

ASSEMBLY SET OF ASSEMBLY-TYPE PLANTING CONTAINER AND ASSEMBLY-TYPE PLANTING CONTAINER

Technical Field

[0001]

The present invention relates to a freely assemblable and disassemblable container that may be used for, e.g., planting, greening and cultivating.

Background Art

[0002]

In modern society, there is a demand for planting containers for easy and space-saving greening in various locations, such as vacant spaces and balconies of individual houses, rooftops of buildings, vacant spaces and balconies of apartment houses, schools, kindergartens and condominium buildings. The planting containers are preferably made portable for easy installation and use and are required to meet demands in wide variety of situations, for example, experience-based education in schools and kindergartens, fun and profit of baby boomers, experience in gardens and communication among family members.

[0003]

When vegetables and flowers are grown, e.g., on the top of buildings, disposal containers such as foam boxes and cardboard boxes or synthetic resin containers are often used for planting containers. Such containers may be easily damaged and decayed and look awful. In order to solve this, the device disclosed in PTL1 is a durable planting container that is assemblable in any desired size and in any desired shape by DIY. This device assembles a planting container in any desired size and in any desired shape from components A, B and C separately manufactured as durable and portable base parts. The material used may be concrete material or FRP material.

[0004]

The invention disclosed in PTL2 provides an assembly-type tough planting container that is easily assembled from and disassembled to hollow concrete blocks. The assembly-type block planting container 20 has a rectangular base plate 2, a plurality of (e.g., six) rectangular metal plates 4

connected along the edges of the top surface of the base plate 2 and each configured to have two columnar projections 3 (3a and 3b) of 2 to 10 cm in height fixed on the upper surface thereof, a plurality of (e.g., twelve) pipe posts 7 configured to receive the columnar projections 3 of the respective rectangular metal plates 4 to be suspended, and a plurality of (e.g., twelve) standardized hollow concrete blocks 1 stacked to form wall surfaces W1, W2, W3 and W4 of the container by inserting the pipe posts 7 into hollow parts 8 thereof. This planting container is easily assembled and disassembled and may be opened by detachment of one wall surface to easily take out the soil horizontally, check the state of the soil and the state of the roots of plants, and enable replanting or transplanting.

Citation List

Patent Literatures

[0005]

PTL 1: JU H05-67242A

PTL 2: JP 2000-125669A

SUMMARY OF INVENTION

Technical Problem

[0006]

When the concrete material is used for the block disclosed in PTL1, however, the size of each block is limited by its weight, and the assembly is not easy but is rather complicated. Using the FRP material has difficulty in providing the sufficient joint strength between the blocks. The convexes for assembly are located inside the planting container. There is accordingly difficulty in scraping out and stirring the soil, as well as in drainage of water in recesses. The container disclosed in PTL2, on the other hand, has the overall size of the assembly depending on the size of one base plate. This is accordingly less versatile and is not applicable in a wide variety of fields. Net and plastic sheets are essential to protect against insects and block the excess light. Additional working for such purposes is rather troublesome.

[0007]

The object of the invention is thus to provide an assembly-type planting container that has high flexibility in assembly and is readily assemblable.

Solution to Problem

[0008]

In order to solve the foregoing, according to one aspect of the invention, there is provided an assembly-type planting container assembly set comprising: a bottom plate piece configured to have a substantially rectangular main plate and fitting elements provided on an upper surface of the main plate in horizontal orientation; a side plate piece configured to have a substantially rectangular main plate and fitting elements provided on an upper surface and a lower surface of the main plate in vertical orientation; an inter-side plate auxiliary piece configured to have a height corresponding to height of the side plate piece in vertical orientation and have fitting elements provided on a lower surface and an upper surface thereof; and a top joining piece configured to have fitting elements on a lower surface thereof, wherein the respective pieces are freely attachable to and detachable from one another by concavo-convex engagement of their fitting elements.

[0009]

According to one preferable embodiment of the invention, the assembly-type planting container assembly set may further comprise a bottom plate joining piece configured to have a main member smaller in size than that of the main plate of the bottom plate piece and have fitting elements provided on a lower surface of the main member in horizontal orientation.

[0010]

According to another preferable embodiment of the invention, the top joining piece may comprise: a linear joining piece configured to have fitting elements linearly aligned; and a corner joining piece configured to have fitting elements arranged orthogonal to each other.

[0011]

According to another preferable embodiment of the invention, the side plate piece may have cutout elements on both ends of the main plate of the side plate piece, wherein the cutout element is cut away along the height of the main plate except the fitting elements. The inter-side plate auxiliary piece may be formed to have an approximate-W cross sectional shape along the height of the inter-side plate auxiliary piece except the fitting elements and include a first trough element and a second trough element, which are

respectively coupled with the cutout elements and are arranged at right angles to each other.

