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(54) ASSEMBLY OF MODULAR PANEL WALLS FOR EXHIBITION STAND CONSTRUCTION

(57) The present invention relates to an assembly of two or more substantially rectangular panels (1) for temporary walls, preferably for exhibition stands, the panels comprising:

two substantially rectangular, substantially rigid, planar outer plates (2),

one or more intermediate structures (5) of a given thickness,

a first, rigid reinforcing element (3), wherein the first reinforcing element is provided with a first coupling element (4a) and a second coupling element (4b),

a second, rigid reinforcing element (9).

The panels are adapted to be easily slid together without additional tools, thereby ensuring alignment of the panel faces, which can be utilised as a visual display, by printing on them.

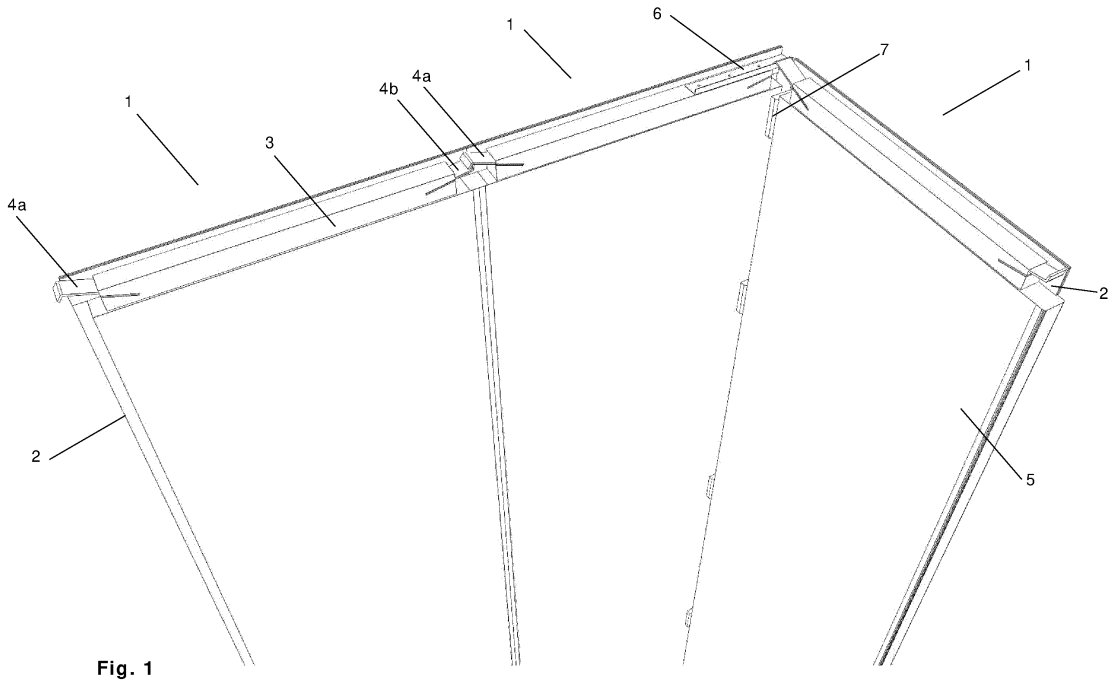

Fig. 1

EP 3 936 675 A1

Description

TECHNICAL FIELD

[0001] The invention relates to modular panel walls with limited weight, which can be built up simply and quickly without additional material requirements (in terms of tools).

PRIOR ART

[0002] Known systems exist in many forms and therefore have to deal with various problems.

[0003] A first series of systems is unwieldy and heavy, and so difficult to manipulate by a user during erection or dismantling. Although this often ensures the stability of the construction, it is detrimental to the efficiency of the erection, it is often not ergonomically responsible, and it is more demanding in terms of material requirements and there are many separate parts to be able to erect them. Moreover, for safety, in such embodiments it will be necessary to anchor items to the floor, walls or other, which in addition often requires additional tools.

[0004] Other systems aim to provide a lightweight solution, but lack stability. To make them stand upright and stand still, the panels must then be fixed to another structure, or hung, for example. This is not always possible (e.g. central positions separate from walls or other structures, locations with wind or drafts, etc.). Moreover, during fixation damage is often necessary to the panels in order to anchor them. Finally, these panels are also often made to be disposed of after a single use.

[0005] The present invention aims to find a solution for at least some of the above problems. By providing a lightweight structure, the panels can be easily erected. These panels can be reused and recycled. The simple coupling method ensures that the panels are erected without the need for loose parts or tools and thus not damaged during use. In addition, the choice of structure also ensures that they are stable enough by themselves not to require further suspension (unless, of course, very large structures are envisaged).

[0006] US 2017/121961, KR 100 810 650, US 2018/347173 and US 2014/208673 amongst others describe modular panel walls, but do not describe reliable, easy adaptations that are possible without additional materials for constructing the panel wall.

[0007] None of the existing systems combines all the advantages described above, without including the associated disadvantages.

SUMMARY OF THE INVENTION

[0008] The invention relates to an improved panel and assembly thereof for erecting modular panel walls, preferably for exhibition stands and walls for events. The panel comprises:

- two substantially rectangular, substantially rigid, planar outer plates extending in a longitudinal and transverse direction, and wherein the two outer plates are positioned parallel to each other;
- one or more, preferably substantially rectangular, intermediate structures of a given thickness, the intermediate structure extending in the longitudinal and transverse direction, the intermediate structure being substantially hollow and/or having cavities, and the intermediate structure being provided between the two outer plates and attached to one side of each outer plate, the intermediate structure extending longitudinally for at least 75%, preferably at least 85%, of the length of the outer plates, and the intermediate structure not being provided at the longitudinal ends along the longitudinal axis of the outer plates, the intermediate structure extending beyond the outer plates at a first transverse end over a distance A, preferably the outer plates extending beyond the intermediate structure at the other transverse end over a distance B approximately equal to the distance A;
- a first, rigid reinforcing element disposed between and attached to the outer plates at the first longitudinal end, said reinforcing element extending transversely over at least 75% of said first longitudinal end;
  wherein the first reinforcing element is provided with a first coupling element at a first end in the transverse direction and a second coupling element at the second opposite end in the transverse direction, said coupling elements being hook-shaped and hooking about an axis perpendicular to the panels, and wherein said coupling elements hook around an axis in the same sense;
- a second, rigid reinforcing element disposed between and attached to the outer plates at the second longitudinal end, said reinforcing element extending transversely over at least 75% of said second longitudinal end;

wherein the first coupling element is adapted to hook into a second coupling element of a first adjacent panel, and wherein the second coupling element is adapted to hook into a first coupling element of a second adjacent panel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Figure 1 shows a perspective view of various panels according to an embodiment of the invention, including a corner panel.

Figure 2 shows a perspective view of the coupling between different panels according to an embodiment of the invention.

Figure 3 shows a perspective view of the coupling

between a corner panel and another panel according to an embodiment of the invention.

Figure 4 shows a perspective view of the underside of the panels according to an embodiment of the invention as in Figures 1-3.

Figure 5 shows a perspective view of the upper side of various panels according to an embodiment of the invention as in Figures 1-4.

Figure 6 shows a perspective view of a base and a panel according to an embodiment of the invention.

Figure 7 shows a perspective view of different panels according to an embodiment of the invention which are connected and stacked in the height direction.

Figures 8 and 9 show a perspective view of the underside of different panels according to an embodiment of the invention, the panels being joined at the bottom for alignment.

Figure 10 shows a perspective view of the top view of the coupling between a corner panel and another panel according to an embodiment of the invention.

Figure 11 shows a perspective view of the reinforcing elements and coupling elements of a panel according to a particular embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0010] Unless otherwise defined, all terms used in the description of the invention, including technical and scientific terms, have the meaning as commonly understood by a person skilled in the art to which the invention pertains. For a better understanding of the description of the invention, the following terms are explained explicitly.

[0011] In this document, 'a' and 'the' refer to both the singular and the plural, unless the context presupposes otherwise. For example, 'a segment' means one or more segments.

[0012] When the term 'around' or 'about' is used in this document with a measurable quantity, a parameter, a duration or moment, and the like, then variations are meant of approx. 20% or less, preferably approx. 10% or less, more preferably approx. 5% or less, even more preferably approx. 1% or less, and even more preferably approx. 0.1% or less than and of the quoted value, insofar as such variations are applicable in the described invention. However, it must be understood that the value of a quantity used where the term 'about' or 'around' is used, is itself specifically disclosed.

[0013] The terms 'comprise', 'comprising', 'consist of', 'consisting of', 'provided with', 'have', 'having', 'include', 'including', 'contain', 'containing' are synonyms and are inclusive or open terms that indicate the presence of what follows, and which do not exclude or prevent the presence of other components, characteristics, elements, members, steps, as known from or disclosed in the prior art.

[0014] In a first aspect, the invention relates to an assembly of two or more substantially rectangular panels, suitable for the construction of temporary walls, preferably stand construction and for events. In a preferred form, at least one side of the panels is printable (suitable to be printed on), or coverable with a printed sheet / plate.

[0015] The panels each comprise two substantially rectangular, substantially rigid, flat outer plates. The outer plates thus extend in a longitudinal and a transverse direction perpendicular to each other in the plane of the outer plate. The two outer plates are positioned parallel to each other, preferably as perpendicular projections onto each other.

[0016] A, preferably substantially rectangular, intermediate structure is provided between the two outer plates, although the shape may deviate from this. The intermediate structure may consist of one or more substructures, preferably rectangular and provided along the longitudinal axis with empty spaces therebetween. The intermediate structure has a predetermined constant thickness and is substantially hollow and / or provided with cavities. An example of this is multi-layered corrugated board. The intermediate structure is attached to the inner side of both outer plates and extends longitudinally for at least 75%, preferably at least 85%, of the length of the outer plates (longitudinal dimension). The intermediate structure is not provided at the level of the longitudinal ends (along the longitudinal axis) of the outer plates. The intermediate structure here extends beyond the outer plates at a first transverse end over a distance A. Preferably, the outer plates extend beyond the intermediate structure at the opposite transverse end over a distance B approximately equal to distance A. It should be borne in mind here that A and B are dimensioned so that the coupling elements of adjacent panels fit perfectly, and the thickness of the coupling elements is not taken into account.

