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(54) WINDOW WITH A MASKED PANE

FENSTER MIT MASKIERTER SCHEIBE

FENÊTRE AVEC UNE VITRE MASQUÉE

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Description

[0001] The present invention relates to a window for a building comprising a frame and a pane mounted thereon, which pane comprises at least two sheet elements, such as sheets of glass, separated by one or more spacer members. In this, the term "frame" covers both stationary and moveable frames including traditional sashes. Furthermore, the term includes such elements, which includes other elements as well.

[0002] Over recent years the number of functionalities expected to be possessed by modern type windows has been constantly increasing and at the same time demands have been for increasingly slimmer designs. In response, the frame structures have been optimised using state of the art materials, hollow profiles housing electrical wires etc. As a result, the number of different components needed have risen and special frame designs have been developed for each kind of window leading to increased manufacturing costs. An example of this is shown in DE10059849A1, where a so-called frameless window uses a protective enamel layer, applied to the inner surface of an exterior sheet of glass in order to protect an adhesives used for fixating the pane to the frame from sun-light.

[0003] It is therefore the object of the invention to provide a window, where the frame structure may be simplified without compromising the comprehensiveness of the window.

[0004] This is achieved by a window according to claim 1.

[0005] In this window a part of the pane projects over the frame, making it invisible from the interior in the mounted state, and at least one sheet element is provided with a functional mask on a surface thereof, the mask being provided on the invisible part(s) of the pane. Functions, which were formerly seated in the frame, can thus be transferred to the pane without reducing the amount of light transmitted to the interior of the building and blocking the view. A mask may for example function as a covering for the gasket used between the pane and frame to protect it from solar radiation or form solar panels or a rain sensor. It may, however, also serve a more indirect purpose such as contributing to or promoting the attachment of the pane. In a particularly preferred embodiment an adhesion promoter is applied to the border of the pane, which is encased in the frame by moulding. The adhesion promoter may be a mask having a particularly good frictional resistance or a material forming a chemical connection to the frame material.

[0006] It is to be understood, that the term "mask" is not limited to covering only thin, sheet-like coverings, but also thicker units such as solar cells, sensors, displays etc. The common feature of the objects covered by the term "mask" being, that they are non-transparent to at least some wavelengths and would therefore block the view or reduce the transmission of light if arranged on the visible part of the pane.

[0007] As the window is provided with more than one mask the pane may be provided with two or more different functionalities. Two or more different masks are provided at different locations on the pane, but it is also possible to provide masks on top of each other.

[0008] Each mask may be formed from any material suited for the particular purpose, such as a current-carrying lacquer for the formation of wires, and it may also be patterned and/or coloured. Patterns and colours may serve purely technical purposes such as achieving a particularly good sun screening. They may, however, also serve more aesthetic purposes such as achieving a better architectural whole by applying a mask, which becomes gradually thinner with the distances from the frame, to thereby visually soften the joint between the frame and the pane.

[0009] A pane of the so-called step unit type, where one sheet element has a larger width or length than the other(s) seen in the plane of the pane, an edge of the larger sheet element projecting over the spacer member, is used. The projection is constituted by the projecting part of the larger sheet element, leading to a considerably lighter appearance than if using a regular thermo pane or the like, where the projection might appear disproportionately bulky due to the thickness of the pane. The size of the larger sheet element in relation to the smaller one can be adjusted to the particular purpose as can the relative positioning of the sheet elements. If applying a larger mask, such as a photo-voltaic element, the outer sheet element may be considerably longer than the smaller one and displaced in relation thereto giving it a large projection on e.g. the lower edge of the pane.

[0010] As the projecting border of step unit panes wholly or partly cover the window frame the transfer of functionalities to the pane are particularly advantageous when using such step unit panes.

[0011] Step unit panes are often mounted using new glazing techniques such as encasing the pane element by a reaction injection moulding (RIM) process in a thermoplastic or pultruded material adhering to the pane surface. As there is then no glazing profiles or the like for protecting the adherent against solar radiation a mask can be used for this purpose.

[0012] Herein the step unit panes are described has having two sheet elements, but it is to be understood that step unit panes with three or more sheet elements may also be employed.

[0013] A window according to the invention may in principle have any kind of frame suitable for mounting in a building, i.e. it may have only a stationary frame or the pane may be mounted in a moveable frame, i.e. a sash, attached to the stationary frame. Intermediate frames can also be envisaged. The frames may be made from wood, plastic or metal and the frame profiles may be hollow or massive. The pane may be attached to the frame by gluing, by adherence or by mechanical means. For the sake of clarity the frame have therefore been left out in the drawing and in the following it will only be discussed brief-

ly.