[0012]

In order to solve the foregoing, according to another aspect of the invention, there is provided an assembly-type planting container comprising: a bottom plate piece configured to have a substantially rectangular main plate and fitting elements provided on an upper surface of the main plate in horizontal orientation; a side plate piece configured to have a substantially rectangular main plate and fitting elements provided on an upper surface and a lower surface of the main plate in vertical orientation; an inter-side plate auxiliary piece configured to have a height corresponding to height of the side plate piece in vertical orientation and have fitting elements provided on a lower surface and an upper surface thereof; and a top joining piece configured to have fitting elements on a lower surface thereof. The side plate pieces and the inter-side plate auxiliary pieces are arranged and joined alternately along periphery of the bottom plate piece by engagement of the fitting elements of the bottom plate pieces, the side plate pieces and the inter-side plate auxiliary pieces to form an upright side plate. The top joining piece is fit on each joint of the side plate piece and the inter-side plate auxiliary piece by engagement of the fitting elements of the top joining piece, the side plate piece and the inter-side plate auxiliary piece.

[0013]

According to one preferable embodiment of the invention, the assembly-type planting container may further comprise a bottom plate joining piece configured to have a main member smaller in size than that of the main plate of the bottom plate piece and have fitting elements provided on a lower surface of the main member in horizontal orientation. A plurality of the bottom plate pieces may be arrayed on a plane and are coupled by engagement of the fitting elements of the bottom plate joining piece and the bottom plate pieces at each joint of the bottom plate pieces to form an integrated bottom plate. The side plate pieces and the inter-side plate auxiliary pieces may be arranged and joined alternately along periphery of the integrated bottom plate by engagement of the fitting elements of the bottom plate pieces, the side plate pieces and the inter-side plate auxiliary pieces to form the upright side plate.

[0014]

According to another preferable embodiment of the invention, the top joining piece may comprise: a linear joining piece configured to have a plurality of fitting elements linearly aligned; and a corner joining piece configured to have a plurality of fitting elements arranged orthogonal to each other. The linear joining piece may be fit on each joint of the side plate piece and the inter-side plate auxiliary piece in each linear side of the side plate. The corner joining piece may be fit on each joint of the side plate pieces and the inter-side plate auxiliary piece at each corner of the side plate. [0015]

According to another preferable embodiment of the invention, the side plate piece may have cutout elements on both ends of the main plate of the side plate piece, wherein the cutout element is cut away along the height of the main plate except the fitting elements. The inter-side plate auxiliary piece may be formed to have an approximate-W cross sectional shape along the height of the inter-side plate auxiliary piece except the fitting elements and include a first trough element and a second trough element, which are respectively coupled with the cutout elements and are arranged at right angles to each other. The first trough element and the second trough element of the inter-side plate auxiliary piece may be respectively coupled with the cutout elements of the two adjacent side plate pieces, at each joint of the side plate pieces and the inter-side plate auxiliary piece at each corner of the side plate. Two inter-side plate auxiliary pieces may be placed symmetrically, such that the first trough element of one adjoining inter-side plate auxiliary piece and the second trough element of the other adjoining inter-side plate auxiliary piece are located outside, and the outside first trough element and the outside second trough element may be coupled with the adjoining cutout elements of the adjacent side plate pieces, at each joint of the side plate piece and the inter-side plate auxiliary piece in each linear side of the side plate. [0016]

According to another preferable embodiment of the invention, the assembly-type planting container may have a re-entrant part formed by placing two side plate pieces adjacent to each other across an interior angle of 270 degrees. At the re-entrant part, three inter-side plate auxiliary pieces may be placed adjacent to one another at right angles, such that the first trough element and the second trough element of each inter-side plate

auxiliary piece are located outside. The outside first trough element and the outside second trough element of the two inter-side plate auxiliary pieces located outside may be coupled with the adjoining cutout elements of the adjacent side plate pieces.

[0017]

The assembly-type planting container of the invention may be assembled in a desired size and a desired shape from specified components by changing the numbers and the combinations of the respective components. For example, the assembly-type planting container in minimum size may use one bottom plate piece as the bottom plate and one side plate piece as each side plate and may be assembled from the bottom plate, four side plates and the inter-side plate auxiliary pieces. Two inter-side plate auxiliary pieces are used in each linear side of this minimum planting container. The present invention specifies the shapes and the combinations of the respective parts but does not specify the assembling order of these parts.

[0018]

The "approximate-W cross sectional shape" of the inter-side plate auxiliary piece is required to have a first trough element and a second trough element on one side of the approximate W shape but is not required to have one trough element on the opposite side of the approximate W shape. The "cross sectional shape" may be an outer shape having hollow inside.

[0019]

According to one preferable embodiment of the invention, the assembly-type planting container may be combined with a plurality of inverse U-shaped frame members placed on the left and right side plates facing each other and laid across and over the left and right side plates and a waterproof sheet and/or a net sheet provided to cover over the top surfaces to the front, the back, the left and the right side surfaces of the plurality of frame members. The side surface of the waterproof sheet and/or the net sheet has a plurality of vertical slits that are extended from the lower end to the upper section of the side surface to be freely opened and closed. These vertical slits divide the side surface of the waterproof sheet and/or the net sheet into a plurality of curtains, each being freely opened and closed in the vertical direction.

[0020]

A fastener may be preferably employed to open and close the vertical

slit. This is, however, not essential and another fastening means, such as snap button may be used for the same purpose.

