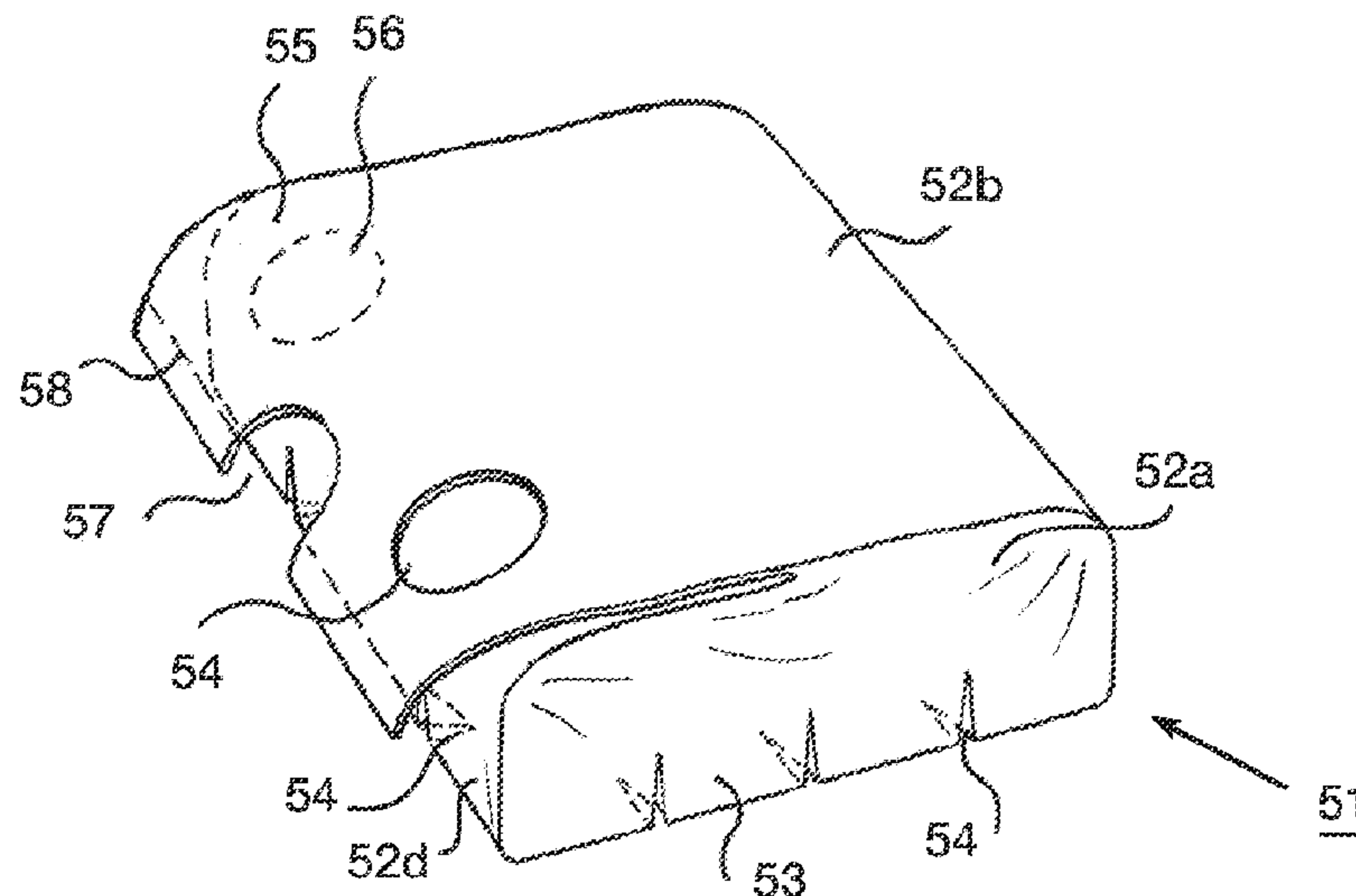




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(54) Title: CONTAINER AND METHOD FOR RAISING A PLANT



(57) Abrégé/Abstract:

The current invention relates to a container (300, 51) for raising a plant (351) that is manufactured from flexible plastic foil material in which a moisture - absorbing substrate (340, 59) is contained. The container has an essentially bar- shaped shape, with a base (53) with a surface of at the most 25 x 25 cm, at least on side wall (52a - 52d) and a top with at least one feed- through aperture (56, 57) through which a seed or seedling is put into the container in use. The invention also relates to a method for raising plants in said container.

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(54) Title: CONTAINER AND METHOD FOR RAISING A PLANT