[0017] The panels further comprise a first, rigid reinforcing element disposed between and attached to the inner side of the outer plates at the first longitudinal end. The first reinforcing element here extends transversely over at least 75% of the said first longitudinal end. The reinforcing element is herein provided with a first coupling element at a first end in the transverse direction, and a second coupling element at the second opposite end in the transverse direction. The said coupling elements are preferably hook-shaped and hook around an axis perpendicular to the panels, and hook around an axis in the same sense.

[0018] The panels further comprise a second, rigid reinforcing element disposed between and attached to the inner side of the outer plates at the second longitudinal end. The second reinforcing element here extends transversely over at least 75% of the said second longitudinal

end.

[0019] The first coupling element is adapted to hook into a second coupling element of a first adjacent panel, wherein the second coupling element is adapted to hook into a first coupling element of a second adjacent panel.

[0020] Preferably one of the coupling elements is completely within the volume defined by the outer plates, and the other coupling element is partially outside the volume defined by the outer plates (at least the hook-shaped end of the other coupling element).

[0021] Said distance A is at least 1.0 mm, preferably at least about 2.5 mm. Said distance B can be 0.0 mm or higher, since the play with the thickness of the coupling elements allows them to fit perfectly together, as can be seen in the figures.

[0022] The proposed panels provide an easily erectable wall, which does not require any tools for its construction. By simply hooking together, the connection is ensured, and the panels cannot slide away from each other once aligned and anchored. The fact that at a first transverse end, a recess is provided between the outer plates, and at the opposite transverse end a portion is provided which protrudes from between the outer plates and is dimensioned to fit in the recess provided, it is also ensured that the panels fit together perfectly and cannot move relative to each other perpendicular to the panels themselves. The protruding part (over a distance A) and the recess (depth B which is at least as large as A) are complementary here. Together these factors ensure a good anchoring, which additionally ensures the alignment of two adjacent panels, and more specifically the outer plates.

[0023] The panel also makes good use of the two reinforcing elements, one at the top and one at the bottom, to provide the coupling elements with a fixed anchoring, while at the same time reinforcing the panels at the 'weakest' points, namely at the longitudinal ends. In the centre, in the belly of the panel, it is thus sufficient to provide a hollow intermediate structure, whereby the weight is greatly reduced, and yet the desired strength is ensured.

[0024] In a preferred embodiment, the intermediate structure comprises corrugated board with at least three layers, two of which are cover layers and a corrugated layer therebetween. The cover layers are each attached to an outer plate on the inside thereof. The advantage of corrugated board in such a form is that it offers sufficient strength - or can easily be adapted for it - for a wall panel, and is extremely light. As a result, one person can easily build a wall of panels in a very short time without additional aids, and without experiencing physical discomfort (ergonomics). Moreover, such corrugated cardboard is cheap, easy to process and easy to recycle.

[0025] In a preferred embodiment, the first coupling element is curved in a first sense about an axis perpendicular to the panel, and the first coupling element extends transversely beyond one of the transverse ends of the outer plates over a distance C. The second coupling element is curved about the axis perpendicular to the panel in the first sense, and is positioned transversely inward from the other transverse end of the outer plates over a distance D. The distances C and D are herein substantially equal, and the coupling elements are substantially at the same height along the longitudinal axis.

[0026] The first coupling element is hook-shaped with the opening of the hook oriented in a first sense along the longitudinal axis, and the second coupling element is hook-shaped with the opening of the hook oriented in a second sense, opposite the first sense, along the longitudinal axis. 'Opening of a hook-shaped element' here refers to the concave side of the hook, as with the letter 'C' the opening would point to the right, or as with the letter 'U' it would point upwards.

[0027] In the case of the panels, the openings of the coupling elements will be oriented substantially up and down respectively.

[0028] With the above configuration it is possible to lift a panel and thus couple the coupling element of the panel to the other coupling element of another panel. For example, a part of the coupling element of the first-mentioned panel may have an end in the shape of '$\cap$', the coupling element of the other panel having a shape of 'U' at the end. By sliding the first from above into the second, they can no longer slide apart without deliberately lifting the panels apart. Because the anchoring takes place on the basis of gravity, it is also easy to detach the panels from each other again through a deliberate action. Due to the shape and positioning of the hooks, the panels are pulled towards each other by gravity. The shape of the hooks is such that the panels can be put together and taken apart with a slightly pivoting movement. This significantly improves the ergonomics of placing and removing the panels.

[0029] In normal use of such wall panels, the main forces acting upon them are horizontal, and it is especially important that the panels remain aligned and abut each other. This is guaranteed by the above measures. In addition, by dimensioning the coupling elements in such a way, it can be guaranteed that the panels connect in a predictable manner, which makes it possible to provide the panels with a print or other visual material that extends over several panels.

[0030] In a preferred embodiment, the outer plates extend longitudinally beyond the first reinforcing element (lower) by a distance E, and wherein the second reinforcing element extends longitudinally beyond the second (lower) longitudinal end of the outer plates by a distance F, wherein the distance F is equal to or less than the distance E. Note that variants are possible in which only the second reinforcing element extends longitudinally beyond the second longitudinal end of the outer plates by a distance F.

[0031] The first variant also allows panels to be connected in the height direction, and thus to work across multiple levels. The second variant is more suitable if single-layer walls were opted for, but simplifies anchoring in the ground or a base due to the availability of the sec-

ond reinforcing element.

[0032] In a preferred embodiment, reinforcing layers are provided at both longitudinal ends of the outer plates on the inside of the two outer plates. The reinforcing elements are attached to the reinforcing layers, wherein the reinforcing layer extends over substantially the width of the outer plates, preferably wherein the reinforcing layers are the same material as the outer plates, more preferably with at least the same thickness.

[0033] By specifically strengthening the outer plates at certain positions where more forces are absorbed, the service life can be greatly increased, as well as an increased certainty that the panels will not tear, break or be damaged in any other way during use or installation.

[0034] In a further preferred embodiment, the reinforcing layer extends from the outer plates a certain distance from the longitudinal ends, the intermediate structure extending from the reinforcing layer of the first longitudinal end of the outer plates to the reinforcing layer of the second longitudinal end of the outer plates.

[0035] In a preferred embodiment, the reinforcing layer extends from the longitudinal ends of the outer plate a distance comprised between 3.0 cm and 10.0 cm, preferably between 4.0 cm and 7.0 cm, and more preferably about 5.0 cm; and wherein the reinforcing layer preferably has a minimum thickness of 1.0 mm, preferably 2.0 mm, more preferably approximately 2.5 mm. The dimensions as indicated here ensure that the reinforcing layer can have a sufficient effect, and moreover - as discussed further - can also assist in the anchoring of the structures below or above.

[0036] In a preferred embodiment, the outer plates comprise recycled white paper, with a minimum thickness of 1.0 mm, preferably 2.0 mm. Preferably the thickness is approximately 2.5 mm. The choice of recycled white paper is for its very easy printability. In addition, by opting for a sufficiently thick plate, plates that have already been printed can easily be 'erased' by sanding off a top layer thereof. This allows the plate to be reused many times, where only one top layer is sanded each time. In existing systems, either individual sheets are printed and attached to the panels, or the sheets are simply disassembled and replaced with newly printed sheets.

[0037] Indeed, alternative materials for recycled white paper also fall within the invention, preferably whereby the material allows a top layer to be easily sanded off for reuse.

[0038] In a preferred embodiment the intermediate structure has a thickness comprised between 20 mm and 50 mm, preferably between 25 mm and 45 mm, more preferably between 30 mm and 40 mm. Preferably, the panels have a width comprised between 40 cm and 150 cm, preferably between 50 cm and 100 cm. Preferably, the panels have a length comprised between 100 cm and 350 cm, preferably between 150 cm and 300 cm. The above dimensions provide an ideal balance of manoeuvrability, weight, erection efficiency, material loss during erection and aesthetics (limitation of transitions).

[0039] In a most preferred embodiment, the length is about 240 cm, the width is about 60 cm, and the thickness is about 45 mm. However, variations on one or more of these sizes are foreseeable, as these walls can easily be produced on request.

[0040] In a preferred embodiment, the coupling elements have a width between 15 mm and 50 mm, preferably between 20 and 40 mm, more preferably between 25 mm and 35 mm, and most preferably about 30 mm. The width is the dimensions along the axis perpendicular to the panels.

[0041] Preferably, the width of the coupling elements is approximately equal to the thickness of the intermediate structure, possibly reduced by the thicknesses of the reinforcing layers present there. By maximising the width of the coupling elements, applied forces are better distributed and high local pressures are avoided that could potentially lead to breakage or damage.

[0042] In a preferred embodiment, the second reinforcing element is provided with a male positioning element at a first end on the transverse side of the panel. The second reinforcing element is provided at a second end on the transverse side of the panel, opposite the first end, with a female positioning element adapted to receive a male positioning element from an adjacent panel. Preferably, the male positioning element is a pin or other elongated element that projects transversely (i.e., in the plane of the plate, perpendicular to the longitudinal axis). In that case, the female positioning element is an opening dimensioned and suitable for receiving the male positioning element. Preferably, this anchoring is substantially rigid to ensure that the positioning elements must be deliberately uncoupled.

[0043] The positioning element offers two advantages. On the one hand, this is a reinforced anchoring to absorb forces perpendicular to the panels, and then in particular in a zone where the plates are less strongly attached (where the coupling elements at the top still provide a stronger attachment). On the other hand, this also makes it easier to print the panels continuously. The panels can be anchored together on a printing path along which they are moved. In this way it can be guaranteed that the printed panels align correctly in terms of image material thereon when setting them up. With other systems it is often difficult to ensure high accuracy here, and poor alignment is a common problem.

[0044] In a preferred embodiment, at least one of the panels is modified to serve as a corner panel. In this case, another panel can be fixed at an angle of 90° or at a different angle with respect to the corner panel. The corner panel is provided with a rigid corner reinforcement on the inside of at least one of the outer plates over at least part of its width. The corner reinforcement preferably has an L-shaped cross-section, in which a first face of the L-shaped corner reinforcement is attached to the inside of the outer plate, and a second face of the L-shaped corner reinforcement is attached to the first re-

inforcing element.