[0021]

The respective pieces of the invention may be preferably made of a plastic material. The plastic material includes various synthetic resins and is, for example, polypropylene. Various steel plates may also be used for the respective pieces.

Advantageous Effects of Invention

[0022]

The assembly-type planting container may be assembled from only the bottom plate pieces, the bottom plate joining pieces, the side plate pieces, the inter-side plate auxiliary pieces and the upper joining pieces. Using common parts facilitates assembling and reduces the manufacturing cost.

[0023]

The assembly-type planting container of the invention is assemblable by coupling the mating fitting elements of the respective parts without using any special tool or additional fastening component, such as bolts. This configuration highly facilitates assembling and improves the safety.

[0024]

The assembly-type planting container of the invention may be provided in any selected size and in any selected shape by changing the numbers of the bottom plate pieces and the side plate pieces. For example, combining one bottom plate piece with four side plate pieces for the front, the back, the left and the right gives the minimum size of assembly-type planting container. Increasing the numbers of the combined parts expands the size of the assembly-type planting container.

[0025]

The inter-side plate auxiliary pieces may be used commonly between the adjacent side plate pieces to form the upright side plate. This configuration uses common parts, while improves the flexibility in assembling. Two inter-side plate auxiliary pieces are used to join adjacent side plate pieces aligned linearly. One inter-side plate auxiliary piece is used to join adjacent side plate pieces arranged at right angles to each other. Three inter-side plate auxiliary pieces are used to join adjacent side plate pieces arranged at right angles to one another across an interior angle of 270

degrees.

[0026]

The assembly-type planting container of the invention has the simple structure and is readily assembled and disassembled and convenient for carriage to be placed in various locations. The simple structure of the assembly-type planting container is suitable for various applications, such as a greenhouse, to meet the wide variety of demands of the society. More specifically, the assembly-type planting container may be combined with frame members and a waterproof sheet and/or a net sheet with curtains formed to be freely opened and closed so as to provide a greenhouse and enable appropriate control of the environment inside the greenhouse.

BRIEF DESCRIPTION OF DRAWINGS

[0027]

Fig. 1 is a perspective view illustrating an assembly-type planting container 110 according to Embodiment 1;

Fig. 2 is a plan view illustrating the assembly-type planting container 110 according to Embodiment 1, wherein top joining pieces 150 are omitted from the illustration;

Fig. 3 is a side view illustrating the assembly-type planting container 110 according to Embodiment 1, wherein the top joining pieces 150 are omitted from the illustration;

Figs. 4(a) to 4(e) are views illustrating respective parts of an assembly-type planting container assembly set 100 according to Embodiment 1;

Fig. 5(a) is a plan view illustrating a bottom plate piece 121 according to Embodiment 1;

Fig. 5(b) is a side view illustrating the bottom plate piece 121;

Fig. 6(a) is a plan view illustrating a bottom plate joining piece 125 according to Embodiment 1;

Fig. 6(b) is a side view illustrating the bottom plate joining piece 125;

Fig. 6(c) is a perspective view illustrating the bottom plate joining piece 125, wherein latticework of a flange 126a is omitted from the illustration;

Fig. 7(a) is a plan view illustrating a side plate piece 131 according to Embodiment 1;

Fig. 7(b) is a front view illustrating the side plate piece 131;

Fig. 7(c) is a side view illustrating the side plate piece 131;

Fig. 8(a) is a plan view illustrating an inter-side plate auxiliary piece 141 according to Embodiment 1;

Fig. 8(b) is a front view illustrating the inter-side plate auxiliary piece 141;

Fig. 8(c) is a perspective view illustrating the inter-side plate auxiliary piece 141;

Fig. 9(a) is a plant view illustrating a linear joining piece 151 according to Embodiment 1;

Fig. 9(b) is a front view illustrating the linear joining piece 151;

Fig. 9(c) is a perspective view illustrating the linear joining piece 151;

Fig. 10(a) is a plan view illustrating a corner joining piece 161 according to Embodiment 1;

Fig. 10(b) is a side view illustrating the corner joining piece 161;

Fig. 10(c) is a perspective view illustrating the corner joining piece 161;

Fig. 11 is a plan view illustrating the state of coupling in a linear part according to Embodiment 1, wherein the linear joining piece 151 is omitted from the illustration;

Fig. 12 is a plan view illustrating the state of coupling at a corner according to Embodiment 1, wherein the corner joining piece 161 is omitted from the illustration;

Fig. 13 is a perspective view illustrating an assembly-type planting container 210 according to Embodiment 2, wherein top joining pieces 250 are omitted from the illustration;

Figs. 14(a) and 14(b) are plan views illustrating the state of coupling at a re-entrant part according to Embodiment 2, wherein a re-entrant part joining piece 271 is omitted from the illustration;

Fig. 15(a) is a plan view illustrating the re-entrant part joining piece 271 according to Embodiment 2;

Fig. 15(b) is a cross sectional view illustrating the re-entrant part joining piece 271, taken on a line A-A; and

Fig. 16 is a perspective view illustrating an assembly-type planting container 310 according to Embodiment 3.

