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(71) Applicant: **PARNASS, besloten vennootschap met beperkte aansprakelijkheid**
2320 Hoogstraten (BE)

(72) Inventor: **Servaes, Jan**
2320 HOOGSTRATEN (BE)

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(74) Representative: **Donné, Eddy**
Bureau M.F.J. Bockstael nv
Arenbergstraat 13
2000 Antwerpen (BE)

(54) **Element for the storage, handling and transport of essentially sheet-form objects**

(57) 1.- Element (1) for transporting objects, that has ribs (2) at a distance from one another and two sides (8,9), each with a connecting slat (3A, 3B) for the ribs, whereby a connecting slat (3A, 3B) has a top edge (10) at a first height (H_1) and a connecting slat (3A, 3B) has a bottom edge (11) at a second height (H_2), whereby the element (1) on one side (8,9) is provided with a protrusion

(12, 15) that protrudes sideways outside the connecting slat (3A, 3B) on this side (8,9) and which has a bottom edge (14) at a third height (H_3) that is greater than or equal to the first height (H_1) or has a top edge (16) at a fourth height (H_4) that is less than or equal to the second height (H_2).

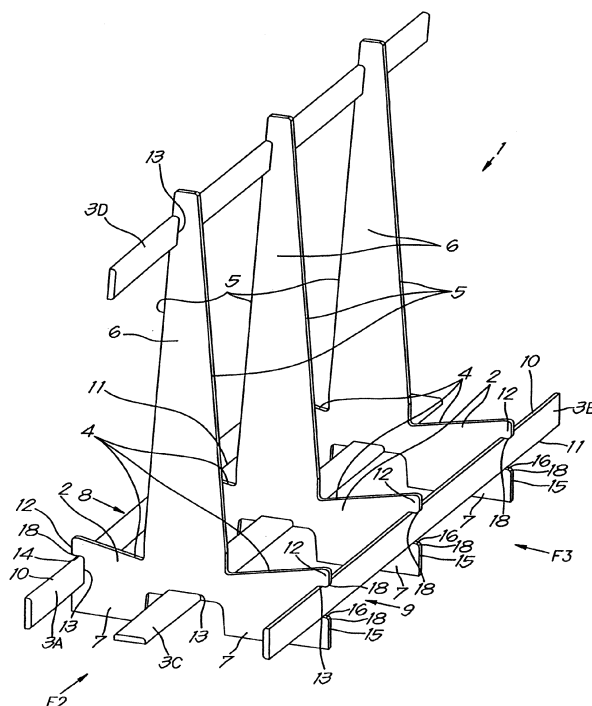


Fig.9

Description

[0001] The present invention relates to an element for the storage, handling and transport of objects.

[0002] More particularly the invention relates to an element for the storage, handling and transport of fragile or easily damaged essentially flat objects, such as panes of glass, plates, tablets, tiles and similar of any material, such as natural stone, ceramic, glass, etc.

[0003] Damage, whether breakage or damage to a surface with a decorative finishing layer, must of course be avoided.

[0004] When such objects are stacked flat for storage, handling or transport, they are relatively vulnerable to shocks that can occur during transport or handling, and to scratches that can occur by sliding the objects over one another.

[0005] When there are hard particles between the objects, such as grains of sand or particles that have broken off from the objects themselves for example, the risk of damage is particularly high.

[0006] With elements for the storage, handling and transport of objects, it is also important that they are made as cheaply as possible, because they are often only intended to be used once.

[0007] For cost reasons, the elements must be made as small as possible for the load for which they are intended.

[0008] Also the elements, if they are small, are relatively light, such that they can be transported more cheaply and such that their own weight compared to the weight placed on them, which typically varies from approximately 500 kg to approximately 1500 kg, is minimised.

[0009] Nevertheless, it goes without saying that such elements have to satisfy the safety requirements, and they must not collapse or fall over in the event of sudden movements, which can occur for example during emergency manoeuvres of a vehicle in which the elements are transported.

[0010] Hence the objects are normally fastened on the elements with tie-down straps or otherwise.

