

ALUMINIUM MATERIAL AND CUSTOM-MADE ALUMINIUM FURNITURE

Field of the Invention

5 The present invention relates to a panel and a furniture made of such panel. In particular, the present invention relates to door panel, wall panel and cabinets, wardrobes or the like with such door panel and wall panel made of aluminium material and custom-made aluminium furniture.

10 Background

 Furniture developers are continuously seeking improvements on furniture quality, one attempt of which is to fabricate furniture with non-traditional materials such as aluminium profiles. The hollow structure of aluminium profiles brings many challenges
15 to the furniture industry to be used as door panel and/or wall panel in both the material selection and fabrication process aspects.

Summary

20 The present invention provides solutions for furniture with storage functions such as cabinets, wardrobes etc. and panels made of aluminium profiles and in particular, to panels used for the doors and wall panels of such types of furniture.

 In one embodiment, the present invention provides a furniture door panel which
25 comprises a frame including a top beam, a bottom beam and two side beams each joining one end of the top beam and the bottom beam. The top beam, the bottom beam and the side beams are cut from an aluminium profile bar. Each of the top beam, the bottom beam and the side beams has a first sidewall, a second sidewall spaced apart from the first sidewall to form a cavity therebetween, and a first end wall joining the first sidewall at a front edge and
30 joining the second sidewall at a back edge. The first end wall has a middle portion concaved into the cavity to allow access to the first end wall of the top beam to facilitate opening of the door panel by a user finger engaging the front edge of the top beam.

In another embodiment, the present invention provides a wall panel for fabricating a furniture such as a cabinet, a wardrobe or the like. The wall panel comprises a side panel and a first side sheet attached to a side surface of the side panel, and a front cover attached to the side panel to cover a front surface of the side panel and a front edge of the first side sheet.

In a further aspect, the present invention provides a cabinet which comprises a top panel, a bottom panel and a pair of side panels spaced apart from each other, with each side panel joining one end of the top and bottom panels. A front door is rotatably mounted to one of the side panels. The front door includes a top beam, a bottom beam and two side beams each joining one end of the top beam and the bottom beam. Each of the top beam, the bottom beam and the side beams has a first sidewall, a second sidewall spaced apart from the first sidewall, a first end wall joining the first sidewall at a front edge and joining the second sidewall at a back edge. The first end wall has a middle portion concaved into a cavity between the first sidewall and the second sidewall.

Other aspects and advantages of the present invention will become apparent from the following detailed description, illustrating by way of examples, the inventive concept and technical solutions to practice the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention are disclosed in detail hereinafter in conjunction with the drawings, in which:

Fig. 1 is a perspective view showing a cabinet with a door panel according to one embodiment of the present invention, in which the cabinet door is at a closed position;

Fig. 2 is a perspective view of Fig. 1 in which the cabinet door is at an open position;

Fig. 3 is an exploded view of the door panel of Fig. 1;

Fig. 4 is a perspective view showing an aluminium profile bar used to form the door panel shown in Fig. 1;

5 Fig. 5 is a cross sectional top view of Fig. 4;

Fig. 6 is an enlarged partial front view of portion 32 of Fig. 3;

10 Fig. 7 is a perspective view showing a top beam and a side beam of the door panel of Fig. 1;

Fig. 8 is an enlarged partial view of the portion 12 of Fig. 1;

15 Fig. 9 is a side view of Fig. 8 illustrating operation of the door panel of Fig. 1 by a user finger engaging the door panel;

Fig. 10 is a perspective partial view of the door panel of portion 22 of Fig. 2 showing a hinge before assembled to the door panel;

20 Fig. 11 is an enlarged partial view of Fig. 10;

Fig. 12 is a partial cross sectional top view of Fig. 2;

25 Fig. 13 is an enlarged partial view of portion 22 of Fig. 2;

Fig. 14 is a perspective of a door panel according to another embodiment of the present invention;

30 Fig. 15 is an exploded partial view of portion 142 of Fig. 14 showing a filling member before assembly;

Fig. 16 is an enlarged perspective view of portion 142 of Fig. 14 showing the filling member after assembled;

Fig. 17 is a partial exploded perspective view showing a cabinet with a side panel
5 and side sheet to be assembled according to a further embodiment of the present invention;

Fig. 18 is a cross sectional partial view Fig. 17 before a front cover is assembled;

Fig. 19 is cross sectional partial view Fig. 18 after the front cover is assembled;
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Fig. 20 is a cross sectional partial view showing a side sheet attached to an internal surface of a side panel;

Fig. 21 is a cross sectional partial view showing two side sheets one attached to an
15 internal surface of a side panel and another one attached to an external surface of the side panel.