[0045] The corner reinforcement is equipped with an anchorage extending perpendicular to the outer plate and a downward hooking end piece suitable for anchoring to an upward hooking coupling element of the other panel.

[0046] The attachment of the corner reinforcement to the reinforcing element provides structural support for the corner reinforcement. Here, the corner reinforcement typically extends over a length between 3.0 cm and 20.0 cm along the transverse direction, preferably between 6.0 cm and 15.0 cm. The anchorage should not be present over the full length of the corner reinforcement, and can only be over part of it, and is preferably dimensioned to correspond in width to the thickness of the coupling elements / thickness of the intermediate structure (as specified in the text). The anchorage extends from the corner reinforcement over the outer plate, creating a hook that extends from the outer plate and then extends downwards. The hook is positioned such that it can hook into a coupling element of an adjacent plate that is directed upwards.

[0047] By providing these corner panels, more complex structures can be built, without the panels having to be substantially changed. Instead of a coupling element, a corner reinforcement is provided which comprises its own variant of a coupling element (anchorage/hook) that can hook into a coupling element of an adjacent panel according to the same principles as with the ordinary panels. In some variants, a corner panel can comprise both the two coupling elements and the corner reinforcement, in order to make a T-shape that can be expanded in all directions. The corner reinforcements can be made of metal and/or comprise plastic, as well as other materials.

[0048] In a further preferred embodiment, the other panel is provided with two or more corner connecting elements which protrude from the outer plates at the other transverse end. Preferably, the corner connecting elements are substantially evenly distributed over the transverse end of the panel. Preferably, the corner connecting elements protrude from the outer plates over a maximum distance of 2.0 cm, preferably 1.5 cm or even 1.0 cm, 0.5 cm or less. These corner connecting elements can comprise wood, but also plastic, synthetic material such as rubber, as well as other materials.

[0049] The above corner connecting elements serve, among other things, as a tongue for the panel over which the groove is placed. This ensures the vertical stability of the hookedin corner wall. The corner connecting elements have a width that fits into the lateral recess of the panel connecting thereto, such that the corner connecting elements are completely hidden therein, while at the same time preventing the movement of the panel perpendicular to said panel.

[0050] In a preferred embodiment, the assembly comprises one or more end pieces that fit into the lateral recesses in terms of width and length, and have a depth lower than the dimension with which the recess is indented. These end pieces serve to close the recess of the panels and give the impression that the recesses are not present.

[0051] In a preferred embodiment the assembly comprises one or more bases. The bases are suitable for supporting the panels and anchoring a (lower) longitudinal end of the panels, the bases having a substantially flat ground surface, for support on a substrate, the bases comprising a top surface with a recess which runs from a first side face of the base to a second opposite side face of the base. The recess is suitable for receiving the (lower) longitudinal end of the panels. The side faces of the base connect the ground surface and the top surface. The recess has a length substantially equal to the transverse dimension of the panels, and a width substantially equal to the thickness of the panels up to 25%, preferably up to 10%, more preferably up to 5%, greater than the thickness of the panels.

[0052] Preferably, the recess extends over the entire top surface (from side face to side face). In this way, panels can be placed over several successive bases, and panels with a larger width can also be placed in one type of base.

[0053] Preferably, the width of the opening is substantially equal to the dimensions of the panels in order to fix them as well as possible in a stable manner (no wobbling walls). Certain widenings and narrowings can be provided in order to match even better with the dimensions of the panels if necessary.

[0054] In a further preferred embodiment, the second reinforcing element extends longitudinally beyond the second longitudinal end of the outer plates. The recess is stepped in a first zone and a second zone, said first and second zones extending in sections parallel to the ground surface, the first zone more distal relative to the ground surface than the second zone. The recess has an opening in the first zone substantially equal to the thickness of the panels up to 25%, preferably up to 10%, more preferably up to 5%, greater than the thickness of the panels. The recess has an opening in the second zone substantially equal to the thickness of the second reinforcing element up to 25%, preferably up to 10%, more preferably up to 5%, greater than the thickness of the second reinforcing element and wherein the recess in the second zone has an opening lower than the thickness of the panels.

[0055] The above measures ensure good fixation at different levels, and also ensure that the panels are all positioned at the same height, in order to correctly align any printing.

[0056] In a preferred embodiment the bases are provided with two or more feet, which are adjustable with respect to the ground surface of the base. This allows the bases to be placed in a desired condition on uneven surfaces (or if a different position is desired compared to a flat surface).

[0057] In a preferred embodiment, the coupling elements comprise a forked end, the forked end comprising at least two, preferably two, fingers, the fingers being

substantially parallel to each other and extending at a distance from each other. This makes it possible to allow cables and the like to pass through the recesses, wherein the cables are moreover also fixed in terms of position. The opening between the fingers can be quite limited, from 5 mm to 3 cm, but preferably between 0.75 cm and 2 cm.

[0058] In a preferred embodiment, the bases comprise two rigid slats, which slats are parallel to each other and spaced from each other by one or more spacer elements, thus defining the recess between the two slats.

[0059] In what follows, the invention is described by way of non-limiting examples illustrating the invention, and which are not intended to and should not be interpreted as limiting the scope of the invention.

LEGEND:

[0060]

1 -	panel
2 -	outer plate
3 -	first reinforcing element
4a, 4b -	coupling elements (first and second)
5 -	intermediate structure
6 -	corner reinforcement
7 -	corner connecting element
8 -	hook / hook-shaped end
9 -	second reinforcing element
10 -	reinforcing layer
11 -	base
12 -	slat
13 -	spacer element
14 -	stepped recess
15 -	foot
16 -	male positioning element
17 -	female positioning element
18 -	anchorage and downwards hooking end piece
19 -	finger
20 -	recess between fingers

EXAMPLES:

[0061] Figures 1-11 show views according to certain embodiments of the invention. Note that most of the figures are similar, but can also be viewed separately from each other (e.g. top views and bottom views, bases, etc.).

[0062] In some Figures, at least one of the outer plates, typically the one in front in the line of sight, has been removed to reveal internal structures.

[0063] Figure 1 shows a panel (1) according to the invention, with the front outer plate (2) removed. The intermediate structure (5) is visible here, which extends over a large part of the height or length of the outer plate (2), but does not extend completely to the top. A rigid reinforcing element (3) is provided at the top, typically wood, although other materials are also possible. This reinforcing element extends over most of the width of the panel, and is provided with coupling elements (4a, 4b) at the lateral ends. The lateral ends are oriented to hook together (first on second) at adjacent panels with the hook-shaped ends (8) of the coupling elements. This coupling is more clearly visible in Figure 2.

[0064] The intermediate structure is approximately the same width as the outer plates, but offset so that they protrude laterally relative to the outer plates on one side of the panel and indent approximately the same distance on the other side. This allows the panels to be joined, with the protruding intermediate structure sliding into the recess of an adjacent panel.

[0065] Figure 3 shows a panel adapted to allow corner joints, in this case a right angle, although other versions are possible. This is done by means of a specific corner reinforcement (6) which is mounted on the outer plate and the reinforcing element, and allows another (ordinary) panel to be hooked into with the coupling element (4a). In addition, corner connecting elements (7) are provided on the corner panel to prevent damage.

[0066] Figure 10 shows a modified version of the corner reinforcement (6) with an anchoring and downwards hooking end piece (18) suitable for anchoring to a coupling element (4b).

[0067] Figure 4 shows a bottom side of panels according to the invention, in which the bottom reinforcing elements (9) protrude at the bottom with respect to the outer plates. This ensures that the stronger reinforcing elements are used for support, and can also be useful when connecting to bases.

[0068] Figure 5 shows a detail of the top side of a panel, in which it is visible that at the level of the reinforcing elements (9) a second reinforcing layer (10) is provided on the outer plate (2), typically of the same material, this to reinforce this zone, which has to handle more forces.

[0069] The thicknesses D1 and D2 are preferably equal and are preferably between 1.0 mm and 5.0 mm, more preferably between 2.0 mm and 3.0 mm and most preferably about 2.5 mm.

[0070] The width B1 is preferably between 20 and 40 mm, more preferably about 30 mm; B2 preferably between 30 and 40 mm, and more preferably about 35 mm.

[0071] Figure 6 shows a detail of the underside of a panel and a base (1), the base comprising two slats (12) interconnected by a number of spacer elements (13), which are themselves provided with a base (15), preferably that can be slid out / is detachable by unscrewing. The slats are provided on the top with a stepped recess (14) which allows to receive a panel in the first zone, and is dimensioned in the deeper zone to receive only the protruding portion of the second reinforcing element (9).

[0072] Figure 7 shows the possibility of a stacking of panels in the height direction, in which a lower reinforcing element (9) can be received in a recess at the top of a lower panel (1). Preferably, the lower reinforcing element (9) protrudes from the outer plates (2) as far as the outer plates (2) extend from the upper reinforcing element (3).

[0073] Figures 8 and 9 show the positioning elements (16, 17) provided on the lower fastening elements (9) for aligning adjacent panels.

[0074] Figure 11 shows a detail drawing of an embodiment of the reinforcing elements (3) with adapted coupling elements (4a, 4b), the coupling elements in this case comprising two fingers (19) with a recess (20) between them, the recess suitable for allowing passage of cables and the like.

