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(54) PANEL UNIT FOR SUSPENDED CEILING

(57) The present invention relates to a panel unit for a suspended ceiling. The panel unit comprises: a first and second panel member, each of the first and a second panel member being provided with a respective at least one connector, each connector comprising a shaft with a first end and an opposing second end, and a head portion arranged at the first end, wherein the second end is fixed to the respective panel member such that the shaft extends from a surface of the panel member with the head portion arranged at a distance from the surface; and a connecting element for suspension of the panel unit and for angled connection of the first and second panel member to each other, the connecting element comprising a first and a second leg connected to each other in an angled relationship for forming a V-shaped structure, the connecting element being configured such that the first and second leg extend obliquely upwards in a suspended state of the panel unit; wherein each of the first and second leg is provided with a groove extending in a leg direction associated with the respective first and second leg, and wherein each groove is configured to receive a respective connector such that the head portion engages an upwardly facing surface of the leg in the suspended state of the panel unit.

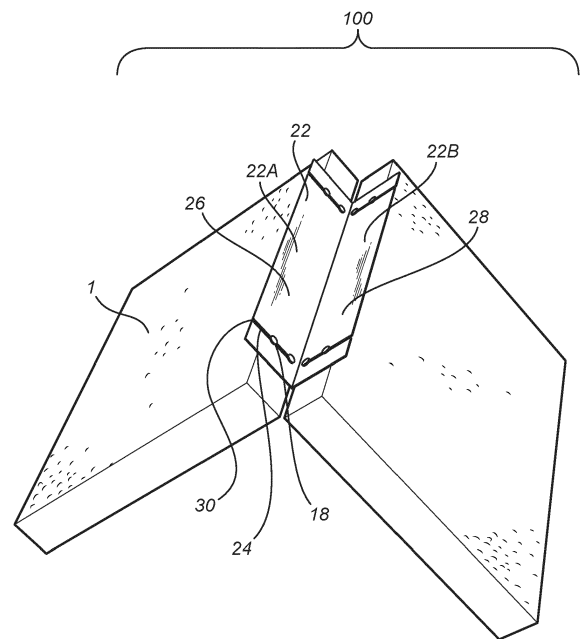


Fig. 3

Description

Technical field of the invention

[0001] The present invention relates to the field of acoustic ceiling elements for suspended ceilings, in particular such elements suitable for use as free hanging elements.

Background of the invention

[0002] In order to improve the acoustical environment of a room, a suspended ceiling may be used. A suspended ceiling often comprises a plurality of panel units. Traditionally, the suspended ceiling is arranged below the structural ceiling and covering the full surface area of the structural ceiling. Hereby, a space is created between the suspended ceiling and the roof, in which space e.g. piping and electrical wiring may be arranged.

[0003] A suspended ceiling may also be provided in a so-called free hanging form. Such an arrangement comprises a plurality of, often disjoint, free hanging planar panel units. This arrangement is mostly used in large rooms with a high ceiling height, such as study halls. Hereby, the acoustical absorption of the room may be improved in an aesthetically pleasing way.

[0004] However, in order to improve the acoustical properties and/or the visual appearance of the suspended ceiling, non-planar panel units are desired.

Summary of the invention

[0005] In view of the above, an object of the present invention is to provide a panel unit for a suspended ceiling having a non-planar shape.

[0006] Any benefit or technical effect discussed in relation any aspect of the present invention, and any embodiments thereof, may be applicable to any other aspect of the present invention.

[0007] According to a first aspect of the present invention, a panel unit for a suspended ceiling is provided, the panel unit comprising: a first and second panel member, each of the first and a second panel member being provided with a respective at least one connector, each connector comprising a shaft with a first end and an opposing second end, and a head portion arranged at the first end, wherein the second end is fixed to the respective panel member such that the shaft extends from a surface of the panel member with the head portion arranged at a distance from the surface; and a connecting element for suspension of the panel unit and for angled connection of the first and second panel member to each other, the connecting element comprising a first and a second leg connected to each other in an angled relationship for forming a V-shaped structure, the connecting element being configured such that the first and second leg extend obliquely upwards in a suspended state of the panel unit; wherein each of the first and second leg is provided with

a groove extending in a leg direction associated with the respective first and second leg, and wherein each groove is configured to receive a respective connector such that the head portion engages an upwardly facing surface of the leg in the suspended state of the panel unit.

[0008] Hereby, a non-planar, V-shaped panel unit is provided. Since planar panel members are easier, and therefore more cost-efficient and time-efficient, to manufacture than non-planar panel members, a panel unit which is more cost-efficient and time-efficient to manufacture is provided.

[0009] Further, due to the interaction between the connectors of the panel members and the grooves of the connecting element, a panel unit which is easy to assemble is provided.

[0010] Furthermore, due to the orientation of the grooves in the suspended state of the panel unit, a gravitationally assisted connection between the connecting element and the panel members is achieved. Hereby, the panel members are easy to secure in the suspended state.

[0011] A panel member may have any shape. Preferably, each panel element is rectangular comprising a first and second main surface and four side surfaces. Thus, in the suspended state, the first main surface may be the upwardly facing surface, whereas the second main surface may be a downwardly facing surface.

[0012] A panel member may be made of any suitable lightweight material. Preferably, the panel members are made of mineral wool.

[0013] The connecting element may e.g. be made of metal, wood, or a hard plastic material.

[0014] The connectors may e.g. be made of metal, wood, or a hard plastic material. For example, each connector may be made of the same material as the respective panel member. Moreover, the connectors and the panel members may be provided as a coherent unit.

[0015] Each panel member may be provided with a plurality of connectors. For example, each panel unit may be provided with two respective connectors.

