



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
03.06.2015 Bulletin 2015/23

(51) Int Cl.:
A47B 13/08 (2006.01)

(21) Application number: **13823505.6**

(86) International application number:
PCT/CN2013/079702

(22) Date of filing: **19.07.2013**

(87) International publication number:
WO 2014/015766 (30.01.2014 Gazette 2014/05)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(30) Priority: **27.07.2012 CN 201210266066**

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(54) **STRUCTURE OF COMPOSITE DESK PANEL**

(57) Disclosed is a structure of a composite desk panel (10), comprising: a face plate (100), the face plate (100) having an even outer and inner surface; and a bottom plate (200), the bottom plate (200) being provided with an array of protrusions (201), with the protrusions (201) being arranged spaced apart in rows and columns, and provided with a planar engagement surface mating with the inner surface; and also a reinforcing frame (300),

the reinforcing frame (300) being fixed to the peripheries of the face plate (100) and the bottom plate (200). The face plate (100), the bottom plate (200) provided with the array of protrusions (201), and the reinforcing frame (300) along the peripheries thereof simplify the structure of the composite desk panel (10) and enable same to be adaptive to various synthetic materials and to have a considerable mechanical strength.

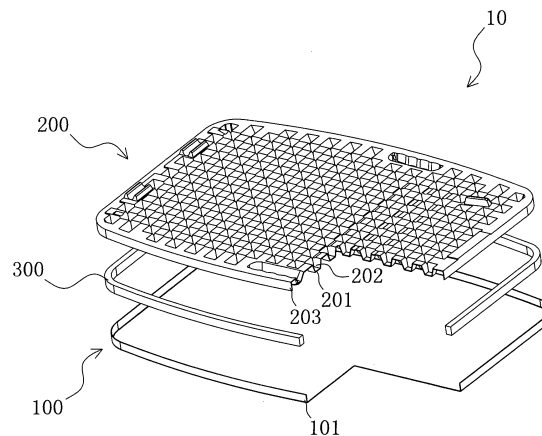


FIG. 1

Description

Field of the Invention

[0001] The present invention relates to an accessory of a table, more specifically, the present invention relates to a composite table top.

Background of the Invention

[0002] As one of the household items, table top panel of prior art is made of the traditional material wood. On one hand the use of excessive amount of wood is environment unfriendly, on the other the wood is not always suitable, and the maintenance cost is high. Substitutes such as fiberboard and flakeboard share some identical defects as wood.

[0003] The design of a table top panel generally starts with toughness, durability, convenience and appearance based on the modern housing design requirements. Environment friendliness and low carbon footprint are likewise considered. Foregoing requirements result in increasing applications of table top panel made of synthetic material.

[0004] Therefore, designing a table top made of synthetic material with wide applicability, low maintenance cost and better mechanical properties inevitably becomes a requirement.

Summary of the Invention

[0005] For above design need of table top of modern home furnishings, the present invention provides a structure of composite table top, the technical proposal of the present invention is that:

A composite table top, comprising:

a face plate with an outer surface and an inner surface; and

a bottom plate with array-like projections arranged in an x-axis direction and a y-axis direction, on the projections contacting and attaching to the inner surface of the face plate; and

a reinforcing piece disposed between the face plate and the bottom plate.

[0006] There are some alternate embodiments to this technical proposal:

[0007] In another preferred embodiment, the bottom plate use vacuum forming technology, the bottom surface thereof is disposed with concave pits with same shape as the projections of the top surface; the projections and the concave pits are arranged alternatively in the horizontal direction on the top surface, and the adjacent rows are offset.

[0008] In another preferred embodiment, the external periphery of the face plate is disposed with an upward flange extending downwardly; the external periphery of the bottom plate is disposed with a downward flange extending upwardly; the upward flange mates the downward flange vertically.

[0009] In another preferred embodiment, the total area of the projections of the bottom plate is 30-70% of the area of the bottom plate.

[0010] Each projection has an available range of 1-15 square centimeters.

