(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 March 2009 (26.03.2009)

PCT

(10) International Publication Number
WO 2009/037552 A2

(51) International Patent Classification:
A01G 9/10 (2006.01)

(21) International Application Number:
PCT/IB2008/002431

(22) International Filing Date:
18 September 2008 (18.09.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
CR2007A000026
20 September 2007 (20.09.2007) IT

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

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv))*

Published:
— *without international search report and to be republished upon receipt of that report*

(54) **Title:** HONEYCOMB TRAY FOR SOWING AND GROWING SEEDLINGS FOR TRANSPLANTING

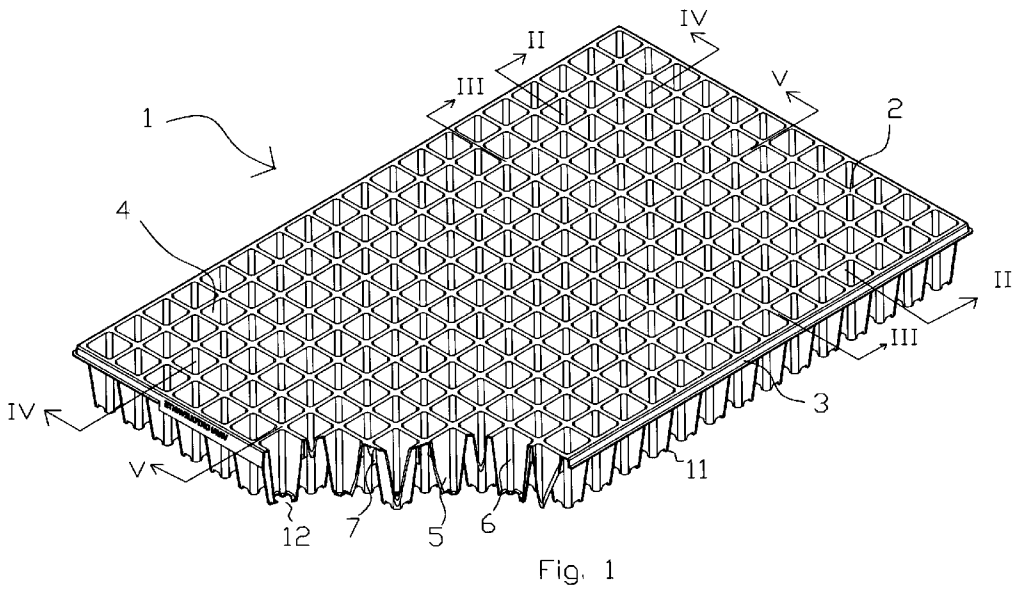

Fig. 1

(57) **Abstract:** Honeycomb tray (1) for sowing and growing seedlings for transplanting, comprising an upper sheet surface (2), the edge of which (3) is folded downwards, and a plurality of cells (4) substantially of a truncated pyramidal shape with square base, the walls of which (5) extend below said surface (2), wherein the cells (4) are arranged in a regular manner in a grid of longitudinal and transverse rows, characterised in that said tray comprises means for connection (7,8,9) between the walls (5) of the cells (4) which protrude below said surface (2).

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HONEYCOMB TRAY FOR SOWING AND GROWING SEEDLINGS FOR TRANSPLANTING

* * *

The invention concerns the agricultural and nursery sector. More specifically, the invention relates to a container of the honeycomb tray type, provided with a plurality of cells, used for sowing and growing vegetable, fruit or flower seedlings, until they are transplanted into the field or greenhouses.

According to the known technique, the honeycomb trays are generally made of a thin sheet of thermoplastic material, usually polystyrene, by means of thermoforming in moulds. The cells are arranged in a regular manner in a grid of longitudinal and transverse rows, separated by narrow interspaces. The trays are generally rectangular, with dimensions that vary depending on handling requirements. Each cell extends below the upper surface of the tray and has a substantially truncated pyramidal shape with square base measuring approximately two centimetres by two centimetres, flat walls and rounded corners. The bottom of the cells has an aperture for drainage of the irrigation water and is furthermore shaped with feet at the four corners, so that the trays can be stacked but without nesting into one another. The edge of the tray is folded downwards in order to strengthen the structure of the container. For sowing and growing the seedlings, the cells are filled with a suitable solid culture medium. The main drawback of the trays of known type is the poor resistance to flexion of the container structure, especially when it has to be moved

from the place of germination, when it is filled with the soil which is damp due to the irrigation water and the seedlings have grown into plants.