[0016] In at least some exemplary embodiments, each of the first and second panel member may be provided with two respective connectors, and wherein each groove of the first and second leg may be configured to receive the two respective connectors of a respective panel member. Alternatively, each of the first and second panel member may be provided with two respective connectors, and each of the first and second leg may be provided with two respective grooves, and wherein each groove of the first and second leg may be configured to receive a respective connector.

[0017] Hereby, the connection between each panel member and the connecting element is not only stronger, but each panel member is also more rotationally secured.

[0018] In at least some exemplary embodiments, each groove may be tapered in the leg direction associated with the respective first and second leg.

[0019] Hereby, each groove wedgingly engages the

respective shaft of the respective at least one connector, such that each panel member is more fixedly attached to the connecting unit.

[0020] In at least some exemplary embodiments, each groove may be provided with an inlet accessible from an edge surface of the first leg or the second leg such that each groove may be configured to receive a respective connector in a direction along the leg direction of the respective first leg or second leg.

[0021] Thus, each groove may be open-ended. Hereby, simple assembly of the panel unit is provided for.

[0022] In at least some exemplary embodiments, each groove may be provided with an inlet accessible from a side surface of the first leg or the second leg such that each groove is configured to receive a respective connector in a direction transverse to the leg direction of the respective first leg or second leg.

[0023] The inlet may e.g. be provided as a widening of the groove. To this end, each groove may for example be substantially keyhole shaped.

[0024] In at least some exemplary embodiments, for each groove of the first leg, a proportion of a length of the groove to a length of the first leg may be greater than a proportion of a length of each groove of the second leg to a length of the second leg.

[0025] Hereby, in the suspended state, a first panel member may e.g. be arranged at a position lower than the second panel member. In the suspended state, a side surface of the second panel member may thus be arranged against a portion of a main surface of the first panel member.

[0026] The first and the second leg of the connecting element may be of the same length. Alternatively, the first and the second leg of the connecting element may be of different lengths. For example, a length of the first leg in the associated leg direction may be greater than a length of the second leg in the associated leg direction.

[0027] The length of each groove of the first leg may be the same as the length of each groove the second leg. Alternatively, a length of each groove of the first leg may be greater than a length of each groove of the second leg.

Brief description of the drawings

[0028] These and other embodiments of the present invention will now be described in more detail, with reference to the appended drawings showing exemplary embodiments of the present invention, wherein:

Fig. 1 is a schematic perspective view of a panel member comprised in a panel unit according to the first aspect of the present invention, wherein the panel member is provided with two connectors arranged on a side surface thereof.

Fig. 2 is a schematic perspective view of a connecting element for suspension of a panel unit according to the first aspect of the present invention.

Fig. 3 is a schematic perspective view of a panel unit according to the first aspect of the present invention, comprising two panel members as shown in Fig. 1 and a connecting element as shown in Fig. 2.

Fig. 4A is a schematic side view of the assembling of the panel unit in Fig. 3.

Fig. 4B is a schematic side view of the panel unit in Fig. 4A when in a suspended state.

Fig. 5A is a schematic side view of the assembling a panel unit according to the first aspect of the present invention, wherein the panel members are provided with a respective at least one connector arranged on a respective main surface thereof.

Fig. 5B is a schematic side view of the panel unit in Fig. 5A when in a suspended state.

Fig. 6 is a schematic side view of a panel unit according to the first aspect of the present invention wherein, in the suspended state, a side surface of one panel member is arranged against a portion of a main surface of the other panel member.

Detailed description of the drawings

[0029] In the following detailed description, some embodiments of the present invention will be described. However, it is to be understood that features of the different embodiments are exchangeable between the embodiments and may be combined in different ways, unless anything is specifically indicated. Even though in the following description, numerous details are set forth to provide a more thorough understanding of the present invention, it will be apparent to one skilled in the art that the present invention may be practiced without these details. In other instances, well known constructions or functions are not described in detail, so as not to obscure the present invention.

[0030] In Fig. 1, Fig. 2 and Fig. 3, a panel member 1, a connecting element 22 and a panel unit 100 assembled from two panel members 1 and a connecting element 22 are shown, respectively. In Fig. 1, the panel member 1 is provided as a rectangular panel comprising a first main side surface 2, a second main side surface 4, a first side surface 6, a second side surface 8, a third side surface 10 and a fourth side surface 12. However, it is to be understood that the panel member 1 may have any suitable shape. For example, the panel member 1 may be shaped as a half-disc or a polygon. The panel member 1 may be made of any suitable lightweight material. Preferably, the panel member 1 is made of mineral wool, or a combination of mineral wool and further material, such as further mineral fiber material.. Furthermore, the panel member 1 may be provided with a surface finish in the form of an exterior surface material, such as a non-woven or fabric facing. To this end, one or more main side surface and/or one or more side surface of the panel member 1 may be provided as an exterior surface material. Furthermore, the panel member 1 may comprise reinforcing material for improving the mechanical properties of the panel

member 1. For example, the panel member 1 may be provided with at least one reinforcement member of a metal material.

[0031] The panel member 1 is further provided with a connector 14. In Fig. 1, the connector 14 is further displayed independently and in greater detail. The connector 14 comprises a shaft 16 with a first end 16A and an opposing second end 16B. The connector 14 further comprises a head portion 18 arranged at the first end 16A, wherein the second end 16B is fixed to the panel member 1 such that the shaft 16 extends from a surface of the panel member 1 with the head portion 18 arranged at a distance from the surface. Here, the connector 14 is fixed to and extends from the second side surface 8 of the panel member 1. The connector 14 may be fixed to the panel member 1 in a variety of ways. For example, the connector 14 may be readily inserted into the panel member 1 such that the shaft 16 is at least partially embedded in the panel member 1.