[0011] In another preferred embodiment, the reinforcing frame is disposed in the annular cavity formed by the external periphery of the face plate and the bottom plate, and then cooperating with the face plate, the bottom plate and the coincide portion of the upward flange and the downward flange and thus limiting.

[0012] In another preferred embodiment, the external periphery of the face plate and the bottom plate form a reinforcing rib with polygon cross-section, the reinforcing frame covers the outer side and the bottom surface of the reinforcing rib.

[0013] In another preferred embodiment, the outer side of the external periphery of the face plate and the bottom plate is further covered with a subsidiary reinforcing frame to tightly cooperate with the outer side and the bottom surface of the external periphery of the face plate and the bottom plate.

[0014] In another preferred embodiment, the projections are regularly array-like arranged, the joint surface is rectangle shaped.

[0015] In another preferred embodiment, the projections are arranged on the bottom plate with non-space and tightly adjacency.

[0016] In another preferred embodiment, the bottom surface is further disposed with an assembly base to assemble movable components, the assembly base is fixed with a folding leg frame or vertical legs.

[0017] The reinforcing frame is disposed with a support bar that two ends of the support bar are fixed to the inner edge of the reinforcing frame, the side surface of the support base is coupled to the bottom surface.

[0018] The present invention has following advantages:

1. The structure of composite table top is noticeably simplified by the bottom plate with projections arranged in arrays and the reinforcing frame. The structure of composite table top is suitable for different synthetic materials, and has proper mechanical properties, low production and assembling cost, and appealing appearance.

2. The x-axis and y-axis arranged projections restrain the deformation of the bottom plate and the top plate in the x-axis and y-axis directions, thus preventing irregular torsion.

3. The projections and the concave pits are arranged alternatively in the horizontal direction on the top surface. The adjacent rows are offset, this arrangement results in each of the projection is surrounded by four concave pits, and each concave pit is surrounded by four projections. When the table top is deformed by a force in the vertical direction, the side walls of the projection and/or the concave pit can provide an elastic force to counter the deformation force, so that the table top has better compression and bending resistance characteristics. Moreover, this structure can be formed in a single step, resulting in short manufacturing time and higher strength.

4. The concave pits and the projections have similar profiles, resulting in simplified manufacturing process, different fastening possibilities for the face plate and the bottom plate and a firm assembly.

5. The compact structure provides versatile usability, in particular, portability and usability in limited spaces.

Brief Description of the Drawings

[0019] The present invention will be further described with the drawings and the embodiments.

Fig. 1 illustrates an exploded diagram of a first embodiment of the present invention with a cut away section;

Fig. 2 illustrates a sectional diagram of the first embodiment of Fig. 1;

Fig. 3 illustrates an exploded and schematic diagram of a second embodiment of the present invention with a cut away section;

Fig. 4 illustrates an exploded and schematic diagram of a third embodiment of the present invention with a cut away section;

Fig. 5 illustrates a sectional diagram of the third embodiment of Fig. 4;

Fig. 6 illustrates a schematic diagram of a fourth embodiment;

Fig. 7 illustrates a schematic diagram of a fifth embodiment; and

Fig. 8 illustrates a schematic diagram of a sixth embodiment.

Detailed Description of the Embodiments

[0020] First Embodiment:

[0021] Fig. 1 is an exploded view including a partially sectional view of the first embodiment. The composite table top 10, which may use vacuum forming technology, comprises a face plate 100, a bottom plate 200 and a reinforcing frame 300. The face plate 100 is a plate with upward flange 101 on the outer peripheral edges. The bottom plate 200 is similar to the face plate 100 in shape. The external peripheries of the bottom plate 200 have the downward flange 203 having similar shape as the outer peripheral edges of the face plate 100.

[0022] Array-distributed projections 201 are on the upper surface of bottom plate 200, which adjoin to each other and have bonding surface to the inner surface of face plate 100 via ultrasonic bonding. The bonding surface has a size in an available range of 1-25 square centimeters, preferably 10 square centimeters. The total area of the projections of the bottom plate is 30%-70% of the total area of the bottom plate, preferably, 40-60%.

