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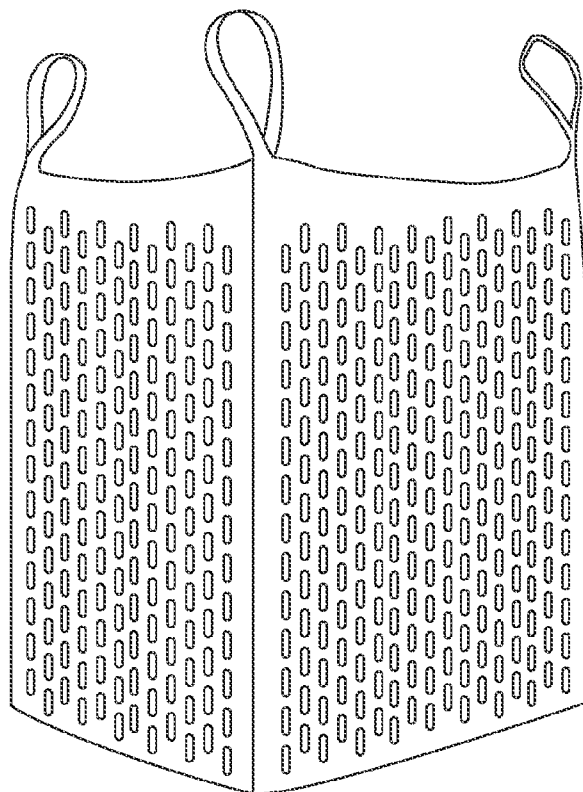


FIG. 1

(57) Abstract: Methods and transportation of high
node concentrations of sugarcane stem sections which
prevent, control, and/or reduce fermentation of the sug-
arcane stem sections.



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High Node Concentration Storage and Transportation of Sugarcane

The present technology relates generally to the storage and transportation of sugarcane, and more particularly to the storage and transportation of sugarcane cuttings having a single node.

Sugar cane is a commercially important gramineous plant. Sugar cane acreage is increasing, and its uses include the production of sugar, Falernum, molasses, rum, cachaça (the national spirit of Brazil) and ethanol for fuel. The bagasse that remains after sugar cane crushing can be used to provide both heat energy, used in the mill, and electricity, which is typically sold to the consumer electricity grid and as a feedstock for the production of ethanol.

A seed of sugar cane is a dry one-seeded fruit or caryopsis formed from a single carpel, the ovary wall (pericarp) being united with the seed-coat (testa). The seeds are ovate, yellowish brown and very small, about 1 mm long. However, for commercial agriculture, the seed of a sugar cane is not sown or planted, but the cane cuttings (also known as a stem section (or part of a stalk or culm or seedling)) of 40-50 cm in length are placed horizontally in furrows which are generally wide at ground level & deep (40 to 50 cm wide and 30 to 40 cm deep), and then lightly covered with soil.

The stem of sugar cane comprises generally several nodes and internodes as in other grasses. The term "node" means the part of the stem of a plant from which a leaf, branch, or aerial root grows; each plant has many nodes. At the position of each node, a bud (or gemma) forms, that can grow to yield the crop. Suitable material for cuttings are pieces of cane cut from 8-14 month old healthy plants, with the older basal buds or buds in the middle to top of the stem germinating stronger and faster. The cuttings are taken from plants which themselves have generally grown from cuttings.

The nodes range from 10 to 25 cm apart along the above-ground section of the stem. At each node a broad leaf rises which consists of a sheaf or base and the leaf blade. The sheaf is attached to the stem at the node and at that point entirely surrounds the stem with edges overlapping. The sheath from one node encircles the stem up to the next node above and may overlap the base of the leaf on the next higher node. The leaf blade is very long and narrow, varying in width from 2.5 to 7.5 cm and up to 1.5m or more in length. Also, at each node along the stem is a bud, protected under the leaf sheath. When stem sections are planted by laying them horizontally and covering with soil a new stem grows from the bud, and roots grow from the base of the new stem. The stem branches below ground so several may rise as a clump from the growth of the bud at a node.

In planting sugar cane fields, mature cane stems are cut into sections, either manually in the furrows or by automation and laid horizontally in furrows. In continental United States cuttings with several nodes are laid while in tropical countries sections with only 2 or 3 nodes are commonly used -
5 since temperatures for growth are more favorable.

The cuttings can be prepared either manually or by mechanical means. Manual preparation involves manually cutting the longer cuttings in the furrow into smaller stem sections having on average three buds, and so a stem section could unintentionally have one bud because of the overlap between the cuttings in the furrow. When mechanical means are used for preparing the cuttings, the stem
10 sections generally have 2 to 3 buds per stem section and these are then placed in the furrows also with aid of mechanical means. Once planted, a stand of cane can be harvested several times; after each harvest, the cane sends up new stems, called ratoons. Usually, each successive harvest gives a smaller yield, and eventually the declining yields justify replanting. Depending on agricultural practice, two to ten harvests may be possible between plantings. After planting, the crop is sprayed with water,
15 fertilizer, and pesticides, such as herbicides and insecticides.