[0032] Further, in Fig. 1, the panel member 1 is provided with four connectors 14 arranged in pairs. Here, each pair of connectors 14 is arranged on a respective disk 20 such that they may be fixed to the panel member 1 in a leveled way. Here, the connectors 14 are fixed to the panel member 1 via the respective disk 20. To this end, each disk 20 may e.g. be provided with an anchoring portion, such as a screw or spiral. Alternatively, each disk 20 may be provided with one or more through-holes for receiving a screw, spiral, nail, or other fastening element.

[0033] The connectors 14 and the disks 20 may e.g. be made of metal, wood, or a hard plastic material. For example, each connector 14 may be made of the same material as the respective panel member 1. Moreover, the connectors 14 and the panel members 1 may alternatively be provided as a coherent unit.

[0034] In Fig. 2, a connecting element 22 for suspension of the panel unit and for angled connection of a first and a second panel member 1 to each other is shown.

[0035] The connecting element 22 may e.g. be made of metal, wood, or a hard plastic material. The connecting element 22 comprises a first and a second leg 22A, 22B connected to each other in an angled relationship for forming a V-shaped structure. The connecting element 22 is configured such that the first and second leg 22A, 22B extend obliquely upwards in a suspended state of the panel unit 100. The angle between the first leg 22A and the second leg 22B may be any angle between 180° and 0°. For example, the angle may be 30°, or 40°, or 50°, or 60°, or 70°, or 80°, or 90°, or 100°, or 110°, or 120°, or 130°.

[0036] Furthermore, each of the first and second leg 22A, 22B is provided with a groove 24. Here, each of the first and second leg 22A, 22B is provided with two grooves 24 each. Each groove 24 is extending in a leg direction associated with the respective first and second leg 22A, 22B. Thus, each groove 24 extend obliquely upwards in a suspended state of the panel unit 100. Furthermore, each groove 24 is configured to receive a re-

spective connector 14 of a panel member 1 such that the head portion 18 of the connector 14 engages an upwardly facing surface 26, 28 of the respective leg 22A, 22B in the suspended state of the panel unit 100.

[0037] Although not shown in Fig. 2, each groove 24 may be tapered in the leg direction associated with the respective first and second leg 22A, 22B, such that each groove 24 is configured to wedgingly engage the respective shaft 16 of a respective connector 14.

[0038] Here, each groove 24 is provided with an inlet 30 accessible from an edge surface 32 of the first leg 22A or the second leg 22B such that each groove 24 is configured to receive a respective connector 14 in a direction along the leg direction of the respective first leg 22A or second leg 22B. Thus, each groove 24 is open-ended. Alternatively, each groove 24 may be provided with an inlet accessible from a side surface 34, 36 of the first leg 22A or the second leg 22B. In Fig. 2, the side surface 34 of the first leg 22A is arranged on an opposite side of the connecting unit 22 as the upward facing surface 26, and the side surface 36 of the second leg 22A is arranged on an opposite side of the connecting unit 22 as the upward facing surface 28. Hereby, each groove 24 is configured to receive a respective connector 14 in a direction transverse to the leg direction of the respective first leg 22A or second leg 22B. Such an inlet may e.g. be provided as a widening of the groove 24. To this end, each groove 24 may for example be substantially keyhole shaped.

[0039] The length of the first leg 22A is in Fig. 2 the same as the second leg 22B. Alternatively, the first and the second leg 22A, 22B may be of different lengths. For example, a length of the first leg 22A in the associated leg direction may be greater than a length of the second leg 22B in the associated leg direction. Moreover, the length of each groove 24 of the first leg 22A is in Fig. 2 the same as the length of each groove 24 of the second leg 22B. Alternatively, a length of each groove 24 of the first leg 22A may be greater than a length of each groove 24 of the second leg 22B. Moreover, the length of any one groove 24 may differ from the length of any other groove 24.

[0040] In Fig. 3, a panel unit 100 comprising two panel members 1 and a connecting element 22. Here, the panel unit 100 is in a suspended state wherein each head portion 18 of each respective connector 14 engages an upwardly facing surface 26, 28 of a respective leg 22A, 22B. Here, as well as in Fig. 1, the connectors 14 are arranged in pairs oriented such that both connectors 14 of a pair of connectors 14 is arranged in the same groove 24. However, the pair of connectors 14 may alternatively be oriented such that the connectors 14 of a pair of connectors 14 are arranged in different grooves 24.

[0041] Furthermore, due to the orientation of the grooves 24 in the suspended state of the panel unit 100, a gravitationally assisted connection between the connecting element 22 and the panel members 1 is achieved.

[0042] In Figs. 1, 2 and 3, each connector 14 is pro-

vided on a respective side surface 6, 8, 10, 12 of the respective panel member 1. This arrangement is further illustrated from a side view in Fig. 4A and Fig. 4B. In Fig. 4A, assembly of the panel unit 100 by insertion of the connectors 14 in the grooves 24 of the connecting element 22 is illustrated. The direction of insertion is indicated by the arrows. Furthermore, the connecting element 22 is here provided with a suspension unit 32 for suspending the panel unit 100 to a structural ceiling, roof, beam, etc. In Fig. 4B, the assembled panel unit 100 is shown.

[0043] The at least one connector 14 may alternatively be provided on any other surface of the respective panel member 1. For example, the at least one connector 14 may be provided on a respective main surface of the panel members 1. This is illustrated in Fig. 5A and Fig. 5B. This way, an alternative arrangement of the panel members 1 in the panel unit 100 is provided. Hereby, by varying the placement of the connectors 14, different shapes of the panel unit 100, e.g. corresponding to different demands on acoustical properties and/or visual appearance may be provided.