[0023] It is not necessary to bond all projections 201 that are off-set distributed on the upper surface of reinforcement plate 200 to the inner surface of face plate 100, a majority of them may suffice. Pipes with square cross-section are bent to form the reinforcement frame 300 that is between face plate 100 and reinforcement plate 200. Every projection 201 corresponds to a concave pit 202 in the lower surface of the reinforcement plate 200.

[0024] In this embodiment, the projections 201 are regularly arranged in an x-axis direction and a y-axis direction in the horizontal direction along the top surface. The projections 201 have the flat joint surfaces adapted to the inner surface, so that the bottom plate 200 can tightly contacted the inner surface of the face plate 100 through the projections 201. The regular arrangement in the x-axis and y-axis directions restrains the deformation of the bottom plate 200 and the top plate 100 in the x-axis and y-axis directions, thus preventing irregular torsion. In particular, the projections 201 and the concave pits 202 are arranged alternatively in the horizontal direction on the top surface. The adjacent rows are offset. This arrangement results in each projection is surrounded by four concave pits 202, and each concave pit 202 is surrounded by four projections 201. When the table top is deformed by a force in the vertical direction, the side walls of the projection 201 and/or the concave pit 202 can provide an elastic force to counter the deformation force, so that the table top has better compression and bending resistance characteristics. Moreover, this structure can be formed in a single step, resulting in short manufacturing time and higher strength.

[0025] The downward flange 203 of the bottom plate 200 mates the upward flange 101 of the face plate vertically to form the outboard of the whole table top, and the reinforcing frame 300 is supported in an annular cavity that is formed between the face plate 100 and the bottom plate 200. The reinforcing frame also provides a boundary function with the face plate 100, the bottom plate, the upward flange and the downward flange.

[0026] The projections 201 of the bottom plate may be

made by vacuum suction method, the projections may be column shaped or conical shaped.

Second Embodiment:

[0027] Fig. 3 is an exploded diagram of the second embodiment with a cut away section. In this embodiment, the structure of composite table top 10 has similar inner structure with the first embodiment such as the shape, distribution of projections and the way they interact. The difference is that the composite table top 10 is combined with two pieces through the hinge 11. The composite table top 10 can be fold through the hinge 11 so that the lower surfaces of the bottom plate 200 face each other.

Third Embodiment:

[0028] Fig. 4 illustrates an exploded and schematic diagram of the third embodiment with a partial sectional view. The structure of composite table top 10 also comprises a face plate 100, a bottom plate 200 and a reinforcing frame 300. The face plate 100 has similar structure with the first and the second embodiments. The projections 201 on the top surface of the bottom plate 200 are shaped as elongated rectangular and arranged in an array. That is, the projections 201 are arranged in an x-axis and a y-axis direction in the direction parallel to the top surface. The concave pits 202 share the same shape as the projections, and corresponded to the projections 201; The surface of the concave pit 202 which interact with the inner surface of the face plate 100 also has an elongated rectangular shape. The joint surface of the projections 201 contacting the inner surface of the face plate 100 is also elongated rectangular shaped.

[0029] Referring to Fig. 5, details of each part is shown, offset distribution can also be chosen to fix the projection 201 of the bottom plate 200 to the inner surface of the face plate 100 through glue. Frame with L-shaped cross section is bent to form reinforcement frame 300. The reinforcement frame 300 is fastened to the downside of the bottom plate 200 and the outside of the whole composite table top 10. The reinforcement frame 300 is also in the exterior of the bottom plate 200. The reinforcement frame 300 covers the upward flange 101 mating the downward flange 203 from outside. The reinforcing frame 300 has a support bar 305 with two ends thereof fixed to the inner edge of the reinforcing frame 300. The side surface of the support bar 305 is coupled to the bottom surface of the bottom plate 200, so as to prevent the bottom plate 200 warping, bending or deforming in the longitudinal direction of the support bar 305.

