The valve selectively opens and closes the overflow. FIG. 33 shows the body of the valve—plug 288. Plug 288 is shown in an inverted state (inverted with respect to the orientation in which it is customarily used). Sealing plate 290 includes sealing surface 292. A complex protrusion extends from sealing surface 292. The protrusion contains several significant features. In sequence, these are: tapered plug 294, rib 296, cylinder 298, and retaining expansion 300. Transverse slot 302 extends laterally through at least the rib, the cylinder, and the retaining expansion. However, in the embodiment illustrated, the transverse slot does not extend all the way through the tapered plug.

[0117] FIG. 34 shows the container geometry designed to receive plug 288 (and thereby create a functioning valve) in more detail. Horizontal surface 310 lies across the top of central tower 278. Overflow 284 is preferably surrounded by tapered side wall 312. The angle of tapered side wall 312 preferably matches the angle of tapered plug 294 shown in FIG. 33.

[0118] FIG. 35 is a sectional elevation view showing sealing plug 288 in position within overflow 284. The plug may be switched between an “open” position in which water can flow through overflow 284 and a “closed” position in which flow is prevented. FIG. 35 shows the “open” position.

[0119] Rib 296 lies above horizontal surface 310, and the interference between the two tends to prevent the sealing plug moving further downward. Cylinder 298 forms a sliding fit with tapered side wall 312.

[0120] Retaining expansion 300 lies below the lowest extent of tapered side wall 312. The retaining expansion tends to prevent the sealing plug being pulled upward and completely out of overflow 284, since it will have to be compressed to pass through the overflow.

[0121] In the open position as shown in FIG. 35, the presence of transverse slot 302 allows water to pass through sealing plug 288 (and therefore through overflow 284). Water passing into the container will flow into the volume inside support ring 280. It will then flow beyond the support ring through gap 282. In the view of FIG. 35, transverse slot 302 and gap 282 are aligned, but the flow will still occur even if gap 282 and transverse slot 302 are not aligned. Transverse slot 302 allows water to flow into or out of the volume contained within support ring 280. The water will “find its way” through a gap or gaps provided in the support ring and into the interior of the container.

[0122] In order to seal overflow 284, the user pushes down on the sealing plug to transition it to the “closed” position. The plant pot may be removed to provide easy access to the sealing plug. The user then presses down on sealing plate 290. The downward pressure forces rib 296 through and past tapered side wall 312.

[0123] The result is shown in FIG. 36. Once the rib descends past the tapered side wall, tapered plug 294 comes to rest against the tapered side wall. This interaction acts like

a stopper in a drain. Further, sealing surface 292 presses down against horizontal surface 310 producing another seal. The reader will note that transverse slot 302 in the sealing plug no longer provides a passage for water. Its uppermost extreme does not extend beyond tapered side wall 312.

[0124] Further downward motion of the plug is prevented by sealing surface 292 coming to rest on horizontal surface 310. However the user may return the plug to the “open” position by bending upward a portion of the perimeter of sealing plate 290 and pulling the plug upward. The plug will then snap back into the position shown in FIG. 35. However, absent a force prying the plug upward, it is retained in the position shown in FIG. 36 by rib 296 lying below the lower extent of tapered side wall 312.

[0125] The sealing plug is preferably made of a flexible material such as silicon rubber. Such a material provides a suitable frictional engagement while also providing a water-tight seal. The presence of transverse slot 302 also permits an appropriate amount of deflection in order for the plug to pop into the two stable positions shown in FIGS. 35 and 36.

[0126] The use of flexible material—in combination with the geometry of the plug—means that the plug may be installed and removed without the use of any tools. The plug is installed initially by pressing it into place. It is switched between the open and closed positions by pushing it down or pulling it up. The inclusion of retaining expansion 300 means that the plug is not likely to become separated from the container.

[0127] The ability to selectively open and close the plug provides an advantage during shipping and any subsequent sales display. The plug will customarily be pressed closed during shipping. However, once the assembly of the plant pot and container arrives at a point of sale, it may be desirable to open the plug again in order to take advantage of available irrigation systems.

[0128] FIGS. 22 and 23 show exemplary display systems that also provide irrigation. The plant pot/container assembly of FIG. 32 may be placed in a support such as shown in FIG. 23. The sealing plug is pulled upward to the “open” position before the assembly is placed in the support. Water will then be added up to and beyond overflow level 286 so that water flows into the container through overflow 284.

[0129] When the plant is sold, the sealing plug may be pressed back to the “closed” position. The buyer then waters the assembly normally by pouring water into the open top of the plant pot (the assembly being shown in FIG. 32). Water will flow down through the holes 268 and accumulate as water supply 65. The wicks will then carry the water—at a suitable rate—back up into soil 2. The assembly may also be used in a system that does not include wicks, such as by extending the defined overflow level to a point above the bottom of the plant pot.

[0130] Many other alternative configurations may also turn out to be fruitful or effective, which should all be considered within the realm of possibilities, that would immediately spring to mind to the skilled person, after having been confronted with the foregoing description and accompanying drawings. For example, although the exemplary embodiments have shown the overflow and valve being located in a central tower, they could also be located in the side wall of the container itself. The other additional and alternative embodiments all within the scope of protection of the present invention according to the accompanying claims, and are in this sense to be considered embodiments of the present invention.

