An exemplary folding container (20) includes a main body (22). The main body includes four fixed sidewalls (221), four folding sidewalls (222), and a bottom wall. The four fixed sidewalls, the bottom wall, and optionally the four folding sidewalls cooperatively form a receptacle. A size of the receptacle is adjustable according to a selected position of the four folding sidewalls.
FOLDING CONTAINER WITH ADJUSTABLE HEIGHT

FIELD OF THE INVENTION

[0001] The present invention relates to containers, and particularly to a folding container used for transporting or shipping products such as liquid crystal display (LCD) panels.

GENERAL BACKGROUND

[0002] A process of fabricating an LCD generally includes forming an LCD panel (known as a cell process), and assembling the LCD panel with other parts such as driving integrated circuits, printed circuit boards, etc. (known as a module process). The cell process and the module process are typically performed at different locations; for example, at factories in different districts of a country or even in different countries. This is because the module process is generally labor-intensive. Therefore after the cell process, the LCD panels are typically transported or shipped to another district or country where labor costs are more favorable.

[0003] Referring to FIG. 8, a typical container 10 includes a main body 12, a cover 13 and a base 11. The main body 12 has a top opening (not labeled). The cover 13 covers the opening of the main body 12. The cover 13 includes a cover body 131, and four blocking portions 132 respectively disposed at four corners (not labeled) of the cover body 131. Each of the blocking portions 132 has a right-angled structure, and has a height greater than a thickness of the cover body 131. The main body 12 is placed on a top surface of the base 11.

[0004] The container 10 is designed for containing LCD panels with a fixed same size. That is, a cubage of the container 10 is fixed. Thus, when LCD panels with different sizes need to be transported or shipped, different containers 10 with different sizes are needed. This adds to the overall cost of assembly of the LCD panels.

[0005] What is needed, therefore, is a container that can overcome the above-described problems.

SUMMARY

[0006] In one embodiment, a folding container includes a main body. The main body includes four fixed sidewalls, four folding sidewalls, and a bottom wall. The four fixed sidewalls, the bottom wall, and optionally the four folding sidewalls cooperatively form a receptacle. A size of the receptacle is adjustable according to a selected position of the four folding sidewalls.

[0007] Other advantages and novel features will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings. In the drawings, all the views are schematic.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is an exploded, isometric view of a folding container according to an exemplary embodiment of the present invention, the folding container including a cover and four folding sidewalls, each folding sidewall including two folding portions, and showing the cover lifted off.

[0009] FIG. 2 is similar to FIG. 1, but showing the folding portions folded down.

[0010] FIG. 3 is similar to FIG. 2, but showing the cover attached.

[0011] FIG. 4 is a top plan view of the folding container of FIG. 1 without the cover, showing 17-inch LCD panels accommodated in the folding container.

[0012] FIG. 5 is a side plan view of the folding container shown in FIG. 4, also showing the cover.

[0013] FIG. 6 is a top plan view of the folding container shown in FIG. 2 but without the cover, showing 22-inch LCD panels accommodated in the folding container.

[0014] FIG. 7 is a side plan view of the folding container shown in FIG. 6, also showing the cover.

[0015] FIG. 8 is an exploded, isometric view of a conventional container.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0016] Reference will now be made to the drawings to describe preferred and exemplary embodiments in detail.

[0017] Referring to FIG. 1, a folding container 20 according to an exemplary embodiment of the present invention is shown. The folding container 20 includes a main body 22, a cover 25, and a base 21.

[0018] Referring also to FIG. 2, the main body 22 includes four fixed sidewalls 221, four folding sidewalls 222, a metal frame 225, and a bottom wall (not labeled). Each folding sidewall 222 includes two folding portions 223 hingedly connected to each other. Each of the fixed sidewalls 221 is hingedly connected to a lower folding portion 223 of the corresponding folding sidewall 222. Each of the folding portions 223 can be pivoted outward and down, and pivoted outward and back up again. The folding sidewalls 222 can be folded down by pivoting down either an upper one of the folding portions 223 only, or pivoting down the lower folding portion 223 (which takes the upper folding portion 223 with it). The folding sidewalls 222 can be returned to their original upright position by pivoting up the respective folding portion 223. When the folding sidewalls 222 are in the upright position, the fixed sidewalls 221, the folding sidewalls 222, and the bottom wall cooperatively form a large receptacle (not labeled). The large receptacle has an opening (not labeled) at a top thereof. When only the upper folding portions 223 are folded down, the fixed sidewalls 221, the lower folding portions 223, and the bottom wall cooperatively form an intermediate-sized receptacle (not shown). The intermediate-sized receptacle has an opening (not shown) at a top thereof. When both folding portions 223 are folded down, the fixed sidewalls 221 and the bottom wall cooperatively form a small receptacle (not labeled). The small receptacle has an opening (not labeled) at a top thereof.