[0014] The pane will usually be composed of monolithic glass elements. In this context the term "monolithic glass" covers annealed glass, tempered glass, laminated glass, wired glass, figured or patterned glass as well as other types of glass that are used in conventional panes. Even if referred to as being made from glass, it is to be understood that Plexiglas (also known as Perspex) or any other sheet element, transparent or not, which is suited for the particular use of the window, may also be employed, including luminescent materials. The glass may have coatings on one or both sides.

[0015] The sheet elements of the pane are separated by spacer members or distance keepers, such as distance profiles, arranged continuously or intermittently along the entire peripheral border, thereby forming a cavity between the sheet elements. The cavity may be filled with dry air, gas such as Ar, Kr or Xe, or with gas mixtures suitable for improving the insulating properties of the pane by reducing its U value. A vacuum pane may also be used as may a pane with a layer of aerogel filling the space between the sheet elements. Panes comprising three or more sheet elements, such as for example three-sheet thermo panes, may also be used as may combinations of different types of panes such as a traditional thermo pane in combination with a single sheet pane. If using a pane type that can best be made in relatively small units, such as vacuum panes, a series of pane elements may be arranged side-by-side for the formation of a larger pane element of the desired size. This method may also be used for providing different areas of the pane with different properties such as colour, opacity, insulation etc.

[0016] The spacer members may be made from metal or plastic. A desiccant may be deposited in hollow distance profiles, embedded in a matrix or in a getter element in each of the cavities delimited by the glass sheets and distance profiles.

[0017] The sheet elements of the pane are normally plane and parallel to each other. They may, however, also be curved for use with a skylight of the curb type and the distance between them may vary, which may improve the sound insulating properties of the pane.

[0018] In an embodiment the pane is provided with a mask along its border. When applied on the exterior sheet of the pane, such a mask protects the sealing, which proofs the space between the two sheets of glass from solar radiation that may cause accelerated deterioration. This is particularly important when using thermo or vacuum panes. The mask may also function as a primer promoting adherence or friction between the pane and the frame thereby contributing to the attachment of the pane. A gasket arranged between the pane and the frame may also be protected from solar radiation by the provision of a mask on the interior sheet of the pane.

[0019] The terms "interior" and "exterior" refers to the orientation of the window when mounted in a building, the interior sheet facing the indoors of the building and

the exterior sheet facing the outdoors. This terminology will be applied throughout the description.

[0020] A mask may be arranged either on the outside surface of the sheet element or on the inside facing the space between the sheet elements. Which is preferred depends on the functionality of the mask. If for example the mask is to serve as a primer for improving adherence it should of course be disposed on the face of the sheet element facing the frame. Other masks are fragile and will be best protected if arranged on the inside of a sheet element, which may for example be desirable if serving a current conductor or antenna.

[0021] The masking is preferably made by printing and may be applied by a serigraphic technique, as a dual-component hot-setting lacquer or another lacquer for cold or hot use.

[0022] By serigraphic techniques the print is preferably applied to annealed glass. Once the print is dry, the glass is passed through a hardening furnace, which burns the print into the surface of the glass and tempers the glass.

[0023] Lacquers are applied to tempered or annealed glass. Normally, tempered glass is used, as solar radiation may cause large thermal strains in the glass, ultimately causing it to break if it is not tempered.

[0024] In some cases it will be sufficient to use a material that blocks light in the visual spectrum but in other case it may be advantageous that the mask also blocks out light in the ultraviolet (UV) or near infrared (NIR) spectrum.

[0025] Many types of masks are applied as a thin layer of material. Adhesive films and the like may be used for this purpose, but if the material is instead applied in liquid form it may be applied as a continuous layer or as discrete spots of material depending on the intended function of the mask.

[0026] The use of spots may give an increased frictional resistance thereby promoting the attachment of the frame. When attaching the pane by encasement in a moulded frame this increased frictional resistance allows the achievement of a satisfactory attachment based only on the adhesion of the frame material. The use of glue, which is particularly sensitive to solar radiation etc., is thus unnecessary. The increased frictional resistance and the advantages thereof may, however, also be achieved in other ways, e.g. by using a coarser masking material.

[0027] Materials capable of reflecting, absorbing or accumulating heat may be used for improving the performance of the window under different climatic conditions.

[0028] If disposed on the outside of the exterior sheet element the masking material should be of a quality making it resistant to wear caused by solar radiation, wetting, grinding effects caused by wind-born material, vegetation, animal activity etc. This may be achieved by using an enamel, which is a coating that is burned into the glass surface during the tempering thereof.