DESCRIPTION OF EMBODIMENTS

[0028]

The following describes an assembly-type planting container assembly set 100 and an assembly-type planting container 110 (hereinafter referred to as container) according to Embodiment 1 of the invention with reference to Figs. 1 to 12.

[0029]

As illustrated in Figs. 1 to 3, the container 110 is assembled from the container assembly set 100 shown in Fig. 4, and is formed in an open-top, substantially box-like shape having one or a plurality of (twelve in the illustrated example) bottom plates 120 and a plurality of (four sets in the illustrated example) side plates 130. The container assembly set 100 includes bottom plate pieces 121, bottom plate joining pieces 125 (hereinafter referred to as joining pieces 125), side plate pieces 131, inter-side plate auxiliary pieces 141 (hereinafter referred to as auxiliary pieces 141) and top joining pieces 150. The top joining pieces 150 include linear joining pieces 151 (hereinafter referred to as joining pieces 151) and corner joining pieces 161 (hereinafter referred to as joining pieces 161). The respective members are described in detail below.

[0030]

As illustrated in Figs. 2 and 5, the bottom plate piece 121 includes a main plate 122 that is square in planar view and a plurality of fitting elements 123 provided in the main plate 122. The plurality of fitting elements 123 are arranged circumferentially at specified intervals inside the four sides.

[0031]

The main plate 122 has rectangular, for example, square plate members 122a and flanges 122b formed on the lower surface for reinforcement. The flanges 122b are provided to reduce the weight and ensure the strength, while keeping some thickness for the fitting elements 123.

[0032]

The fitting elements 123 are non-through holes in a specified shape (for example, rectangular shape) located proximate to the respective sides on the upper surface of the main plate 122. A plurality of (for example, four) fitting elements 123 are arranged along each side. The fitting elements 123

are provided as common holes to adjacent sides at the corners of the main plate 122, so that four fitting elements 123 each side, i.e., total of twelve fitting elements 123, are formed in each bottom plate piece 121. The fitting elements 123 are arranged, such that their respective centers are located at the positions by a certain interval away from the respective proximate edges of the main plate 122. The two fitting elements 123 at the non-cornered positions on each side of the main plate 122 are located across a specified center-to-center distance.

[0033]

As illustrated in Fig. 6, the bottom plate joining piece 125 includes a main member 126 smaller in size than the bottom plate piece 121 and fitting elements 127 provided on the lower surface of the main member 126. The fitting elements 127 are protruded perpendicularly in a convex shape from the lower surface of the main plate 122. The main member 126 is formed in a chamfered shape and has a flange 126a to ensure the thickness and the strength on the lower surface. The fitting elements 127 are rectangular projections protruded more downward than the lower surface of the flange 126a to be joined with the fitting elements 123 shown in Fig. 5. The adjacent fitting elements 127 are located across a specified center-to-center distance.

[0034]

As illustrated in Fig. 7, the side plate piece 131 includes a main plate 132, upper fitting elements 134 provided on the upper surface of the main plate 132 and lower fitting elements 135 provided on the lower surface of the main plate 132.

[0035]

The main plate 132 includes a rectangular vertical plate member 132a, a flange 132b formed horizontally along the upper end of the plate member 132a, a flange 132c formed horizontally along the lower end of the plate member 132a, a flange 132d formed vertically along the left side end of the plate member 132a, a flange 132e formed adjacent to and inside of the flange 132d to have a greater protruded length (twice the length in this example), a flange 132f formed vertically along the right side end of the plate member 132a, a flange 132g formed adjacent to and inside of the flange 132f to have a greater protruded length (twice the length in this example), and a shorter lattice-like flange 132h for reinforcement that is extended

perpendicular to the plane of the plate member 132a to be coupled with the flanges 132b to 132g.

[0036]

Steps in planar view are formed at both ends of the main plate 132, such that cutout elements 133a and 133b are extended in the vertical direction.

[0037]

The upper fitting elements 134 in an elliptical shape are located proximate to the respective cutout elements 133a and 133b at both ends of the flange 132b. A plurality of (for example, two) lower fitting elements 135 are provided on the flange 132c as projections in a specific shape to be fit in the fitting elements 123 shown in Fig. 5. The two lower fitting elements 135 are protruded vertically downward and are located across a specified center-to-center distance.

[0038]

Holes 136a and 136b are formed at corresponding positions on the flange 132b and on the flange 132c. These holes 136a and 136b are used to place a waterproof sheet according to Embodiment 2 as described later.

[0039]

As illustrated in Fig. 8, the auxiliary piece 141 includes a main member 142 formed as a long member having the same height as that of the main plate 132 of the side plate piece 131, upper fitting elements 143a formed in a concave shape on the upper surface of the main member 142 and lower fitting elements 143b formed in a convex shape protruded in the vertical direction on the lower surface of the main member 142.

[0040]

The main member 142 has rectangular planes on its respective surfaces and includes a first element 142a and a second element 142b arranged orthogonal to each other, a third element 142c and a fourth element 142d arranged respectively parallel to the first element 142a and the second element 142b, an L-shaped cutout element 142e arranged to join the base ends of the first element 142a and the second element 142b, and a U-shaped center element 142f arranged to join the inner surfaces of the first element 142a and the second element 142b.

