



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.03.2015 Bulletin 2015/11

(51) Int Cl.:
B32B 17/10 (2006.01) E04C 2/54 (2006.01)

(21) Application number: **14184024.9**

(22) Date of filing: **09.09.2014**

(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

(72) Inventors:
• **Miranda Camino, Santiago**
20144 Milano (IT)
• **King, Perry Allan**
20144 Milano (IT)

(30) Priority: **10.09.2013 IT MI20131498**

(74) Representative: **Mittler, Enrico et al**
Mittler & C. S.r.l.
Viale Lombardia, 20
20131 Milano (IT)

(71) Applicant: **King & Miranda Design s.r.l.**
20144 Milano (IT)

(54) **Wall with transparent insulated sheet**

(57) A wall (60) with transparent material sheet (50) is described, which provides for a multilayer sheet (1, 1b, 70) associated with said transparent material sheet (50) by means of a joint (51) to form a closed chamber (52)

between them (1, 1b, 70, 50). Said multilayer sheet (1, 1b, 70) comprises at least one transparent material sheet (4) and at least one opaque material sheet (2, 3) with at least one through hole (20).

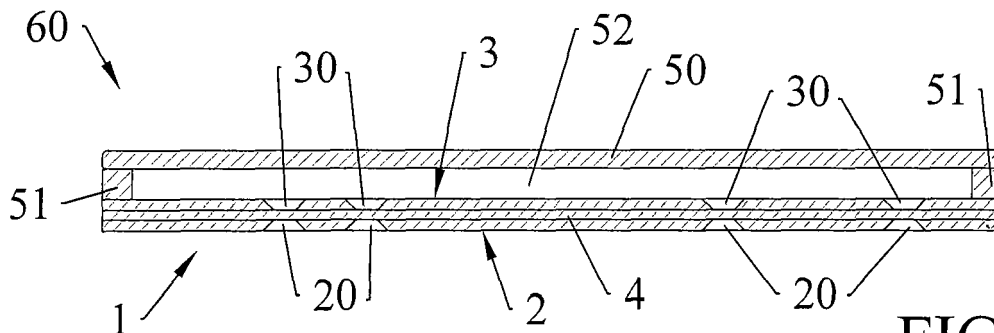


FIG.8

Description

[0001] The present invention relates to a wall with a transparent insulated sheet.

[0002] Walls made of transparent glass are known, for example in skyscrapers, where in order to increase the insulation while preserving the passage of light, a second transparent inner glass is provided, which is joined to the outer glass by the interposition of a chamber containing vacuum or inert gas.

[0003] Disadvantageously, insulation is very limited and the amount of light passing is too high, especially in warm places.

[0004] There are multilayer sheets for building coatings, e.g. as described in patent document DE3921779A1 where the multilayer sheet comprises two layers of ceramic material and two or more inner layers of glass fiber having the function of thermal insulating material. Said multilayer sheets are totally opaque.

[0005] There are patent documents such as for example US4640850, which describes a multilayer sheet for building coatings comprising a stone material sheet protected by a layer made of transparent glass so as to make the stone material glossier. Disadvantageously, light cannot pass through said multilayer sheets.

[0006] In order for the light to pass through the stone, the patent document EP1555119A1 describes a multilayer sheet for building coatings comprising at least one thin layer of marble protected by at least one layer of transparent glass. Said marble sheet is difficult to be manufactured and disadvantageously fragile. Furthermore, said thin marble sheet allows only a part of the light to pass and cannot be seen through.

[0007] In order for the light to pass through a wall without filters, the wall needs to be bored, thus reducing its insulation.

[0008] Sheets of porcelain ceramic material are also known, which have acoustically and thermally insulating properties, but do not allow any passage of light.

[0009] It is an object of the present invention to provide a wall comprising a transparent material sheet which needs to be associated with a robust multilayer sheet with excellent thermal and acoustic insulation properties, which allows light to penetrate and allows it to be seen through.

[0010] In accordance with the invention such an object is achieved by a wall with a transparent material sheet, characterized in that it provides a multilayer sheet associated with said transparent material sheet by means of a joint to form a closed chamber therebetween, said multilayer sheet comprising at least one transparent material sheet and at least one opaque material sheet with at least one through hole.