These existing agricultural practices with for example, sugar cane, show several disadvantages such as the requirement of workmanship to cut the stem, use of different kinds of bulky machines, many steps and low efficiency. This scenario usually leads to high costs of operation and logistic and undesirable risks for people working in field when cutting the stems. Additionally, one of the greatest
20 disadvantages is that the cutting is cut in a long length of about 40 cm, especially when automated, more specifically about 37 cm, in order to ensure that there will be at least two or three buds (or also known as gemmas) per part of cutting, which requires large areas for processing and incurs higher costs. Further, once cut, the larger stem sections require big areas to stock, bringing further increased costs for the process. Also, the planting of the known stem sections requires a high weight of stem sections per
25 hectare, such as 16-18 ton/ha (by mechanic planting) or 12-16 ton/ha (by conventional planting).

FIG. 1 is a schematic illustration of a flexible perforated container in accordance with the present technology.

FIG. 2 is a schematic illustration of a perforated container in accordance with the present technology.

FIG. 3 is a schematic illustration of a perforated container in the form of a tractor-trailer in accordance

with the present technology.

FIG. 4 is a schematic illustration of a perforated container in the form of a truck in accordance with the present technology.

FIG. 5 is a schematic illustration of a perforated container in the form of a railcar in accordance with the present technology.

FIG. 6 is a schematic illustration of a perforated container in the form of a storage silo in accordance with the present technology.

Suitably the stem section comprising the node in accordance with the present technology is from about 2 to about 12 cm in length. More suitably, it is from about 3 to about 8 cm in length, especially from 3.5 to 4.5 cm in length.

The present invention, allows cost-effective methods having logistic advantages for a crop, such as sugar cane, through improved handling, storage, and transportation.

Other crops suitable for the present technology include, for example, bamboo.

Sugarcane or sugar cane (*Saccharum*) is a genus of 6 to 37 species (depending on taxonomic interpretation) of tall grasses (family Poaceae, tribe Andropogoneae), native to warm temperate to tropical regions of the Old World. They have stout, jointed, fibrous stems that are rich in sugar and measure 2 to 6 meters tall. All of the sugarcane species interbreed, and the major commercial cultivars are complex hybrids.

Specific examples of species include *Saccharum arundinaceum*, *Saccharum bengalense*, *Saccharum edule*, *Saccharum officinarum*, *Saccharum procerum*, *Saccharum ravennae*, *Saccharum robustum*, *Saccharum sinense*, *Saccharum spontaneum*.

The stem section (or 'cutting', or part of the stalk or culm) for planting according to the technology preferably has defined characteristics, such as having at least one node, bud, or gemma, having only one node, bud, or gemma, and/or having a defined length. Suitably the stem section has only one node.

In the context of the present technology, the term 'bud' also encompasses the node at which a bud is capable of forming, since the bud itself may not have formed at the time of cutting or planting.

The stem section to be stored is generally from about 2 to about 20 cm in length, suitably from about 2 to about 12 cm, more suitably from about 3 to about 8 cm, more suitably from about 3.5 to 4.5 cm, and especially about 4 cm in length.

5 The stem section is of a minimum length that the section contains at least one node. Suitably, the stem section is from about 3 to about 8 cm in length, and comprises only one node.

The present technology is suitable for the different types of nodes (e.g. tall root band, constricted root band, conoidal root band and obconoidal root band) and internodes (e.g. cylindrical, tumescent, bobbin-shaped, conoidal, obconoidal and concave-convex).

10 A stem section containing one node can be obtained by manually cutting the cutting to the desired lengths (for example, with a machete) or by mechanical or automated means. Suitably, the stem section is prepared by making two cross-sectional cuts through the stem, one above and one below the position of the node at which the bud forms.

Storage and transportation of the stem sections in high node concentrations (e.g. nodes/volume) and in large volumes (e.g. greater than 1 cubic meter) can prove problematic without
15 the proper storage and transportation methods of the present technology. Without the storage and transportation method of the present technology, the sugarcane stem sections can ferment during storage and transportation, which in-turn lowers the germination and shelf-life of the sugarcane stem section for planting. As such, the present technology provides for methods of storage and transportation of high node concentrations of sugarcane stem sections which prevent, control, and/or reduce
20 fermentation of the sugarcane stem sections.

The present technology provides for a method of storing and transporting high concentrations of sugarcane stem sections in a container designed to allow for airflow into the container in an amount effective to prevent or reduce fermentation of the sugarcane stem sections within the container.

Node concentrations in accordance with the present technology range from about 10,000 to
25 about 50,000 nodes per cubic meter. Preferably the node concentrations are from about 10,000 to about 30,000 nodes per cubic meter, from about 10,000 to about 25,000 nodes per cubic meter, from about 12,000 to about 25,000 nodes per cubic meter, from about 12,000 to about 20,000 nodes per cubic meter, from about 15,000 to about 25,000 nodes per cubic meter, and from about 15,000 to about 20,000 nodes per cubic meter.

A container in accordance with the present technology may be a rigid or flexible container. The container of the present technology is preferably greater than 1 cubic meter in storage capacity.

The container of the present technology is of a design which allows for airflow into the container in an amount effective to prevent or reduce fermentation of the sugarcane stem sections within the container. Airflow into the container is preferably obtained through perforations in the container wall or walls. The perforations for airflow may be present throughout a wall section or may be present in only a portion of a wall section. The perforations for airflow may be present on only one wall section or present on two or more wall sections. Perforations may also be present on either the top or bottom of the container as well.