The trays tend to bend due to the regular arrangement of the cells, which are joined together only by the thin sheet material between the interspaces of the grid of cells, so that the folded edge of the long sides, which takes the full brunt of the structural resistance, splits due to the excessive weight of the load, causing breakage by crushing of the soil contained in the central cells, or even overturning and loss of the contents of the tray during the automatic movement for loading the transplanting machines.

Another drawback is that, due to the fact that they deteriorate easily, the trays are not suitable for being re-used and have to be disposed of.

The invention aims to overcome these limits, providing a honeycomb cell tray for growing seedlings for transplanting which is sturdy and durable, and can be re-used if necessary.

Said advantages are achieved with a honeycomb tray for sowing and growing seedlings for transplanting, comprising an upper sheet surface, the edge of which is folded downwards, and a plurality of cells substantially of a truncated pyramidal shape with square base, the walls of which extend below said surface, in which the cells are arranged in a regular manner according to a grid pattern of longitudinal and transverse rows, characterised in that said tray comprises means of connection between the walls of the cells which

protrude below said surface.

The connection means between the walls preferably consist of a plurality of linear ribs which develop in a longitudinal and transverse direction to the tray, forming a regular grid, suitable for stiffening said tray.

Advantageously a series of ribs extends continuously in the longitudinal direction of the tray, following the lines identified by the walls of the cells positioned in the same longitudinal direction, also incorporating the walls of the cells, which are advantageously thicker than those in the transverse direction, for a height equal to that of said ribs.

According to a further aspect of the invention, the means of connection between the cells are arranged also in order to create further connecting ribs in the longitudinal and transverse direction between the two opposite faces of the cells, advantageously positioned in the vicinity of the rounded corners of the cells. To obtain greater rigidity of the tray, also the portion of wall of the cells which from the longitudinal direction continues beyond the corners in the transverse direction as far as said rib structures is advantageously thickened like the longitudinal walls.

Preferably connections are also provided between the walls of the perimeter cells and the edge of the tray folded downwards.

To obtain greater resistance to flexion of the tray, the grid acting as a stiffening element gives the tray a slightly convex structure so that when the tray is fully loaded, it is perfectly flat.

Advantageously the tray is produced by an injection moulding process and via the use of a purposely developed technology which employs a press for fine injection moulding and a robot for automatic movement of the moulded product.

The invention has numerous advantages: the tray is sturdier than those currently used obtained by thermoforming in addition to being easy to move even when fully loaded. The fine thicknesses obtained by the injection moulding process allow the weight of the grid to be kept within a few hundred grams, considerably limiting material and transport costs. A further advantage is the possibility of re-using the trays, thus overcoming the problem of disposal and recycling, thereby limiting the environmental impact of the object. The injection moulding technology also considerably reduces large-scale production costs.

The advantages of the invention are illustrated in further detail in the following description of a preferred embodiment, provided as a non-limiting example, and with the help of the figures in which:

Fig. 1 shows a partially sectioned axonometric view of a honeycomb tray for sowing and growing seedlings for transplanting according to the invention;

Fig. 2 and 3 show two generic cross sections according to the lines II-II and III-III of the tray of Fig. 1, corresponding to the centre line of a row of cells and the space between two rows;

Fig. 4 and 5 show two generic longitudinal sections according to the lines IV-IV and V-V of the tray of Fig. 1, corresponding to the centre line of a row of cells and the space between two rows;

Fig. 6 shows a part of the tray according to the invention, seen from below.

With reference to Fig. 1, a honeycomb tray 1 is shown for sowing and growing seedlings for transplanting, which essentially comprises an upper sheet surface 2, the edge 3 of which is folded downwards, and a plurality of cells 4 arranged in a regular manner, according to a grid of longitudinal and transverse rows with a substantially truncated pyramidal shape and square base, the walls 5 of which extend below said upper sheet surface 2.

The vertical joint between the walls 5 is provided by means of a rounded corner 6.

The thickness of the walls of each individual cell 4 is very fine, 0.6 mm, like the originating sheet surface 2 which is 1 mm thick. In this way a tray containing 228 cells weighs approximately 650 grams.

Between the walls 5 of the cells 4, linear connecting ribs are provided which develop in a longitudinal and transverse direction to the tray, creating a regular grid which acts as a stiffening element for said tray.