[0011] Preferably, the transparent material is glass.

[0012] These and other features of the present invention will become more apparent from the following detailed description of practical embodiments thereof, shown by way of non-limiting examples with reference

to the accompanying drawings, in which:

Figure 1 shows a front perspective view of a multilayer sheet;

Figure 2 shows a rear view of the multilayer sheet; Figure 3 shows a sectional view according to the line III-III in Figure 2;

Figure 4 shows a front perspective view of an alternative multilayer sheet;

Figure 5 shows a rear view of the alternative multilayer sheet;

Figure 6 shows a sectional view according to the line VI-VI in Figure 5;

Figure 7 shows a plan view of a wall according to the present invention;

Figure 8 shows a sectional view according to the line VIII-VIII in Figure 7;

Figure 9 shows a sectional view similar to that in Figure 8, of an alternative wall according to the present invention.

Figures 1-3 show by way of example a multilayer sheet 1 comprising a transparent material sheet 4 enclosed between a sheet 2 of opaque material, more precisely of porcelain ceramic material, and another sheet 3 of opaque material, more precisely of porcelain ceramic material.

[0013] Said two porcelain ceramic material sheets 2, 3 have the same size and shape as the transparent material sheet 4.

[0014] The porcelain ceramic material sheet 2 is glued over a front face of the transparent material sheet 4, while the other porcelain ceramic material sheet 3 is glued over a rear face of the transparent material sheet 4.

[0015] The porcelain ceramic material sheet 2 has a plurality of through holes 20 identical and coinciding with a plurality of through holes 30 in the other porcelain ceramic material sheet 3, said through holes 20 and 30 being dimensioned so as to advantageously allow to see through the multilayer sheet 1 and to advantageously allow the light to pass through the multilayer sheet 1 without being filtered.

[0016] Preferably, said transparent material sheet 4 is made of transparent glass or a transparent plastic material which allows to ensure the insulation of the wall.

[0017] The porcelain ceramic material sheets 2, 3 are preferably made of porcelain stoneware by means of a known process of sintering ceramic clays, feldspats, kaolins and sand. Alternatively, the use of other stone materials is possible.

[0018] Sheets 2, 3 may also be made of a different opaque material, e.g. of metal or plastic.

[0019] A multilayer sheet 1 is manufactured by enclosing a transparent material sheet 4 between two porcelain ceramic material sheets 2, 3 which are glued thereto on both faces. Known glues are applied to both inner faces of the two porcelain ceramic material sheets 2, 3 for adhering to the front face and to the rear face of the trans-

parent material sheet 4, respectively.

[0020] The two porcelain ceramic material sheets 2, 3 are made directly with a plurality of through holes 20, 30 by means of a cutting or pressing process.

[0021] A plurality of spatial arrangements of through holes 20, 30 of the two porcelain ceramic material sheets 2, 3 may be provided as shown in a first example of multilayer sheet 1 (Figures 1-3) and in a second example of alternative multilayer sheet 1b (Figures 4-6).

[0022] A plurality of said multilayer sheets 1, 1b may be mounted together to build a wall (not shown in the figures) that is advantageously robust, with excellent properties of thermal and acoustic insulation, bright and which allows vision therethrough. The mounting operation may be carried out by placing the multilayer sheets close to one another in the vertical direction or in the horizontal direction, for example for ceilings.

[0023] Alternatively, the multilayer sheets 1, 1b may consist of walls of furniture (not shown in the figures).

[0024] The thus built wall with one or more multilayer sheets 1 advantageously allows vision therethrough, letting the light pass without filters, while preserving excellent properties of thermal and acoustic insulation.

[0025] As shown in Figures 7 and 8, the multilayer sheet 1 (or 1b) may be associated with a sheet of glass or other transparent material 50, for example a glass sheet outside a building, such as a skyscraper, thus forming a wall 60.

[0026] Said sheets 1 and 50 are joined together by means of a joint 51 which allows to leave a chamber 52 closed between said sheets 1 and 50, which is filled with inert gas or contains vacuum.

[0027] Said sheets 1, 50 are glued to said joint 51 for example in the form of a square or rectangular frame following the edge of the sheets 1, 50.