Having described our invention, we claim:

1. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container, comprising:

- a. providing a plant pot, having a bottom and at least one side wall extending from said bottom up to a top rim, said bottom and said at least one side wall defining an interior of said plant pot;
- b. said plant pot including at least one hole located in or proximate to said bottom;
- c. providing at least one wick extending from below said bottom of said plant pot, through said hole, and into said interior of said plant pot;
- d. providing a container, including a bottom, and a side wall extending upward from said bottom;
- e. said plant pot resting in said container, with said bottom of said plant pot being above said bottom of said container;
- f. providing an overflow opening in said container;
- g. providing a valve located in said overflow opening, said valve being movable between an open position in which said valve allows said liquid to flow through said overflow opening and a closed position in which said valve prevents any flow of said liquid through said overflow opening;
- h. selectively opening and closing said valve in order to allow or prohibit passage of said liquid through said overflow opening; and
- i. said container including a defined overflow level, said defined overflow level being a level of water resulting in said container when said container is flooded to a level above said valve, said valve is opened, and water is allowed to flow out of said container through said valve until a stable level is reached wherein no more water flows out of said container through said valve; and
- j. said defined overflow level being proximate said bottom of said plant pot.

2. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 1, wherein:

- a. said container includes a central tower extending upward from said bottom; and
- b. said overflow opening is located in said central tower.

3. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 2, wherein:

- a. said central tower contains an upper portion; and
- b. said upper portion bears against said bottom of said plant pot.

4. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 2, wherein:

- a. said central tower includes an upper portion;
- b. said upper portion of said central tower includes a horizontal surface; and
- c. said horizontal surface includes said overflow opening.

5. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 4, wherein:

- a. said central tower includes a support ring extending upward from said upper portion; and
- b. said support ring bears against said bottom of said plant pot.

6. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 4, wherein said overflow opening includes a tapered side wall.

7. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 6, wherein:

- a. said valve includes a movable sealing plug, including,
 - i. a sealing plate, with a sealing surface facing toward said horizontal surface,
 - ii. a tapered plug extending from said sealing plate toward said overflow opening,
 - iii. a cylinder extending from said tapered plug,
 - iv. a rib separating said tapered plug from said cylinder,
 - v. a retaining expansion extending from said cylinder,
 - vi. a transverse slot extending through said rib, said cylinder, and said retaining expansion,
- b. said sealing plug being configured so that,
 - i. in a first position said sealing plate is lifted off said horizontal surface and said transverse slot allows said liquid to flow through said overflow opening, and
 - ii. in a second position said sealing plate is pressed against said horizontal surface and said tapered plug seals against said tapered side wall, thereby blocking said overflow opening.

8. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 1, further comprising:

- a. placing said assembly of said plant pot and said container in a tray that is part of an ebb and flood irrigation system;
- b. while said valve is in said open position, flooding said tray to a level that is higher than said defined overflow level of said container, whereupon water in said tray flows through said valve and into said container;
- c. while said valve remains in said open position, removing said water from said tray so that a level of water within said container stabilizes at said defined overflow level.

9. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 8, further comprising after said water within said container has stabilized at said defined overflow level, closing said valve.

10. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 1, wherein said defined overflow level is below said bottom of said plant pot.

11. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container, comprising:

- a. providing a plant pot, having a bottom and at least one side wall extending from said bottom up to a top rim, said bottom and said at least one side wall defining an interior of said plant pot;
- b. providing a container, including a bottom, and a side wall extending upward from said bottom;
- c. said plant pot resting in said container, with said bottom of said plant pot being above said bottom of said container;
- d. providing an overflow opening in said container controlled by a valve;
- e. said valve being movable between an open position in which said valve allows said liquid to flow through said overflow opening and a closed position in which said valve prevents any flow of said liquid through said overflow opening;

f. selectively opening and closing said valve in order to allow or prohibit passage of said liquid through said overflow opening;

g. said container including a defined overflow level, said defined overflow level being a level of water resulting in said container when said container is flooded to a level above said valve, said valve is opened, and water is allowed to flow out of said container through said valve until a stable level is reached wherein no more water flows out of said container through said valve; and

h. said defined overflow level being proximate said bottom of said plant pot.

12. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 11, wherein:

a. said container includes a central tower extending upward from said bottom; and

b. said overflow opening is located in said central tower.

13. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 12, wherein:

a. said central tower contains an upper portion; and

b. said upper portion bears against said bottom of said plant pot.

14. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 12, wherein:

a. said central tower includes an upper portion;

b. said upper portion of said central tower includes a horizontal surface; and

c. said horizontal surface includes said overflow opening.

15. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 14, wherein:

a. said central tower includes a support ring extending upward from said upper portion; and

b. said support ring bears against said bottom of said plant pot.

16. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 14, wherein said overflow opening includes a tapered side wall.

17. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 16, wherein:

- a. said valve includes a movable sealing plug, including,
- a sealing plate, with a sealing surface facing toward said horizontal surface,
 - a tapered plug extending from said sealing plate toward said overflow opening,
 - a cylinder extending from said tapered plug,
 - a rib separating said tapered plug from said cylinder,
 - a retaining expansion extending from said cylinder,
 - a transverse slot extending through said rib, said cylinder, and said retaining expansion,
- b. said sealing plug being configured so that,
- in a first position said sealing plate is lifted off said horizontal surface and said transverse slot allows said liquid to flow through said overflow opening, and
 - in a second position said sealing plate is pressed against said horizontal surface and said tapered plug seals against said tapered side wall, thereby blocking said overflow opening.

18. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 11, further comprising:

- a. placing said assembly of said plant pot and said container in a tray that is part of an ebb and flood irrigation system;
- b. while said valve is in said open position, flooding said tray to a level that is higher than said defined overflow level of said container, whereupon water in said tray flows through said valve and into said container;
- c. while said valve remains in said open position, removing said water from said tray so that a level of water within said container stabilizes at said defined overflow level.

19. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 18, further comprising after said water within said container has stabilized at said defined overflow level, closing said valve.

20. A method for controlling a flow of liquid into and out of an assembly of a plant pot and a container as recited in claim 19, wherein said defined overflow level is below said bottom of said plant pot.

* * * * *