A series of said ribs 7 extends continuously in the longitudinal direction of the tray, following the lines identified by the walls of the cells positioned in the same longitudinal direction, also incorporating said walls of the cells, which are advantageously thicker than those in the transverse direction. As can be seen in fig. 2 and 3, the thickest height of said walls in the longitudinal direction of the tray is equal to that of said ribs 7.

Further double connecting ribs 8 and 9 are also provided, between the two opposite faces of the cells, located near the rounded corners of the cells in the longitudinal and transverse direction respectively.

Also the portion of wall of the cells which from the longitudinal direction continues beyond the corners in the transverse direction as far as said ribs 8 is thicker, as for the longitudinal walls, again for a height equal to that of said ribs 8.

Connections 10 are also provided between the walls of the perimeter cells and the edge 3 of the tray folded downwards.

The grid acting as stiffening element consisting of the ribs 7, 8 and 9 gives the tray 1, when empty, a slightly convex shape, the centre of curvature of which is located on the cell side towards the bottom of the tray.

On the bottom of the cells, supporting feet 11 and a drainage hole 12 for the irrigation water are provided.

The geometry of the new product is obtained by means of an injection moulding process and the use of a purposely developed technology which uses a press for injection moulding of fine thicknesses and a robotised system for automatic movement of the moulded product.

Naturally, without prejudice to the principle of the invention, the embodiments can be widely varied according to known techniques, without departing from the protective scope of the invention as described and illustrated and for the objects specified.

CLAIMS

1. Honeycomb tray (1) for sowing and growing seedlings for transplanting, comprising an upper sheet surface (2), the edge of which (3) is folded downwards, and a plurality of cells (4) substantially of a truncated pyramidal shape with square base, the walls of which (5) extend below said surface (2), wherein the cells (4) are arranged in a regular manner in a grid of longitudinal and transverse rows, characterised in that said tray comprises means for connection (7,8,9) between the walls (5) of the cells (4) which protrude below said surface (2).
2. Honeycomb tray (1) according to claim 1, characterised in that said connection means between the walls comprise a plurality of linear ribs (7,8,9) which develop in a longitudinal and transverse direction to the tray, creating a regular grid and acting as a stiffening element for said tray.
3. Honeycomb tray (1) according to claim 1, characterised in that a series of ribs (7) extends continuously in the longitudinal direction of the tray, following the lines identified by the walls of the cells in the same longitudinal direction, also incorporating the same walls of said cells, which are advantageously thicker than those in the transverse direction, for a height equal to that of said ribs (7).
4. Honeycomb structure (1) according to claim 1, characterised in that the connection means between the cells are arranged so as to create further connection ribs in the longitudinal (8) and transverse (9) directions between the opposite faces of the cells,

advantageously arranged near the rounded corners (6) of said cells.

5. Honeycomb tray (1) according to claim 1, characterised in that also the portion of wall of the cells which from the longitudinal direction continues beyond the corners in the transverse direction as far as said ribs (8) is advantageously thickened like the longitudinal walls, for a height equal to that of said ribs (8).
6. Honeycomb tray (1) according to claim 11, characterised in that connections (10) are also provided between the walls of the perimeter cells and the edge of the tray folded downwards.
7. Honeycomb tray (1) according to claim 1, characterised in that the grid acting as a stiffening element gives the tray, when empty, a slightly convex shape.