[0029] A masking may additionally add aesthetic functions to the pane unit. An example thereof is to give the

border of the pane an appearance, which creates a correlation between the pane element, distance profiles, flashings, coverings, claddings and the roofing material. The mask may for instance be of the same colour as the flashings, coverings and claddings used and gradually fade out with the distance from the edge, thereby blurring the joint between the pane and the frame. For this purpose the mask should preferably be applied on the exterior side of the pane to thereby also blur the difference in reflection between glass and metal.

[0030] In the following the invention will be described in closer detail by reference to the accompanying drawing, in which:

Fig. 1 shows a pane unit for use in a window and with a masking along the border of the pane,
 Fig. 2 shows a pane unit corresponding to that of Fig. 1 but with the addition of a patterned print,
 Fig. 3 shows a pane unit corresponding to that of Fig. 1 but with the addition of a photo-voltaic element,
 Fig. 4 shows a pane unit corresponding to that of Fig. 1 but with the addition of printed hot wires,
 Fig. 5 shows a pane unit corresponding to that of Fig. 1 but with the addition of printed antenna,
 Fig. 6 shows a pane unit corresponding to that of Fig. 1 but with the addition of an integrated sensor,
 Fig. 7 shows a pane unit corresponding to that of Fig. 1 but with the addition of a printed logo, and
 Fig. 8 shows examples of different configurations of step unit panes.

[0031] In Fig. 1, showing an embodiment not covered by the invention, the pane 1 is provided with a mask 2 along its border. When applied on the exterior sheet of the pane 1, such a mask 2 protects the sealing, which proofs the space between the two sheets of glass from solar radiation that may cause accelerated deterioration.

[0032] The masking may additionally add aesthetic functions to the pane unit 21. An example of this, which is not by the scope of the present invention, is shown in Fig. 2, where a mask 23 serving an aesthetic purpose is disposed adjacent to a protective mask 22 of the type described above.

[0033] The mask may also be used for separating parts of the pane serving different functional purposes. An example of this is shown in Fig. 3, where a masking strip 32 separates the upper part 31 from the lower part 33. The upper part may serve the common purpose of windows to transmit light to the interior of the building, whereas the lower part may be fitted with a photo-voltaic element supplying electricity to other functional elements, which may even be disposed of on other windows mounted in the same structure.

[0034] An example, which is not covered by the scope of the present invention, of such a functional element is shown in Fig. 4, where the protective border masking is supplemented by a series of hot wires 43. The purpose of these wires 43 are to heat the pane 41 to thereby min-

imize the formation of condensation, which often occurs on the exterior side of modern type panes 41 with particularly low U values. The energy needed for heating the wires 43 may be supplied from a conventional power source or from a solar cell, possibly arranged on a pane 41. The hot wires 43 themselves must of course be arranged on the visible part of the pane 41, but the connections to the supply line and possibly also the power source itself is arranged on the invisible part of the pane 41 as illustrated by the border mask 42.

[0035] The hot wires 43 are very thin and can only be seen when studying the pane closely. The serigraphic printing technique is particularly well suited for making such a thin masking.

[0036] Other examples of electrically conducting masks are shown in Figs. 5 and 6.

[0037] In Fig. 5, which is showing an embodiment not covered by the scope of the present invention, an antenna 53 is integrated in the pane 51 having a border mask 52, preferably on the inside of the exterior glass sheet to optimize the combination of protection and reception. Many kinds of antenna may be integrated in this way, e.g. for DAB radio, digital TV and mobile telephone.

[0038] In Fig. 6, which is showing an embodiment not covered by the scope of the present invention, a sensor 63 is integrated in the pane surface 61 having a border mask 62. It may register meteorological data such as rain, temperature, pressure, humidity, carbon dioxide levels, UV intensity, light intensity etc., which may be e.g. used for controlling ventilation, roller shutters and automatic opening/closing of windows etc.

[0039] A sensor on the exterior side of the pane may be combined with a display (not shown) on the interior side communicating output data to persons in the building. As for the hot wires mentioned above, the display and/or sensor may be arranged on the visible part of the pane, while connections, power supply etc. is on the invisible part. If both the sensor and the display are arranged on the visible part of the pane they should preferably be arranged one on each side of the pane opposite each other to thereby minimize the area covered.

[0040] Fig. 7, which is showing an embodiment not covered by the scope of the present invention, shows a different kind of functional element, namely the provision of a logo 73 on the exterior side of the window, where the pane 71 of the window has a border mask 72. Other figural objects such as decorations, adverts, name signs, directional information or the like may also be applied. In the embodiments shown, an opaque or coloured masking is applied underneath to hide spacer members, gaskets and the like, which might otherwise blur the image.

[0041] Antennas, sensor, displays and other functional elements may be arranged in different location on the pane, with or without contact with each other, and may have different sizes and shapes than the ones shown. Similarly the different functional elements described herein may be combined both with each other and with other elements not explicitly described herein.