[0011] The elements with their objects are also secured to a vehicle or a container. Because the objects are generally not strong enough, affixing the tie-down straps or similar over the objects must be avoided, but they have to run over a part of the elements where there are no objects.

[0012] Such elements are described in WO 2012/031340, which satisfy all requirements: they are light but strong, and cheap to manufacture.

[0013] However, these elements have a disadvantage if a number of them are placed next to one another. Moreover, preferably one single tie-down strap is used to secure a number of elements in one go.

[0014] The tie-down straps thereby only exert a very limited downward force on elements that are between two elements, such that these elements can move relatively easily.

[0015] This in itself can cause damage to the objects when these elements move or tilt. Rather more so however, an element can collapse because upon violent external movements, the forces act in a direction that does not correspond to the direction in which the element can withstand the maximum forces, normally the vertical direction, or are not distributed evenly over the entire element.

[0016] Hence the purpose of the invention is to provide a solution to at least one of the aforementioned and other disadvantages, by providing an element for the storage, handling and transport of objects, that comprises two or more ribs that extend at a mutual distance from one another in the width and height directions, whereby the element has two sides located opposite one another that are both provided with a sidelong connecting slat that extends in the longitudinal direction of the element, whereby at least one sidelong connecting slat has a top edge that is at a first height and at least one sidelong connecting slat has a bottom edge that is at a second height, whereby the ribs are connected together by means of the connecting slats, whereby the element is provided with one or more protrusions on one or both sides that protrudes or protrude sideways outside the sidelong connecting slat on this side and which has or have a bottom edge at a third height that is greater than or equal to the first height or has or have a top edge at a fourth height that is less than or equal to the second height, so that, when the element is placed sideways against an identical element, a protrusion or protrusions is or are above or below a sidelong connecting slat of the identical element.

[0017] When such elements are used side-by-side, upon a first slight deformation or tilting, the protrusions of a first element and a sidelong connecting slat of another element will transmit vertical forces to one another, such that further movement of the elements, which ultimately could lead to the collapse of an element or toppling, is prevented.

[0018] As a result, in brief the resistance of the elements to all kinds of violent movements that can occur during transport is increased, such that with an equal construction of the element the weight of the load can be increased, or with an equal load a lighter and/or smaller element can be used.

[0019] Preferably the difference between the third and the first height and/or the difference between the second and the fourth height is hereby less than 5 mm, more preferably less than 2 mm and even more preferably less than 1 mm.

[0020] As a result, in the event of a very slight deformation or movement, a transmission of force takes place, which moreover comes into being smoothly.

[0021] In a further preferred embodiment the said one or more protrusions are on one or more ribs.

[0022] Because the ribs bear the vertical forces, this gives the advantage that the action of the protrusions is the most direct, because the forces do not first have to

be transferred from the ribs to other elements.

[0023] In a further preferred embodiment the protrusions are an integral part of a rib. As a result, an element with protrusions is no more expensive or is barely more expensive than a conventional element.

[0024] In a further preferred embodiment, the element is provided on both sides with one or more of the said protrusions, whereby the said protrusions have a bottom edge on the first side at a third height that is greater than or equal to the first height of the top edge of the connecting slat at a second opposite side, and whereby the said protrusions on the second side have a top edge at a fourth height that is less than or equal to the second height of the bottom edge of the connecting slat on the first side.

[0025] This has the advantage that loaded elements can be easily and accurately positioned correctly with respect to one another by means of a pallet trolley, by placing elements on the pallet trolley and driving with the first side oriented in the drive direction.

[0026] Hereby the element on the pallet trolley is higher than elements already in place, such that the protrusions on the elements cannot collide with the other elements and the sides of the elements can be neatly placed against one another, after which the element on the pallet trolley is lowered so that the protrusions and the sidelong connecting slats can act on one another with the transmission of forces.

[0027] In another preferred embodiment the element has at least two such protrusions on either side and at least one of the protrusions has a bottom edge on either side at a third height that is greater than or equal to the first height and at least one of the protrusions has a top edge at a fourth height that is less than or equal to the second height.