[0028] Alternatively (Figure 9), a wall 60 may be made in accordance with the invention with a multilayer sheet 70 consisting of a transparent material sheet 4 associated with a single opaque material sheet 2, for example made of porcelain ceramic. In said configuration, the transparent material sheet 4 contacts joint 51, for example being glued thereto.

[0029] The embodiment shown in Figure 9 allows saving material while preserving an excellent insulating capability. The passage of light does not change due to the presence of the through holes of sheet 2.

[0030] All the embodiments described advantageously allow an appropriate amount of light to pass and penetrate the glass sheet 50, thus preserving the insulating capability of wall 60, which is important in places with very high external temperatures where energy issues arise when constructing glass buildings such as skyscrapers.

[0031] The present invention thus allows creating well-insulated glass buildings in very warm places. The mounting operation is simple and quick.

[0032] The wall 60 object of the present invention may also be for internal use.

Claims

1. A wall (60) with transparent material sheet (50), **characterized in that** it includes a multilayer sheet (1, 1b, 70) associated to said transparent material sheet (50) by means of a joint (51) to form a closed chamber (52) between them (1, 1b, 70, 50), said multilayer sheet (1, 1b, 70) comprising at least one transparent material sheet (4) and at least one opaque material sheet (2, 3) with at least one through hole (20, 30).
2. A wall (60) according to claim 1, **characterized in that** said multilayer sheet (1, 1b) comprises at least one transparent material sheet (4) enclosed between at least two opaque material sheets (2, 3), each of which with at least one through hole (20) coinciding with at least one through hole (30) of the other opaque material sheet (3).
3. A wall (60) according to claim 1, **characterized in that** said multilayer sheet (70) consists of a transparent material sheet (4) associated to a single sheet of opaque material (2), said sheet of opaque material (4) being in contact with said joint (51).
4. A wall (60) according to any one of the preceding claims, **characterized in that** said opaque material sheet (2, 3) consists of porcelain ceramic material sheets.
5. A wall (60) according to any one of the preceding claims, **characterized in that** said transparent material sheets (4, 50) are made of transparent glass.
6. A wall (60) according to any one of the preceding claims, **characterized in that** said through holes (20, 30) are dimensioned so as to allow to see through the multilayer sheet (1).
7. A wall (60) according to any one of claims 2, 4-6, **characterized in that** each of said opaque material sheets (2, 3) comprises a plurality of through holes (20) coinciding with identical through holes (30) in the other opaque material sheet (2, 3).
8. A wall (60) according to any one of the preceding claims, **characterized in that** the through holes (20, 30) in the opaque material sheets (2, 3) are formed by means of a cutting processing.
9. A wall (60) according to any one of claims 1-7, **characterized in that** the through holes (20, 30) in the opaque material sheets (2, 3) are formed by means of a pressing process.
10. A wall (60) according to any one of the preceding claims, **characterized in that** said chamber (52) is

filled with inert gas or contains vacuum.