[0042] Depending on the design of the frame and the method of mounting it may be advantageous to use panes of the step unit type, where the exterior sheet elements of the pane project over the spacer members. The functional elements will then be disposed on the projecting part of the exterior sheet element. As an example, the pane shown in Fig. 3 may be mounted with the lower part 33 projecting over the frame of the window, the interior sheet element and the frame corresponding in size and shape to the upper part of the pane.

[0043] Fig. 8 shows a series of examples of two-sheet step unit panes, where the two sheet elements are displaced in relation to each other in different ways, only Fig. 8D being covered by the scope of the present invention. In Fig. 8A one of the two rectangular sheet elements of the pane projects over the other on all four sides, whereas the larger sheet element of Figs. 8B and 8C only projects on two parallel sides. The type in Fig. 8D may be used for the pane shown in Fig. 3 as explained above.

[0044] Step unit panes are often attached to the frame by gluing. As most glues are light sensitive, it is then advantageous that the pane is provided with a light proof peripheral mask as the one shown on all of the embodiments of Figs. 1 to 7. It is, however, to be understood, that step unit panes may also be attached by being encased in a moulded frame in which case the peripheral mask may be superfluous.

[0045] In the above, the pane module has been described as either constituting a sash in itself or as constituting an element to be coupled to a further element to constitute a sash, in the sense that the sash is openable. The sash could also be fixed, i.e. not openable in the traditional sense but connected to a traditional frame. Furthermore, it would be possible to integrate the sash and the frame into a single element, or to form the sash as a traditional window frame for connection to the roof structure. All of these interpretations could be applied to the term "frame" within the context of the present application.

[0046] Furthermore, it is conceivable to make use of other configurations of the pane element. For instance, there may be more than two sheets of glass, and the sheets need not to be plane and/or parallel with each other.

Claims

1. A window for a building comprising a frame and a pane (1) mounted thereon, which pane (1) comprises at least two sheet elements, such as sheets of glass, separated by one or more spacer members, where a part of the pane (1) projects over the frame, making it invisible from the interior in the mounted state, where one sheet element has a larger width or height than the other(s), an edge of the larger sheet element projecting over the spacer member(s), and where at

least one sheet element is provided with a functional mask (2) on a surface thereof, the mask (2) being provided on the invisible part(s) of the pane (1), **characterized in that** the larger sheet element projects over the other(s) only at one side, that a further mask (2) is provided on a surface of the pane, that at least one of the masks (2) surrounds a photo-voltaic element (33), arranged on the pane (1), and that the two or more different masks (2) are provided at different locations on the pane (1).

2. A window according to claim 1, **characterized in that** a mask (2) covers the border of the sheet element.
3. A window according to any of the preceding claims, **characterized in that** a mask (2) is light-proof, particularly blocking UV light with wavelengths in the interval between 250 and 400 nanometres.
4. A window according to any of the preceding claims, **characterized in that** a mask (2) is patterned and/or coloured.
5. A window according to claim 4, **characterized in that** a mask (2) is in the form of letters, numbers and/or figures.
6. A window according to any of the preceding claims, **characterized in that** a mask (2) is applied by printing.
7. A window according to any of the preceding claims, **characterized in that** a mask (2) is made from a current-carrying material, such as a lacquer.
8. A window according to claim 7, **characterized in that** a mask (2) forms hot wires (43), antennas (53) or the like on the pane (1) surface.
9. A window according to any of the preceding claims, **characterized in that** two or more different masks (2) are provided on top of each other.
10. A window according to any of the preceding claims, **characterized in that** a mask (2) is provided on the border of the sheet element projecting over the spacer member(s).
11. A window according to any of the preceding claims, **characterized in that** the two sheet elements have different shapes.