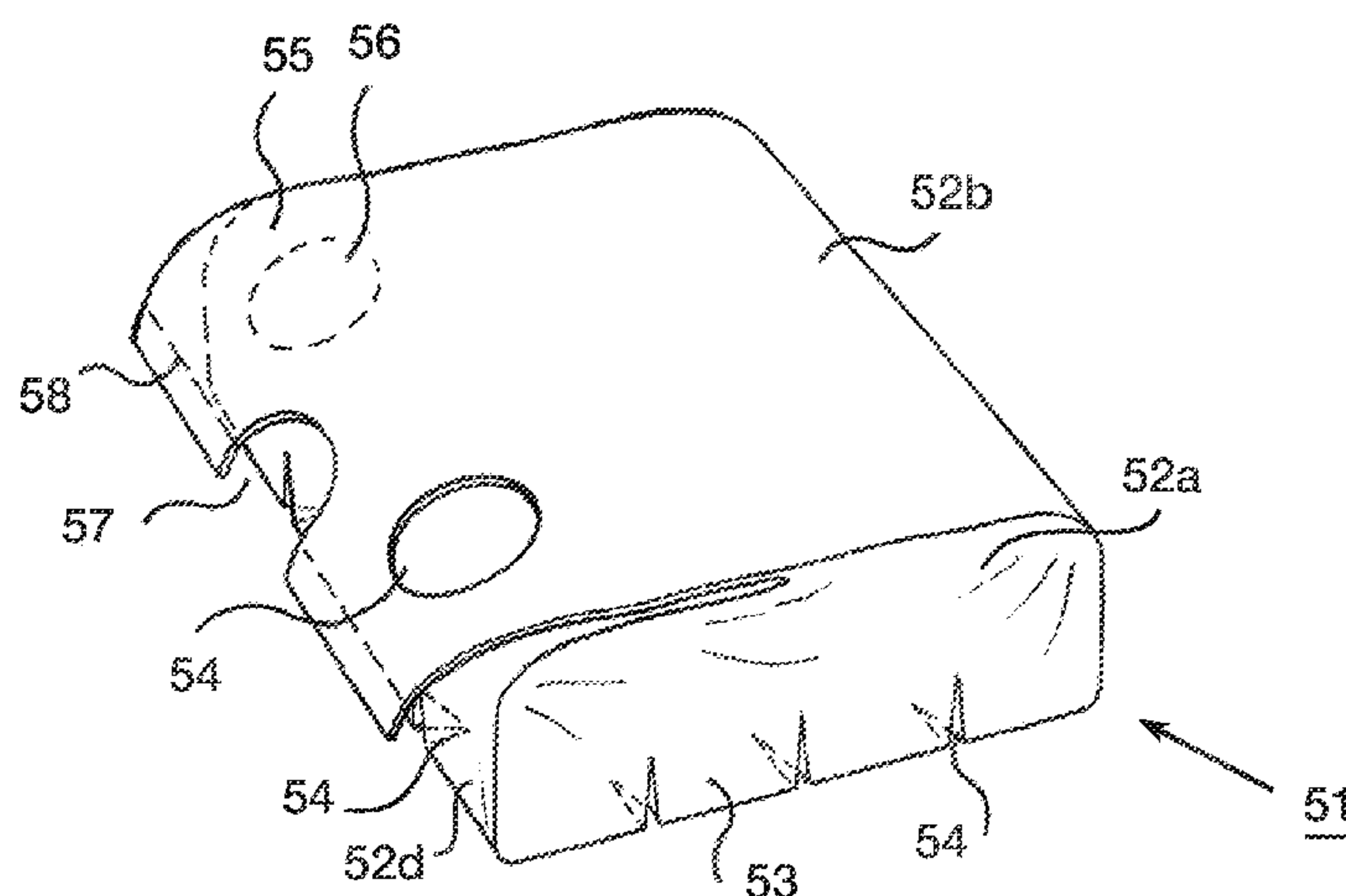


Fig. 4

(57) Abstract: The current invention re-
lates to a container (300, 51) for raising a
plant (351) that is manufactured from flex-
ible plastic foil material in which a mois-
ture - absorbing substrate (340, 59) is con-
tained. The container has an essentially
bar- shaped shape, with a base (53) with a
surface of at the most 25 x 25 cm, at least
on side wall (52a - 52d) and a top with at
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CONTAINER AND METHOD FOR RAISING A PLANT

DESCRIPTION

A first aspect of the current invention relates to a container for raising a plant, the said container being manufactured from flexible plastic foil material containing a moisture-absorbing substrate. Said moisture-absorbing substrate is thus part of the subject of the invention.

There are many containers known that are made of flexible plastic foil material and that contain a substrate. Containers according to the invention exist, for example, as packaging for potting compost for use in the garden. The invention relates in particular to containers that are intended for growing a seed or seedling without having to remove the substrate from the plastic foil.

The second aspect of the invention relates to a method for raising a plant in a container according to the introduction.

To date rockwool substrate has been used on a large scale for raising, for example, young vegetable plants in large-scale professional nurseries. A block of rockwool retains its shape relatively well, so it is also used without a container. Typically sowing is done on plugs of an initial substrate of approximately 2 cm x 2 cm and with a height of approximately 2.5 cm. Said plugs are typically in a Perspex seed tray with, for example, 250 similar plugs in the tray.

After germination each seedling with plug is transferred to, for example, a rockwool block measuring 10 cm x 10 cm and 6.5 cm high that has been moistened for several days. These blocks contain a lining-out hole of 2.5 cm diameter to receive the seedling with plug. Sometimes so-called duo blocks are used which measure 15 x 10 x 6.5 cm and in which 2 seedlings are lined out. In said rockwool block the seedling is then raised to, for example, a young plant of 3 - 6 weeks old, depending on the species and type of plant.

The rockwool blocks with young plants are then transported from the nursery to a market gardener. The market gardener has in advance prepared a matrix of substrate mats of a suitable material, such as rockwool, coconut fibre or perlite, in his/her garden or greenhouse onto which the young plants are planted. For tomatoes, for example, substrate mats that are 100 cm long, 20 cm wide and 7.5 cm high are usually used that are suitable for four plants. This corresponds to approximately 3.75 litres of substrate per plant. As an alternative mats measuring

120 cm x 20 cm x 7.5 cm are used that are suitable for six plants. This corresponds to approximately 3.0 litres per plant. Naturally deviations from these volumes are possible.

Rooting from the rockwool block in the substrate mat is a tricky business, especially in the winter period or in the summer period. When transplanting to substrate mats there are also problems with Pythium, for example if the substrate mat is too cold or too warm. This causes plant loss at the market gardener's premises.

Moreover, a market gardener will often not let young plants root on the mat immediately, as the plant may then develop vegetatively. The market gardener is therefore often forced to introduce a waiting period to control the growth of the plant before letting the young plants root in the end substrate.

Another disadvantage of the method referred to above is that plants are unproductive for longer at the market gardener's premises, i.e. do not bear harvestable fruit. A further disadvantage of the method is that it is labour-intensive, because the plantlet has to be transferred and/or transplanted several times. Another disadvantage is that the method sometimes involves relatively high losses, among other things because plantlets have to be transferred and are sensitive to damage during transfers. Even relatively shape-retaining rockwool is susceptible to damage.

The market gardener further cultivates the young plants until they bear fruit and continues to further cultivate and harvest until the next planting in the next year. So the end substrate with plantlet goes from the grower to the market gardener, who then places said end substrate on the mat, this being the third substrate. The plantlet is now given the opportunity to grow further. After another few weeks the plantlet is typically capable of bearing fruit, after which the harvesting of the fruit at the market gardener's premises can start.

In a method for raising plants whereby a substrate is used that retains its shape less well, such as compressed coconut fibre, a container is preferably used. A container provided with a moisture-absorbing substrate is known to the expert. Plastic pots that contain potting compost or another substrate are used on a large scale for raising plants, for germinating and cultivating seeds and seedlings, and as (insert) pots for plants, for example in the house or garden. These plastic pots are typically manufactured from hard, i.e. essentially shape retaining,

plastic, such as PE, PP, PS and mixtures of these.

A disadvantage of known containers is that they are not adequately accessible for the placing of plantlets and/or seedlings. Some containers are also difficult to access for transferring seedlings or plantlets provided with a substrate.

5 This means that the expert will have to carry out additional actions and/or will not be able to carry out actions as quickly.

The object of the first aspect of the invention is to provide a container according to the introduction that is suitable for raising plants in a more efficient way. This objective is achieved according to the invention with a container
10 according to the introduction that has an essentially rod-like shape, having a base with a surface of at the most 750 cm², at least one side wall and a top with at least one feed-through aperture through which a seed or seedling is put into the container in use. The surface of the base is more preferably at the most 500 cm². The container according to the invention is suitable for raising a seed, or possibly a
15 seedling, to a full plant, without having to repot the plant during cultivation and without having to remove the foil. This does impose conditions on the substrate. Rockwool is unsuitable, for example, as it can effectively retain sufficient moisture only to a limited height. At a height of 8.5 cm or more rockwool would remain too dry in immediate vicinity of a seedling even with sufficient moistening. To be able to
20 retain sufficient moisture for cultivation a sufficient amount of effectively moisture-retaining substrate is required, such as at least 3 litres of substrate per plant to be raised. Thus as a consequence a greater surface of rockwool is required. This also applies to other substrates, such as lignocellulose. Coconut fibre in contrast is extremely suitable for being able to retain sufficient moisture on a
25 relatively small surface in a column, as coconut fibre can retain moisture along the entire height of a relatively high column. Thus the invention provides the possibility to achieve a more effective use of space and of labour with the right choice of substrate than with the known containers with substrate. It is, incidentally, possible to provide a container with substrate without a feed-through aperture so that a user
30 (grower) has to make one or more openings in the container him/herself for planting a seed or seedling.