5

10

15

20

25

30

35

40

45

50

55

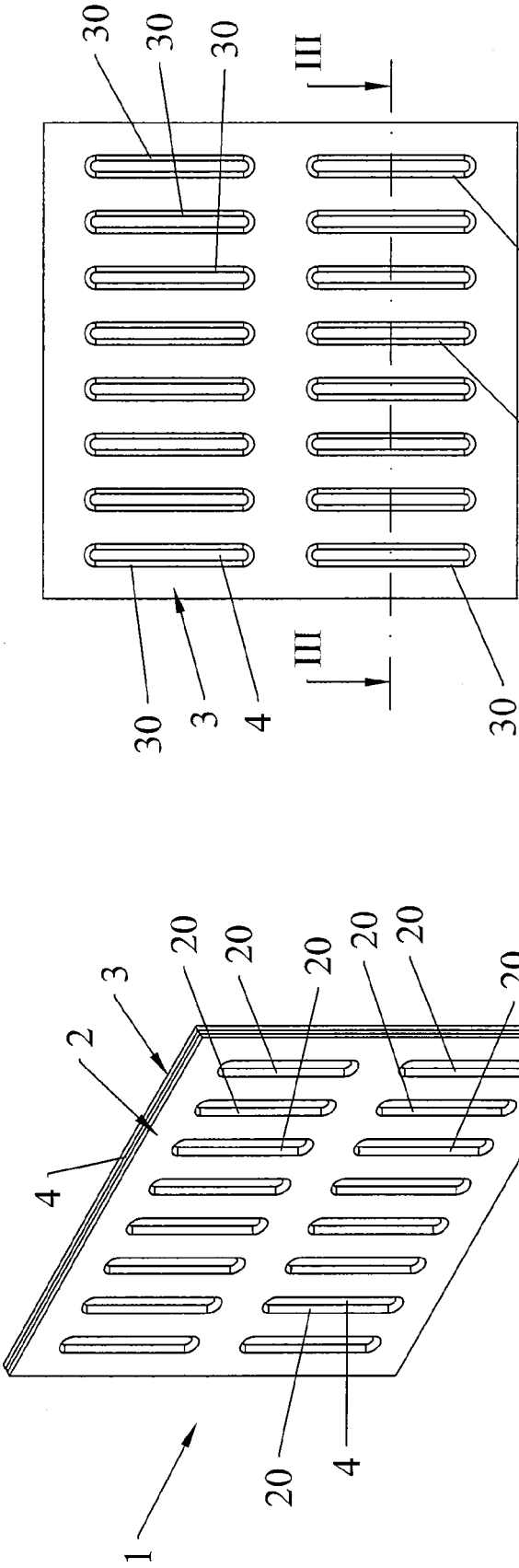


FIG. 1

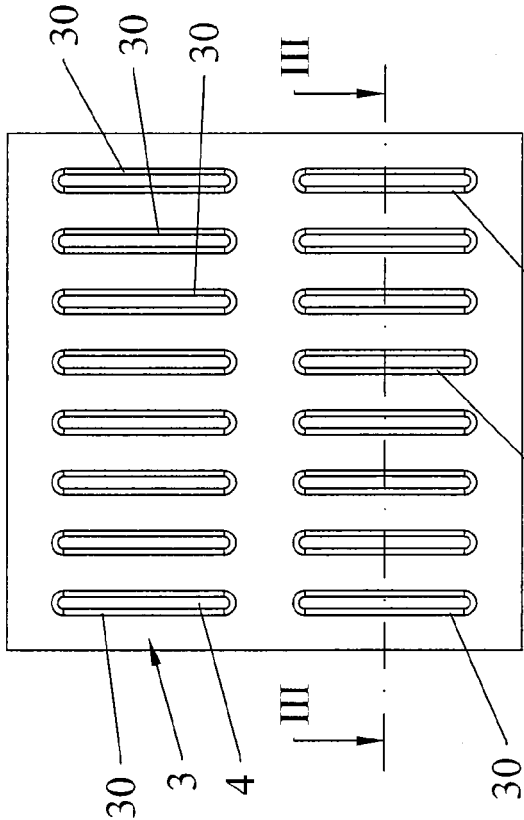


FIG. 2

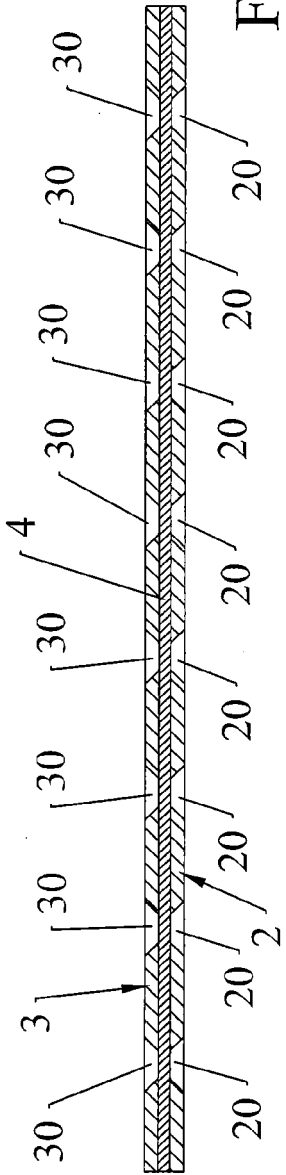


FIG. 3

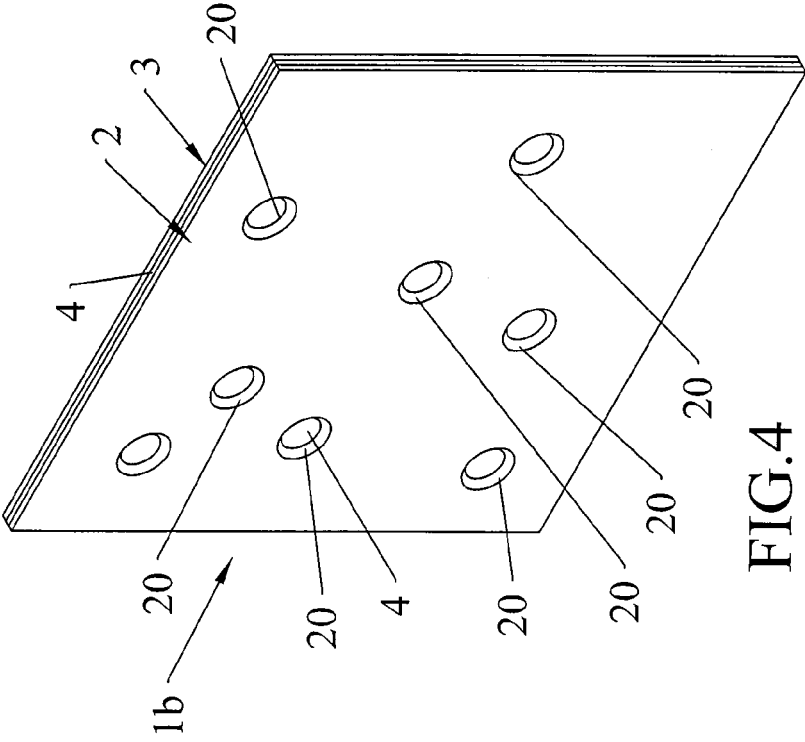


FIG. 4

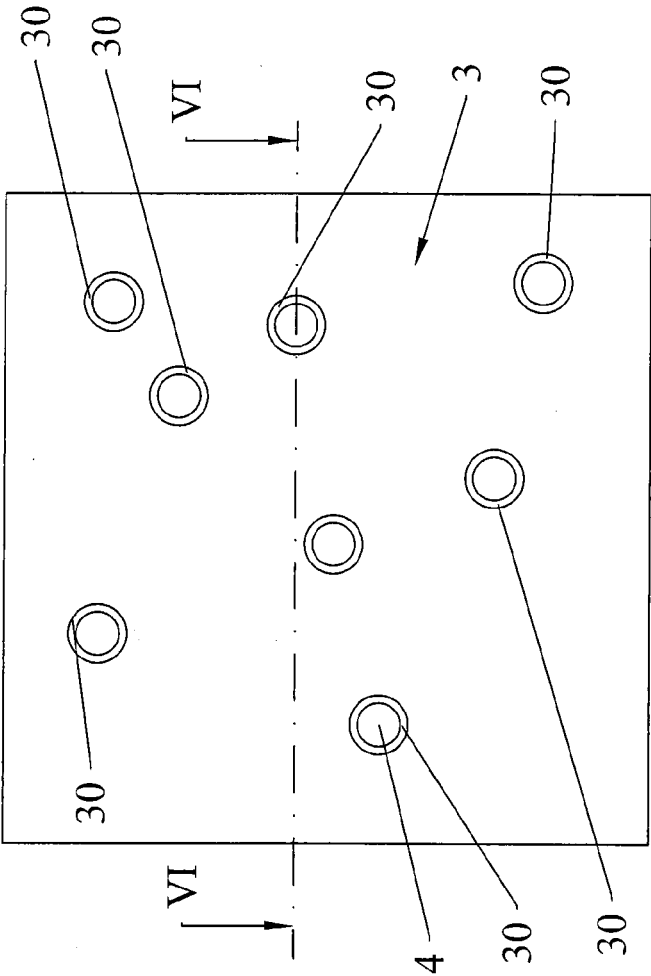


FIG. 5

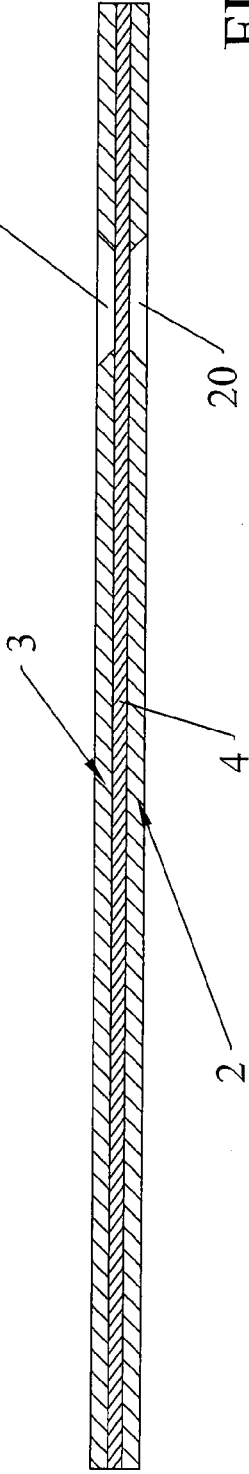


FIG. 6

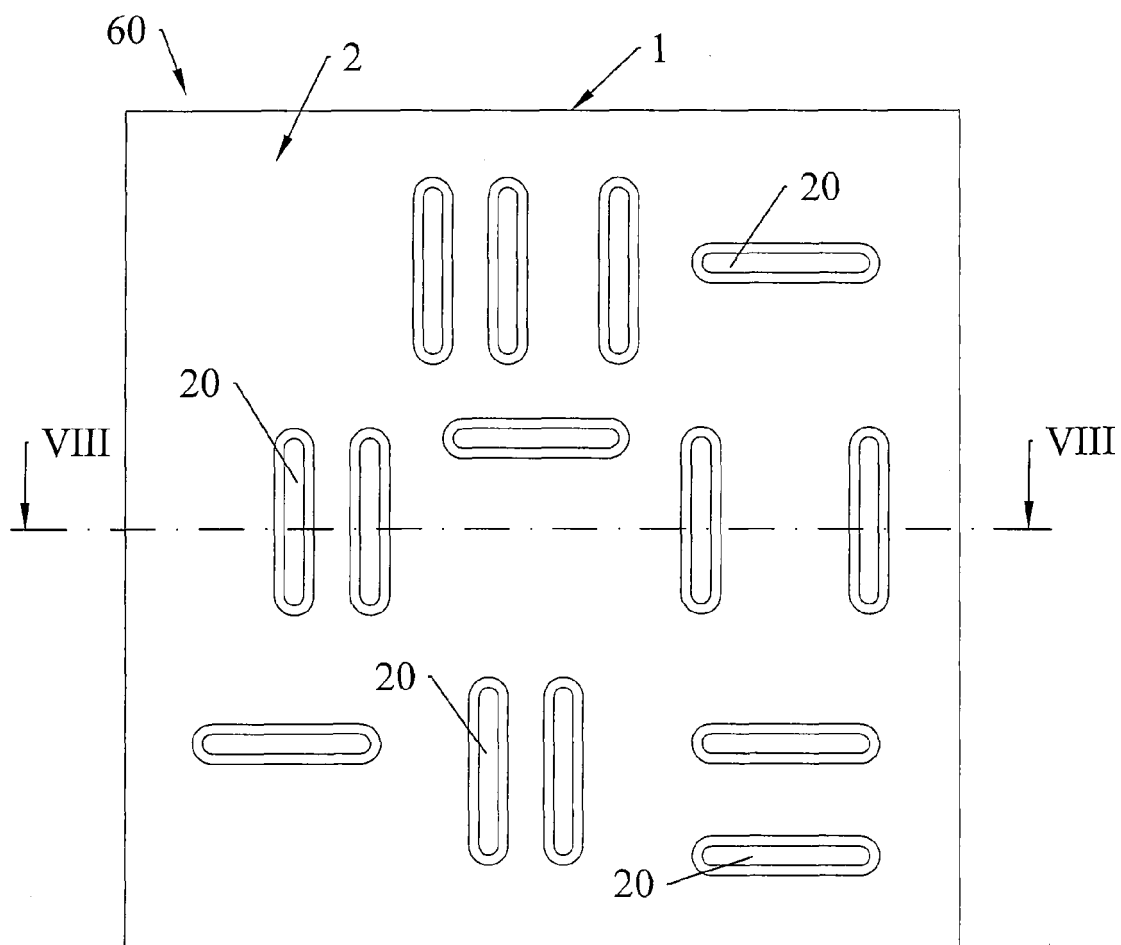


FIG. 7

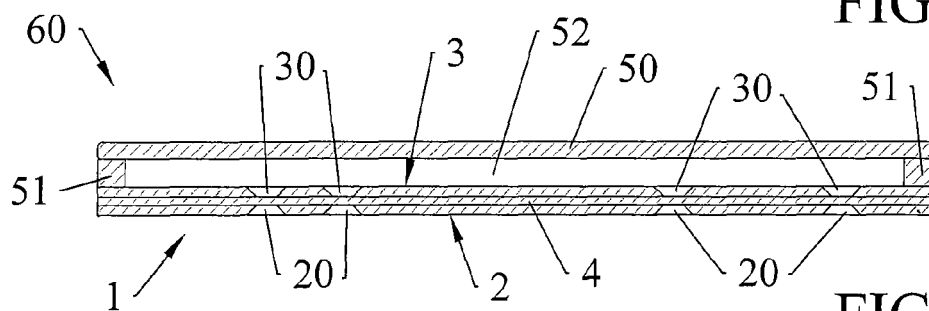


FIG. 8