Patentansprüche

1. Fenster für ein Gebäude mit einem Rahmen und ei-

- ner Fensterscheibe (1), die daran angebracht ist, wobei die Fensterscheibe (1) wenigstens zwei Scheibenelemente aufweist, wie beispielsweise Scheiben aus Glas, die durch ein oder mehr Abstandselemente getrennt sind, wobei ein Teil der Fensterscheibe (1) über den Rahmen vorsteht, was ihn in dem montierten Zustand unsichtbar aus dem Inneren macht, wobei ein Scheibenelement eine größere Breite oder Höhe als das/die andere(n) hat, wobei eine Kante des größeren Scheibenelements über das/die Abstandselement(e) vorsteht und wobei wenigstens ein Scheibenelement mit einer funktionellen Maske (2) an einer Oberfläche davon versehen ist, wobei die Maske (2) auf dem/den unsichtbaren Teil(en) der Fensterscheibe (1) vorgesehen ist, **dadurch gekennzeichnet, dass** das größere Scheibenelement über das/die andere(n) nur an einer Seite vorsteht, dass eine weitere Maske (2) auf einer Oberfläche der Fensterscheibe vorgesehen ist, dass wenigstens eine der Masken (2) ein Photovoltaikelement (33) umgibt, das auf der Fensterscheibe (1) angeordnet ist, und dass die zwei oder mehr unterschiedlichen Masken (2) an unterschiedlichen Orten auf der Fensterscheibe (1) vorgesehen sind.
2. Fenster gemäß Anspruch 1, **dadurch gekennzeichnet, dass** eine Maske (2) den Rand des Scheibenelements abdeckt.
3. Fenster gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** eine Maske (2) lichtdicht ist, wobei sie insbesondere UV-Licht mit Wellenlängen in dem Intervall zwischen 250 und 400 Nanometer blockiert.
4. Fenster gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** eine Maske (2) ein Muster hat und/oder gefärbt ist.
5. Fenster gemäß Anspruch 4, **dadurch gekennzeichnet, dass** eine Maske (2) in der Form von Buchstaben, Nummern und/oder Figuren ist.
6. Fenster gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** eine Maske (2) durch Drucken aufgebracht ist.
7. Fenster gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** eine Maske (2) aus einem stromleitenden Material hergestellt ist, wie beispielsweise einem Lack.
8. Fenster gemäß Anspruch 7, **dadurch gekennzeichnet, dass** eine Maske (2) Heizdrähte (43), Antennen (53) oder dergleichen auf der Fensterscheibenoberfläche (1) bildet.
9. Fenster gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** zwei oder mehr unterschiedliche Masken (2) übereinander vorgesehen sind.
10. Fenster gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** eine Maske (2) an dem Rand des Scheibenelements, das über das/die Abstandselement(e) vorsteht, vorgesehen ist.
11. Fenster gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die zwei Scheibenelemente unterschiedliche Formen haben.
- ## 15 Revendications
1. Fenêtre pour un bâtiment comprenant un cadre et une vitre (1) montés dessus, laquelle vitre (1) comprend au moins deux éléments en feuille, tels que des feuilles de verre, séparés par un ou plusieurs organes espaceurs, où une partie de la vitre (1) dépasse au-dessus du cadre, la rendant invisible depuis l'intérieur à l'état monté, où un élément en feuille a une plus grande largeur ou hauteur que l'autre ou les autres, un bord du plus grand élément en feuille dépassant par-dessus l'organe ou les organes espaceurs et où au moins un élément en feuille est pourvu d'un masque fonctionnel (2) sur une surface de celui-ci, le masque (2) étant ménagé sur la ou les parties invisibles de la vitre (1), **caractérisée en ce que** le plus grand élément en feuille dépasse par-dessus l'autre ou les autres uniquement en un côté, **en ce qu'**un masque supplémentaire (2) est ménagé sur une surface de la vitre, **en ce qu'**au moins l'un des masques (2) entoure un élément photovoltaïque (33) agencé sur la vitre (1), et **en ce que** les deux masques différents ou plus (2) sont ménagés à des emplacements différents sur la vitre (1).
2. Fenêtre selon la revendication 1, **caractérisée en ce qu'**un masque (2) couvre la bordure de l'élément en feuille.
3. Fenêtre selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**un masque (2) est résistant à la lumière, bloquant en particulier la lumière UV avec des longueurs d'onde dans l'intervalle compris entre 250 et 400 nanomètres.
4. Fenêtre selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**un masque (2) est modelé et/ou coloré.
5. Fenêtre selon la revendication 4, **caractérisée en ce qu'**un masque (2) se présente sous la forme de lettres, de nombre et/ou de figures.
6. Fenêtre selon l'une quelconque des revendications

précédentes, **caractérisée en ce qu'un** masque (2) est appliqué par impression.

7. Fenêtre selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'un** masque (2) est constitué d'un matériau porteur de courant, tel qu'une laque. 5
8. Fenêtre selon la revendication 7, **caractérisée en ce qu'un** masque (2) forme des fils chauds (43), des antennes (53) ou similaires sur la surface de la vitre (1). 10
9. Fenêtre selon l'une quelconque des revendications précédentes, **caractérisée en ce que** deux masques différents ou plus (2) sont ménagés au-dessus les uns des autres. 15
10. Fenêtre selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'un** masque (2) est ménagé sur la bordure de l'élément en feuille dépassant par-dessus l'organe ou les organes espaceurs. 20
11. Fenêtre selon l'une quelconque des revendications précédentes, **caractérisée en ce que** les deux éléments en feuille ont des formes différentes. 25