In a preferred embodiment according to the invention the walls of the container form an, at least in essence, closed area. That means that the base, at least one side wall and the top of the container form a whole or are connected to

each other in such a way that the moisture-absorbing substrate is enclosed in the flexible plastic foil material. This does not detract from the fact that there may be openings in one or more walls to facilitate a good cultivation environment for a plant to be raised, such as at least one feed-through aperture.

5 For example there is preferably a plant opening provided in the top, through which a seed or seedling is planted in the substrate in use. Naturally a grower can make said opening him/herself in the top, but a plant opening made in advance simplifies the work of the grower.

10 In a preferred embodiment according to the invention the feed-through aperture or the plant opening is in the centre of the top. This makes it possible to moisten the substrate in the middle of the top, which promotes a uniform moistening of the substrate, or to raise a plant in the middle of the substrate. Naturally it is possible for the feed-through aperture to also serve as a plant opening.

15 It is preferred that drainage openings be provided in the base and/or in the side wall of the container. The drainage openings provide a drain for surplus/excess moisture. Naturally in a basic embodiment of the invention the drainage openings can also be provided afterwards by a grower, but providing said drainage openings in advance simplifies work for the grower. Incidentally, in the case of substrates such as rockwool it is undesirable, if not impossible, to make the drainage openings in advance as this makes the adequate moistening of the rockwool time-consuming or even impossible. In the case of more suitable substrates, such as coconut fibre, which are more suitable for retaining moisture, this is not a problem and the work of the grower can be made easier.

25 For an optimum use of the surface it is preferred that the container have a cross-section that is in essence rectangular, more preferably square. With such a cross-section, of for example 25 x 25 cm, 20 x 20 cm or 30 x 15 cm, containers can be efficiently placed alongside each other. In the square cross-section this further results in a uniform distribution of plants over the surface. The containers can also possibly have a hexagonal cross-section. The same advantages can also be achieved with said hexagonal cross-section.

30 In a preferred embodiment according to the invention the substrate is compressed before use so that at the most a third, more preferably a quarter, of the container is filled with compressed moisture-absorbing substrate. The flexible

plastic foil of the container can then be folded in, as a result of which relatively little transport and storage space is needed for as yet unused containers.

It is to be preferred that the moisture-absorbing substrate be at least 3 cm high before use. It is more to be preferred that the substrate be at least 2 cm high in a compressed state. The smaller the volume of the compressed substrate, the more efficiently the containers can be stored and transported. It is to be preferred that the substrate be at least 10 cm high in use. Thus on a limited surface a sufficiently large volume for the absorbing substrate can be provided to a plant growing in the substrate.

It is to be preferred that coconut fibres be used as the moisture-absorbing substrate.

The known rockwool mat has the disadvantage that before potting the mat has to be saturated with liquid, which is a time-consuming process. Saturation after potting is virtually impossible. Thus the rockwool has to be first of all provided with openings for receiving the pots, then the rockwool has to soak up liquid to the point of saturation, then the seedlings or young plants can be potted, after which the excess liquid has to be removed by being drained from the mats. This is thus a long, labour-intensive process.

According to a second aspect the current invention relates to a method for raising a plant from a seed or a seedling and comprising the steps

- 1) providing a moisture-absorbing substrate;
- 2) placing a seed or seedling in or on the moisture-absorbing substrate;
- 3) letting a plant grow from the seed or the seedling in or on the moisture-absorbing substrate

characterised in that in step 1) a container with a moisture-absorbing substrate according to the first aspect of the invention is provided, in which the plant grows in step 3.

An objective and the advantages of the method of the second aspect correspond to the objective and the advantages discussed above in relation to the first aspect of the current invention.

In step 1) a container with compressed, moisture-absorbing substrate is preferably provided, which is made to swell before step 2) by the addition of moisture. This combines the advantage of having a relatively compact container before use with having a sufficient amount of moisture contained in a

swollen substrate for raising plants in the substrate. The volume of swollen substrate can correspond approximately to the content of the container.

If the volume of the moisture-absorbing substrate in a compressed state is at the most a third, more preferably at the most a quarter, of the volume of the moisture-absorbing substrate in a swollen state, a considerable amount of space can be saved until after step 1) compared with a substrate that is incapable of swelling and therefore has to be handled, stored and transported in the volume in which it is used.

In a preferred embodiment according to the invention in step 2) a seedling with initial substrate in which the seedling has been cultivated from a seed is placed in or on the moisture-absorbing substrate surrounded by the container. Alternatively it is also possible to place a seed directly into the substrate in order to let it grow. This makes the action of transferring a seedling to substrate in the container redundant.

It is to be preferred that the plant be left to grow in step 3) until it is fruit-bearing, before the plant is transferred from the cultivation environment to a harvesting environment. With the known methods for raising a plant that can be taken to a market gardener, who then harvests the fruit from the plant, the plant is supplied to the market gardener at a relatively early stage. Known substrates, whether or not in containers, are supplied to market gardeners relatively early as they are not suitable for nourishing the plant for a long time. The outcome of this is that the young plants have to continue to grow for some time at the market gardeners' premises before they are suitable for harvesting. Thus they occupy space for the market gardener without being productive.

The invention will be explained below with reference to the appended figures.

Figure 1 schematically shows a method according to the prior art.

Figure 2 schematically shows a method according to the current invention.

Figure 3 schematically shows a container according to the invention.

Figure 4 is a perspective plan view of an example embodiment of a container according to the current invention before moistening of the substrate.

Figure 5 is a perspective plan view of the container from figure 4

after moistening of the substrate.

Figure 1a1 schematically shows the placing of a seedling or seed 110 on a substrate 100. Substrate 100 measures 2 cm x 2 cm. The seed then germinates and grows, see figure 1a2. The plantlet 111 obtained in this way including substrate 100 is then transferred to a second substrate 120 of, for example, rockwool, as is shown in figure 1a3. The plantlet can now grow further, until it is sufficiently large, see figure 1a4, to be transferred, for example to a market gardener. In other words until the substrate can no longer retain sufficient moisture for the further raising of the plant in an efficient manner.