[0041]

The auxiliary piece 141 is formed in an approximately W shape in

planar view having two consecutive steps. A right-angled first trough element 144a is formed between the first element 142a and the center element 142f, and a right-angled second trough element 144b is formed between the second element 142b and the center element 142f.
[0042]

The first trough element 144a and the second trough element 144b are arranged in a specific shape to respectively receive the flanges 132d and 132f of the side plate piece 131. The first element 142a and the third element 142c are arranged in a specific shape to receive the cutout elements 133a and 133b. Similarly the second element 142b and the fourth element 142d are arranged in a specific shape to receive the cutout elements 133a and 133b. The first element 142a, the second element 142b and the center element 142f are hollow to have flanges 142g and 142h formed inside thereof.
[0043]

The upper fitting element 143a is formed in an elliptical shape on the upper surface of each of the first element 142a and the second element 142b. The two upper fitting elements 143a are arranged, such that the respective longitudinal axes of the ellipses are orthogonal to each other. A lower fitting element 143b is provided on the lower surface of the center element 142c and is formed as a projection in a specific shape to be fit in the fitting element 123 of the bottom plate piece 121.
[0044]

The joining piece 151 is one of the top joining pieces 150 and is used to couple the two auxiliary pieces 141 with the two side plate pieces 131. The joining piece 151 is used on the top of the container 110 as the coupling member to join the side plate pieces 131 aligned linearly. As illustrated in Fig. 9, the joining piece 151 is provided as an integral member including a main plate 156, holder elements 152, 153 and 154 of endless hollow walls protruded perpendicularly from one main surface of the main plate 156, and fitting elements 155 formed in a convex shape to be smaller in size and shorter in height than the holder elements 152, 153 and 154. Shorter-wall flanges are formed between the holder elements 152, 153 and 154 to facilitate the user's grasp during assembly.
[0045]

The holder elements 152 and 153 are arranged opposite to the holder element 154 to clamp the side plate pieces 131 and the auxiliary pieces 141.

The holder elements 152 and 153 are located symmetrically across an interval.

[0046]

The holder element 154 has a projection 154a, which is fit in the cutout elements 142e of the two auxiliary pieces 141 arranged adjacent to each other and prevents deformation of the auxiliary pieces 141. The fitting elements 155 are protruded perpendicularly from the main surface of the main plate 150 and are located in the area between the holder elements 152 and 153 and the holder element 154. The fitting elements 155 are provided as projections in an elliptical shape to be fit in the upper fitting elements 134 and the upper fitting elements 143a in an elliptical shape shown in Fig. 11. A plurality of (for example, four) fitting elements 155 are aligned linearly.

[0047]

The joining piece 161 is the other of the top joining pieces 150 and is used on the top of the container 110 as the coupling member at the corner to join the side plate pieces 131 arranged perpendicularly to each other. As illustrated in Fig. 10, the joining piece 161 is provided as an integral member including a main plate 160, holder elements 162 and 163 of endless hollow walls protruded perpendicularly from the main plate 160, and fitting elements 164 protruded perpendicularly from the main plate 160 and formed in a convex shape to be smaller in size and shorter in height than the holder elements 162 and 163. The holder elements 162 and 163 are arranged opposite to each other. The joining piece 161 is formed in a circular shape in the illustrated example but may be formed in any other suitable shape. Shorter-wall flanges are formed between the holder elements 162 and 163 to facilitate the user's grasp during assembly.

[0048]

The holder elements 162 and 163 are protruded from the main surface of the main plate 160 and are arranged opposite to each other to clamp the side plate pieces 131 and the auxiliary pieces 141. The fitting elements 164 are located between the holder elements 162 and 163 and are formed as projections in an elliptical shape to be fit in the upper fitting elements 134 in the elliptical shape of the side plate pieces 131. Two fitting elements 164 are arranged orthogonally to each other. More specifically, the fitting elements 164 are provided as projections in an elliptical shape to be fit in the upper fitting elements 134 and the upper fitting elements 143a

in the elliptical shape shown in Fig. 12. Two fitting elements 164 are aligned linearly in a set. Two sets are arranged orthogonally to each other, so that a plurality of (for example, four) fitting elements 164 are arrayed. The outer two fitting elements 164 are formed only in a partial shape relative to the elliptical shape of the upper fitting elements 134, for the purpose of size reduction of the parts.

[0049]

The bottom plate pieces 121, the joining pieces 125, the side plate pieces 131, the auxiliary pieces 141, the joining pieces 151 and the joining pieces 161 are made of polypropylene in this embodiment, but this is not essential. Preferable materials include polyethylene, polyvinyl chloride, polyethylene terephthalate, acrylic resin and various other synthetic resins including plastics reinforced with, for example, glass fibers or plastic fibers. Steel sheets, such as stainless steel sheet and aluminum-coated sheet, may also be used as the material.