Forth Embodiment:

[0030] FIG. 6 shows a perspective view of the forth embodiment according to the invention. The composite table top 10 used in this embodiment is the same as the first embodiment. A portable folding scheme is formed

by an erecting floor 13 that is located on the bottom of the composite table top 10 and used for fastening the folding legs 401.

5 Fifth Embodiment:

[0031] FIG. 7 shows a perspective view of the fifth embodiment according to the invention. This embodiment shares the same composite table top 10 and the hinge 11 of the second embodiment and has folding vertical legs 402 attached to the outside frame of composite table top 10 in addition. In use, space can be saved through the folding of the vertical legs 402 and the folding of the composite table top 10 through the hinge 11.

Sixth Embodiment:

[0032] FIG. 8 shows a perspective view of the sixth embodiment. This embodiment shares the same composite table top 10 as the third embodiment and has four detachable vertical legs 403 which are inserted in the four corners of the bottom of the composite table top 10. A portable solution is provided by an erecting floor 13 that is located on the bottom of the composite table top 10 and used for fastening the detached legs 403.

[0033] Although the present invention has been described with reference to the preferred embodiments thereof for carrying out the patent for invention, it is apparent to those skilled in the art that a variety of modifications and changes may be made without departing from the scope of the patent for invention which is intended to be defined by the appended claims.

Industrial Applicability

[0034] The present invention provides a structure of composite table top that is noticeably simplified by the bottom plate with projections arranged in arrays and the reinforcing frame. The structure of composite table top is suitable for different kinds of synthetic materials, and has proper mechanical properties, low production and assembling cost, and appealing appearance.

Claims

1. A composite table top comprising:
 - a face plate with an outer surface and an inner surface; and
 - a bottom plate with array-like projections arranged in an x-axis direction and a y-axis direction, on the projections contacting and attaching to the inner surface of the face plate; and
 - a reinforcing piece disposed between the face plate and the bottom plate.
2. The composite table top according to claim 1, where-

in the total area of the projections of the bottom plate is 30%-70% of the total area of the bottom plate.

3. The composite table top according to claim 2, wherein the area of each projection is 1-15 square centimeter. 5
4. The composite table top according to claim 2, wherein the total area of the projections of the bottom plate is 40%-60% of the total area of the bottom plate. 10
5. The composite table top according to claim 3, wherein the area of each projection is 3-9 square centimeter. 15
6. The composite table top according to any one of claims 1, and 4 - 5, wherein the projections of the bottom plate are produced via vacuum forming process, the projections are column shaped or cone frustum shaped. 20
7. The composite table top according claim 1 or claim 6, wherein the reinforcing piece is disposed at the opposite sides of the edges of the bottom plate or the periphery of the bottom plate to form a reinforcing frame. 25
8. The composite table top according to claim 7, wherein a concave cavity is formed at a surrounding edge of the face plate and the bottom plate, the reinforcing piece is disposed in the concave cavity. 30
9. The composite table top according to any one of claims 1, and 6-7, further comprising a crossbeam that disposed at the center of the table top longitudinally or transversally. 35
10. The composite table top according to claim 9, wherein the crossbeam is disposed at the lower edge of the bottom plate. 40
11. The composite table top according to any one of claims 1, 4-5 and 7, wherein the face plate is concaved and is disposed with side walls. 45