[0019] The metal frame 225 is arranged at respective junctions of the fixed sidewalls 221 and the bottom wall, to provide structural support for the folding container 20. In detail, the metal frame 225 includes a first set of support members (not labeled) extending vertically along substantially the entire height of the fixed sidewalls 221, and a second set of support members (not labeled) extending horizontally along a perimeter of the bottom wall. Each of the first set of support members joins two corresponding adjacent fixed sidewalls 221. Each of the second set of support members joins the bottom wall and a corresponding adjacent fixed sidewalls 221. Thus, the fixed sidewalls 221 and the bottom wall are interconnected by the metal frame.
In the illustrated embodiment, the metal frame 225 has a one-piece construction. The fixed sidewalls 221, the frame 225, the bottom wall, and the folding sidewalls 222 essentially constitute the main body 22.

The main body 22 is disposed on a top surface of the base 21. The main body 22 and the base 21 can be integrated together in a one-piece construction, or be separate parts attached together or simply stacked together. Generally, the metal frame is made from iron (Fe). The fixed sidewalls 221 can be made from aluminum (Al). The folding sidewalls 222 can be made from magnetic materials, such as magnetized iron. The cover 25 includes a cover body 251 and four blocking portions 252. The cover body 251 and the opening of the main body 22 have a same rectangular shape. The four blocking portions 252 are respectively disposed at four corners (not labeled) of the cover body 251. Each blocking portion 252 has a right-angled structure. A height of the blocking portion 252 is slightly greater than a thickness of the cover body 251. Thus the blocking portion 252 slightly protrudes vertically beyond the thickness of the cover body 251. In the illustrated embodiment, the blocking portion 252 protrudes both above and below the cover body 251.

The cover 25 covers the opening of the main body 22 when the folding container 20 is being used transport or ship products such as LCD panels. The blocking portions 250 about the folding portions 223 respectively, that the cover 25 is securely attached on the main body 22.

Before the LCD panels are loaded into the folding container 20, they are usually prepackaged with buffer materials such as expanded polypropylene (EPP). Further or alternatively, the LCD panels may be stacked up with buffer materials therebetween.

Referring to FIG. 2, this shows all the folding portions 223 folded down. In one embodiment, the folding sidewalls 222 are made from magnetized material, and the metal frame 225 is made of iron. Thus, when the folding portions 223 hingedly connected to the main body 22 are pivoted outward, magnetic force is generated between the folding portions 223 and the metal frame 225. Furthermore, when an angle between each of the folding portions 223 and the metal frame 225 is small enough, the folding sidewalls 222 snap sideward and are attached onto the metal frame 225 due to the effects of the magnetic force. With all the folding portions 223 folded down, a height of the main body 20 is at its smallest. The small receptacle of the folding container 20 is suitable for containing LCD panels with small sizes. Referring also to FIG. 3, this shows the cover 25 attached on the main body 22 of the folding container 20. The blocking portions 252 of the cover 25 are engaged between the folding sidewalls 222 and the fixed sidewalls 221.

Referring to FIG. 4 and FIG. 5, these show all the folding portions 223 folded up in their original upright positions. A plurality of 17-inch LCD panels is accommodated in the large receptacle of the folding container 20. A height of each fixed sidewall 221 is equal to 480 millimeters (mm). A height of each folding portion 223 is equal to 120 mm. A height of the base 21 is equal to 160 mm, and a height of the cover body 251 is 30 mm. The main body 22 can accommodate a lower group of LCD panels packaged together, and an upper group of LCD panels packaged together. Each group includes 19 packed LCD panels. That is, the main body 22 can accommodate as many as 38 packed LCD panels.

Referring to FIG. 6 and FIG. 7, these show all the folding portions 223 folded down. A plurality of 22-inch LCD panels is accommodated in the small receptacle of the folding container 20. The main body 22 can accommodate one group of LCD panels packaged together. Each group includes 18 packed LCD panels.