[0050]

The method of assembling the container 110 is described with reference to Figs. 1 to 3, Fig. 11 and Fig. 12. The method aligns a plurality of the bottom plate pieces 121 on the plane and fits the joining pieces 125 on the respective joints of every four adjacent bottom plate pieces 121 to connect the respective bottom plate pieces 121 and thereby form the bottom plate 120. Such connection is made by coupling the fitting elements 127 of the joining pieces 125 with a plurality of fitting elements 123 proximate to the joint among the fitting elements 123 of the four adjacent bottom plate pieces 121.

[0051]

The method subsequently assembles four sets of the side plate pieces 131 with the auxiliary pieces 141 fit therebetween to form four upright side plates 130. The lower fitting elements 135 shown in Fig. 7 and the lower fitting elements 143b shown in Fig. 8 are set in the fitting elements 123 located along the respective sides of the bottom plate 120.

[0052]

In order to join the linearly aligned side plate pieces 131, two auxiliary pieces 141 are placed at right-angled positions to each other between two adjacent side plate pieces 131 as illustrated in Fig. 11. The first element 142a of one auxiliary piece 141 is aligned with the second element 142b of the other auxiliary piece 141 across their cutout elements

142e, while the second element 142b of one auxiliary piece 141 is placed in contact with the first element 142a of the other auxiliary piece 141. With respect to the right-side auxiliary piece 141 shown in Fig. 11, the first trough element 144a is arranged to receive the flange 132f placed therein and the first element 142a and the third element 142c are arranged to abut the flange 132g, whilst the second trough element 144b is kept free. With respect to the left-side auxiliary piece 141 shown in Fig. 11, on the other hand, the second trough element 144b is arranged to receive the flange 132d placed therein and the second element 142b and the fourth element 142d are arranged to abut the flange 132e, whilst the first trough element 144a is kept free. In other words, one of the first trough element 144a and the second trough element 144b of the auxiliary piece 141 is fully coupled with one side end of the side plate piece 131.

[0053]

In order to join the side plate pieces 131 at the corner, one auxiliary piece 141 is placed between the two side plate pieces 131 as illustrated in Fig. 12. The first trough element 144a and the second trough element 144b of the auxiliary piece 141 are fully coupled with the respective side ends of the adjacent side plate pieces 131.

[0054]

The method then fits the joining pieces 151 on the joints between the side plate pieces 131 and the auxiliary pieces 141 in the respective linear sides and the joining pieces 161 on the joints between the side plate pieces 131 and the auxiliary pieces 141 at the respective corners. In the linear sides, the fitting elements 155 of each joining piece 151 are fit in the two upper fitting elements 134 and the two upper fitting elements 143a. At the corners, the fitting elements 164 of each joining piece 161 are fit in the two upper fitting elements 134 and the two upper fitting elements 143a. In the assembled state, it is preferable to form a drain hole (not shown) in the bottom of one side plate piece 131. The foregoing describes only one example of assembling, and the numbers of the respective parts and the assembling method are not limited to the foregoing. U-shaped clips may auxiliary be used to join the respective pieces.

[0055]

The container assembly set 100 and the container 110 according to Embodiment 1 have the following advantageous effects. The container 110

is assembled in any desired size from only the bottom plate pieces 121, the joining pieces 125, the side plate pieces 131, the auxiliary pieces 141, the joining pieces 151 and the joining pieces 161. The auxiliary pieces 141 are commonly usable for coupling in both the linear sides and the corners.

Using such common parts facilitates assembling and reduces the manufacturing cost. The container is assemblable by coupling the mating fitting elements of the respective parts without using any special tool or additional fastening component, such as bolts. This configuration highly facilitates assembling and improves the safety.

[0056]

The following describes a container 210 according to Embodiment 2 of the invention with reference to Figs. 13 to 15. Embodiment 2 relates to the container 210 assembled to have a re-entrant part with the interior angle of 270 degrees from the container 110 of Embodiment 1 and a corresponding container assembly set (not shown). The top joining pieces for the assembly-type planting container 210 include joining pieces 271 for the re-entrant part, in addition to those similar to the joining pieces 151 and the joining pieces 161 according to Embodiment 1. Unless otherwise specified, the above description of Embodiment 1 is applied to the respective parts of the assembly-type planting container 210, which are not illustrated in detail.

[0057]

The joining piece 271 is one of the top joining pieces and is used on the top of the container 210 as the coupling member at the re-entrant part to join the side plate pieces 131 arranged to have the interior angle of 270 degrees. As illustrated in Fig. 15, the joining piece 271 is provided as an integral member including holder elements 272, 273, 274 and 275 and fitting elements 276. Flanges are formed along the periphery of the joining piece 271 to facilitate the user's grasp during assembly. The holder elements 272, 273 and 274 are arranged opposite to the holder element 275 to clamp the side plate pieces 231 and the auxiliary pieces 241 in the assembly.

[0058]

More specifically, as illustrated in Fig. 15, the joining piece 271 is provided as an integral member including a main plate 270, holder elements 272, 273, 274 and 275 of endless hollow walls protruded perpendicularly from one main surface of the main plate 270, and fitting elements 276 formed in a convex shape to be smaller in size and shorter in height than the

holder elements 272, 273, 274 and 275. Shorter-wall flanges are formed between the holder elements 272, 273, 274 and 275 to facilitate the user's grasp during assembly.