[0044] The at least one connector 14 of a first panel member 1 may further be arranged at a relative positive different than the at least one connector 14 of a second panel member 1. An exemplary embodiment of this is illustrated in Fig. 6, wherein the connectors 14 of a first panel member 1 is arranged closer to a lower side surface 8 of said panel member 1 compared to the connectors 14 of the second panel member 1. Hereby, the second panel member 1 is arranged at a position lower than the first panel member 1, such that a side surface 8 of the first panel member is arranged against a portion of a main surface 2 of the second panel member 1.

[0045] It is to be understood that this may also be achieved by, or in conjunction with, the respective grooves 24 of the respective leg 22A, 22B having different lengths. For example, by, for each groove 24 of the first leg 22A, a proportion of a length of the groove 24 to a length of the first leg 22A being greater than a proportion of a length of each groove 24 of the second leg 22B to a length of the second leg 22B.

Claims

1. Panel unit for a suspended ceiling, the panel unit comprising:

a first and second panel member, each of the first and a second panel member being provided with a respective at least one connector, each connector comprising a shaft with a first end and an opposing second end, and a head portion arranged at the first end, wherein the second end is fixed to the respective panel member such that the shaft extends from a surface of the panel member with the head portion arranged at a dis-

tance from the surface; and

a connecting element for suspension of the panel unit and for angled connection of the first and second panel member to each other, the connecting element comprising a first and a second leg connected to each other in an angled relationship for forming a V-shaped structure, the connecting element being configured such that the first and second leg extend obliquely upwards in a suspended state of the panel unit; wherein each of the first and second leg is provided with a groove extending in a leg direction associated with the respective first and second leg, and wherein each groove is configured to receive a respective connector such that the head portion engages an upwardly facing surface of the leg in the suspended state of the panel unit.

2. The panel unit according to claim 1, wherein each of the first and second panel member is provided with two respective connectors, and wherein each groove of the first and second leg is configured to receive the two respective connectors of a respective panel member.
3. The panel unit according to claim 1, wherein each of the first and second panel member is provided with two respective connectors, wherein each of the first and second leg is provided with two respective grooves, and wherein each groove of the first and second leg is configured to receive a respective connector.
4. The panel unit according to any preceding claim, wherein each groove is tapered in the leg direction associated with the respective first and second leg.
5. The panel unit according to any preceding claim, wherein each groove is provided with an inlet accessible from an edge surface of the first leg or the second leg such that each groove is configured to receive a respective connector in a direction along the leg direction of the respective first leg or second leg.
6. The panel unit according to any one of claims 1-4, wherein each groove is provided with an inlet accessible from a side surface of the first leg or the second leg such that each groove is configured to receive a respective connector in a direction transverse to the leg direction of the respective first leg or second leg.
7. The panel unit according to any preceding claim, wherein a length of the first leg in the associated leg direction is greater than a length of the second leg in the associated leg direction.
8. The panel unit according to any preceding claim,

wherein a length of each groove of the first leg is greater than a length of each groove of the second leg.

9. The panel unit according to any preceding claim, wherein for each groove of the first leg, a proportion of a length of the groove to a length of the first leg is greater than a proportion of a length of each groove of the second leg to a length of the second leg.