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Fig. 1

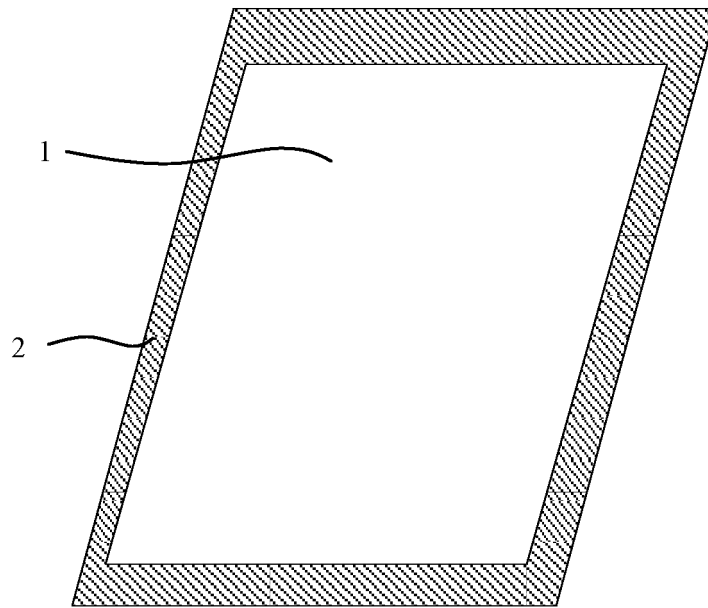


Fig. 2

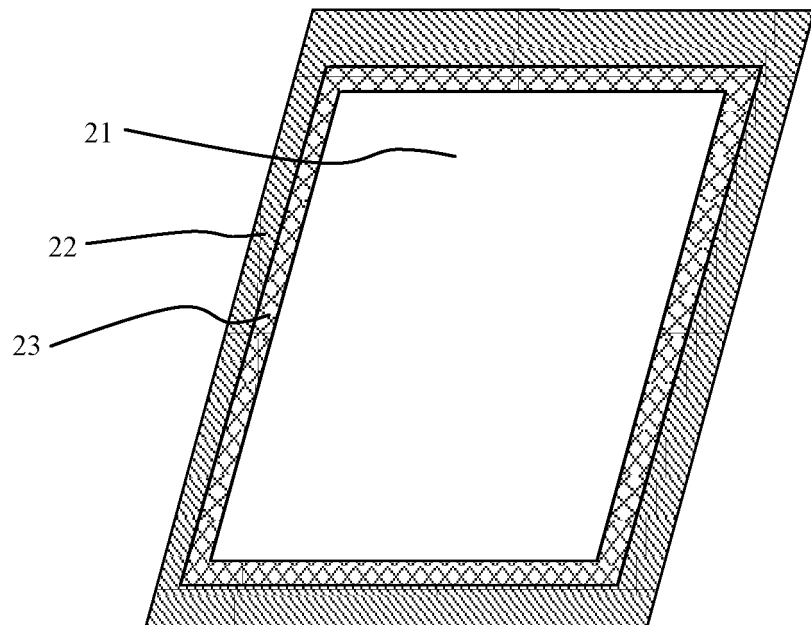


Fig. 3

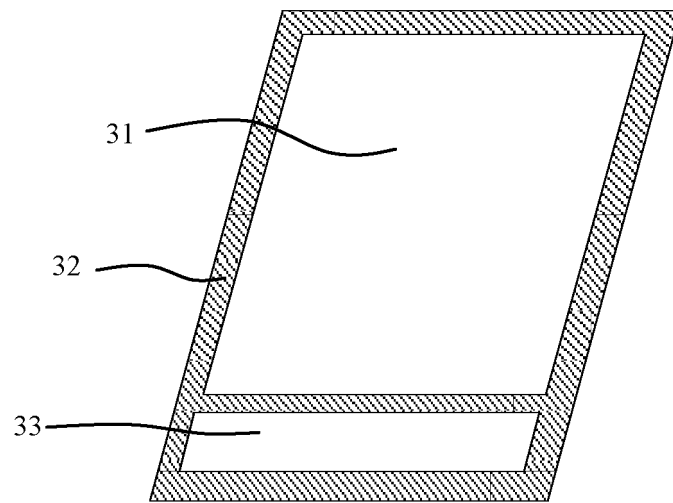