Detailed description

20 It will be readily understood that the components of the embodiments, as generally described in the specification and illustrated in the drawings herein, may be arranged and designed in a wide variety of different configurations in addition to the described example embodiments. Thus, the following more detailed description of the example embodiments, as represented in conjunction with the drawings, are not intended to limit the scope of the
25 embodiments, as claimed, but is merely representative of example embodiments.

Reference throughout this specification to “one embodiment”, “another embodiment” or “an embodiment” (or the like) means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus,
30 the appearance of the phrases “in one embodiment” or “in an embodiment” or the like in various places throughout this specification are not necessarily all referring to the same embodiment.

Furthermore, the described features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. In the following description, numerous specific details are provided to provide a clear and full understanding of embodiments. One skilled in the relevant art will recognize, however, that the various embodiments can be practiced without one or more of the specific details, or with other methods, components, materials, etc. In other instances, some or all known structures, materials, or operations may not be shown or described in detail to avoid obfuscation.

As shown in Figs. 1 and 2, according to one embodiment, a cabinet 10 includes a top panel 110, a bottom panel 120 parallel to and spaced apart from the top panel 110, and a pair of side panels 130, 140 parallel to and spaced apart from each other. Each side panel 130, 140 joins to one end of the top panel 110 and the bottom panel 120 to form a frame structure. A front door 150 is rotatably mounted to one of the side panels, e.g. the front door 150 is rotatably mounted to the side panel 130 shown in Figs. 1 and 2 at left side of the cabinet. The top panel 110, the bottom panel 120 and the pair of side panels form a compartment 102. The front door 150 is mounted to the side panel 140 via hinges 160 to become rotatable between a close position to cover the compartment, as shown in Fig. 1, and an open position for access to the compartment 102, as shown in Fig. 2.

As shown in Fig. 3, the front door 150 includes a top beam 152, a bottom beam 154 parallel to and spaced apart from the top beam 152, and a pair of side beams 156 and 158 each joining to one end of the top beam 152 and the bottom beam 154. A center board 159 is disposed between the top beam 152, the bottom beam 154 and side beams 156, 158 to form the front door 150.

The top beam 152, the bottom beam 154 and the side beams 156, 158 are formed from an aluminium profile bar 151, by cutting the aluminium profile bar 151 into respective predetermined length. Shown in Figs. 4 and 5 as one example, an aluminium profile bar 151 has a first sidewall 1512, a second sidewall 1514 spaced apart from each other, and a first end wall 1516 connecting the top ends of the first sidewall 1512 and the second sidewall 1514. A second end wall 1518 connects the bottom ends of the first sidewall 1512 and the

second sidewall 1514. The sidewalls 1512, 1514, the top wall 1516 and the bottom wall 1518 form a cavity 1519 between the first and second sidewalls 1512 and 1514.

5 The first and second sidewalls 1512 and 1514 are formed preferably parallel to each other. The top wall 1516 and the first sidewall 1512 intersect to form a front edge 1516b. The top wall 1516 and the second sidewall 1514 intersect to form a back edge 1516c. A middle portion 1516a between the front edge 1516b and the back edge 1516c is concaved into the cavity 1519. The front edge 1516b and the back edge 1516c are preferably positioned within a plane 1516d perpendicular to the first sidewall 1512 and the second
10 sidewall 1514.

The aluminium profile bar 151 is cut, according to predetermined length and at a 45-degree cutting angle with respect to a longitudinal direction 151a of the aluminium profile bar 151, to form the top beam 152, the bottom beam 154 and the side beams 156, 158,
15 respectively. The top beam 152, the bottom beam 154 and the side beams 156, 158 are assembled with the top beam 152 and the bottom beam 154 arranged parallel to and spaced apart from each other, and with each of the side beams 156, 158 joining to one end of the top beam 152 and the bottom beam 154, together with the center board 159 positioned between the top beam 152 and the bottom beam 154, and between the side beams 156, 158,
20 to form the front door 150.

Cutting from the aluminium profile bar 151 at 45-degree cutting angle, the cross section at both ends of each of the top beam 152, the bottom beam 154 and the side beams 156, 158 have the same shape and dimension, as shown in Figs. 6 and 7 (only the cross
25 sections 152s and 158s of the top beam 152 and the side beam 158 are shown as examples). In this regard, the top beam 152 has a first end wall 1526 connected to the first sidewall 1522 and the second sidewall 1524. The first end wall 1526 intersects the first sidewall 1522 at a front edge 1526b, and intersects the second sidewall 1524 at a back edge 1526c. The first end wall 1526 has a middle portion 1526a between the first sidewall 1522 and the
30 second sidewall 1524. The middle portion 1526a is concaved into a cavity between the first sidewall 1522 and the second sidewall 1524.