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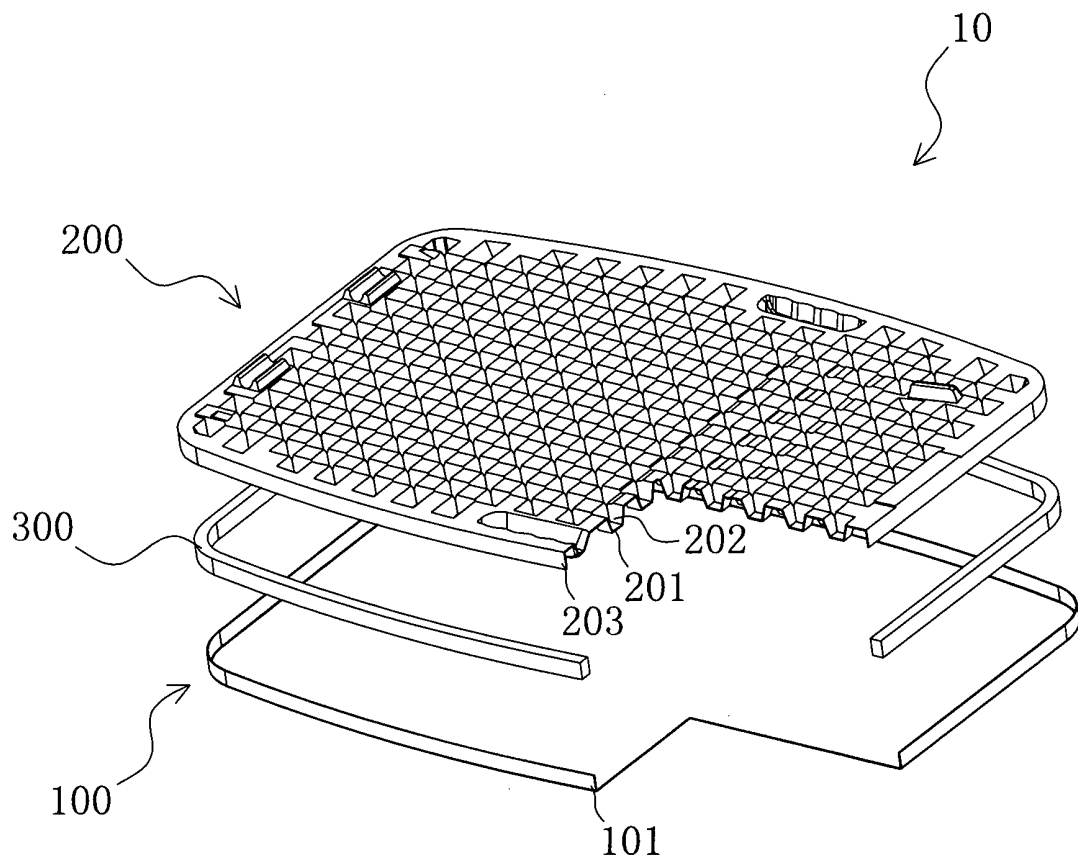