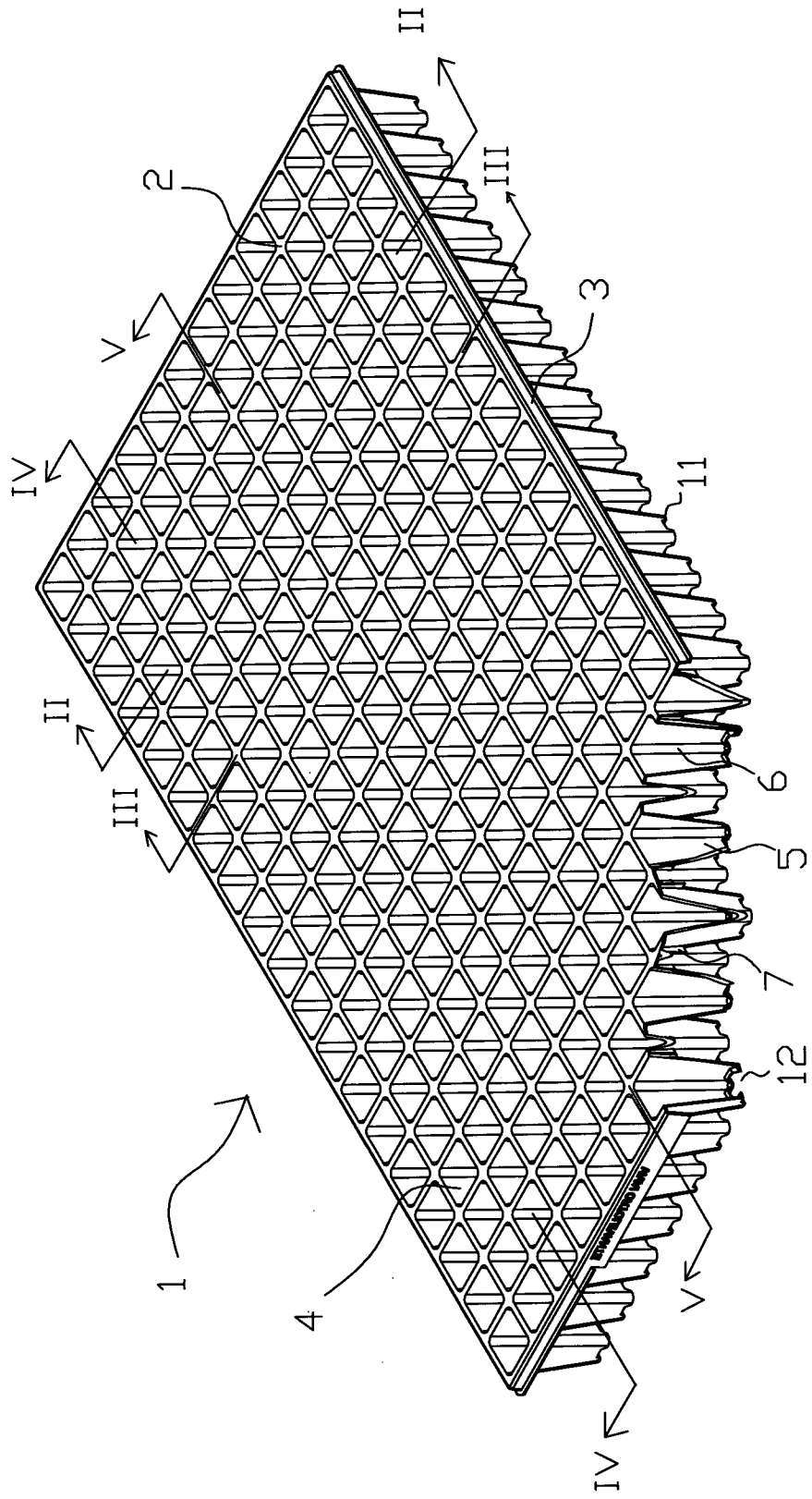

Fig. 1

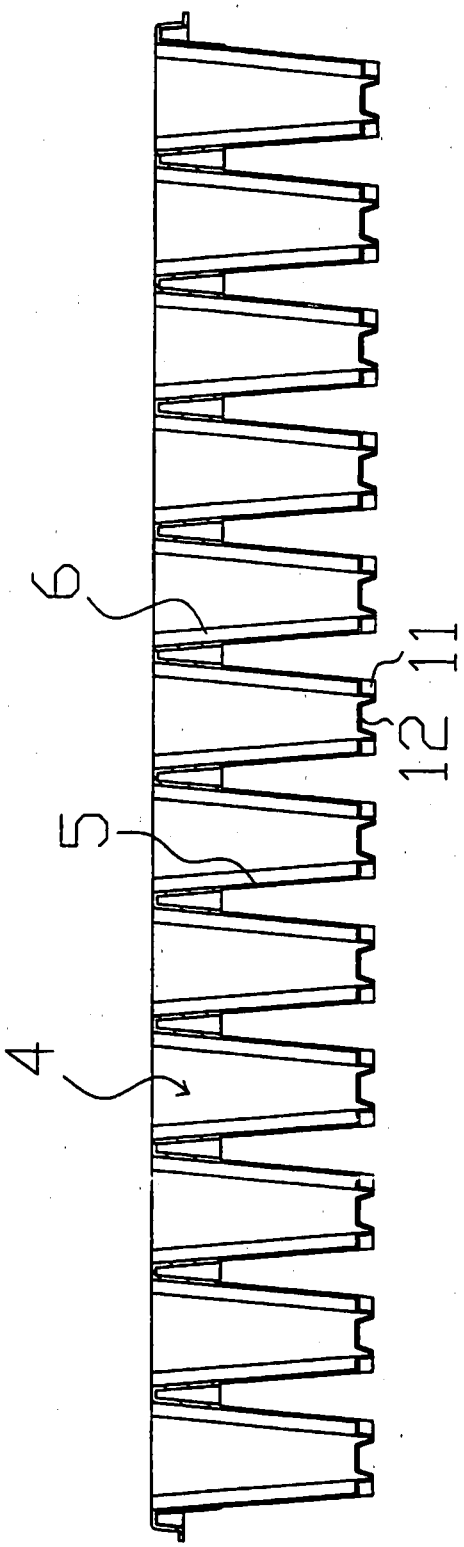

Fig. 2