[0059]

The holder elements 272 to 274 are arranged opposite to the holder element 275 to clamp the side plate pieces 231 and the auxiliary pieces 241. The holder elements 272 and 273 are arranged orthogonally to each other, and the holder element 274 is located therebetween.

[0060]

The holder element 275 is formed in an L shape and includes a convex element 275a at a bend to be fit in cutout elements 242e of three adjacent auxiliary pieces 241 and thereby prevent deformation of the auxiliary pieces 241. The fitting elements 276 are protruded perpendicularly from the main surface of the main plate 270 and are located in the area between the holder element 275 and the holder elements 272 to 274. The fitting elements 276 are provided as projections in an elliptical shape to be fit in the upper fitting elements 234 and the upper fitting elements 243a in an elliptical shape shown in Fig. 14(a). A plurality of (for example, eight) fitting elements 276 are aligned orthogonally.

[0061]

The container 210 is assembled by a method similar to that of Embodiment 1. The description of Embodiment 1 is applied to the assembling method of the container 210, and the following describes only the differences with reference to Fig. 13 and Fig. 14(a). The method places three bottom plate pieces 221 orthogonal to one another on the plane at the re-entrant part. The re-entrant part is assembled by engagement of the three auxiliary pieces 241 and the two side plate pieces 231 with fitting elements 223 of the bottom plate pieces 221 at the corresponding positions. The method of assembling the auxiliary pieces 241 and the side plate pieces 231 places three auxiliary pieces 241 at right-angled-positions to one another to form the interior angle of 270 degrees and couples the two orthogonally-arranged side plate pieces 231 with the two side auxiliary pieces 241. The method then fits the joining piece 271 on the three auxiliary pieces 241 and the two side plate pieces 231. The fitting elements 276 are fit in the upper fitting elements 234 and 243a.

[0062]

Fig. 14(b) shows a modified structure of Fig. 14(a), which has a greater number of parted divisions inside the container 210 and uses four side plate pieces 231 for the improved reinforcement. This modification is only illustrated and is not specifically described.

[0063]

The container 210 according to Embodiment 2 has the following advantageous effects. The container 210 including the re-entrant part with the interior angle of 270 degrees can be assembled by using the three auxiliary pieces 241 and coupling their upper ends with the joining piece 271. This remarkably improves the flexibility of assembly.

[0064]

The following describes a container 310 according to Embodiment 3 of the invention with reference to Fig. 16. The container 310 additionally includes a sheet 380 provided to cover over the container 110 according to Embodiment 1 and frames 390 provided to support the sheet 380. The container 310 of Embodiment 3 has the common components to those of the container 110 according to Embodiment 1, which are shown by similar numerical symbols in the three hundreds and are not specifically described here.

[0065]

The frames 390 are provided as inverse U-shaped members to place the sheet 380. A plurality of the frames 390 are arranged, such that the open ends of each inverse U shape faces downward and each frame 390 is laid across the short side of the container 310 between the two side plates 330 facing each other. The frame 390 is vertically placed by inserting the two support posts of the inverse U shape into a pair of holes formed in the side plates 330 (corresponding to the holes 136a) and fastening these support posts at two positions, i.e., upper and lower positions. The plurality of frames 390 are located at adequate intervals in the longitudinal direction. The height of the frame 390 may be determined arbitrarily to be suitable for the inside workability and the application of planting.

[0066]

The sheet 380 is formed to have the upper and side surfaces supported by and covering over the plurality of upright frames 390 and the open lower end. According to this embodiment, the sheet 380 has the double-layered structure of a water-proof sheet 381 and a net sheet 382.

The water-proof sheet 381 has a plurality of vertical slits 383 extended from the lower end to the upper section of the side surface to be freely opened and closed by fasteners. The vertical slits 383 are provided at the four corners of the side surface and at the centers in the longitudinal parts of the side surface according to this embodiment but may be provided at any other arbitrary positions. A roll-up curtain 384 is provided on each division of the side surface of the water-proof sheet 381 divided by the vertical slits 383. The water-proof sheet 381 may be made of any arbitrary material.

[0067]

The net sheet 382 has the similar structure to that of the water-proof sheet 381, and the above description is similarly applied to the net sheet 382. The net sheet 382 is placed between the water-proof sheet 381 and the frames 390 and may be adjusted to have an adequate size. The net sheet 382 may be made of any arbitrary material. According to this embodiment, the net sheet 382 is formed to have the similar structure to that of the water-proof sheet 381, and the upper and side surfaces of the sheet 380 are formed to fully have the double-layered structure of the water-proof sheet 381 and the net sheet 382. According to another embodiment, the net sheet 382 may be provided only in specific parts corresponding to the curtains 384 of the water-proof sheet 381.

[0068]

Hooks 385 are located at adequate positions on the upper portion of the side surface of the water-proof sheet 381 to keep the water-proof sheet 381 and the net sheet 382 open. Lock rings (not shown) for the hooks 385 are provided on the rear surfaces at the upper portions of the side surfaces of the water-proof sheet 381 and the net sheet 382.