Claims

1. Assembly of two or more substantially rectangular panels (1) for temporary walls, preferably for exhibition stands, the panels comprising:

   a. two substantially rectangular, substantially rigid, planar outer plates (2) extending in a longitudinal and transverse direction, and wherein the two outer plates are positioned parallel to each other;
   b. one or more, preferably substantially rectangular, intermediate structures (5) of a given thickness, the intermediate structures extending in the longitudinal and transverse direction, the intermediate structure being substantially hollow and/or having cavities, and the intermediate structure being provided between the two outer plates and attached to one side of each outer plate, the intermediate structure extending longitudinally for at least 75%, preferably at least 85%, of the length of the outer plates, and the intermediate structure not being provided at the longitudinal ends along the longitudinal axis of the outer plates, the intermediate structure extending beyond the outer plates at a first transverse end over a distance A, preferably the outer plates extending beyond the intermediate structure at the other transverse end over a distance B approximately equal to the distance A;
   c. a first, rigid reinforcing element (3) disposed between and attached to the outer plates at the first longitudinal end, said reinforcing element extending transversely over at least 75% of said first longitudinal end; wherein the first reinforcing element is provided with a first coupling element (4a);
   d. a second, rigid reinforcing element (9) disposed between and attached to the outer plates at the second longitudinal end, said reinforcing element extending transversely over at least 75% of said second longitudinal end;

   characterized in that the first reinforcing element is provided with the first coupling element at a first end in the transverse direction and a second coupling element (4b) at the second opposite end in the transverse direction, said coupling elements (4a, 4b) being hook-shaped and hooking about an axis perpendicular to the panels, and wherein said coupling elements hook around an axis in the same sense; and
   wherein the first coupling element (4a) is adapted to hook into a second coupling (4b) element of a first adjacent panel (1), and wherein the second coupling element (4b) is adapted to hook into a first coupling element (4a) of a second adjacent panel (1).

2. Assembly according to preceding claim 1, wherein the intermediate structure comprises corrugated board with at least three layers, two of which are cover layers and a corrugated layer therebetween.

3. Assembly according to any of the preceding claims 1 or 2, wherein the first coupling element is curved in a first sense about an axis perpendicular to the panel, and wherein the first coupling element extends transversely beyond one of the transverse ends of the outer plates over a distance C, and wherein the second coupling element is curved about the axis perpendicular to the panel in the first sense, and is positioned transversely inward from the other transverse end of the outer plates by a distance D, the distance C and the distance D being substantially the same, and wherein the coupling elements are substantially at an equal height along the longitudinal axis;
   and wherein the first coupling element is hook-shaped with the opening of the hook (8) oriented in a first sense along the longitudinal axis, and the second coupling element is hook-shaped with the opening of the hook (8) oriented in a second sense along the longitudinal axis, with the second sense opposite to the first sense.

4. Assembly according to any of the preceding claims 1 to 3, wherein the outer plates extend longitudinally beyond the first reinforcing element by a distance E, and wherein the second reinforcing element extends longitudinally beyond the longitudinal end of the outer plates by a distance F, where the distance F is equal to or less than the distance E.

5. Assembly according to any of the preceding claims 1 to 4, wherein reinforcing layers (10) are provided at both longitudinal ends of the outer plates on the inside of the two outer plates, wherein the reinforcing elements are attached to the reinforcing layers, and wherein the reinforcing layer extends over the substantial width of the outer plates, preferably wherein the reinforcing layers are the same material as the outer plates, more preferably with at least the same thickness.

6. Assembly according to the preceding claim 5, where-

in the reinforcing layer extends from the outer plates over a certain distance from the longitudinal ends, and wherein the intermediate structure extends from the reinforcing layer of the first longitudinal end of the outer plates to the reinforcing layer of the second longitudinal end of the outer plates.

7. Assembly according to any of the preceding claims 5 or 6, wherein the reinforcing layer extends from the longitudinal ends of the outer plate over a distance between 3.0 cm and 10.0 cm, preferably between 4.0 cm and 7.0 cm; and wherein the reinforcing layer preferably has a minimum thickness of 1.0 mm, preferably 2.0 mm.

8. Assembly according to any of the preceding claims 1 to 7, wherein the outer plates comprise recycled (white) paper, and have a minimum thickness of 1.0 mm, preferably 2.0 mm, and have a maximum thickness of 7.5 mm, preferably 5.0 mm, and wherein the outer plates preferably have a thickness between 2.0 mm and 3.0 mm, most preferably about 2.5 mm.

9. Assembly according to any of the preceding claims 1 to 8, wherein the intermediate structure has a thickness between 20 mm and 50 mm, preferably between 25 mm and 45 mm, more preferably between 30 mm and 40 mm; wherein the panels have a width comprised between 40 cm and 150 cm, preferably between 50 cm and 100 cm; and wherein the panels have a length comprised between 100 cm and 350 cm, preferably between 150 cm and 300 cm.

10. Assembly according to any of the preceding claims 1 to 9, wherein the coupling elements have a width comprised between 15 mm and 50 mm, preferably between 20 mm and 40 mm, more preferably between 25 mm and 35 mm.

11. Assembly according to any of the preceding claims 1 to 10, wherein the second reinforcing element is provided with a male positioning element (16) at a first end on the transverse side of the panel, and at a second end on the transverse side of the panel, opposite to the first end, is provided with a female positioning element (17) suited to receive a male positioning element from an adjacent panel.

12. Assembly according to any of the preceding claims 1 to 11, wherein at least one of the panels has been modified to serve as a corner panel, another panel being able to be fixed at an angle of 90° with respect to the corner panel, the corner panel being provided with a rigid corner reinforcement (6) on the inside of at least one of the outer plates over at least a part of its width, preferably wherein the corner reinforcement has an L-shaped cross-section, with a first plane of the L-shaped corner reinforcement being attached on the inside of the outer plate, and a second plane of the L-shaped corner reinforcement being attached to the first reinforcing element, the corner reinforcement having an anchor (18) extending perpendicular to the outer plate, and comprising a downwards hooking end piece (18) suitable for anchoring the other panel to the second coupling element.

13. Assembly according to the preceding claim 12, wherein the other panel is provided with two or more corner connecting elements (7) protruding from the outer plates at the other transverse end, preferably wherein the corner connecting elements are substantially evenly distributed over the transverse end of the panel, preferably wherein the corner connecting elements protrude from the outer plates over a maximum distance of 2.0 cm, preferably 1.5 cm, and wherein the corner connecting elements have a maximum width which is at most equal to the distance between the outer plates.

14. Assembly according to any of the preceding claims 1 to 13, further comprising one or more bases (11), said bases being suitable to support the panels and anchoring a longitudinal end of the panels, the bases having a substantially flat ground surface, the bases comprising a top surface with a recess (14) extending from a first side surface of the base to a second opposite side surface of the base, the recess being suitable to receive the longitudinal end of the panels, the side surfaces connecting the ground surface and the top surface wherein the recess has a length substantially equal to the transverse dimension of the panels, and a width substantially equal to the thickness of the panels up to 25%, preferably 10%, greater than the thickness of the panels.

15. Assembly according to the preceding claim 14 and claim 4, wherein the second reinforcing element extends longitudinally beyond the second longitudinal end of the outer plates, wherein the recess (14) is stepped in a first zone and a second zone, said first and second zones extending in sections parallel to the ground surface, the first zone more distal to the ground surface than the second zone, wherein the recess in the first zone has an opening substantially equal to the thickness of the panels up to 25%, preferably 10%, greater than the thickness of the panels, and wherein the recess in the second zone has an opening substantially equal to the thickness of the second reinforcing element up to 25%, preferably 10%, greater than the thickness of the second reinforcing element and wherein the recess in the second zone has an opening less than the thickness of the panels.

16. Assembly according to any of the preceding claims

14 or 15, wherein the bases are provided with two or more feet (15), which are adjustable with respect to the ground surface of the base.

17. Assembly according to any of the preceding claims 14 to 16, wherein the bases comprise two rigid slats (12), which are parallel to each other and spaced from each other by one or more spacer elements (13), thus defining the recess between the two slats.

18. Assembly according to any of the preceding claims 1 to 17, wherein the coupling elements comprise a forked end, the forked end comprising at least two, preferably two, fingers (19), the fingers being substantially parallel to each other and extending spaced apart from each other.