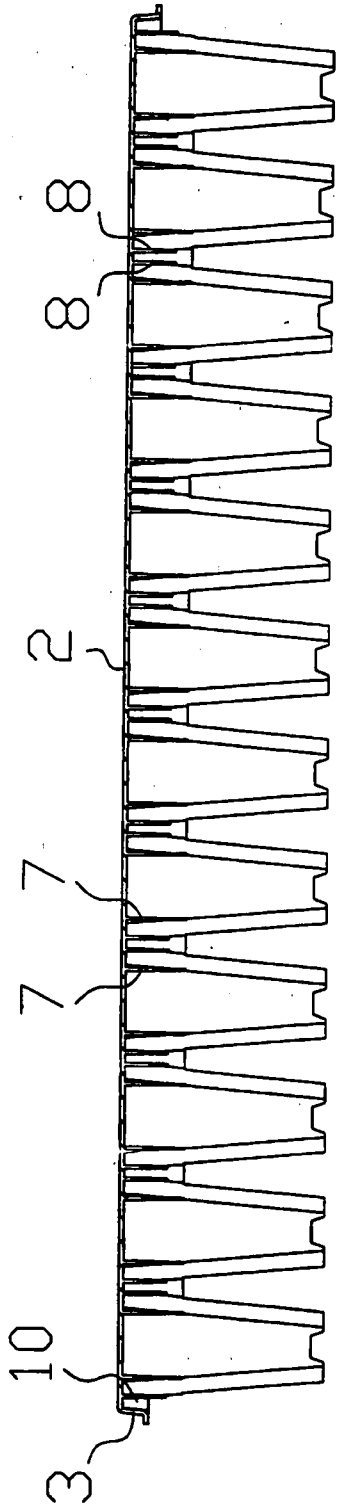

Fig. 3

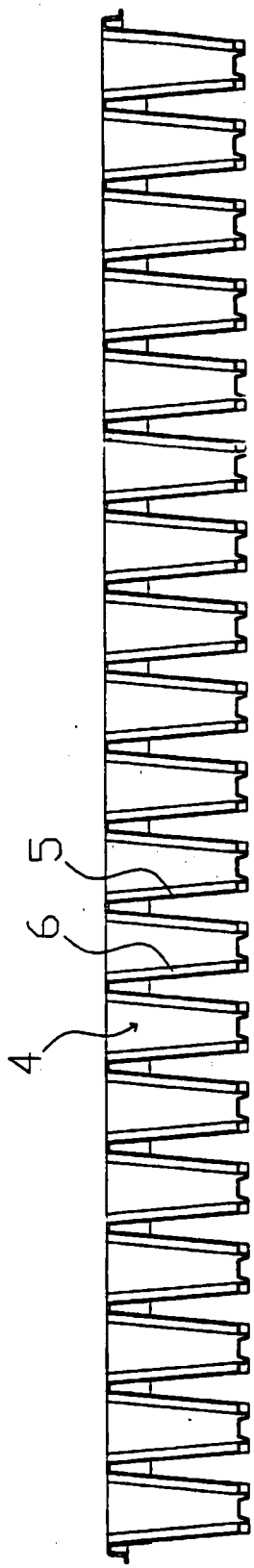

Fig. 4