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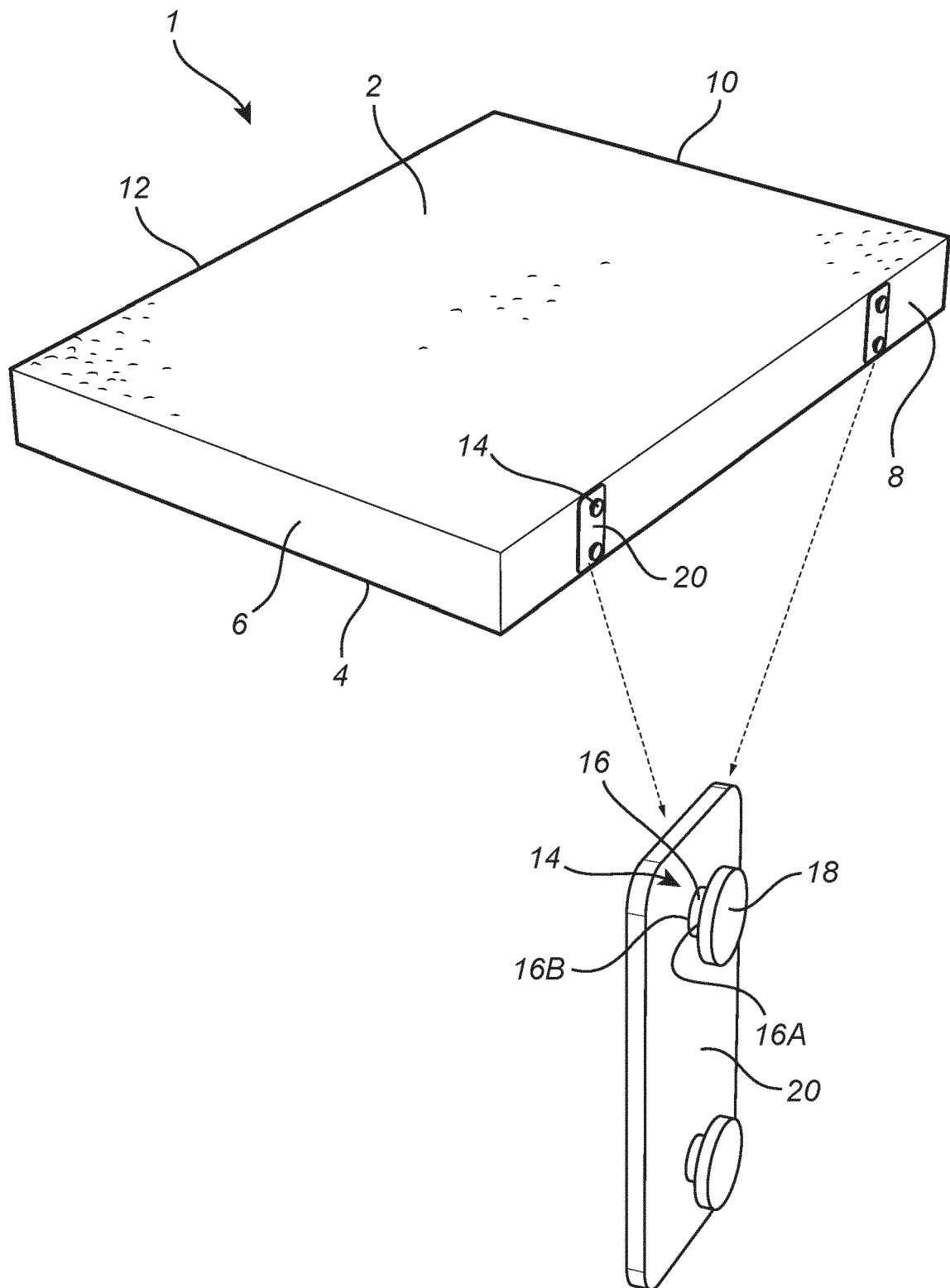
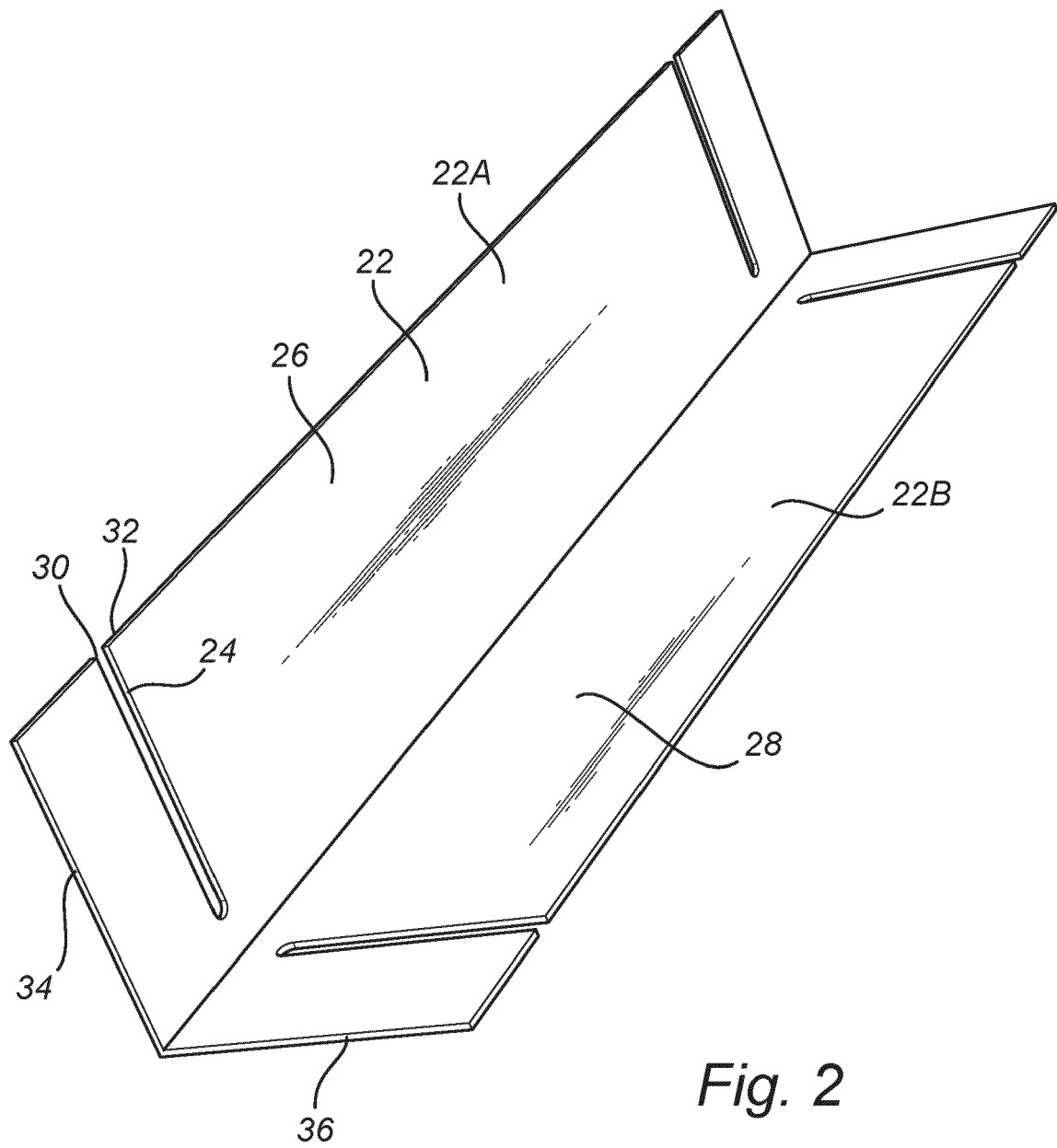