[0069]

The container 310 is equipped with the water-proof sheet 381 and the net sheet 382 that can be freely opened and closed. In addition to the advantageous effects of the container 110, this configuration enables the container 310 to be used as a greenhouse. Covering the container 310 with the water-proof sheet 381 and the net sheet 382 allows cultivation of chemical-free vegetables. Using a plastic sheet as the sheet 38 for protection from hot and cold climates forms a greenhouse.

[0070]

Placing this container on the rooftop allows protection of the lower

levels from hot and cold climates. The water-proof sheet 381 may be partially opened and closed by rolling up and down the curtains 384 in the respective divisions. The net sheet 382 may be opened and closed in the similar manner to the water-proof sheet 381. The water-proof sheet 381 and the net sheet 382 may be opened and closed independently. The state of each division with the curtain 384 may be selected independently among the state that both the water-proof sheet 381 and the net sheet 382 are closed, the state that both the water-proof sheet 381 and the net sheet 382 are opened and the state that the net sheet 382 is closed and only the water-proof sheet 381 is opened (see Fig. 16). The internal environment, such as ventilation, temperature and humidity, may be controlled by partially opening and closing the curtains 384.

[0071]

The foregoing has described the invention in detail with reference to some embodiments. The embodiments of the invention described above are only illustrative for the purpose of better understanding of the invention, and the invention is not limited to these embodiments in any sense. Various variations and modifications may be made to the embodiments without departing from the spirit and the scope of the invention. The invention includes such variants, modifications and equivalents.

CLAIMS:

1. An assembly-type planting container, comprising:
 - a bottom plate piece configured to have a substantially rectangular main plate and fitting elements provided on an upper surface of the main plate;
 - a side plate piece configured to have a substantially rectangular main plate and fitting elements provided on both an upper surface and a lower surface of the main plate;
 - an inter-side plate auxiliary piece configured to have a height corresponding to height of the side plate piece and have fitting elements provided on both an upper surface and a lower surface thereof; and
 - a top joining piece configured to have fitting elements on a lower surface thereof, wherein
 - the side plate pieces and the inter-side plate auxiliary pieces are arranged and joined alternately along periphery of the bottom plate piece to form an upright side plate, and
 - the top joining piece is fit on each joint of the side plate piece and the inter-side plate auxiliary piece.
2. The assembly-type planting container according to claim 1, further comprising:
 - a bottom plate joining piece configured to have a main member smaller in size than that of the main plate of the bottom plate piece and have fitting elements provided on a lower surface of the main member, wherein
 - a plurality of the bottom plate pieces are arrayed on a plane and are coupled by engagement of the fitting elements of the bottom plate joining piece and the bottom plate pieces at each joint of the bottom plate pieces to form an integrated bottom plate, and
 - the side plate pieces and the inter-side plate auxiliary pieces are arranged and joined alternately along periphery of the integrated bottom plate by engagement of the fitting elements of the bottom plate pieces, the side plate pieces and the inter-side plate auxiliary pieces to form the upright side plate.
3. The assembly-type planting container according to either one of

claims 1 and 2, wherein

the top joining piece comprises:

a linear joining piece configured to have a plurality of fitting elements linearly aligned; and

a corner joining piece configured to have a plurality of fitting elements arranged orthogonal to each other, wherein

the linear joining piece is fit on each joint of the side plate piece and the inter-side plate auxiliary piece in each linear side of the side plate, and

the corner joining piece is fit on each joint of the side plate pieces and the inter-side plate auxiliary piece at each corner of the side plate.

4. The assembly-type planting container according to any one of claims 1 to 3, wherein

the side plate piece has cutout elements on both ends of the main plate of the side plate piece, and

the inter-side plate auxiliary piece is formed to have a cross section in a two-step shape including a first trough element and a second trough element, wherein

the first trough element and the second trough element of the inter-side plate auxiliary piece are respectively coupled with adjoining ends of the two adjacent side plate pieces, at each joint of the side plate pieces and the inter-side plate auxiliary piece at each corner of the side plate, and

two inter-side plate auxiliary pieces are placed at right angles to each other, such that the first trough element or the second trough element of the inter-side plate auxiliary piece is coupled with an adjoining end of the adjacent side plate piece, at each joint of the side plate piece and the inter-side plate auxiliary piece in each linear side of the side plate.

5. The assembly-type planting container according to any one of claims 1 to 4,

the assembly-type planting container having a re-entrant part formed by placing two side plate pieces adjacent to each other across an interior angle of 270 degrees, wherein

at the re-entrant part, three inter-side plate auxiliary pieces are placed at right angles to one another, such that an outer one of the first trough element and the second trough element of each of the two inter-side

plate auxiliary pieces located outside is coupled with an adjoining end of the adjacent side plate piece.

6. An assembly set for assembling the assembly-type planting container according to any one of claims 1 to 5,
the assembly set comprising the bottom plate pieces, the side plate pieces, the inter-side plate auxiliary pieces and the top joining pieces.