[0028] As a result upward-oriented and downward-oriented deformations are transferred to adjacent elements, such that the elements support one another in two directions, and thus a more stable positioning is obtained.

[0029] With the intention of better showing the characteristics of the invention, a preferred embodiment of an element according to the invention is described herein-after by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

Figure 1 schematically shows a perspective view of an element according to the invention;

figure 2 shows a side view according to arrow F2 of the element of figure 1;

figure 3 shows a side view according to arrow F3 of the element of figure 1;

figures 4 and 5 show the use of elements according to figure 1;

figure 6 is a presentation of the part of figure 5 indicated with F6 on a larger scale and with more details;

figure 7 is a top view of elements as shown in figure 5 with F6;

figure 8 is a presentation of the part of figure 7 indicated with F8 on a larger scale and with more details;

Figure 9 schematically shows a perspective view of an alternative element according to the invention; and

Figures 10 and 11 respectively are presentations that correspond to the presentations in figures 6 and 8 respectively and which concern the use of the element of figure 9.

[0030] The element 1 shown in figures 1 to 3 for placing sheet-form objects thereon is made of wood, for example multilayered sheets of wood, such as multiply, and has a length L of 1800 mm and a width B of 600 mm.

[0031] The element 1 essentially consists of three sheet-form ribs 2 that extend in the height direction and width direction, and which each consists of a single piece of wood and of four connecting slats 3 that connect the ribs parallel to one another and at a distance from one another viewed in the longitudinal direction.

[0032] The connecting slats 3 are affixed in recesses in the ribs 2. They extend in the longitudinal direction of the element 1 and protrude outside the ribs 2.

[0033] The ribs 2 and connecting slats 3 are fastened together by means of combined pin/screw connectors, but other fastening methods are of course also possible.

[0034] The ribs 2 each have two bearing edges 4 that extend essentially horizontally, but at a small angle α of 5° to a horizontal line, such that they make an upward-oriented angle to one another of 170° .

[0035] The bearing edges 4 of each rib 2 run parallel to the bearing edges 4 of the other ribs 2.

[0036] The ribs 2 also have two supporting edges 5, that are each perpendicular to a bearing edge 4. The supporting edges 5 of a rib 2 together define a back section 6. Because the ribs 2 are identical, the supporting edges 5 of each rib 2 are parallel to the supporting edges 5 of the other ribs 2.

[0037] The bearing edges 4 are not the same length, so that the centre of the back section 6 is approximately 15 mm next to the centre of the element 1.

[0038] The ribs 2 have feet 7 on which the element 1 rests, and which ensure that there are clear spaces under the element 1 in which the forks of standard transport aids, such as a forklift truck or a pallet trolley for example, fit.

[0039] Two of the connecting slats, 3A, 3B are at the sides 8, 9 of the element, i.e. one connecting slat 3A, 3B on each side 8,9. These sidelong connecting slats 3A, 3B have a thickness D_v of 18 mm and a height H_v of 92 mm. Its top edge 10 is at a first height H_1 of 186 mm and its bottom edge 11 has a second height H_2 of 94 mm above the underside of the element 1.

[0040] A third connecting slat 3C is in the centre between the two sidelong connecting slats 3A, 3B, under the back section 6 of the ribs 2, and is affixed at such a height that its underside is also at the second height H_2 of 94 mm.

[0041] A fourth connecting slat 3D is in a recess in one of the supporting edges 4 of each of the ribs 2.

[0042] The ribs 2 are each provided with a protrusion 12 on a first side 8 of the element 1, that is an integral part of the rib 2, thus made from the same sheet of wood, and which is above the recess 13 for the sidelong connecting slat 3A on the first side, and fits in this recess 13.

[0043] The bottom edge 14 of each of the protrusions 12 on the first side 8 are at a third height H_3 187.5 mm, thus 0.5 mm above the first height H_1 . This difference is so small that it cannot be seen in the drawings.