Fig. 4

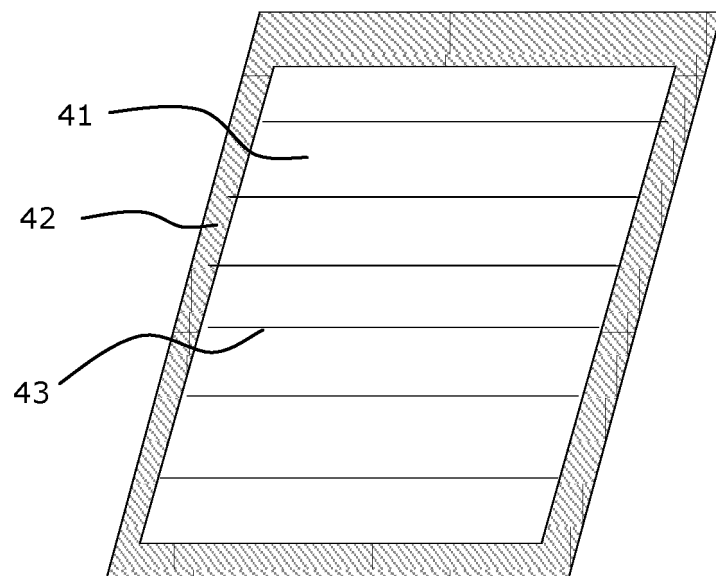


Fig. 5

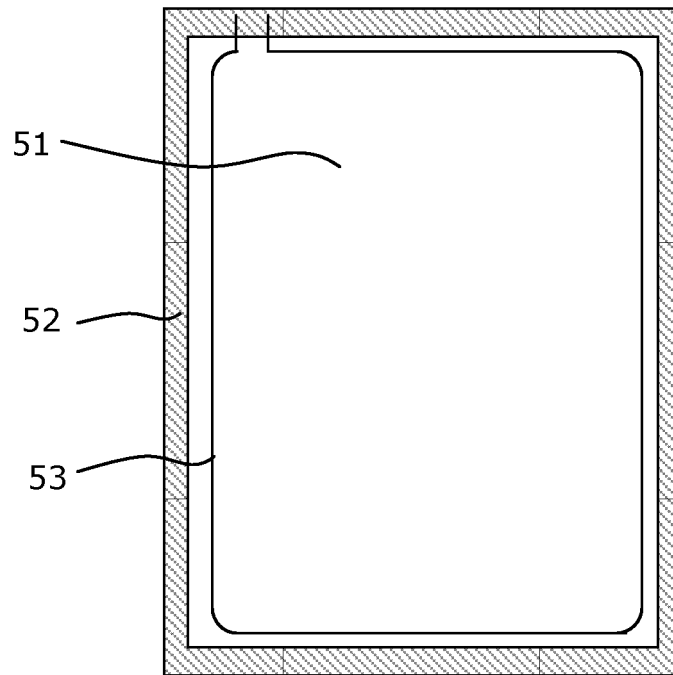


Fig. 6

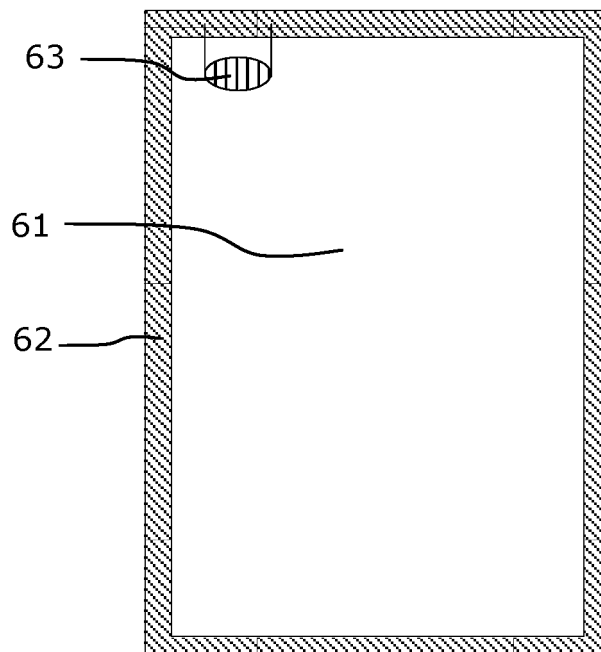


Fig. 7