Fig. 1



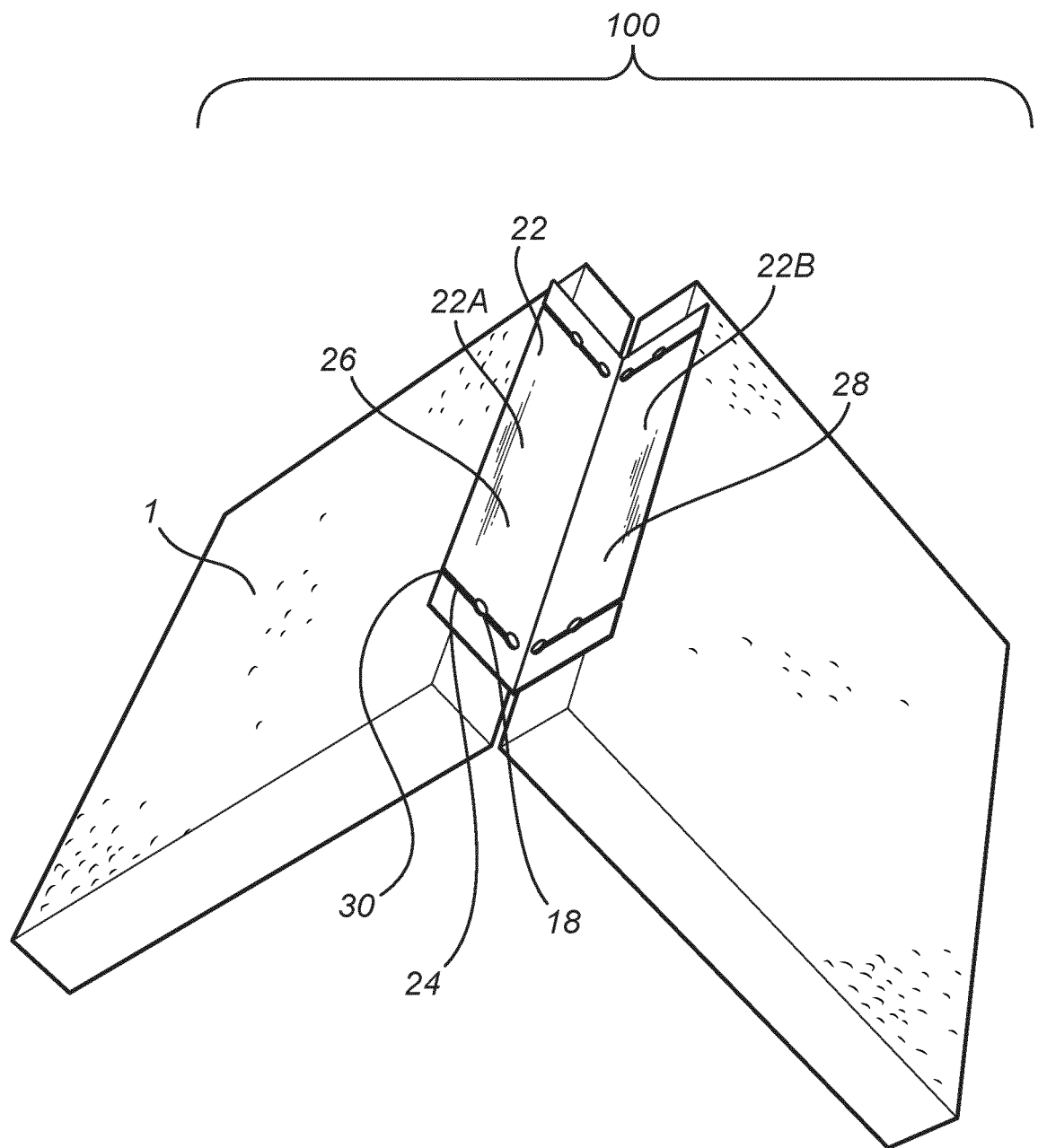


Fig. 3

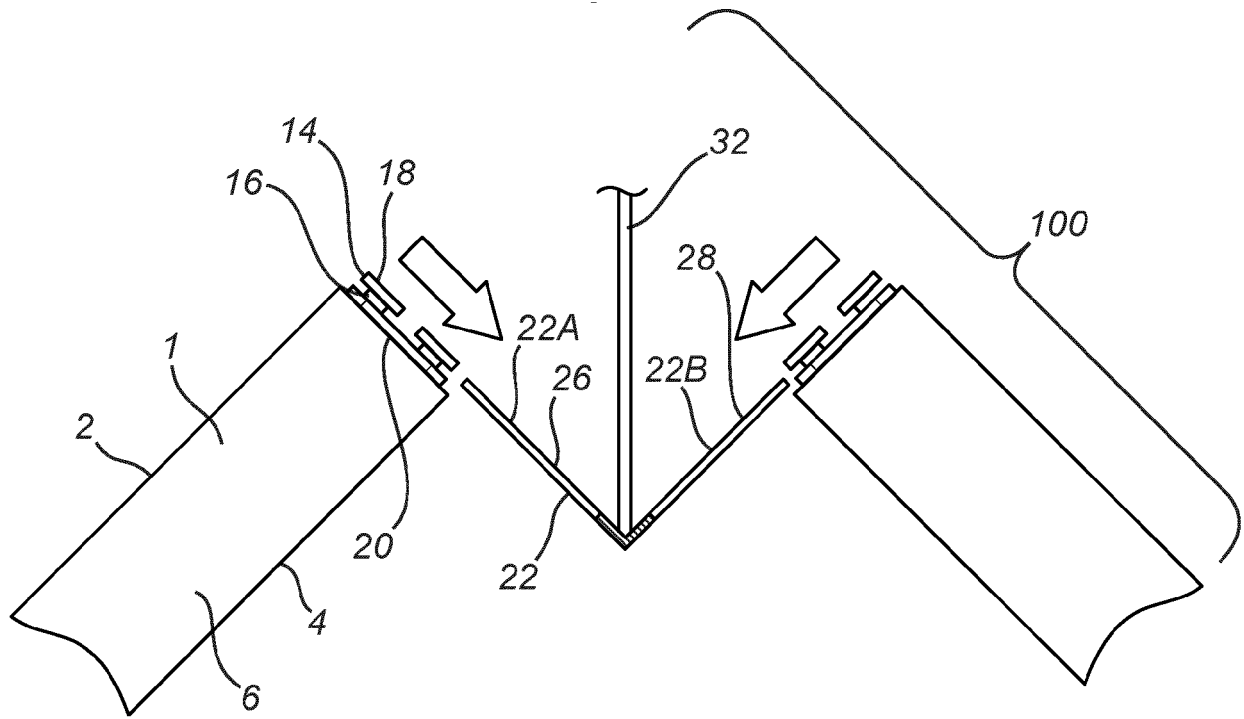


Fig. 4A

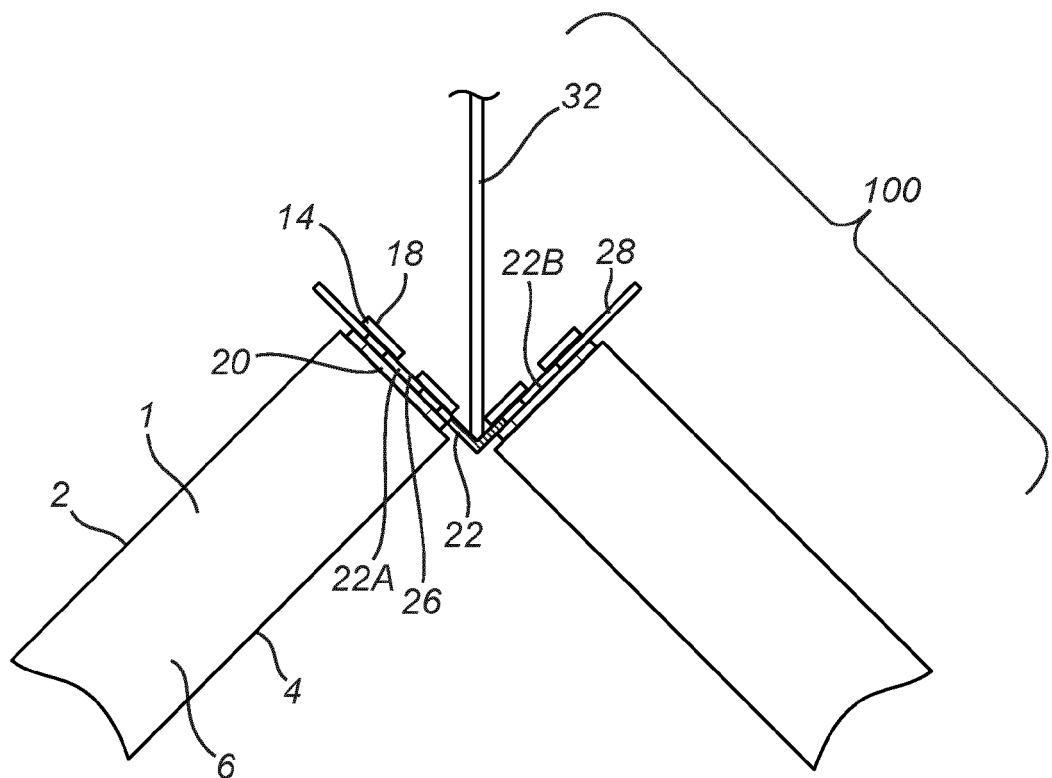


Fig. 4B

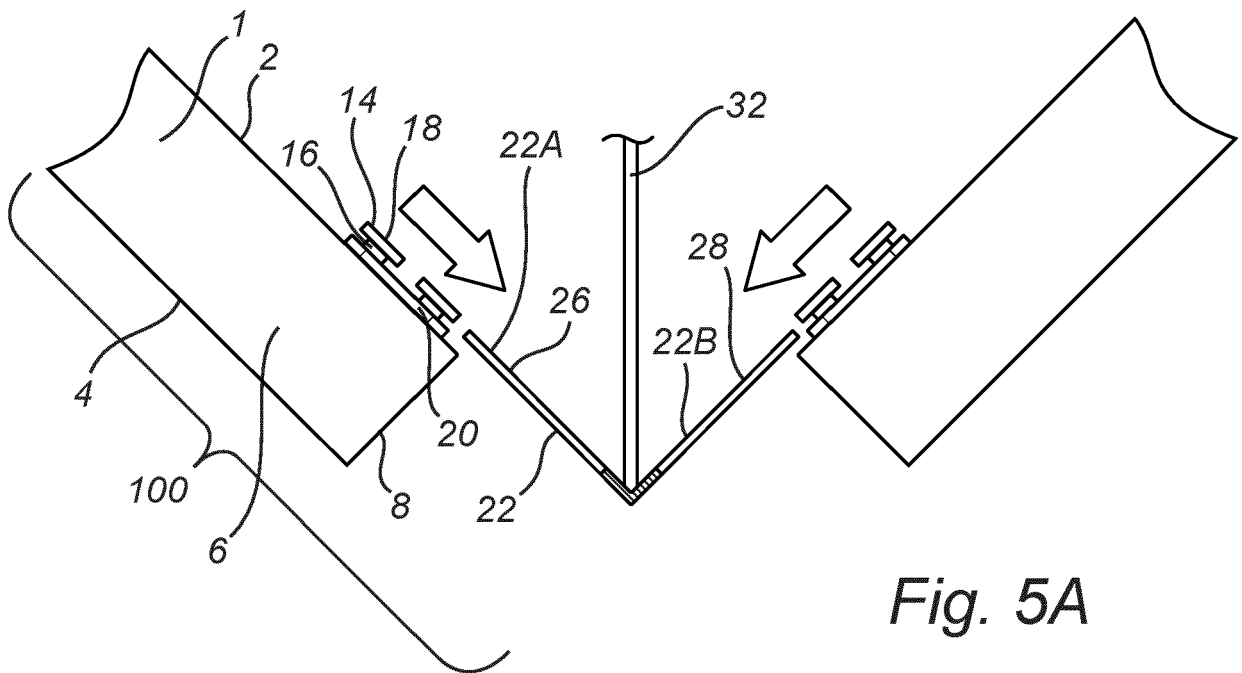