[0044] On the second opposite side 9 the ribs 2 are each provided with a protrusion 15, that is also an integral part of the rib 2, and which is under the recess 13 for the sidelong connecting slat 3B on the second side 9, and fits in this recess 13.

[0045] The top edge 16 of each of the protrusions 15 on the second side 9 is at a fourth height H_4 of 93.5 mm, thus 0.5 mm below the second height H_2 . This difference is so small that it cannot be seen in the drawings.

[0046] The protrusions 12, 15 protrude over a distance of 15 mm outside the sidelong connecting slat 3A, 3B on the same side.

[0047] The use of the element 1 described above is described hereinafter, with reference to figures 4 to 8. This use concerns the positioning of a number of elements 1, as is done in a lorry prior to transport for example.

[0048] Hereby, for clarity no objects placed on the elements are shown. However, in practice objects to be transported are placed on the elements 1 during use, for example panes of glass that are placed side-by-side, each with an edge on the bearing edges 4 and are thereby vertically supported, and which rest with a flat side against the supporting edges 5, directly or via glass plates placed closer to the supporting edges 5 and are thereby supported sideways.

[0049] A first element 1A is first positioned, using a pallet trolley 17 for example, whereby the positioning direction is in the direction from the second side 9 to the first side 8, and corresponds to the driving direction of the lorry. This direction is indicated by the arrow P.

[0050] Then a second identical element 1B is positioned, in the same positioning direction, also using a pallet trolley 17.

[0051] Thanks to the fact that there is only a fourth connecting slat 3D on one side of the back sections 6, the loader can easily select the correct orientation for each element 1.

[0052] The pallet trolley 17 lifts the element 1B via the sidelong connecting slat 3B on the second side 9 and the third connecting slat 3C. As a result no part of the pallet trolley 17 protrudes outside the first side 8, so that the second element 1B can be placed exactly against the first element 1A.

[0053] This situation is shown in figure 4. The second element 1B is somewhat higher than the first element 1A, because the second element 1B is on the pallet trolley 17.

[0054] The second element 1B is driven with its first

side 8 against the second side 9 of the first element 1A. This is done in a slightly displaced position compared to the first element 1A, so that the ribs 2 of the two elements 1A, 1B are not in line with one another. This is especially clear from figure 6.

[0055] Due to the somewhat raised position of the second element 1B, the protrusions 12 on the first side 8 of the second element 1B are substantially higher than the sidelong connecting slats 3A, 3B of the first element 1A, and the sidelong connecting slats 3A, 3B of the second element 1B are substantially higher than the protrusions 15 on the second side 9 of the first element 1A, so that the said protrusions 12, 15 do not impede the accurate positioning of the second element 1B against the first element 1A with their sidelong connecting slats 3A, 3B against one another.

[0056] Then the element 1B can be lowered and the pallet trolley 17 removed.

[0057] The protrusions 15 on the second side 9 of the first element 1A are now under the sidelong connecting slat 3A on the first side 8 of the second element 1B, and the protrusions 12 on the first side 8 of the second element 1B are above the sidelong connecting slat 3B on the second side 9 of the first element 1A, in both cases with a gap in between of only 0.5 mm.

[0058] In an equivalent way a third element 1C is now positioned, whereby this third element 1A is again displaced slightly in the longitudinal direction L with respect to the second element 1B, and such that the ribs 2 of the third element 1C are in line with the ribs 2 of the first element 1A.

[0059] The situation now obtained is shown in figures 5 to 8. It is clear that more elements 1 can be placed in an equivalent way, but for clarity only three elements 1 are used in this example.

[0060] Then the elements 1A, 1B, 1C can be secured, for example by means of straps or belts over the protruding parts of the sidelong connecting slats 3A, whereby little downward force is exerted on the second element 1B.

[0061] If the vehicle in which the elements 1A, 1B, 1C are placed now has to brake hard, large downward forces will be exerted on the feet 7 on the first side 8 of each of the elements 1A, 1B, 1C, which could collapse as a result of this. Alternatively, elements 1A, 1B, 1C could tip over with their load.