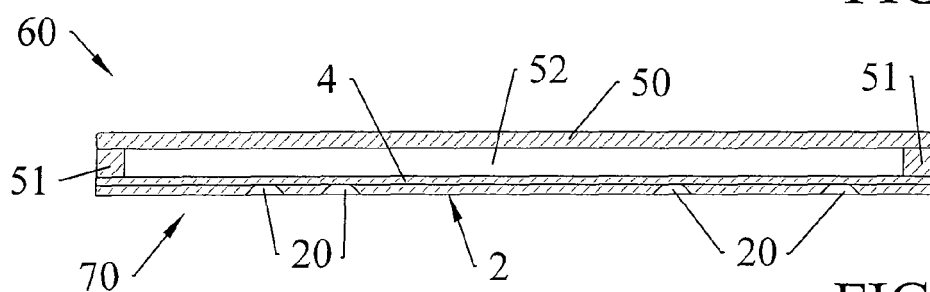


FIG. 9



EUROPEAN SEARCH REPORT

 Application Number
 EP 14 18 4024

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 555 119 A1 (MDF ITALIA SRL [IT]) 20 July 2005 (2005-07-20) * claims 1-3 *	1-10	INV. B32B17/10 E04C2/54
A	JP H03 76642 A (YASUDA HISAO) 2 April 1991 (1991-04-02) * abstract *	1-10	
A	DE 20 2007 000289 U1 (SCHROER RUDOLF [DE]) 8 March 2007 (2007-03-08) * paragraph [0011] *	1-10	
A	FR 2 932 206 A1 (LAMELLUX [FR]) 11 December 2009 (2009-12-11) * figures 1,2,3 *	1-10	
A	EP 1 997 975 A1 (ZAOT S R L [IT]) 3 December 2008 (2008-12-03) * figure 2 *	1	
A	WO 95/18016 A1 (LOWE HENRY E [US]) 6 July 1995 (1995-07-06) * figure 2 *	1	TECHNICAL FIELDS SEARCHED (IPC)
			B32B E04C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 4 December 2014	Examiner Schweissguth, Martin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 18 4024

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-12-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1555119 A1	20-07-2005	NONE	
JP H0376642 A	02-04-1991	JP 2643468 B2 JP H0376642 A	20-08-1997 02-04-1991
DE 202007000289 U1	08-03-2007	NONE	
FR 2932206 A1	11-12-2009	NONE	
EP 1997975 A1	03-12-2008	NONE	
WO 9518016 A1	06-07-1995	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 3921779 A1 [0004]
- US 4640850 A [0005]
- EP 1555119 A1 [0006]