FIG. 1

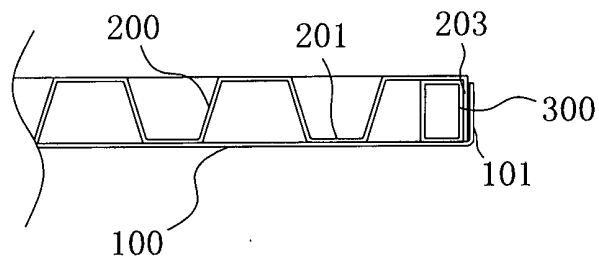


FIG. 2

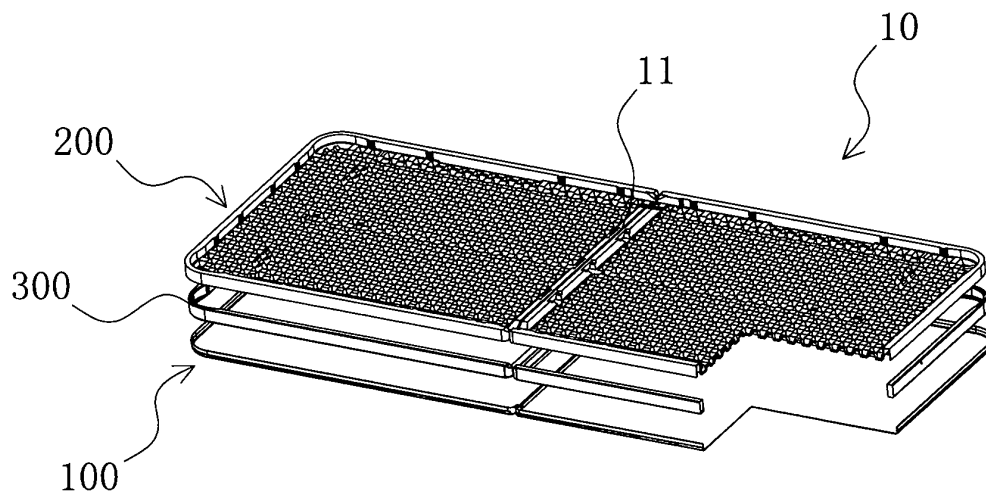


FIG. 3

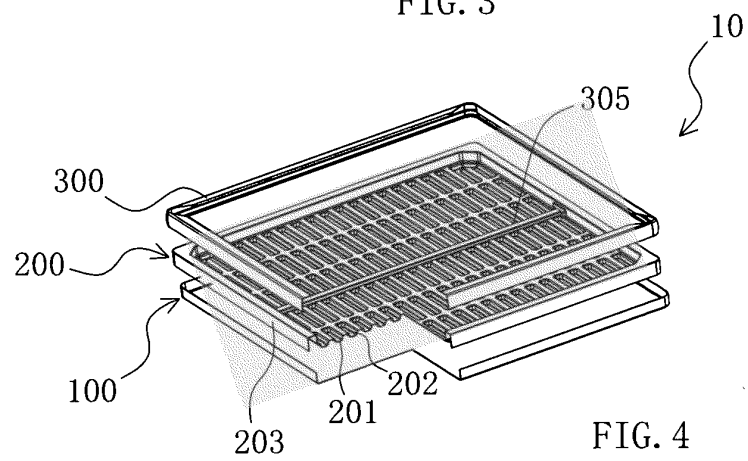


FIG. 4

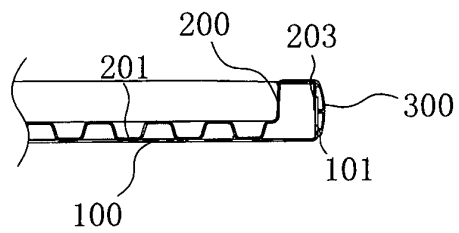


FIG. 5

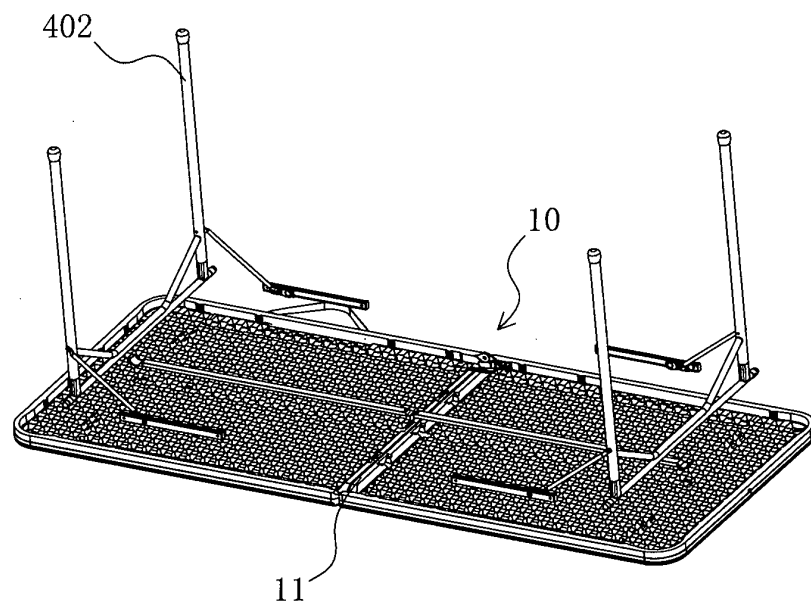
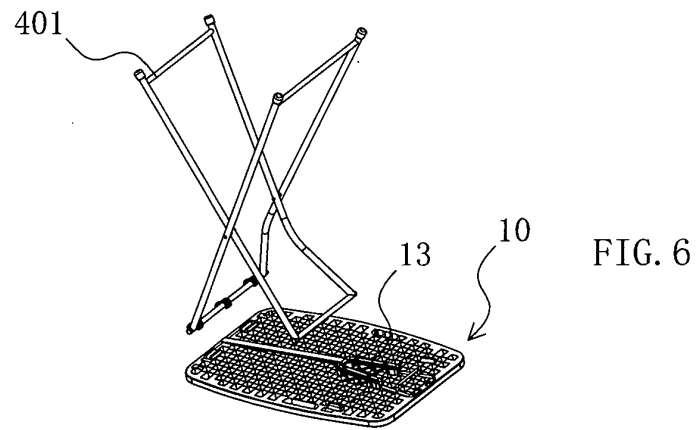