[0062] The feet 7 on the second side 9 of all elements 1A, 1B, 1C will hereby experience additional upward forces, thus will be unloaded and consequently have the tendency to move upwards.

[0063] In the first instance these forces will be coupled with slight deformations or movements of the elements 1A, 1B, 1C, which results in the protrusions 12, 15 of the elements 1A, 1B, 1C and the sidelong connecting slats 3A, 3B of the elements 1A, 1B, 1C placed next to them come against one another and the upward and downward forces can be transmitted to one another.

[0064] More specifically, downward forces are hereby

transmitted from the first side 8 of the elements 1A, 1B, 1C to the second side 9 of another element 1A, 1B, 1C, thus precisely where additional upward forces occur due to braking and vice versa. As a result these forces are distributed over all elements 1A, 1B, 1C so that the elements 1A, 1B, 1C stabilise each other, and the risk of the elements 1A, 1B, 1C falling over and/or collapsing is reduced.

[0065] The alternative element 1 of figure 9 differs from the element 1 described above by all ribs 2 being provided on both sides 8,9 with first protrusions 12 and second protrusions 15.

[0066] The use of this alternative element 1 is similar to the element 1 described above, with the difference that elements 1 cannot be placed next to one another with a good fit with a pallet trolley 17, because then protrusions 12, 15 collide against a sidelong connecting slat 3A,3B.

[0067] This means that two elements 1 are first brought close to one another with a pallet trolley 17 and afterwards must be moved against one another as soon as they are at the same height. This turns out not to be a problem in practice. In order to facilitate this, the corners 18 of the protrusions are somewhat rounded.

[0068] As is especially clear from figure 10, the protrusions 12, 15 on a side 8,9 are now both above and below a sidelong connecting slat 3A,3B of an adjacent element, such that a better coupling and stabilisation is obtained.

[0069] Different further alternative embodiments of the element described above are possible.

[0070] For example, the protrusions 12, 15 can be above the connecting slats on both sides 8, 9, or below the connecting slats 3A, 3B on both sides 8, 9.

[0071] This does not have any direct consequences on the stability that is obtained with the side-by-side positioning, but the positioning by means of a pallet truck 17 is more difficult.

[0072] The protrusions 12, 15 could also not be at the ribs 2, but on another component of the element 1 and the number of protrusions 12,15 is not fixed. A single protrusion will also provide an effect.

[0073] The sidelong connecting slats 3A, 3B, and thereby also the protrusions 12, 15 are not necessarily at the same height on both sides 8, 9.

[0074] An embodiment in which one or more protrusions 12, 15 are only present on one side is also possible.

[0075] The present invention is by no means limited to the embodiments described as an example and shown in the drawings, but an element according to the invention can be realised in all kinds of forms and dimensions, without departing from the scope of the invention.

Claims

1. Element (1) for the storage, handling and transport of objects, that comprises two or more ribs (2) that extend at a mutual distance from one another in the width and height directions, whereby the element (1)

has two sides (8,9) located opposite one another that are both provided with a sidelong connecting slat (3A, 3B) that extends in the longitudinal direction (L) of the element (1), whereby at least one sidelong connecting slat (3A, 3B) has a top edge (10) that is at a first height (H_1) and at least one sidelong connecting slat (3A, 3B) has a bottom edge (11) that is at a second height (H_2), whereby the ribs (2) are connected together by means of the connecting slats (3A, 3B), **characterised in that** the element (1) is provided with one or more protrusions (12, 15) on one or both sides (8,9) that protrudes or protrude sideways outside the sidelong connecting slat (3A, 3B) on this side (8,9), and which has or have a bottom edge (14) at a third height (H_3) that is greater than or equal to the first height (H_1) or has or have a top edge (16) at a fourth height (H_4) that is less than or equal to the second height (H_2), so that, when the element (1) is placed sideways against an identical element (1), a protrusion or protrusions (12, 15) is or are above or below a sidelong connecting slat (3A, 3B) of the identical element (1).