Before the cultivated plants are supplied, a market gardener prepares a substrate 130 such as a rockwool mat shown in figure 1b1. The substrate 130 is moistened and possibly provided with nutrients. When the prepared substrate 131 is ready for receiving the plants cultivated by the grower (figure 1b2), a substrate 120 with plants cultivated by the grower is delivered to the market gardener and is there placed on the prepared substrate 131. Figure 1b3 schematically shows a plant with substrate 120 that has been cultivated by a grower and placed by the market gardener on the substrate 131 prepared by him/her.

In a method according to the invention, such as is schematically shown in figures 2a1 - 2c, a seedling or seed 210 is placed on an initial substrate 200 made of coconut fibres (figure 2a1). Substrate 200 typically measures 2 cm x 2 cm. The seed then germinates and grows into a small plantlet that can be seen in figure 2a2. The grower then prepares a container with substrate 240. The substrate, in this case compressed coconut fibre 240, as can be seen in figure 2b1, is moistened and possibly provided with nutrients. The nutrients can incidentally be added to the substrate in advance. The compressed coconut fibre substrate 240 expands on addition of moisture into the prepared substrate 241. Figure 2b2 shows the container with coconut fibre 241 in a swollen state, ready for receiving the plantlet that has been further cultivated by the grower. The plantlet 211 thus provided including substrate 200 is then immediately, without any intermediate steps, transferred to the container with the swollen coconut fibre 241, which is schematically shown in figure 2a4. The plantlet 211 can grow further until it is large enough to be supplied to a market gardener. In contrast to the known method described above the last step can be executed when the plant is already bearing fruit. The container with swollen coconut fibre 240 and plant 211 does not need to be

placed on a subsequent substrate but can be used as an integral part of the cultivation and harvesting process.

Figures 3a-d schematically show an alternative use of a container according to the invention in a vertical cross-section. The container is only partly filled with a substrate of compressed coconut fibre 340. Container 300 has a top 350 of flexible foil that closes off the substrate 340. In the top 350 there is an opening 351, which is large enough to receive a seed or a seedling. After a seed has been placed in opening 350, the plant can grow through the relevant opening. Figure 3c schematically shows a vertical cross-section view of a plant 351 in the container 350. Figure 3d is a schematic plan view of the container 350, the top edge of which has been partly cut away so that part of the substrate 341 is visible.

Figure 4 is a perspective plan view of an example embodiment of a container 51 according to the invention. Container 51 is sack-shaped and is made of plastic foil. The horizontal cross-section surface measures approximately 20 x 20 cm and is approximately 5 cm high, at least in the state shown in figure 4. The foil according to said example has a white, at least light-reflecting, exterior and a dark, at least light-absorbing, interior. Container 51 is partly filled with dry compressed coconut fibre (not visible in figure 4). In the side walls 52 through incisions 54 shown by dotted lines are provided in the base 53 as drainage openings. At some distance from the base 53 the container 51 is folded, which is possible as the compressed coconut fibre only partly fills the container 51. Thus part of the side walls 52a-52d is folded flat over the part of the container 51 that is filled with coconut fibre. At the top of the side walls 52b and 52d, which in said embodiment seamlessly become a top wall 55, are three openings 56, 57 provided as openings 56 through which a seed or seedling can always be placed in the container and a moistening opening 57. The side walls 52b, 52d, which become the top wall 55, are fastened to each other by a weld 58 to form an essentially closed container 51.

Figure 5 shows a perspective view of the container from figure 4 in use, at least after the coconut fibre has swollen as a result of the supply of moisture. The horizontal cross-section surface is virtually unchanged, but the container is approximately 18 cm in this state. Side walls 52b, 52d have been folded up from figure 4, after which moisture has been let into the container 51 through moistening opening 57. As a result of this the coconut fibre 59, which is visible in figure 5 through openings 56, 57, has become swollen, as a result of which the whole volume

of container 51 is filled with moistened coconut fibre 59. In side wall 52a folding lines 60 of the container are shown by dotted lines. In use, an excess of moisture, which for example has been let in through opening 57 in container 51, can leave the container 51 via drainage openings 54. This prevents rotting of the coconut-fibre substrate in container 51. Seeds or seedlings (not shown in figure 5) can be placed in the swollen coconut fibre 59 through openings 56. The seeds or seedlings can then grow into full fruit-bearing plants before they are transported to a market gardener.

In the figures and the description there are only a limited number of example embodiments of a container and a method according to the invention shown and described. It should be clear that many variants of the container and/or the method are conceivable, whether or not these are obvious to the skilled person. However, these do not place a restriction on the scope of protection of the invention, which is defined by the claims below. For example the plant openings can be used to supply water and the moistening opening can be used to plant seeds or seedlings. The number of openings in an container can vary, as can the shape of these. Instead of round openings incisions or differently shaped openings can be provided. Instead of the incisions for the drainage openings holes can be provided by cutting away, instead of cutting into, the foil material. Also, another suitable substrate other than coconut fibre can be used and the substrate material does not have to swell, at least not to a factor of three or more, after moisture has been supplied.

CLAIMS

1. A container for raising a plant, manufactured from flexible plastic foil material in which a moisture-absorbing substrate is contained, the container having an essentially bar-shaped shape, having a base with a surface of at the most 500 cm^2 , at least one side wall and a top with at least one feed-through aperture through which a seed or seedling is put into the container in use.
2. A container according to claim 1, characterised in that the walls of the container form an at least essentially closed space.
3. A container according to claim 1 or 2, characterised in that a plant opening is provided in the top wall through which a seed or seedling is planted in the substrate in use.
4. A container according to claim 3, characterised in that the feed-through aperture or the plant opening is provided in the centre of the top.
5. A container according to any one of claims 1 to 4, characterised in that drainage openings are provided in the base and/or in the side wall.
6. A container according to any one of claims 1 to 5, characterised in that the container has an essentially rectangular cross-section.
7. A container according to any one of claims 1 to 6, characterised in that the substrate has been compressed before use so that at the most a third of the container is filled with compressed moisture-absorbing substrate.
8. A container according to claim 7, characterised in that the moisture-absorbing substrate is at least 3 cm high before use.
9. A container according to any one of claims 1 to 8, characterised in that the substrate is at least 10 cm high in use.
10. A method for raising a plant from a seed or a seedling, comprising of the steps of
 - 1) providing a moisture-absorbing substrate;
 - 2) placing a seed or seedling in the moisture-absorbing substrate;
 - 3) letting a plant grow from the seed or the seedling in the moisture-absorbing substratecharacterised in that in step 1) a container with a moisture-absorbing substrate according to one or more of the preceding claims is provided in which the plant grows in step 3.