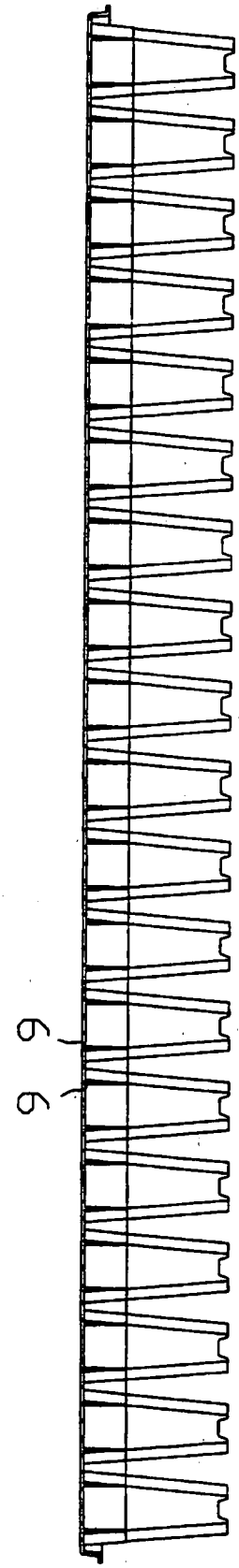

Fig. 5

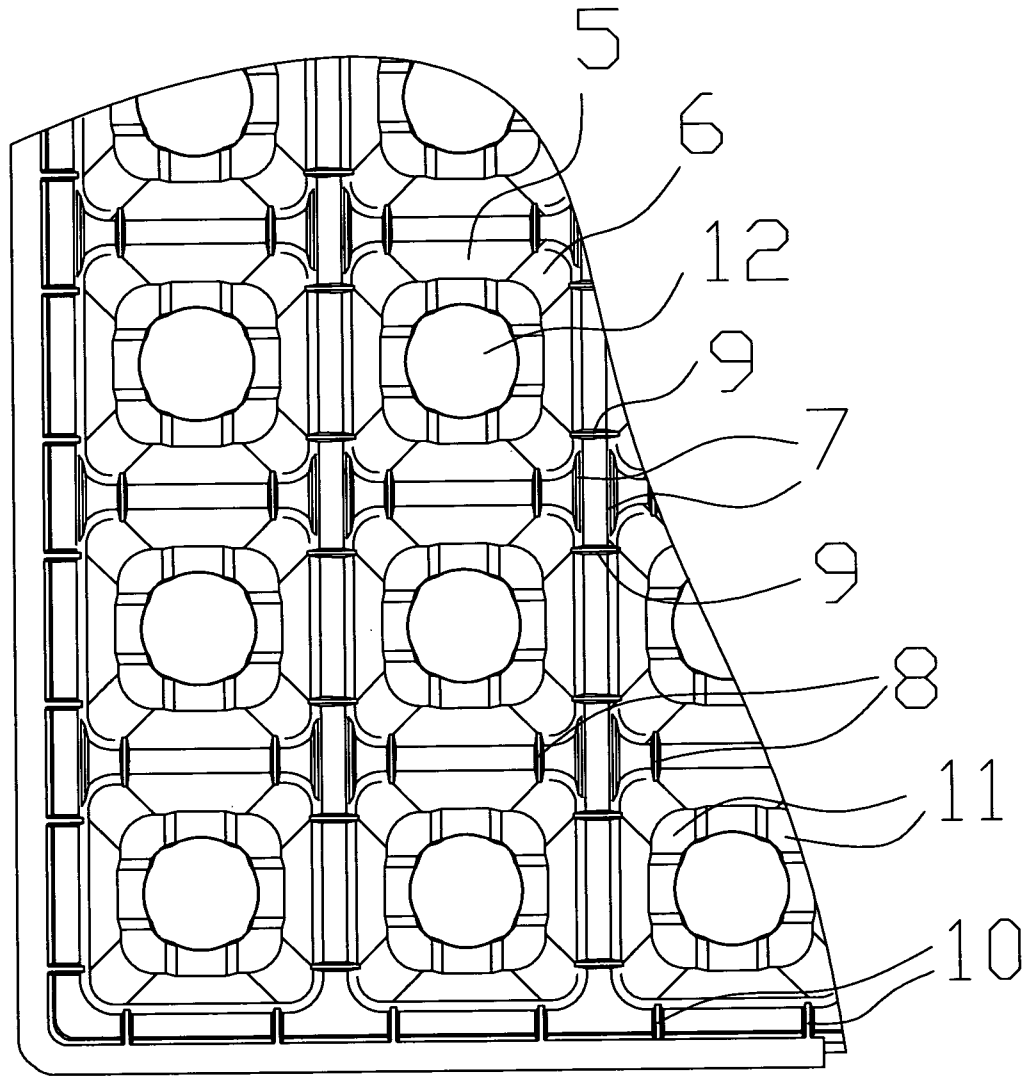

Fig. 6