The perforations of the present technology are designed to allow for proper airflow into the container and around the sugarcane stem sections. The perforations are of a design that is small enough to prevent the sugarcane stem sections from falling through the perforations. The perforations are also of a design that is small enough to prevent the stem sections from being forced through the perforations under normal storage and transportation conditions. Also, the perforations are of a design and quantity large enough to allow for airflow into the container in an amount effective to prevent or reduce fermentation of the sugarcane stem sections within the container.

As discussed above, perforations in accordance with the present technology must be small enough to prevent the loss of the sugarcane stem sections through the perforations. Sugarcane stem sections in accordance with the present technology range from about 2 to about 20 cm in length, suitably from about 2 to about 12 cm, suitably from about 2 to about 8 cm, more suitably from about 3 to about 8 cm, more suitably from about 3.5 to 4.5 cm, and especially about 4 cm in length. The diameter of sugarcane stem sections in accordance with the present technology range from about 1 to about 5 cm, suitably from about 2 to about 4 cm, more suitably from about 2 to about 3 cm. Individual perforations in accordance with the present technology are preferably less than 2 cm in either width or length, or less than 2 cm in both width and length. Square, rectangular, and quadrilateral perforations in accordance with the present technology range from a length of from about 0.1 cm to about 30 cm and a width of from about 0.1 cm to about 6 cm; preferably a length of from about 0.1 cm to about 15 cm and a width of from about 0.1 cm to about 3 cm; preferably a length of from about 0.1 cm to about 7 cm and a width of from about 0.1 cm to about 3 cm; preferably a length of from about 0.1 cm to about 5 cm and a width of from about 0.1 cm to about 3 cm; preferably a length of from about 0.1 cm to about 3 cm and a width of from about 0.1 cm to about 3 cm; preferably a length of from about 0.1 cm to about 5 cm and

a width of from about 0.1 cm to about 1 cm.

Additional preferred square, rectangular, and quadrilateral (average length and width) perforation dimensions in accordance with the present technology are shown below in **Table 1**:

	Width (cm)														
	0.1	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	5	5.5	6	
Length (cm)	0.1	0.1×0.1	0.1×0.25	0.1×0.5	0.1×0.75	0.1×1	0.1×1.5	0.1×2	0.1×2.5	0.1×3	0.1×3.5	0.1×4	0.1×5	0.1×5.5	0.1×6
	0.25	0.25×0.1	0.25×0.25	0.25×0.5	0.25×0.75	0.25×1	0.25×1.5	0.25×2	0.25×2.5	0.25×3	0.25×3.5	0.25×4	0.25×5	0.25×5.5	0.25×6
	0.5	0.5×0.1	0.5×0.25	0.5×0.5	0.5×0.75	0.5×1	0.5×1.5	0.5×2	0.5×2.5	0.5×3	0.5×3.5	0.5×4	0.5×5	0.5×5.5	0.5×6
	0.75	0.75×0.1	0.75×0.25	0.75×0.5	0.75×0.75	0.75×1	0.75×1.5	0.75×2	0.75×2.5	0.75×3	0.75×3.5	0.75×4	0.75×5	0.75×5.5	0.75×6
	1	1×0.1	1×0.25	1×0.5	1×0.75	1×1	1×1.5	1×2	1×2.5	1×3	1×3.5	1×4	1×5	1×5.5	1×6
	1.5	1.5×0.1	1.5×0.25	1.5×0.5	1.5×0.75	1.5×1	1.5×1.5	1.5×2	1.5×2.5	1.5×3	1.5×3.5	1.5×4	1.5×5	1.5×5.5	1.5×6
	2	2×0.1	2×0.25	2×0.5	2×0.75	2×1	2×1.5	2×2	2×2.5	2×3	2×3.5	2×4	2×5	2×5.5	2×6
	2.5	2.5×0.1	2.5×0.25	2.5×0.5	2.5×0.75	2.5×1	2.5×1.5	2.5×2	2.5×2.5	2.5×3	2.5×3.5	2.5×4	2.5×5	2.5×5.5	2.5×6
	3	3×0.1	3×0.25	3×0.5	3×0.75	3×1	3×1.5	3×2	3×2.5	3×3	3×3.5	3×4	3×5	3×5.5	3×6
	3.5	3.5×0.1	3.5×0.25	3.5×0.5	3.5×0.75	3.5×1	3.5×1.5	3.5×2	3.5×2.5	3.5×3	3.5×3.5	3.5×4	3.5×5	3.5×5.5	3.5×6
	4	4×0.1	4×0.25	4×0.5	4×0.75	4×1	4×1.5	4×2	4×2.5	4×3	4×3.5	4×4	4×5	4×5.5	4×6
	4.5	4.5×0.1	4.5×0.25	4.5×0.5	4.5×0.75	4.5×1	4.5×1.5	4.5×2	4.5×2.5	4.5×3	4.5×3.5	4.5×4	4.5×5	4.5×5.5	4.5×6
	5	5×0.1	5×0.25	5×0.5	5×0.75	5×1	5×1.5	5×2	5×2.5	5×3	5×3.5	5×4	5×5	5×5.5	5×6
	6	6×0.1	6×0.25	6×0.5	6×0.75	6×1	6×1.5	6×2	6×2.5	6×3	6×3.5	6×4	6×5	6×5.5	6×6
	6	6×0.1	6×0.25	6×0.5	6×0.75	6×1	6×1.5	6×2	6×2.5	6×3	6×3.5	6×4	6×5	6×5.5	6×6
	6.5	6.5×0.1	6.5×0.25	6.5×0.5	6.5×0.75	6.5×1	6.5×1.5	6.5×2	6.5×2.5	6.5×3	6.5×3.5	6.5×4	6.5×5	6.5×5.5	6.5×6
	7	7×0.1	7×0.25	7×0.5	7×0.75	7×1	7×1.5	7×2	7×2.5	7×3	7×3.5	7×4	7×5	7×5.5	7×6
	7.5	7.5×0.1	7.5×0.25	7.5×0.5	7.5×0.75	7.5×1	7.5×1.5	7.5×2	7.5×2.5	7.5×3	7.5×3.5	7.5×4	7.5×5	7.5×5.5	7.5×6
	8	8×0.1	8×0.25	8×0.5	8×0.75	8×1	8×1.5	8×2	8×2.5	8×3	8×3.5	8×4	8×5	8×5.5	8×6
	8.5	8.5×0.1	8.5×0.25	8.5×0.5	8.5×0.75	8.5×1	8.5×1.5	8.5×2	8.5×2.5	8.5×3	8.5×3.5	8.5×4	8.5×5	8.5×5.5	8.5×6
	9	9×0.1	9×0.25	9×0.5	9×0.75	9×1	9×1.5	9×2	9×2.5	9×3	9×3.5	9×4	9×5	9×5.5	9×6
	9.5	9.5×0.1	9.5×0.25	9.5×0.5	9.5×0.75	9.5×1	9.5×1.5	9.5×2	9.5×2.5	9.5×3	9.5×3.5	9.5×4	9.5×5	9.5×5.5	9.5×6
	10	10×0.1	10×0.25	10×0.5	10×0.75	10×1	10×1.5	10×2	10×2.5	10×3	10×3.5	10×4	10×5	10×5.5	10×6
	11	11×0.1	11×0.25	11×0.5	11×0.75	11×1	11×1.5	11×2	11×2.5	11×3	11×3.5	11×4	11×5	11×5.5	11×6
	12	12×0.1	12×0.25	12×0.5	12×0.75	12×1	12×1.5	12×2	12×2.5	12×3	12×3.5	12×4	12×5	12×5.5	12×6
	13	13×0.1	13×0.25	13×0.5	13×0.75	13×1	13×1.5	13×2	13×2.5	13×3	13×3.5	13×4	13×5	13×5.5	13×6
	14	14×0.1	14×0.25	14×0.5	14×0.75	14×1	14×1.5	14×2	14×2.5	14×3	14×3.5	14×4	14×5	14×5.5	14×6
	15	15×0.1	15×0.25	15×0.5	15×0.75	15×1	15×1.5	15×2	15×2.5	15×3	15×3.5	15×4	15×5	15×5.5	15×6
	16	16×0.1	16×0.25	16×0.5	16×0.75	16×1	16×1.5	16×2	16×2.5	16×3	16×3.5	16×4	16×5	16×5.5	16×6
	17	17×0.1	17×0.25	17×0.5	17×0.75	17×1	17×1.5	17×2	17×2.5	17×3	17×3.5	17×4	17×5	17×5.5	17×6
18	18×0.1	18×0.25	18×0.5	18×0.75	18×1	18×1.5	18×2	18×2.5	18×3	18×3.5	18×4	18×5	18×5.5	18×6	
19	19×0.1	19×0.25	19×0.5	19×0.75	19×1	19×1.5	19×2	19×2.5	19×3	19×3.5	19×4	19×5	19×5.5	19×6	
20	20×0.1	20×0.25	20×0.5	20×0.75	20×1	20×1.5	20×2	20×2.5	20×3	20×3.5	20×4	20×5	20×5.5	20×6	
21	21×0.1	21×0.25	21×0.5	21×0.75	21×1	21×1.5	21×2	21×2.5	21×3	21×3.5	21×4	21×5	21×5.5	21×6	
22	22×0.1	22×0.25	22×0.5	22×0.75	22×1	22×1.5	22×2	22×2.5	22×3	22×3.5	22×4	22×5	22×5.5	22×6	
23	23×0.1	23×0.25	23×0.5	23×0.75	23×1	23×1.5	23×2	23×2.5	23×3	23×3.5	23×4	23×5	23×5.5	23×6	
24	24×0.1	24×0.25	24×0.5	24×0.75	24×1	24×1.5	24×2	24×2.5	24×3	24×3.5	24×4	24×5	24×5.5	24×6	
25	25×0.1	25×0.25	25×0.5	25×0.75	25×1	25×1.5	25×2	25×2.5	25×3	25×3.5	25×4	25×5	25×5.5	25×6	
26	26×0.1	26×0.25	26×0.5	26×0.75	26×1	26×1.5	26×2	26×2.5	26×3	26×3.5	26×4	26×5	26×5.5	26×6	
27	27×0.1	27×0.25	27×0.5	27×0.75	27×1	27×1.5	27×2	27×2.5	27×3	27×3.5	27×4	27×5	27×5.5	27×6	
28	28×0.1	28×0.25	28×0.5	28×0.75	28×1	28×1.5	28×2	28×2.5	28×3	28×3.5	28×4	28×5	28×5.5	28×6	
29	29×0.1	29×0.25	29×0.5	29×0.75	29×1	29×1.5	29×2	29×2.5	29×3	29×3.5	29×4	29×5	29×5.5	29×6	
30	30×0.1	30×0.25	30×0.5	30×0.75	30×1	30×1.5	30×2	30×2.5	30×3	30×3.5	30×4	30×5	30×5.5	30×6	