Likewise, the side beam 158 has a first end wall 1586 connected to the first sidewall 1582 and the second sidewall 1584. The first end wall 1586 intersects the first sidewall 1582 at a front edge 1586b, and intersects the second sidewall 1584 at a back edge 1586c. The first end wall 1586 has a middle portion 1586a between the front edge 1586b and the back edge 1586c. The middle portion 1586a is concaved into a cavity between the first sidewall 1582 and the second sidewall 1584.

After the front door 150 is assembled, the joints at the four corners of the front door 150 are aligned into a 90-degree angle such that the front door 150 is formed of a rectangular shape well suitable for use in a cabinet.

As shown in Figs. 8 and 9, the front door 150 is assembled to the side panel 140 to form a gap 115 between the top beam 152 and the top panel 110. Opening of the front door 150 can be effected by a user placing a finger in the gap 115 and pressed the finger against the concaved middle portion 1526a of the top beam 152 of the front door 150. A pulling action by the user finger will exert a force F_1 against the front edge 1526b of the top beam 152 of the front door 150, to open the front door 150.

As shown in Figs. 10 to 13, formed from the same aluminium profile bar 151, the side beam 158 has the same structure, cross-sectional shape / dimension and cutting angle as the top beam 152. Accordingly, the side beam 158 provides sufficient material at the second sidewall 1584 to allow mounting of the hinge 160 via an opening 1584c and screw holes 1584d formed on the second sidewall 1584 at positions proximate to the back edge 1586c.

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In a preferred embodiment as shown in Figs. 14 to 16, the four corner portions of the front door 150' may be cut into notches 150a, 150b, 150c and 150d. The front door 150' includes four filling members 157a, 157b, 157c and 157d each is fitted into a corresponding notch 150a, 150b, 150c and 150d. The filling members 157a, 157b, 157c and 157d include a filleted convex corner surface to improve the operability of the front door 150' e.g. to provide a smooth feeling of using the front door 150'.

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According to a further embodiment, as shown in Fig. 17, a cabinet 20 includes a top panel 210, a bottom panel 220, a pair of side panels 230, 240 and a front door 250 assembled together, forming a storage compartment 202. Cabinet 20 includes a side sheet 272 attached to an external surface 230a of the side panel 230. The side sheet 272 may be formed with a structure and/or appearance different from the side panel 230. For example, the side sheet 272 may be coated or painted with color(s) / pattern(s) different from that of the side panel 230, to broaden the selections of a cabinet with more structural and/or appearance variations to better adapt to requirements of different users.

The side sheet 272 may be attached to the side panel 230 by an appropriate fastening means, for example by an adhesive. The cabinet 20 includes a front cover 282 fixed to the side panel 230. Side panel 230 has a pair of outer walls 232 spaced apart from each other and a rib 234 joining the outer walls 232 to form a cavity 236 between the outer walls 232, and an opening 238 facing the front cover 282.

The front cover 282 has a main body 2822, a pair of spaced apart ridges 2824 extending perpendicularly from the main body 2822, and an external flange 282a extending sidewardly from the main body 2822. The front cover 282 is assembled to the side panel 230, by insertion into the side panel 230 along an assembling direction 282x. The pair of ridges 2824 are inserted into the opening 238 to fix the front cover 282 to the side panel 230, to cover a front surface of the side panel 230, the front edge of the side sheet 272 and the seam 273 between the side panel 230 and the side sheet 272, such that the side panel 230 is hidden from an external looking of the cabinet 20. The front cover 280 is also advantageous in preventing external objects such as dusts from entering the space between the side panel 230 and the side sheet 272.

In further embodiments as shown in Figs. 20 and 21, a side sheet 274 may be attached to an internal surface 230b of the side panel 230, with a front cover 284 attached to the side panel 230. The front cover 284 has an internal flange 284b covering the front edge of the side panel 230, the side sheet 274 a seam 275 between the side panel 230 and the side sheet 274. Alternatively, a first side sheet 272 is attached to the external surface 230a of the side panel 230, and a second side sheet 274 is attached to the internal surface

230b of the side panel 230. A front cover 286 is attached to the front surface of the side panel 230. The front cover 286 has an external flange 286a and an internal flange 286b covering the front surface of the side panel 230, the front edge of the first side sheet 272, a seam 277 between the side panel 230 and the side sheet 274, a seam 279 between the side
5 panel 230 and the side panel 279, and the front edge of the second side sheet 274.

As used herein, the singular “a” and “an” may be construed as including the plural “one or more” unless clearly indicated otherwise.

10 This disclosure has been presented for the purposes of illustration and description, which is not intended to be exhaustive or limiting. Many modifications and variations will become apparent to those of ordinary skill in the art based on the technical solutions provided herein. The example embodiments were chosen and described in order to explain principles and practical application, and to enable others of ordinary skill in the art to
15 understand the disclosure for various embodiments with various modifications as are suited to the particular use contemplated.