2. Element (1) according to claim 1, **characterised in that** the difference between the third height (H_3) and the first height (H_1) and/or the difference between the second height (H_2) and the fourth height (H_4) is less than 5 mm.
3. Element (1) according to claim 1 or 2, **characterised in that** the said one or more protrusions (12, 15) is or are located on one or more ribs (2).
4. Element (1) according to any one of the previous claims, **characterised in that** the said one or more protrusions (12, 15) is or are an integral part of a rib or ribs (2).
5. Element (1) according to any one of the previous claims, **characterised in that** the said one or more protrusions (12, 15) protrudes or protrude sideways outside the sidelong connecting slat (3A, 3B) over a distance (A) that is less than or equal to twice the thickness (D_v) of the connecting slats (3A, 3B) but is greater than half of the thickness (D_v) of the connecting slats (3A, 3B).
6. Element (1) according to any one of the previous claims, **characterised in that** it is provided on both sides (8, 9) with one or more of the said protrusions (12, 15).
7. Element (1) according to claim 6, **characterised in that** the sidelong connecting slats (3A, 3B) are placed at the same height on both sides (8, 9) and are of the same size, viewed in a vertical cross-section.

8. Element (1) according to claims 6 or 7, **characterised in that** all said protrusions (12, 15) have a bottom edge (14) at a third height (H_3) that is greater than or equal to the first height (H_1), or all said protrusions (12, 15) have a top edge (16) at a fourth height (H_4) that is less than or equal to the second height (H_2). 5

9. Element (1) according to claims 6 or 7, **characterised in that** the said protrusions (12) have a bottom edge (14) on a first side (8) at a third height (H_3) that is greater than or equal to the first height (H_1) of the top edge (10) of the connecting slat (3B) on a second opposite side (9) and that the said protrusions (15) on the second side (9) have a top edge (16) at a fourth height (H_4) that is less than or equal to the second height (H_2) of the bottom edge (11) of the connecting slat (3A) on the first side (8). 10
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10. Element (1) according to any one of the previous claims, **characterised in that** the element (1) has at least two such protrusions (12, 15) on either side (8, 9) and that at least one of the protrusions (12, 15) on either side (8, 9) has a bottom edge (14) at a third height (H_3) that is greater than or equal to the first height (H_1) and at least one of the protrusions (12, 15) has a top edge (16) at a fourth height (H_4) that is less than or equal to the second height (H_2). 20
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11. Element (1) according to any one of the claims 1 to 9, **characterised in that** the element (1), on either side (8, 9) where it has the said one or more protrusions (12, 15), has at least two such protrusions (12, 15) and that the protrusions (12, 15) on a certain side (8,9) all have a bottom edge (14) at a third height (H_3) that is greater than or equal to the first height (H_1) or all have a top edge (16) at a fourth height (H_4) that is less than or equal to the second height (H_2). 30
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12. Element (1) according to any one of the previous claims, **characterised in that** it is provided with a third connecting slat (3C) that connects the ribs (2) together, that is between the two sidelong connecting slats (3A, 3B) and which extends parallel to them, whereby the underside of the two sidelong connecting slats (3A, 3B) and of the third connecting slat (3C) are at the same height (H_2). 45

13. Element (1) according to any one of the previous claims, **characterised in that** the ribs (2) each have a bearing edge (4) for the downward support of the objects, whereby the bearing edges (4) are in the same plane and **in that** the ribs (2) each have a supporting edge (5) for the sideways support of the objects, whereby the supporting edges (15) are in the same plane and perpendicular to the bearing edges (4). 50
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14. Element (1) according to claim 13, **characterised in that** the ribs (2) each have two bearing edges (4) that each have an incline, whereby the inclines of these two bearing edges (4) are such that they make an upward-oriented angle to one another that is less than 180° , and that the ribs (2) have a back section (6) on which there are two supporting edges (5) that are each perpendicular to a bearing edge (4) of the same rib (2).

15. Element (1) according to claims 11 and 14, **characterised in that** the element is provided with a fourth connecting slat (3D) that connects the ribs (2) together, whereby this fourth connecting slat (3D) is in recesses in the supporting edges (5).