Additional preferred circular, oval, and substantially circular perforation dimensions and areas in accordance with the present technology are shown below in **Table 2**:

Average Diameter (cm)	Average Area (cm ²)
0.1	0.008
0.2	0.03
0.3	0.07
0.4	0.13
0.5	0.20
0.6	0.28
0.7	0.38
0.8	0.50
0.9	0.64
1	0.79
1.1	0.95
1.2	1.13
1.3	1.33
1.4	1.54
1.5	1.77
1.6	2.01
1.7	2.27
1.8	2.54
1.9	2.84
2	3.14
2.1	3.46
2.2	3.80
2.3	4.15
2.4	4.52
2.5	4.91
2.6	5.31
2.7	5.73
2.8	6.16
2.9	6.61
3	7.07
3.1	7.55
3.2	8.04
3.3	8.55
3.4	9.08
3.5	9.62
3.6	10.18
3.7	10.75
3.8	11.34
3.9	11.95
4	12.57
5	19.63
6	28.27
7	38.48

Table 2

In one embodiment of the technology, the container is a perforated flexible plastic bag with an internal volume from about 1-5 yd³ (0.76-3.82 m³), more preferably from 1.5-3 yd³ (1.15-2.29 m³). Flexible plastic bags in this volume range are known as F.I.B.C.'s (Flex Intermediate Bulk Containers). A preferred material for the containers of the present technology is polypropylene. By way of non-limiting example, a perforated flexible plastic bag in accordance with the technology is shown in **FIG. 1**.

In another embodiment of the technology, the container is a perforated rigid container with an internal volume from about 1-5 yd³ (0.76-3.82 m³), more preferably from 1.5-3 yd³ (1.15-2.29 m³). Such a rigid container may be constructed from any suitable rigid material such as a metal for example, steel, aluminum, or tin, wood, or a rigid plastic. By way of non-limiting example, a perforated rigid container in accordance with the technology is shown in **FIG. 2**.

In another embodiment of the technology, the container is a perforated rigid container with an internal volume of from about 5-200 yd³ (3.82-152 m³), preferably from 35-200 yd³ (26.8-152 m³), and preferably from 100-200 yd³ (76.5-152 m³). Such a rigid container may in the form of, for example, a perforated shipping container, a perforated vehicle trailer, or a perforated rail car. By way of non-limiting example, a perforated container in accordance with the technology is shown in **FIGS. 3-5**.

In another embodiment of the technology, the container is a perforated rigid container with an internal volume of greater than 200 yd³ (152 m³). Such a rigid container may be in the form of, for example, a perforated storage container, perforated cargo hold of a ship, or perforated rail car. By way of non-limiting example, a perforated container in accordance with the technology is shown in **FIGS. 5-6**.

CLAIMS

1. A method of transporting high node concentrations of sugarcane stem sections comprising:

placing sugarcane stem sections having a single node into a container with an node concentration of from about 10000 to about 50000 nodes per cubic meter, wherein said container comprises two or more sides and wherein at least one side contains perforations to allow airflow in an amount to effective to control, reduce, or substantially prevent, fermentation of said sugarcane stem sections; and

transporting said container.

2. A method of storing high node concentrations of sugarcane stem sections comprising:

placing sugarcane stem sections having a single node into a container with an node concentration of from about 10000 to about 50000 nodes per cubic meter, wherein said container comprises two or more sides and wherein at least one side contains perforations to allow airflow in an amount to effective to control, reduce, or substantially prevent, fermentation of said sugarcane stem sections.

3. The method of claim 2, wherein said stem sections have a length from about 2 cm to about 8 cm.

4. The method of claim 2 wherein said stem sections have an average length between 2 cm to 8 cm.

5. The method of claim 4 wherein said container has an internal volume greater than 1 cubic meter.

6. The method of claim 4 wherein said container has an internal volume of from 1 cubic meter to 200 cubic meters.

7. The method of claim 6, wherein said container has an internal volume of from 1 cubic meter to 5 cubic meters

8. The method of claim 7, wherein said container has an internal volume of from 1 cubic meter to 3 cubic meters.

9. The method of claim 8, wherein said container is a flexible container.

10. The method of claim 9, wherein said container sides comprise plastic.

11. The method of claim 10, wherein said plastic is polypropylene.
12. The method of claim 4, wherein said node concentration is from about 10,000 to about 30,000 nodes per cubic meter.
13. The method of claim 12, wherein said node concentration is from about 10,000 to about 25,000 nodes per cubic meter.
14. The method of claim 13, wherein said node concentration is from about 12,000 to about 25,000 nodes per cubic meter.
15. The method of claim 14, wherein said node concentration is from about 15,000 to about 25,000 nodes per cubic meter.
16. The method of claim 15, wherein said node concentration is from about 15,000 to about 25,000 nodes per cubic meter.
17. The method of claim 16, wherein said node concentration is from about 15,000 to about 20,000 nodes per cubic meter.
18. The method of claim 4, wherein said perforations have length of from about 0.1 cm to about 5 cm and a width of from about 0.1 cm to about 3 cm.
19. The method of claim 4, wherein said perforations are substantially circular and have a diameter of from about 0.1 cm to about 8 cm.
20. The method of claim 19, wherein said diameter is from about 0.1 cm to about 5 cm.
21. The method of claim 20, wherein said diameter is from about 0.1 cm to about 3 cm.
22. The method of claim 21, wherein said diameter is from about 0.1 cm to about 1 cm