Thus, although illustrative example embodiments have been described herein with reference to the accompanying figures, it is to be understood that this description is not
20 limiting and that various other changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the disclosure.

CLAIMS

1. A wall panel comprising:
5 a side panel,
a first side sheet attached to a side surface of the side panel, and
a front cover attached to the side panel to cover a front surface of the side panel
and a front edge of the first side sheet.
- 10 2. The wall panel as recited in claim 1, wherein the side panel has a pair of outer
walls spaced apart from each other and a rib joining the outer walls to form a
cavity between the outer walls, and an opening facing the front cover, wherein the
front cover has a main body, a pair of spaced apart ridges extending
perpendicularly from the main body, the pair of ridges inserted into the opening to
15 fix the front cover to the side panel.
3. The wall panel as recited in claim 2, wherein the first side sheet is attached to an
external surface of the side panel and the front cover comprises an external flange
covering the front surface of the side panel, the front edge of the first side sheet
20 and a seam between the side panel and the first side sheet.
4. The wall panel as recited in claim 3, further comprising a second side sheet
attached to an internal surface of the side panel, wherein the front cover comprises
an internal flange covering the front surface of the side panel, a front edge of the
25 second side sheet and a seam between the side panel and the second side sheet.
5. The wall panel as recited in claim 2, wherein the first side sheet is attached to an
internal surface of the side panel and the front cover comprises an internal flange
covering the front surface of the side panel, a front edge of the first side sheet and a
30 seam between the side panel and the first side sheet.

6. A door panel comprising:
a frame including a top beam, a bottom beam and two side beams each joining
one end of the top beam and the bottom beam,
wherein each of the top beam, the bottom beam and the side beams having:
5 a first sidewall,
a second sidewall spaced apart from the first sidewall to form a cavity
therebetween,
a first end wall joining the first sidewall at a front edge and joining the
second sidewall at a back edge;
10 wherein the first end wall has a middle portion concaved into the cavity.
7. The door panel as recited in claim 6, wherein the first sidewall and the second
sidewall are parallel to each other.
- 15 8. The door panel as recited in claim 7, wherein the front edge and the back edge are
positioned in a plane perpendicular to the first sidewall and the second sidewall.
9. The door panel as recited in claim 6, wherein the frame comprises a notch formed
at each corner thereof, wherein the door panel further comprises four filling
20 members each being fixed to one of the notches.
10. The door panel as recited in claim 9, wherein each filling member has a filleted
convex corner surface.
- 25 11. A cabinet comprising:
a top panel, a bottom panel and a pair of side panels spaced apart from each
other, each side panel joining one end of the top and bottom panels,
a front door rotatably mounted to one of the side panels, the front door includes
a top beam, a bottom beam and two side beams each joining one end of the
30 top beam and the bottom beam;
wherein each of the top beam, the bottom beam and the side beams having:
a first sidewall,

a second sidewall spaced apart from the first sidewall,
a first end wall joining the first sidewall at a front edge and joining the
second sidewall at a back edge;
wherein the first end wall having a middle portion concaved into a cavity
5 between the first sidewall and the second sidewall.

12. The cabinet as recited in claim 11, wherein the top beam is positioned spaced apart
from the top panel to form a gap therebetween to allow access to the first end wall
of the top beam.

13. The cabinet as recited in claim 12, wherein the first sidewall and the second
sidewall are parallel to each other.

14. The cabinet as recited in claim 13, wherein the front edge and the back edge are
15 positioned in a plane perpendicular to the first sidewall and the second sidewall.

15. The cabinet as recited in claim 11, wherein the front door has a notch formed at
each corner thereof, wherein the cabinet further comprises four filling members
each being fixed to one of the notches.

16. The cabinet as recited in claim 15, wherein each filling members has a filleted
convex corner surface.

17. The cabinet as recited in claim 11, further comprising a first side sheet attached to
25 a side surface of one of said pair of the side panels and a front cover attached to
said one of the side panels and covers a front surface of said one of the side panels
and a front edge of the first side sheet.

18. The cabinet as recited in claim 17, wherein the first side sheet is attached to an
30 external side surface of said one of the side panels and the front cover comprises an
external flange covering the front surface of said one of the side panels and the
front edge of the first side sheet.

19. The side panel as recited in claim 18, further comprising a second side sheet
attached to an internal side surface of said one of the side panels, wherein the front
cover comprises an internal flange covering the front surface of said one of the side
5 panels and a front edge of the second side sheet.

20. The cabinet as recited in claim 17, wherein the first side sheet is attached to an
internal side surface of said one of the side panels and the front cover comprises an
internal flange covering the front surface of said one of the side panels and the
10 front edge of the first side sheet.