In summary, the receptacle of the folding container 20 can be changed according to different sizes of LCD panels to be accommodated therein. Therefore, the one single folding container 20 can occupy a minimum amount of space whenever it is used to transport or ship LCD panels of any of various sizes. That is, the folding container 20 is a cost effective way to transport or ship LCD panels of varying sizes.

Further or alternative embodiments may include the following. In one example, each folding sidewalk 222 can include only one, or three or more, folding portions 223. In another example, the base 21 is integrated with the main body 22. In such case, the bottom wall of the main body 22 can be omitted. That is, the top surface of the base 21 adjoining the main body 22 functions as the equivalent of the bottom wall.

It is believed that the present embodiments and their advantages will be understood from the foregoing description, and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the examples hereinafter described merely being preferred or exemplary embodiments of the invention.

What is claimed is:

1. A folding container comprising:
   a main body, the main body comprising four fixed sidewalls, four folding sidewalls, and a bottom wall; wherein
   the four fixed sidewalls and the bottom wall, and optionally the four folding sidewalls, cooperatively form a receptacle, a size of the receptacle being adjustable according to a selected position of the four folding sidewalls.

2. The folding container as claimed in claim 1, wherein
   the four folding sidewalls are hingedly connected to the four fixed sidewalls.

3. The folding container as claimed in claim 1, wherein
   each of the folding sidewalls comprises two folding portions, the folding portions being hingedly connected to each other, and a lower one of the folding portions being hingedly connected to a respective one of the fixed sidewalls.

4. The folding container as claimed in claim 1, further comprising a cover, the cover comprising a cover body and four blocking portions, the four blocking portions being at four corners of the cover body respectively.

5. The folding container as claimed in claim 4, further comprising a base, wherein
   the main body is provided on the base.

6. The folding container as claimed in claim 5, wherein
   the main body and the base are integrated together as a single body.

7. The folding container as claimed in claim 5, wherein
   the main body and the base separate parts attached together.

8. The folding container as claimed in claim 4, wherein
   the main body further comprises a metal frame, the metal frame comprising:
   a first set of support members extending vertically along substantially an entire height of the fixed sidewalls; and
a second set of support members extending horizontally along a perimeter of the bottom wall.

9. The folding container as claimed in claim 4, wherein each of the blocking portions comprises a right-angled structure.

10. The folding container as claimed in claim 9, wherein a height of the blocking portion is greater than a thickness of the cover body.

11. The folding container as claimed in claim 8, wherein the four fixed sidewalls are made from aluminum.

12. The folding container as claimed in claim 11, wherein the folding sidewalls are made from magnetized iron.

13. A folding container comprising a main body, the main body defining a box having a top opening, a size of the box being changeable by manual adjustment of movable portions of the main body.

14. The folding container as claimed in claim 13, further comprising a cover, wherein the cover covers the opening of the box.

15. The folding container as claimed in claim 13, wherein the main body comprises:

   four fixed sidewalls;
   four folding sidewalls, each of the folding sidewalls being hingedly connected to a corresponding one of the fixed sidewalls; and
   a bottom wall adjoining bottoms of the fixed sidewalls; the fixed sidewalls and the bottom wall, and optionally the folding sidewalls, cooperatively forming five sides of the box.

16. The folding container as claimed in claim 13, further comprising a base below and integrated with the main body, the base comprising a top surface, the main body comprising:

   four fixed sidewalls; and
   four folding sidewalls, each of the folding sidewalls being hingedly connected to a corresponding one of the fixed sidewalls;

   wherein the fixed sidewalls and the top surface of the base, and optionally the folding sidewalls, cooperatively form five sides of the box.

17. The folding container as claimed in claim 15, wherein the main body further comprises a metal frame, and the metal frame comprises:

   a first set of support members extending vertically along substantially an entire height of the fixed sidewalls; and
   a second set of support members extending horizontally along a perimeter of the bottom wall.

18. The folding container as claimed in claim 15, wherein each of the folding sidewalls comprises at least two folding portions, the folding portions being hingedly connected to each other.

19. The folding container as claimed in claim 15, wherein the fixed sidewalls are made from aluminum.

20. The folding container as claimed in claim 15, wherein the folding sidewalls are made from magnetized iron.

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