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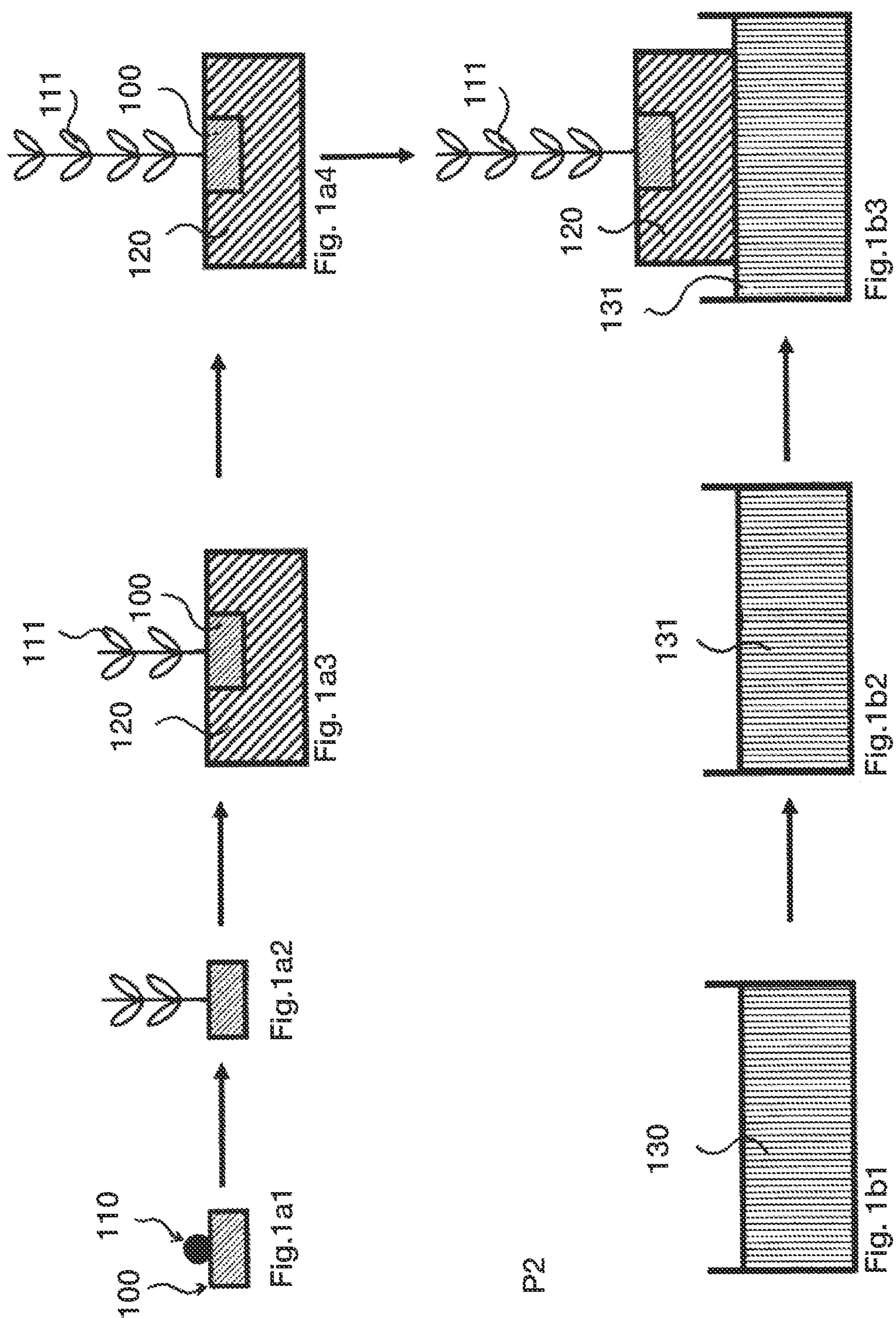
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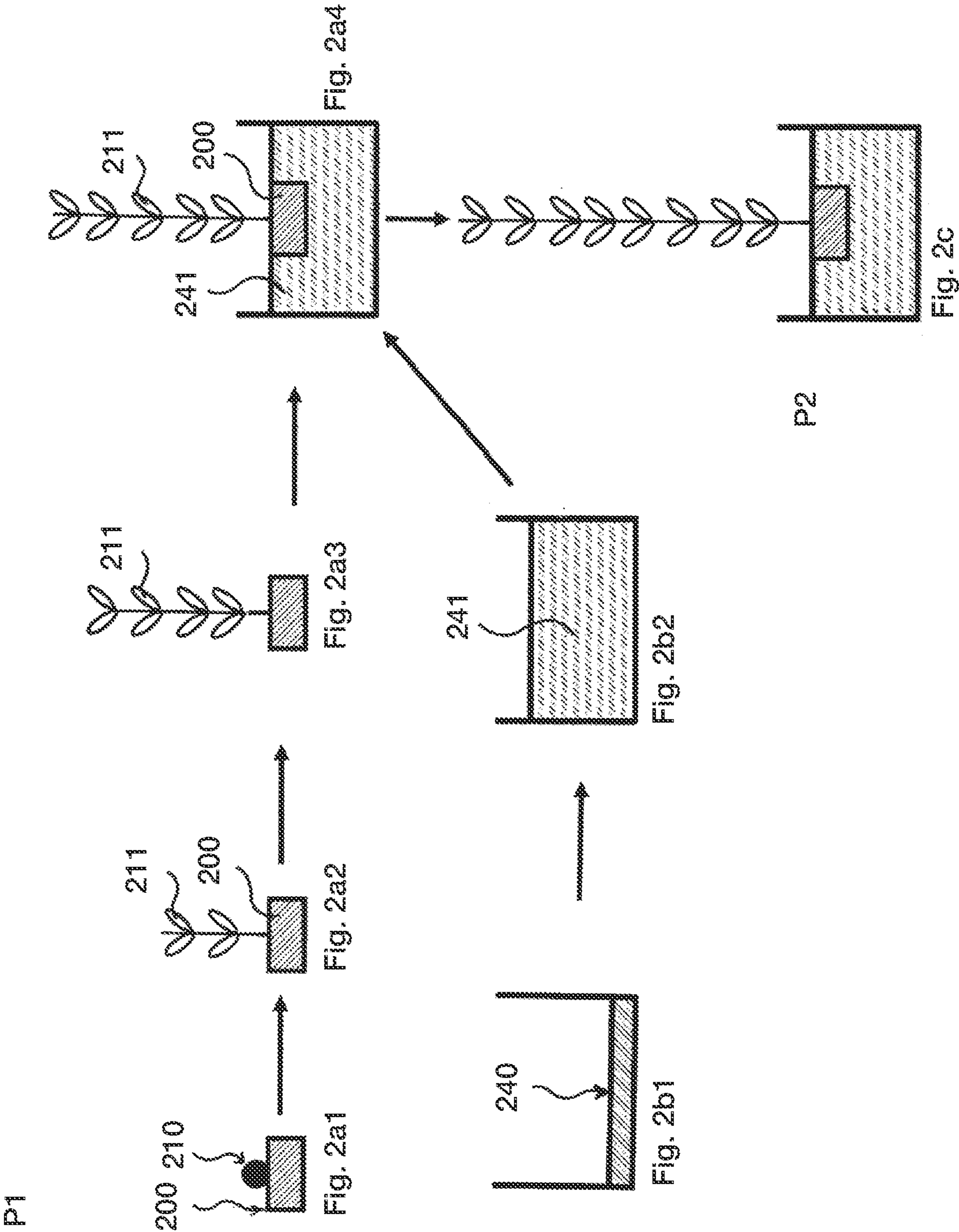
11. A method according to claim 10, characterised in that in step 1) a container with compressed moisture-absorbing substrate is provided that is made to swell by the addition of moisture before step 2).
12. A method according to claim 11, characterised in that the volume of the moisture-absorbing substrate in a compressed state is at the most $1/3$ of the volume of the moisture-absorbing substrate in a swollen state.
13. A method according to any one of claims 10 to 12, characterised in that in step 2) a seedling with initial substrate in which the seedling has grown from a seed is placed in the moisture-absorbing substrate enclosed by the container.
14. A method according to any one of claims 10 to 13, characterised in that the plant is left to grow in step 3) until it is fruit-bearing before the plant is transferred from the cultivation environment to a harvesting environment.