Fig. 5A

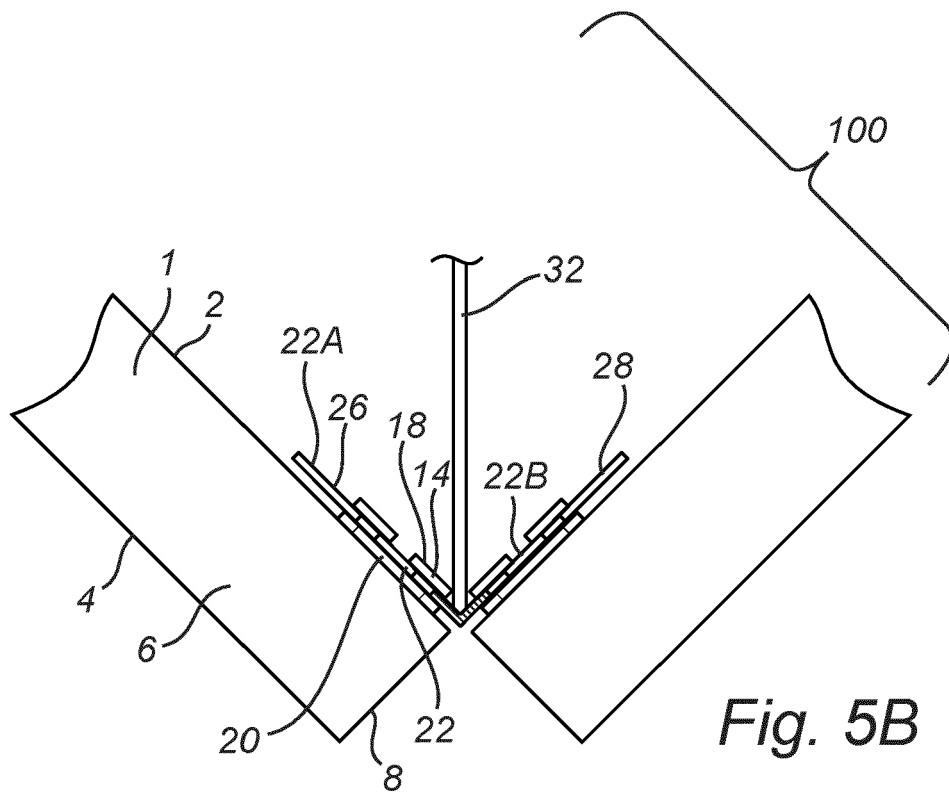


Fig. 5B

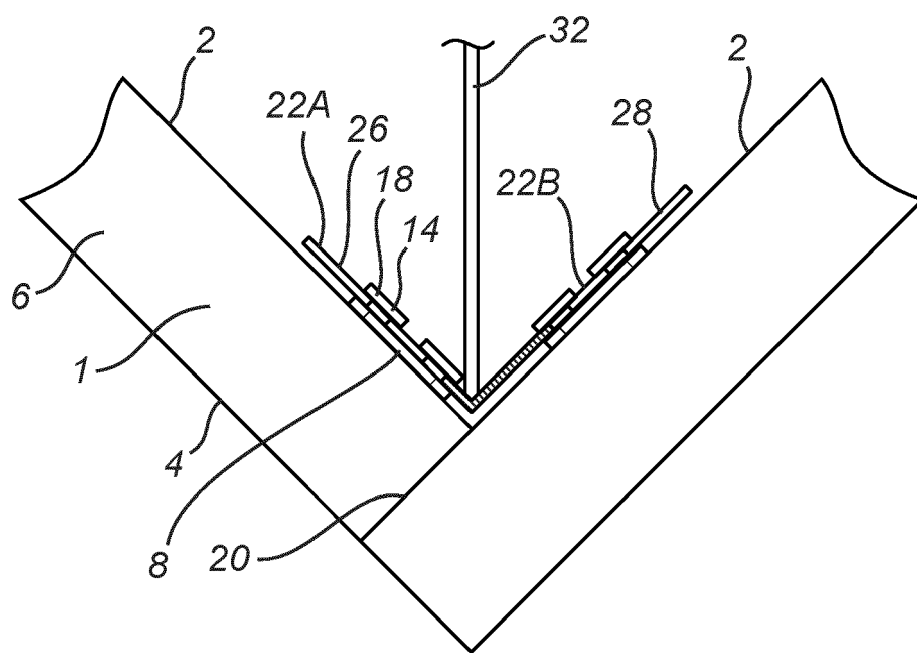


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 22 20 7410

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 May 2023	Examiner Righetti, Roberto
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 20 7410

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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