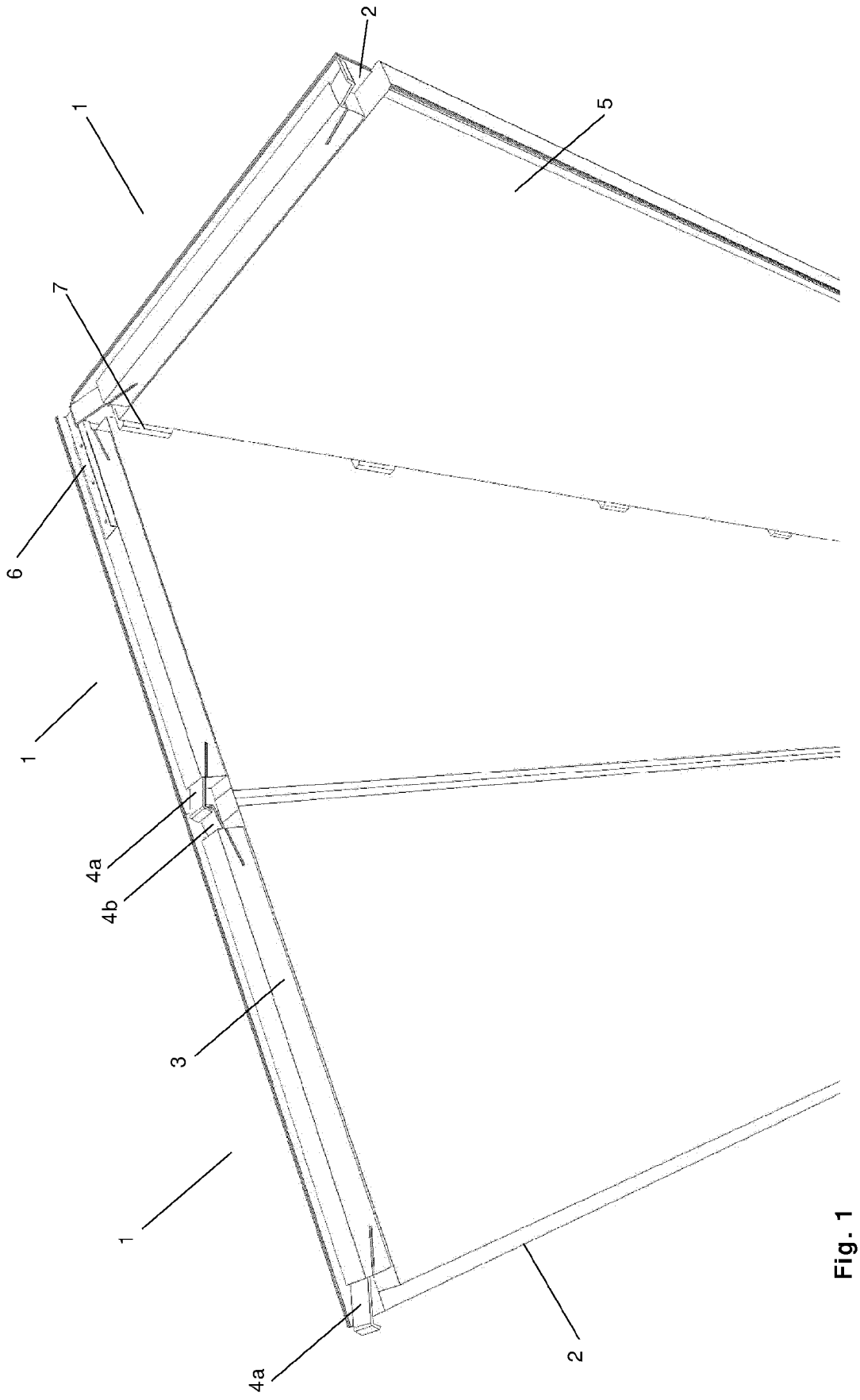

Fig. 1

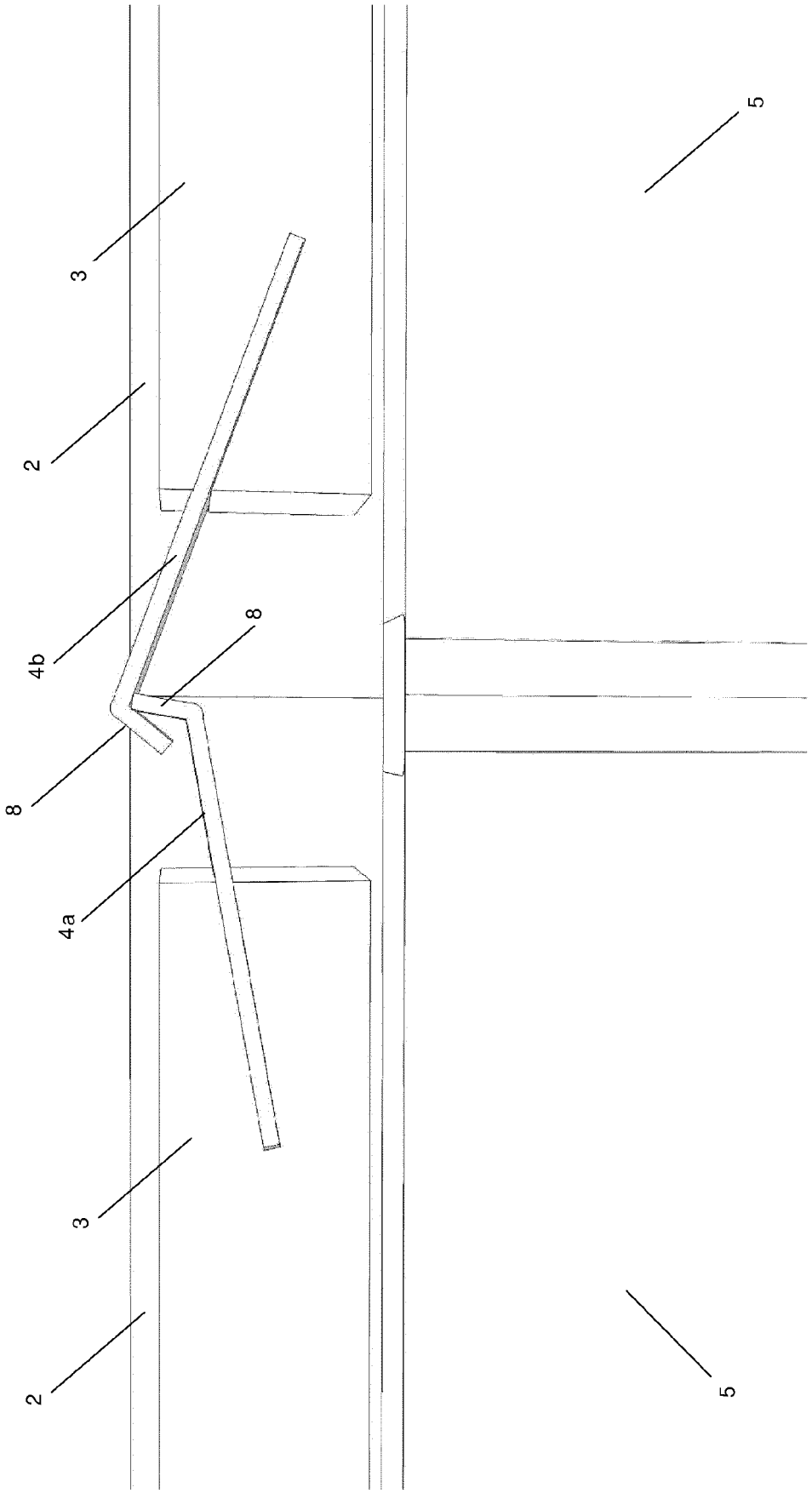

Fig. 2

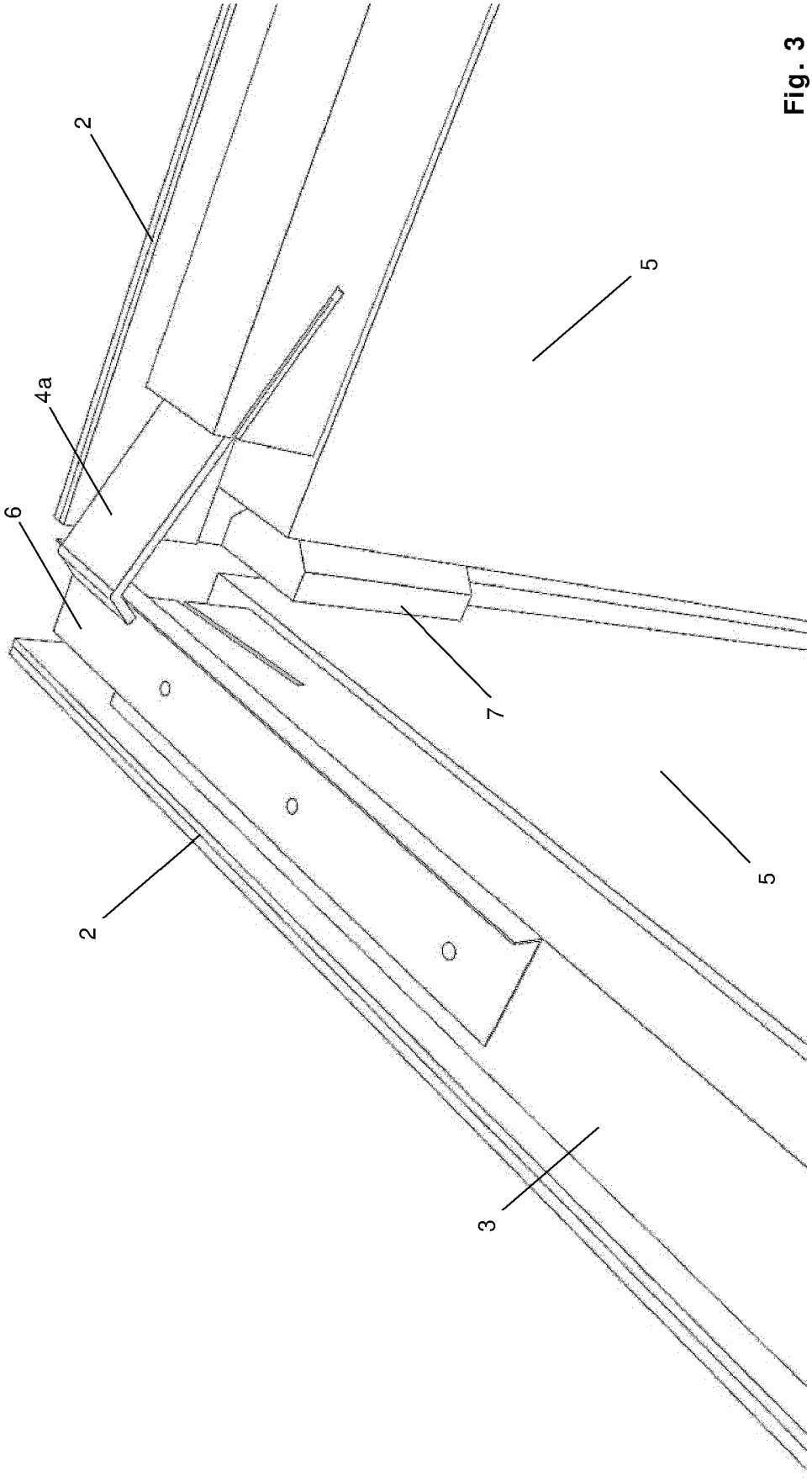

Fig. 3

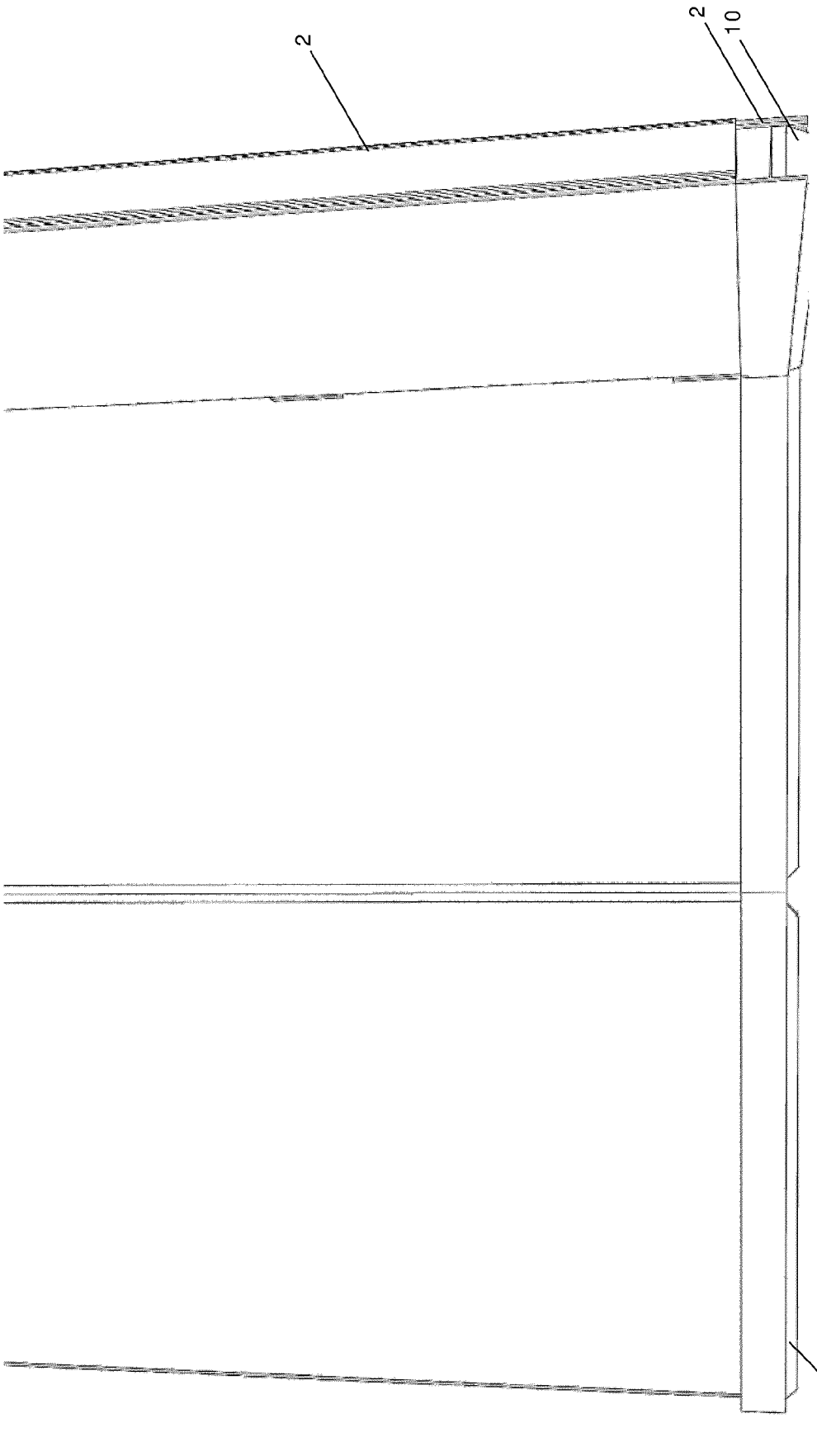

Fig. 4

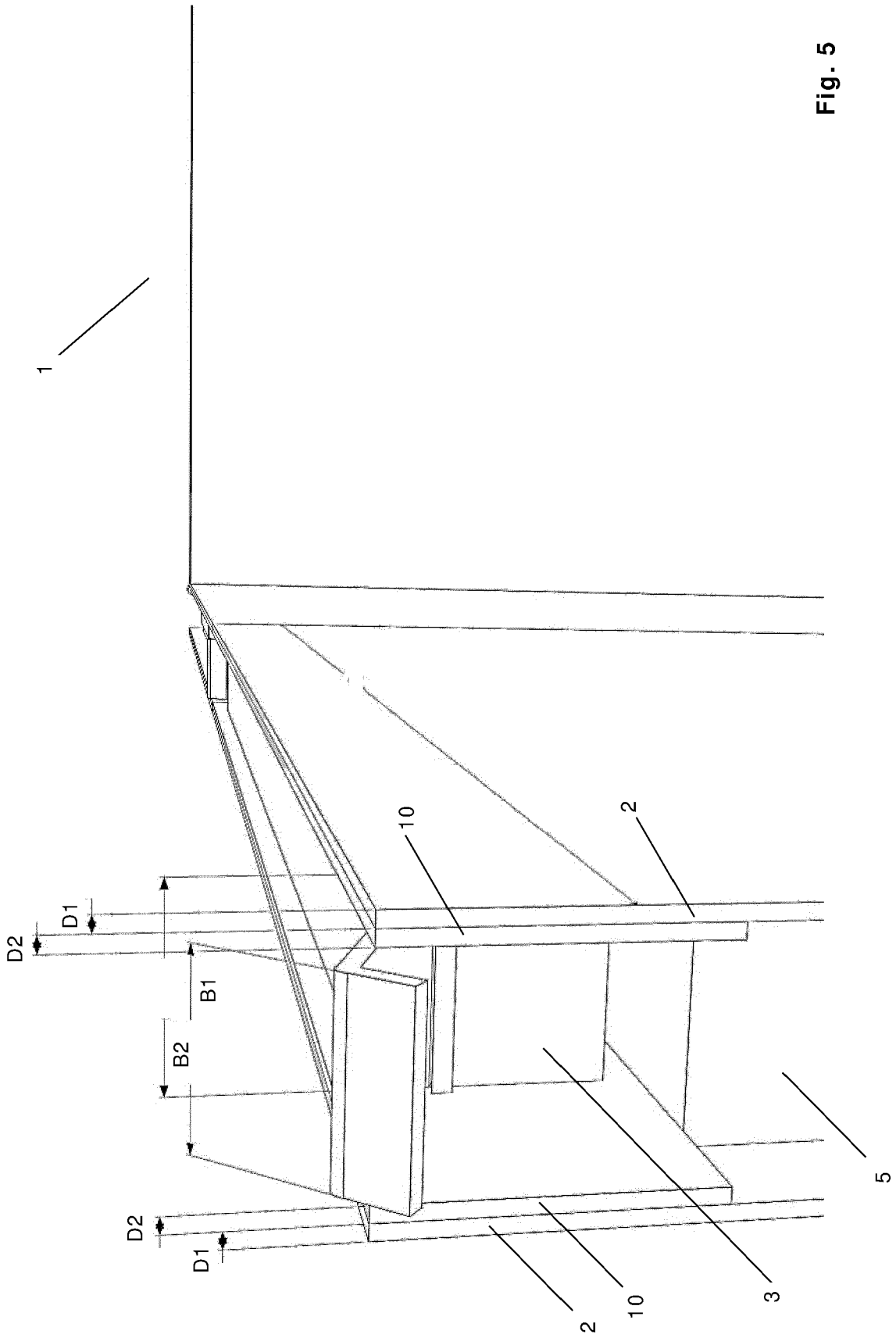

Fig. 5

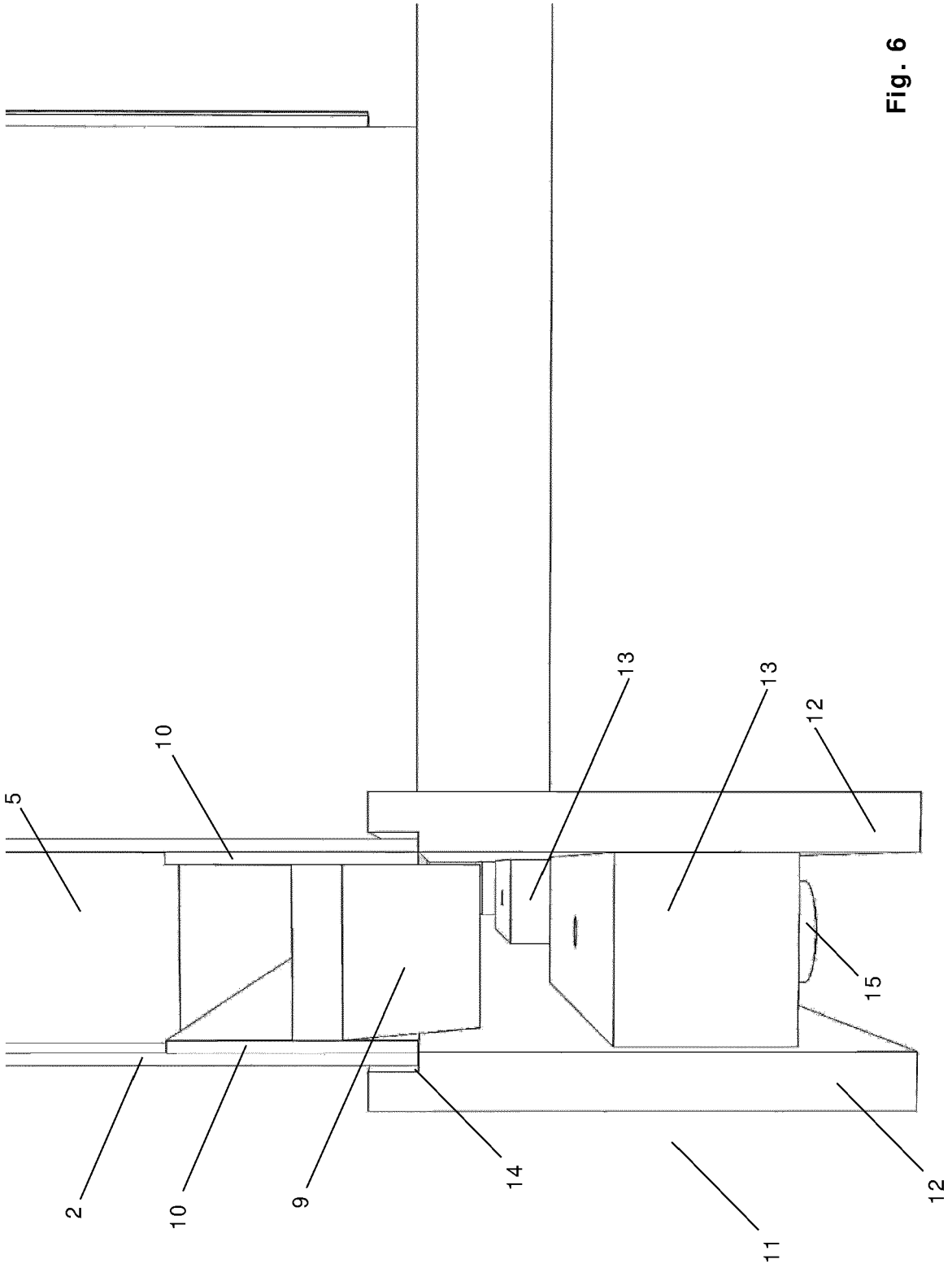

Fig. 6

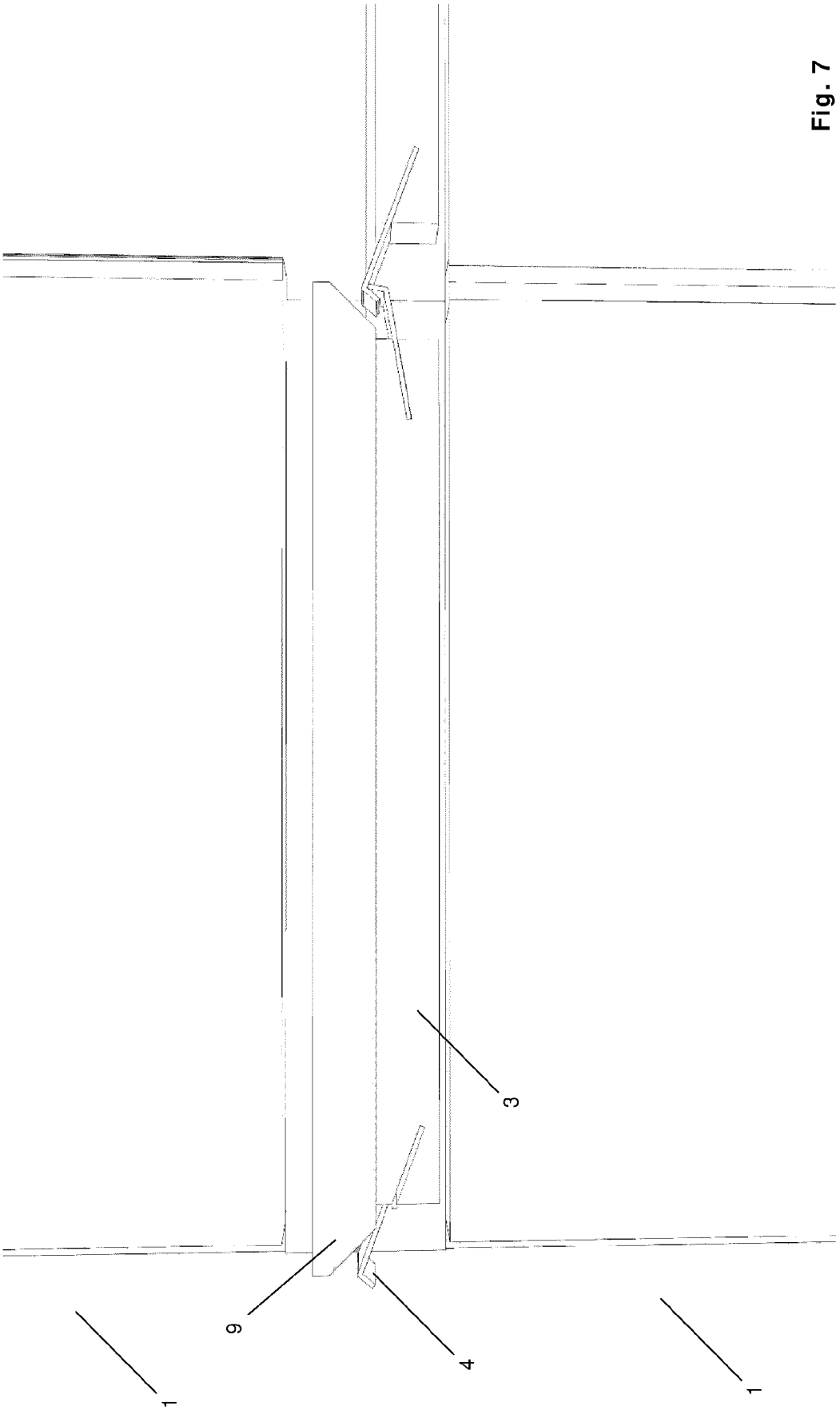

Fig. 7

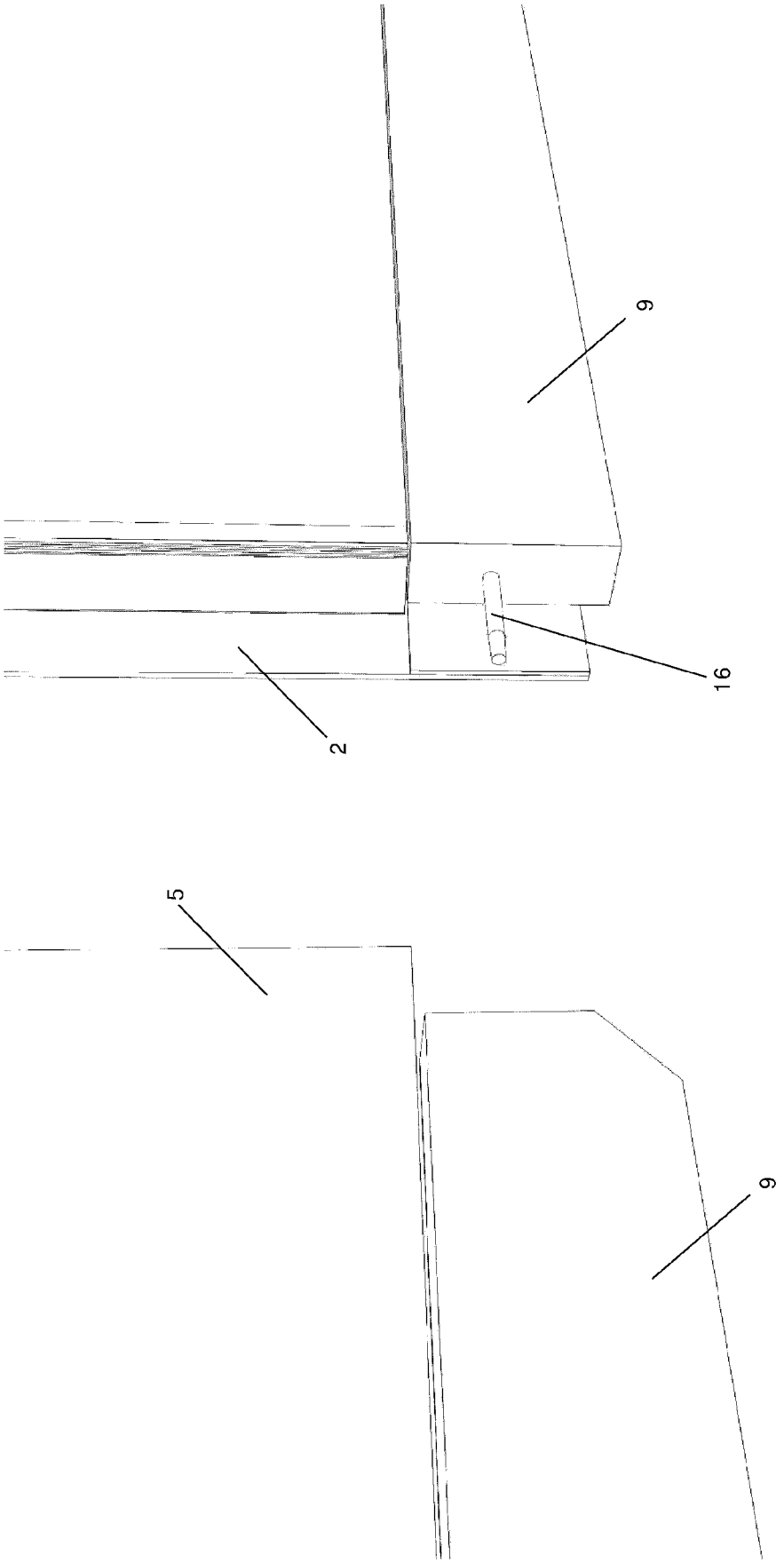

Fig. 8

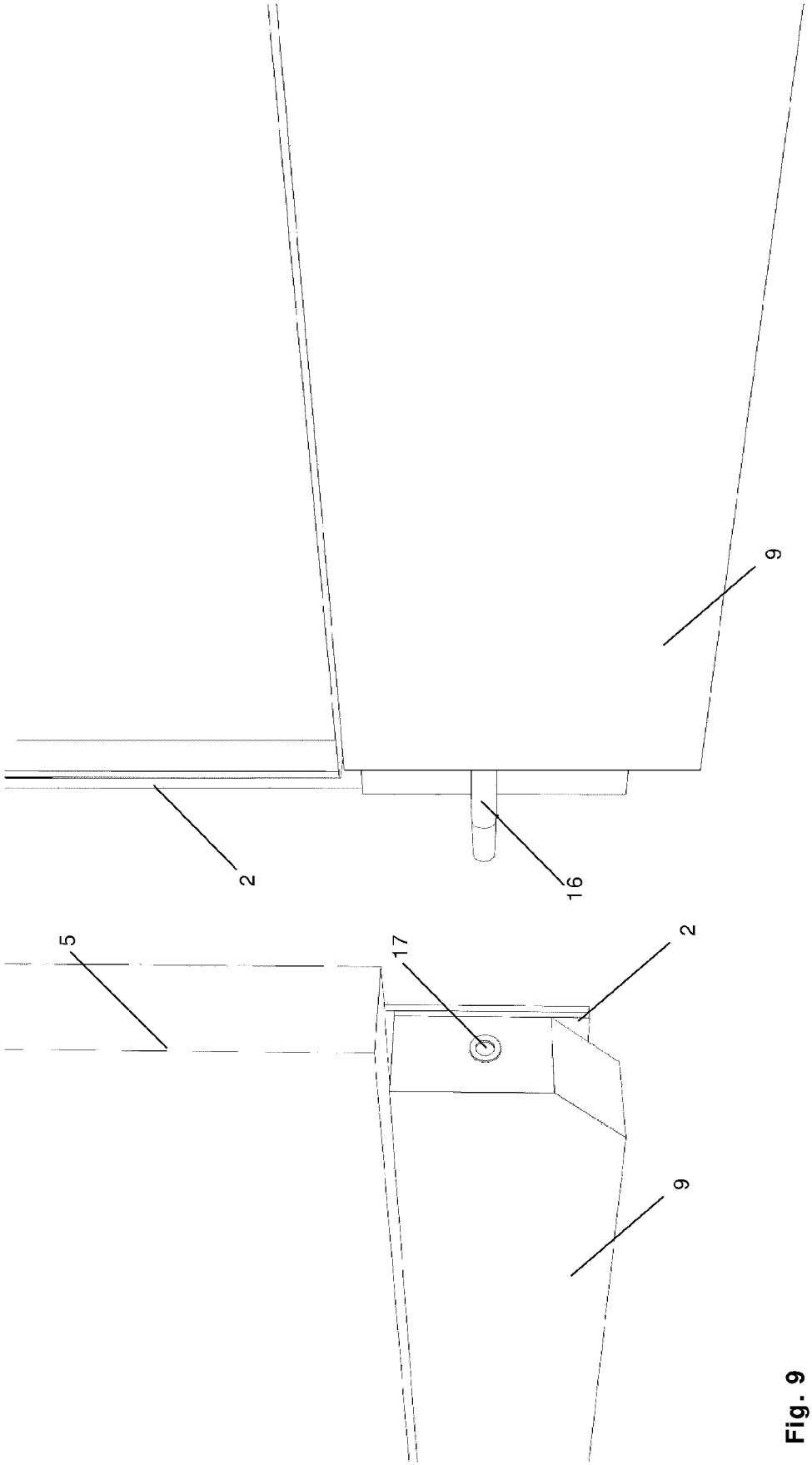

Fig. 9