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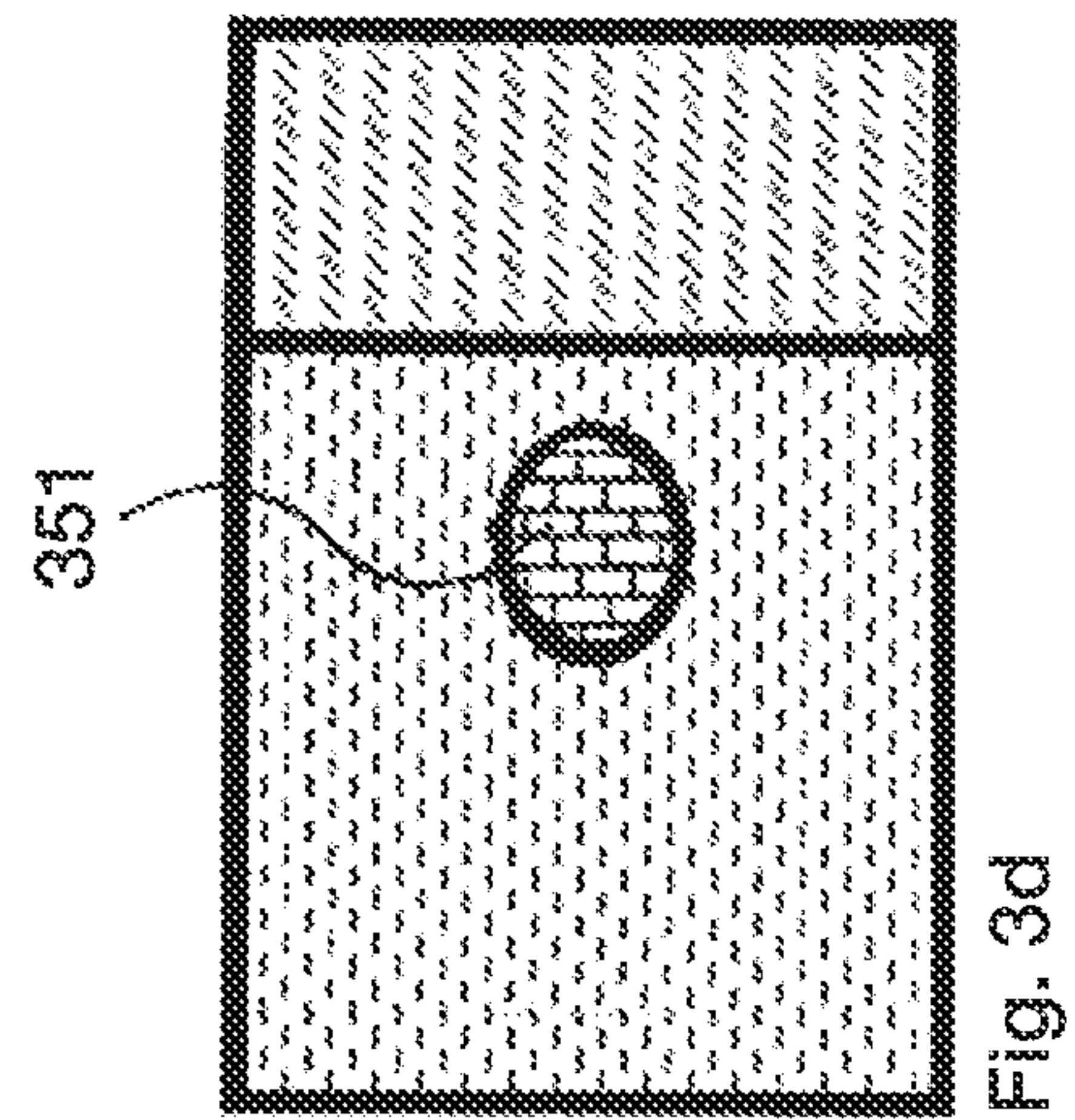