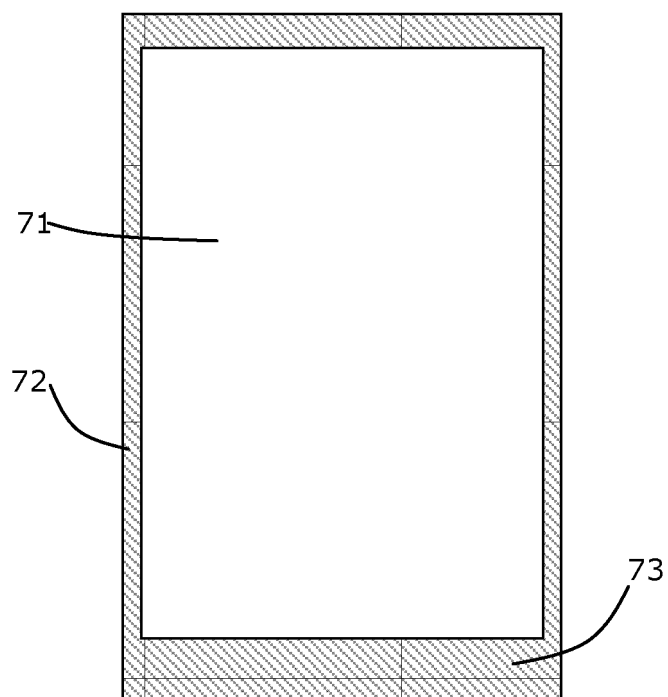
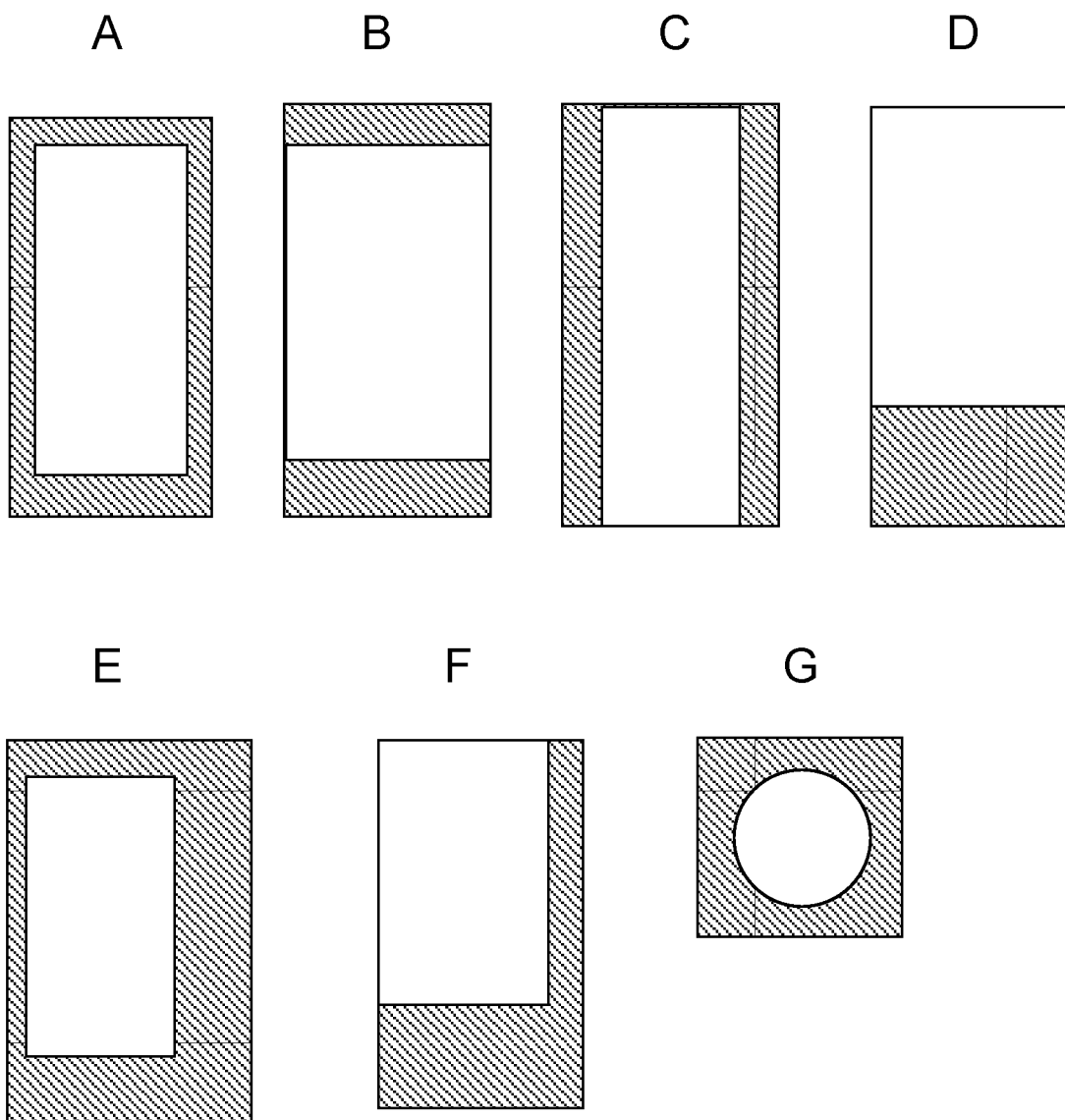


Fig. 8



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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