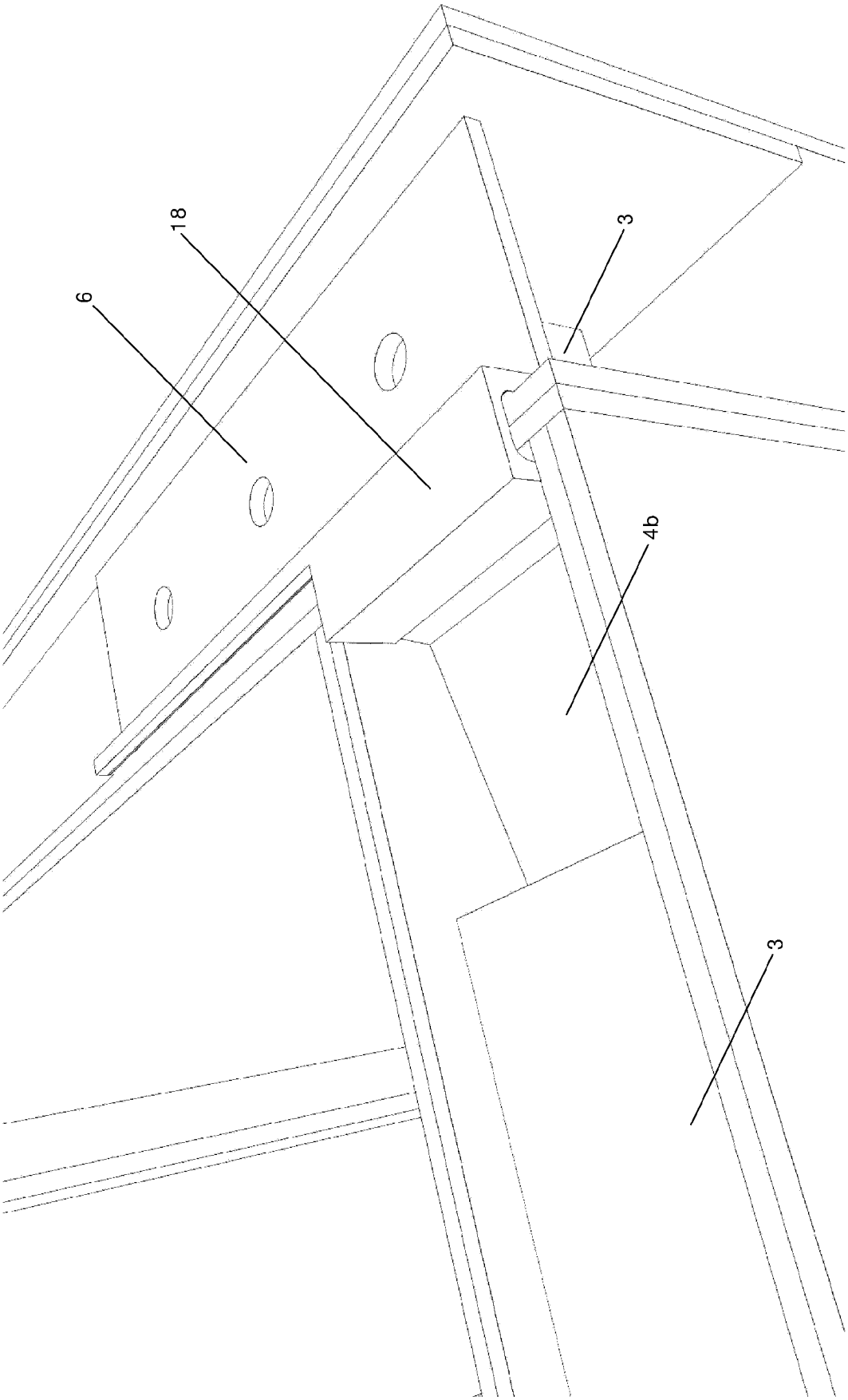

Fig. 10

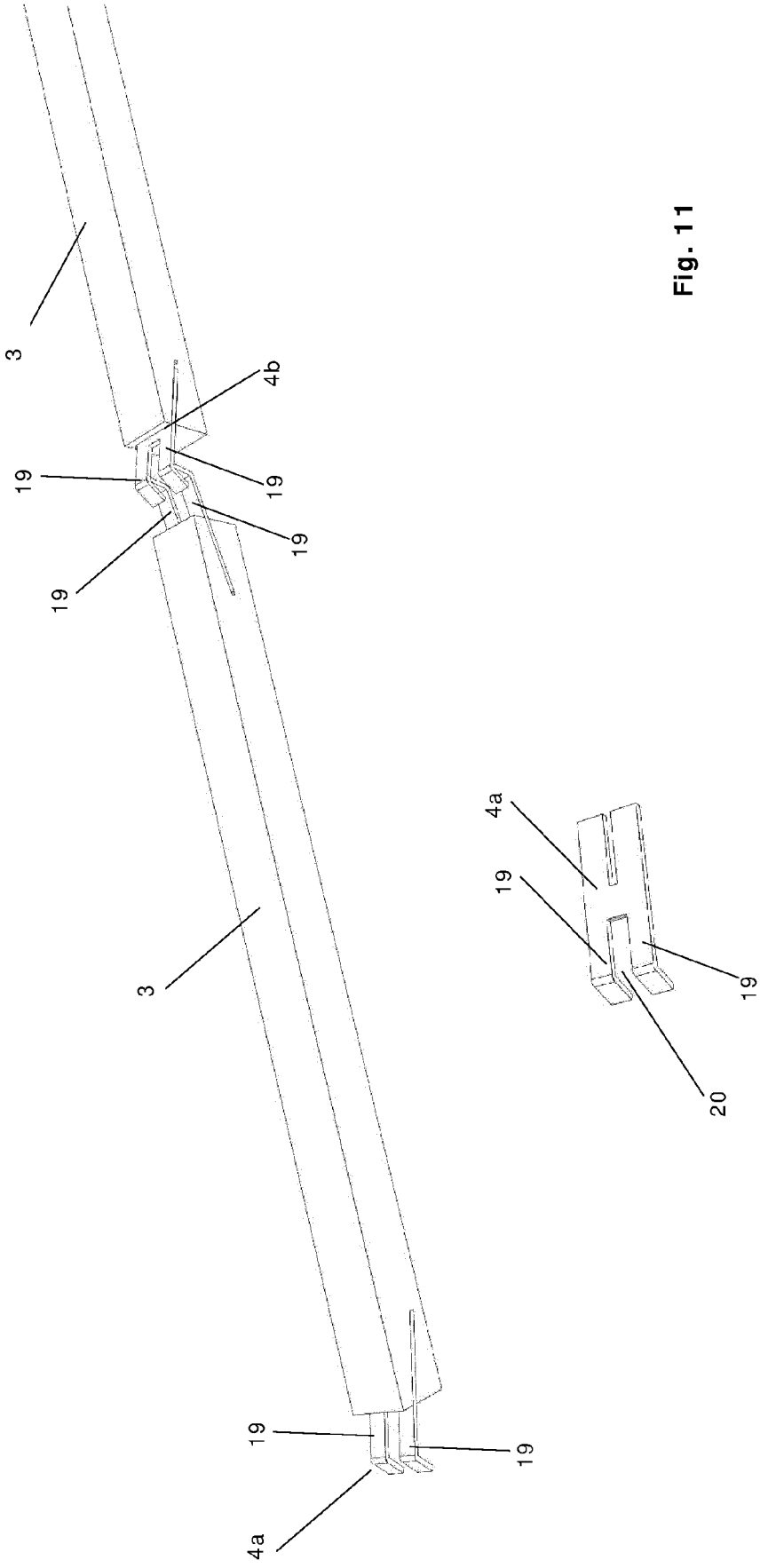

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 21 17 5065

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	US 2017/121961 A1 (HODSON SIMON [US] ET AL) 4 May 2017 (2017-05-04) * figures 1-43 * * the whole document *	1-15	INV. E04B1/61 E04B2/74
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A	US 2014/208673 A1 (HUANG CHE-HSIUNG [TW]) 31 July 2014 (2014-07-31) * figure 9 * * paragraphs [0004], [0051] *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) E04B A47F F16B

2 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 December 2021	Klein, A

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
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D : document cited in the application
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EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 21 17 5065

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☒ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 17 5065

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
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REFERENCES CITED IN THE DESCRIPTION

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- KR 100810650 **[0006]**
- US 2018347173 A **[0006]**
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