FIG. 7

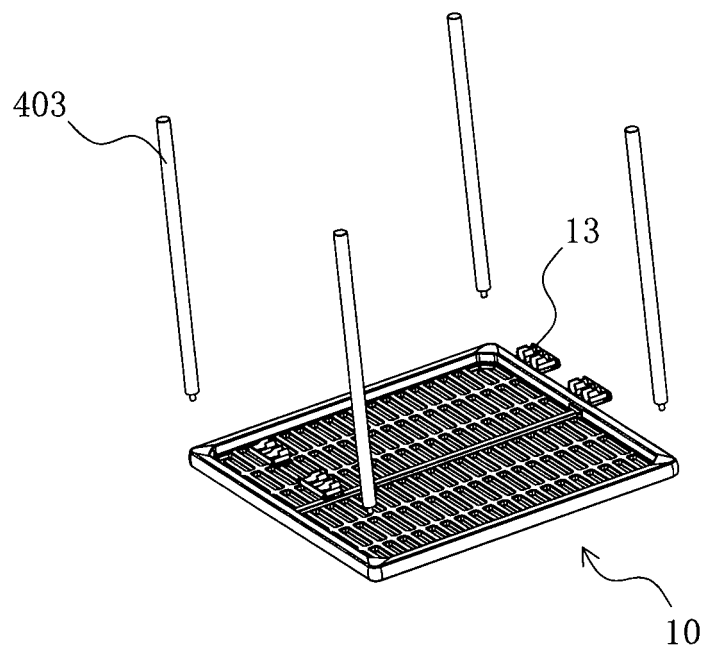


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2013/079702

A. CLASSIFICATION OF SUBJECT MATTER

A47B 13/08 (2006.01) i

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)

IPC: A47B 13

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 practicable, search terms used)

CNABS, CNTXT, VEN, CNKI: protrude, cross, interval, convex, adhere, TABLE, PLATE, BOARD, REINFORCEMENT, COMPOSITE, PROJECTION, SHEET, LAYER

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 102987726 A (LENG, Luhao), 27 March 2013 (27.03.2013), description, pages 2-3, and figures 1-8	1-11
PX	US 20130025508 A1 (LENG, L.), 31 January 2013 (31.01.2013), description, paragraphs 0033-0041, and figures 1-8	1-11
A	CN 101449876 A (FUJIAN WANSHENG FURNITURE CO., LTD.), 10 June 2009 (10.06.2009), the whole document	1-11
A	CN 201147003 Y (LENG, Luhao), 12 November 2008 (12.11.2008), the whole document	1-11
A	CN 2664900 Y (LENG, Luhao), 22 December 2004 (22.12.2004), the whole document	1-11
A	JP 2002306251 A (YAMADA INDUSTRY CO., LTD.), 22 October 2002 (22.10.2002), the whole document	1-11

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
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Date of the actual completion of the international search 08 October 2013 (08.10.2013)	Date of mailing of the international search report 17 October 2013 (17.10.2013)
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer HE, Yi Telephone No.: (86-10) 62085814

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2013/079702

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 102987726 A	27.03.2013	US 20130025508 A1	31.01.2013
US 20130025508 A1	31.01.2013	CN 102987726 A	27.03.2013
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CN 201147003 Y	12.11.2008	None	
CN 2664900 Y	22.12.2004	None	
JP 2002306251 A	22.10.2002	None	

Form PCT/ISA/210 (patent family annex) (July 2009)