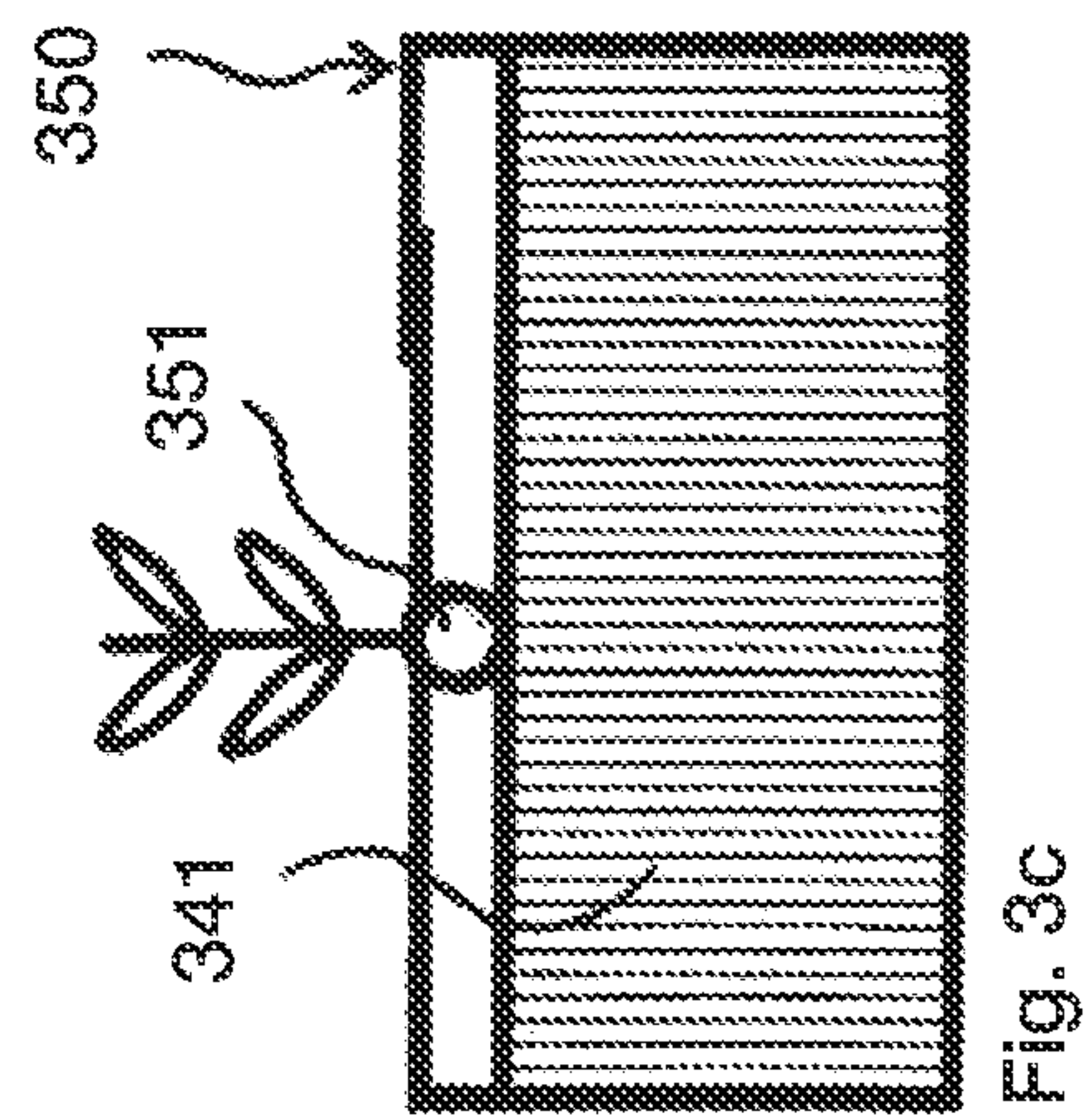
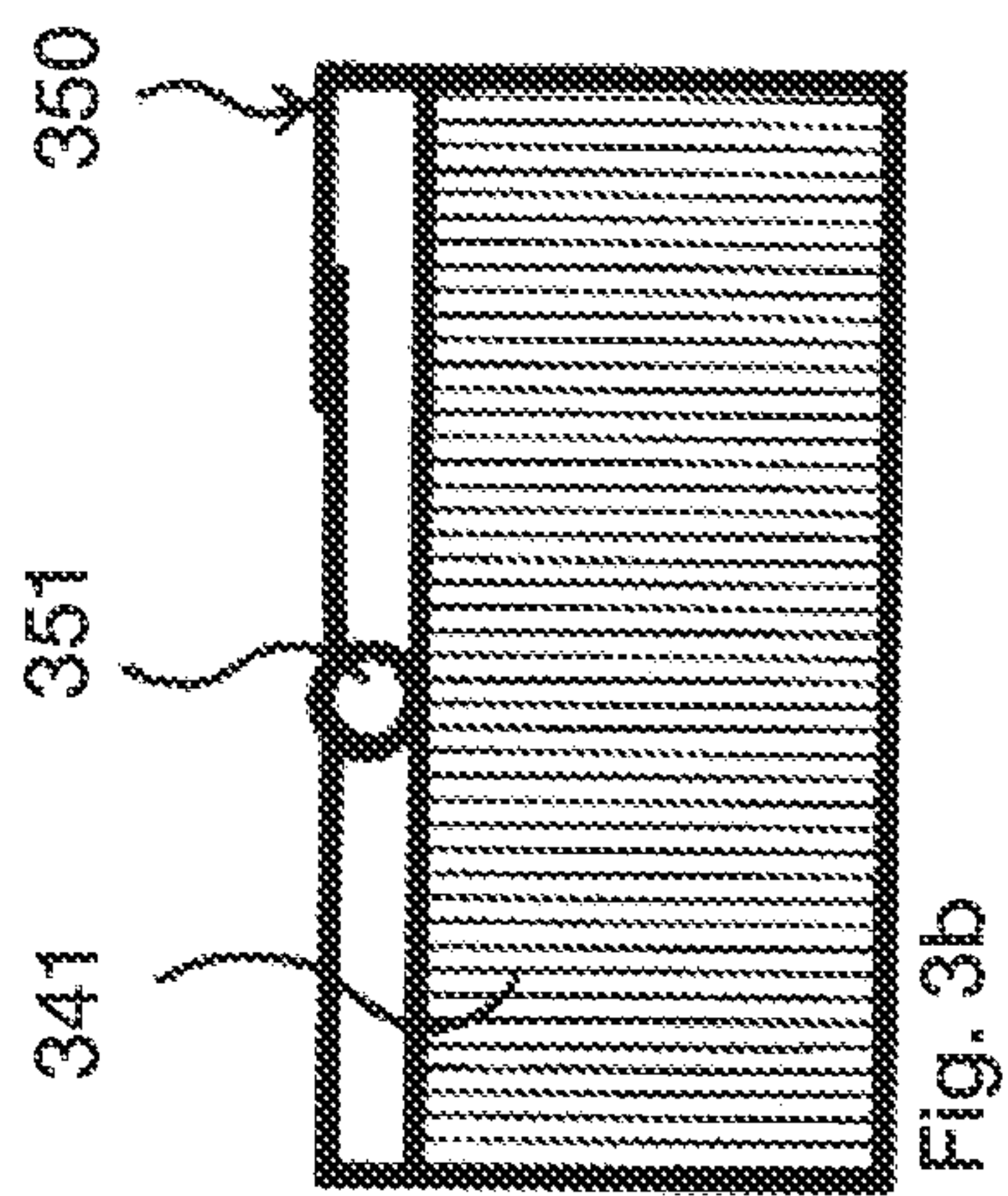
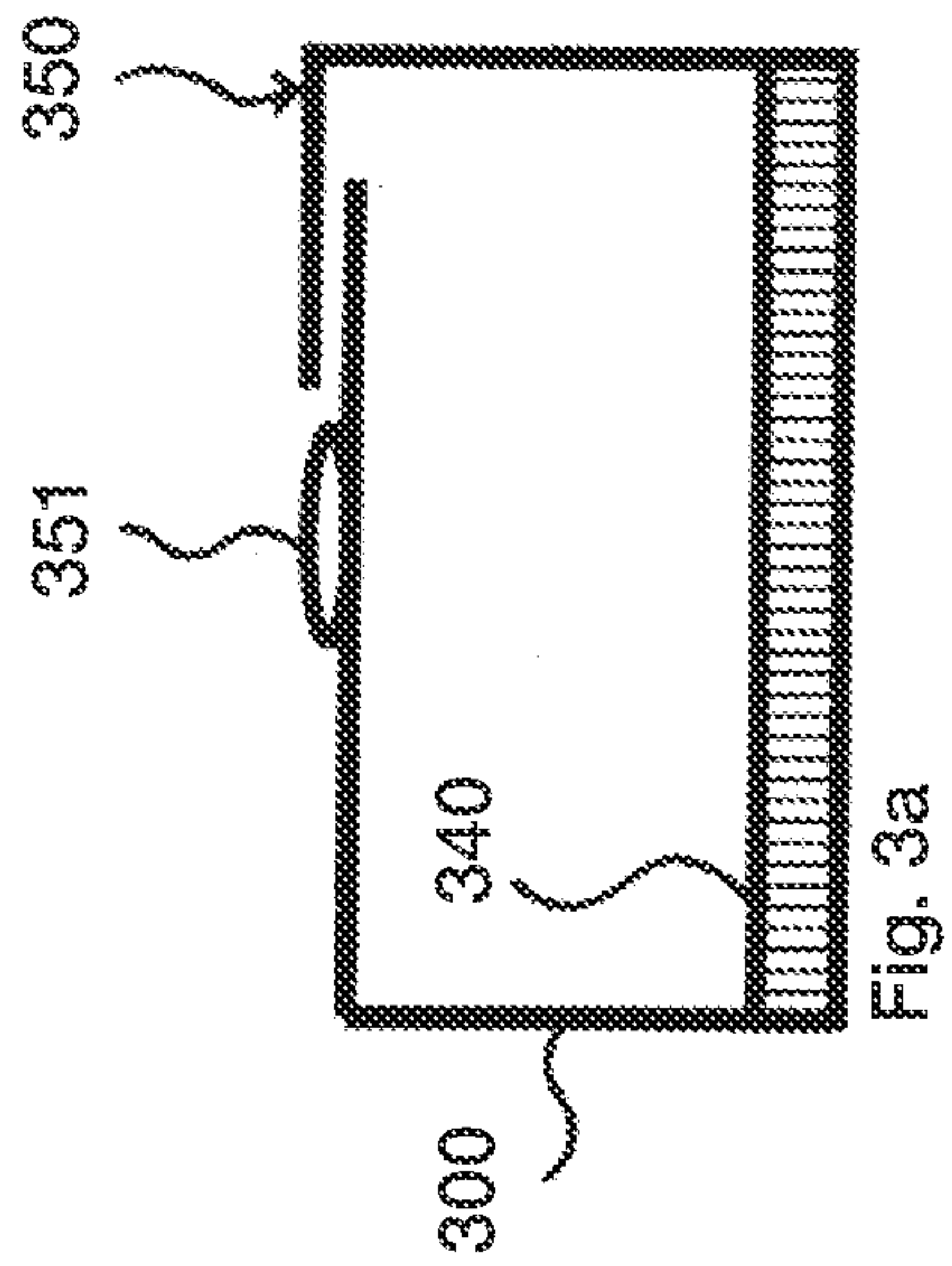