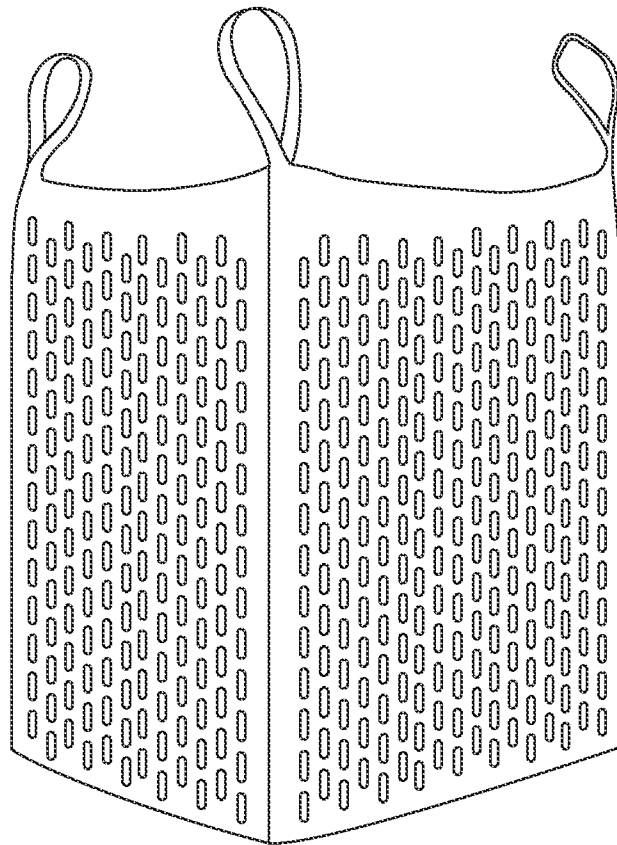


FIG. 1

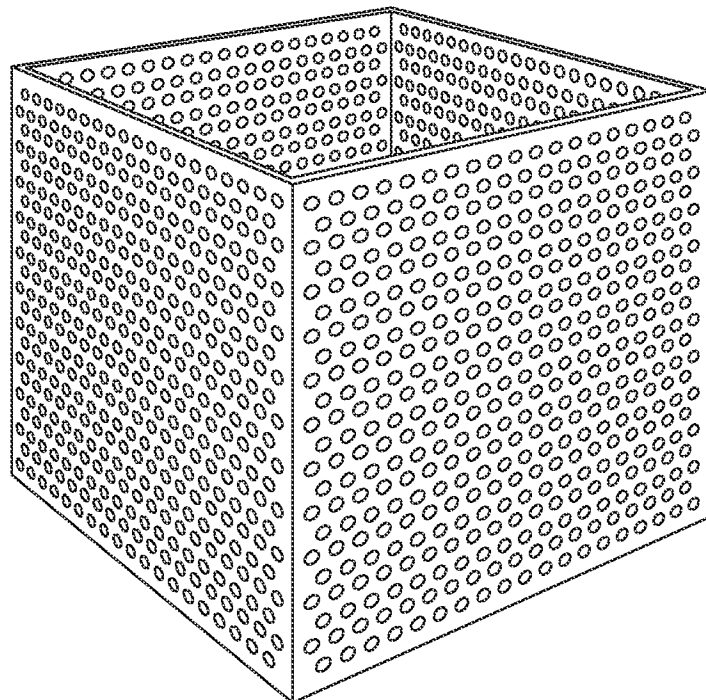


FIG. 2

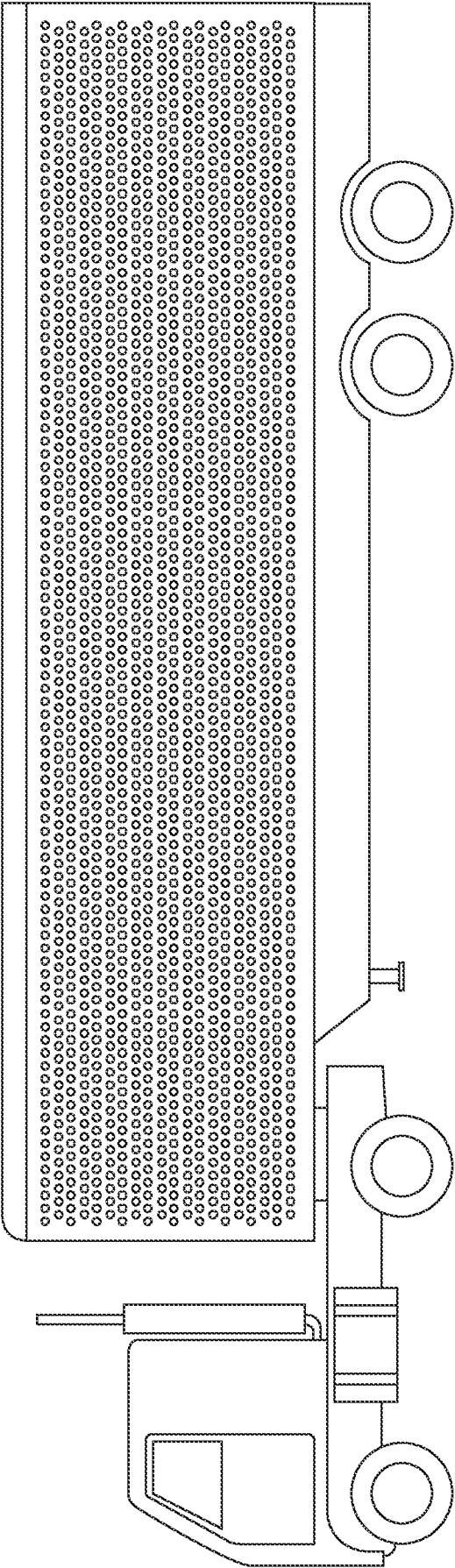


FIG. 3

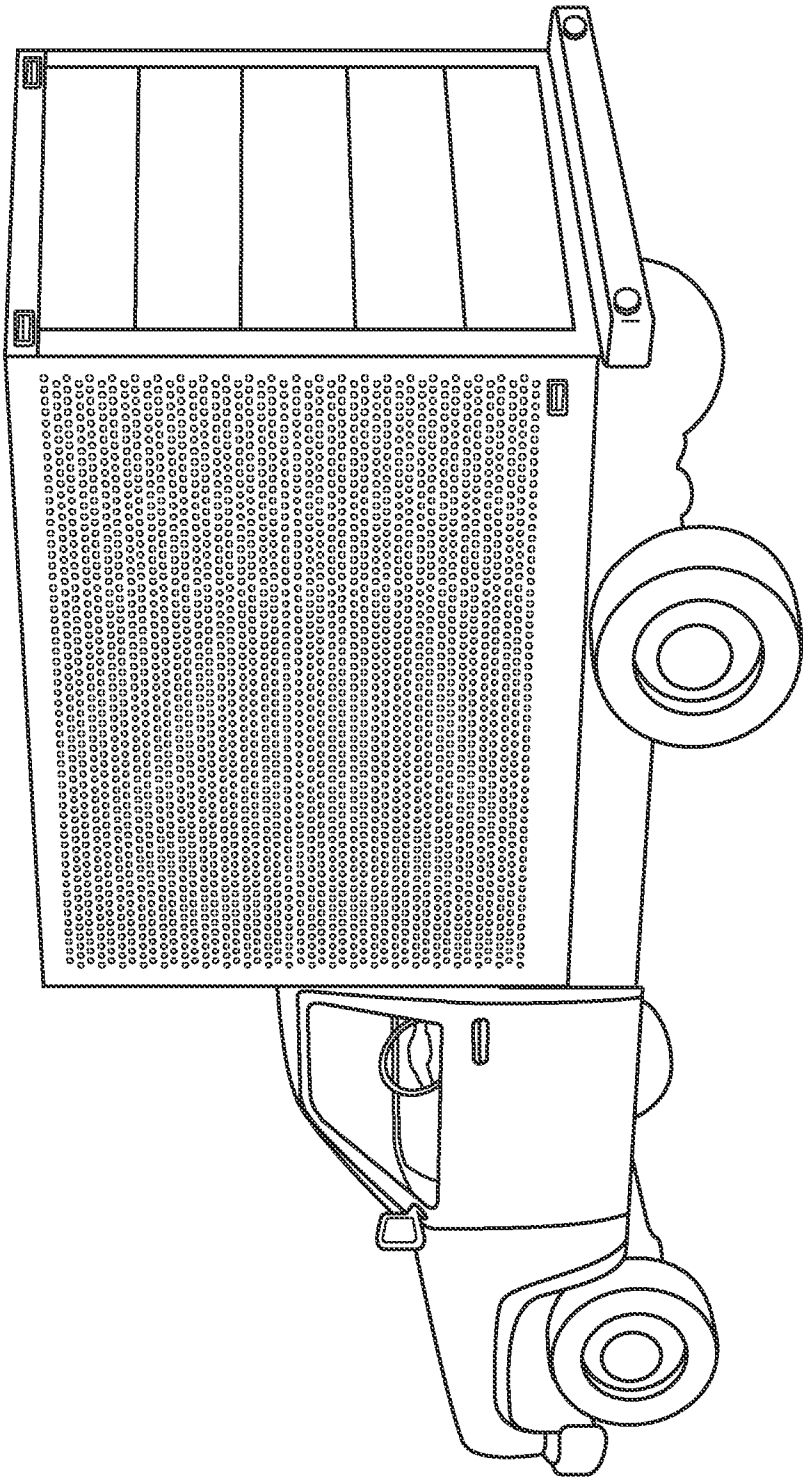


FIG. 4

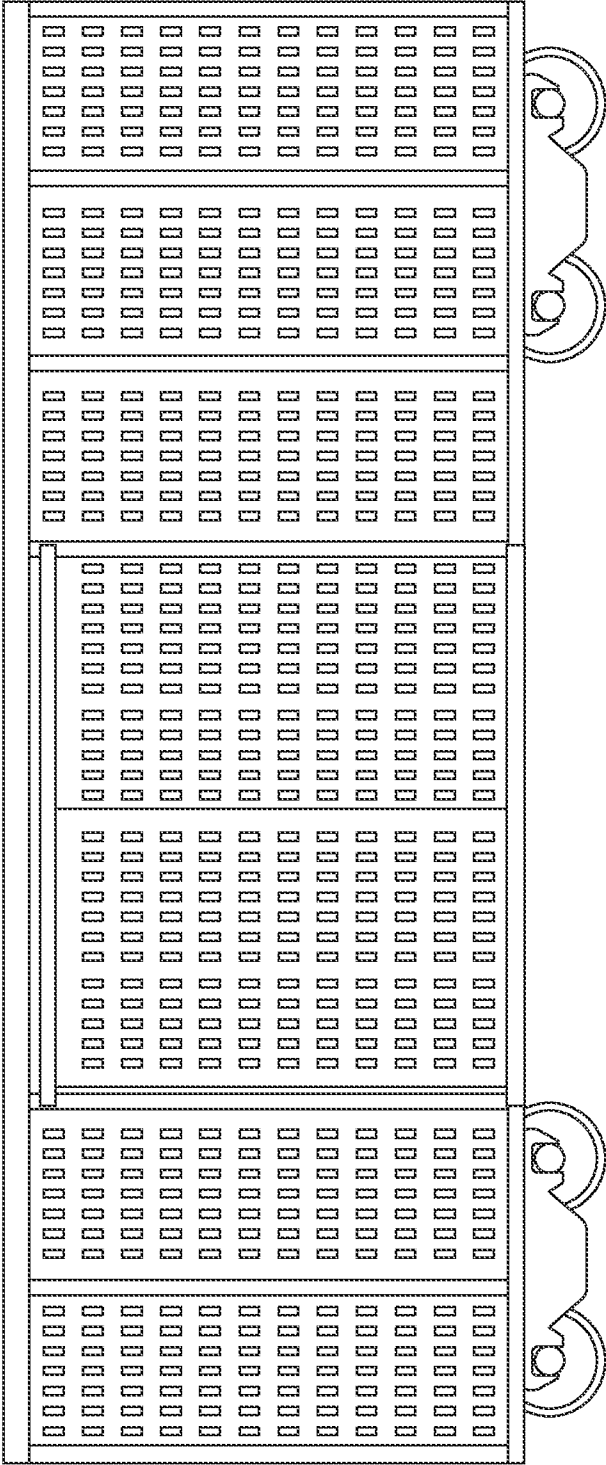


FIG. 5

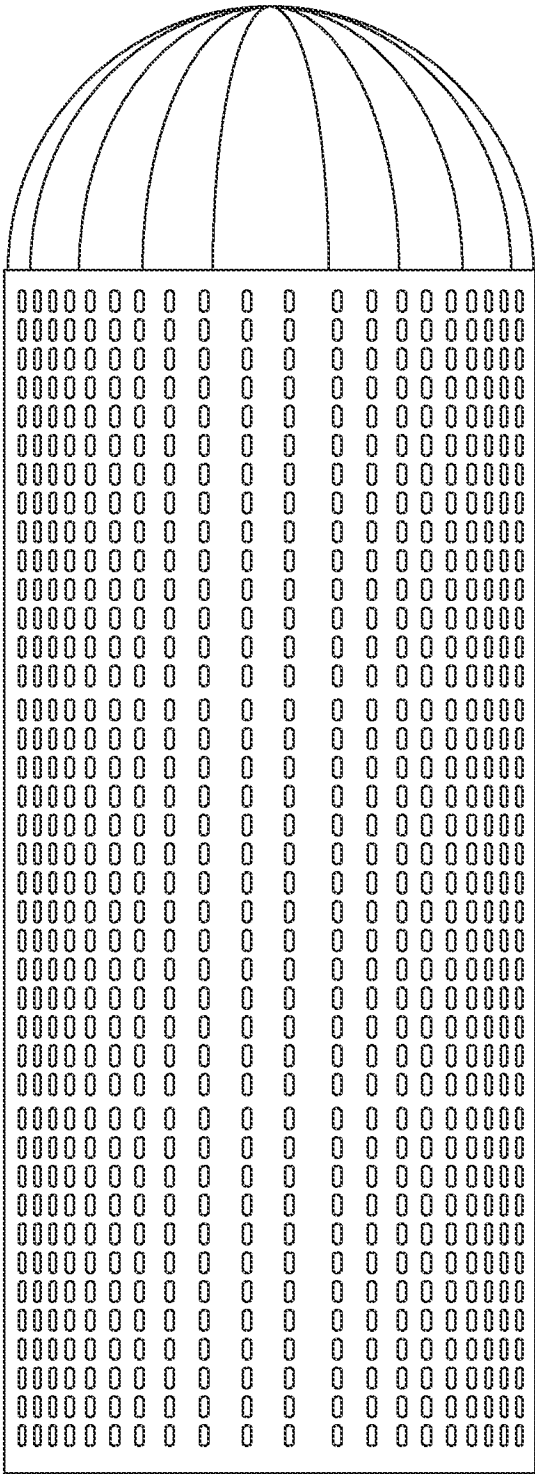


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/054375

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01D90/12 A01F25/08 A01F25/14 A01F25/22 B65D88/16
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01D A01F B65D A01C A01G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2009/000401 A1 (SYNGENTA PARTICIPATIONS AG [CH]; ARAMAKI PAULO [BR]; LEUENBERGER JAKOB) 31 December 2008 (2008-12-31) * abstract; claims 1,2; figures 1,2 page 5, lines 5-10 page 17, lines 1-5 page 41, lines 1-7	1-22
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search

26 November 2010

Date of mailing of the international search report

06/12/2010

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INTERNATIONAL SEARCH REPORT

International application No
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A	JP 2 057112 A (OMORI HITOSHI) 26 February 1990 (1990-02-26) * abstract	1,2

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Information on patent family members

International application No

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