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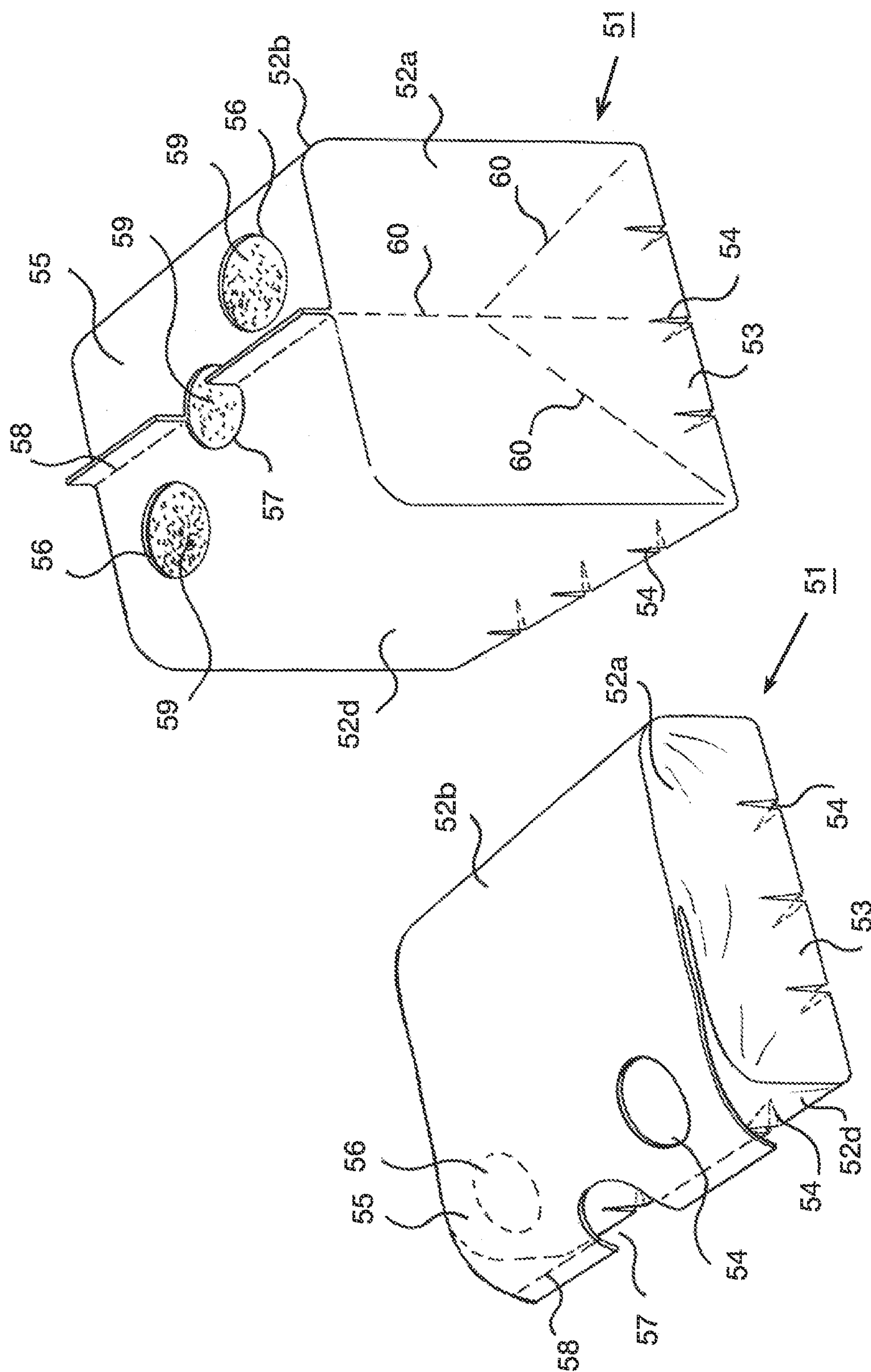


Fig. 5

Fig. 4