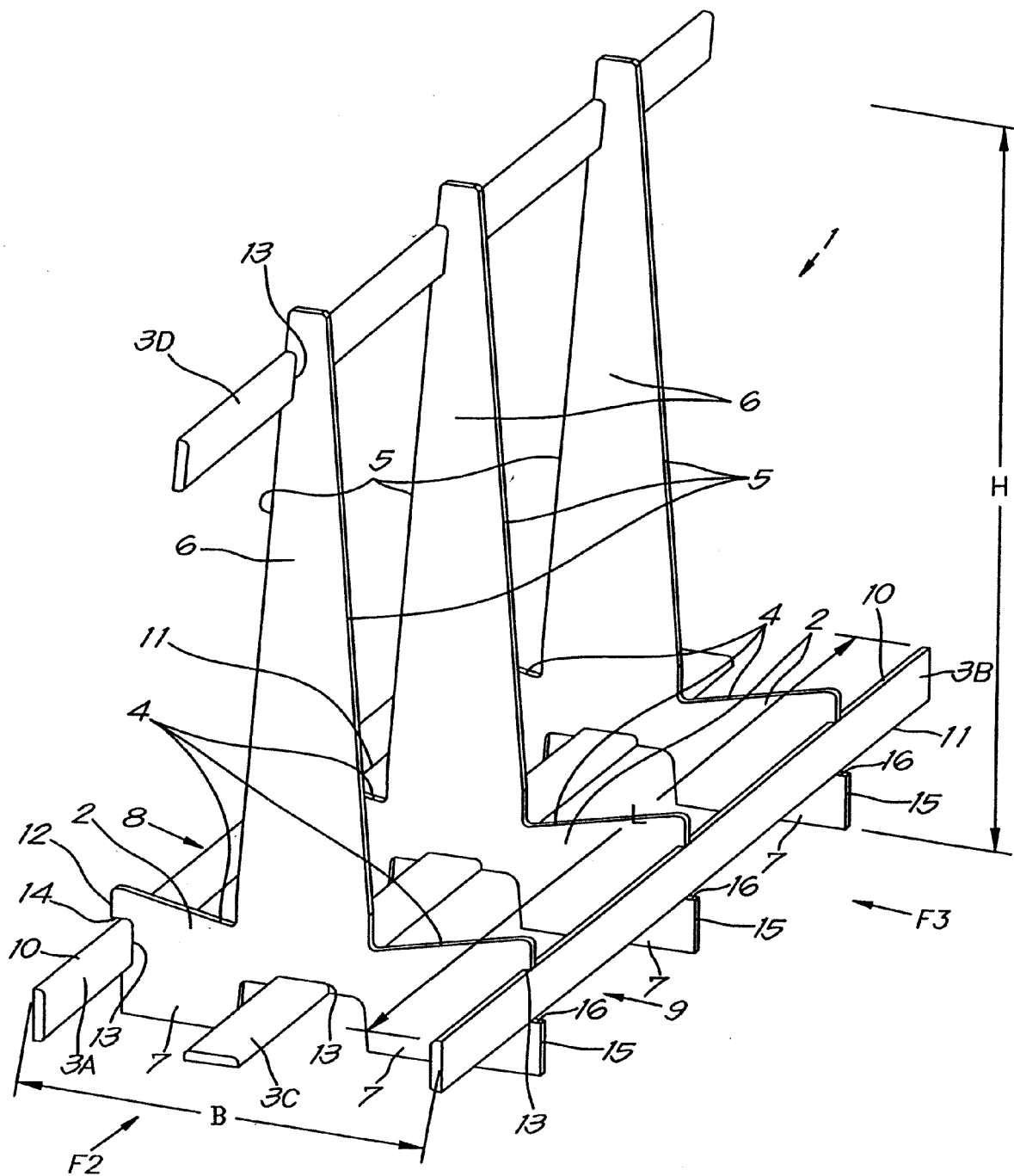
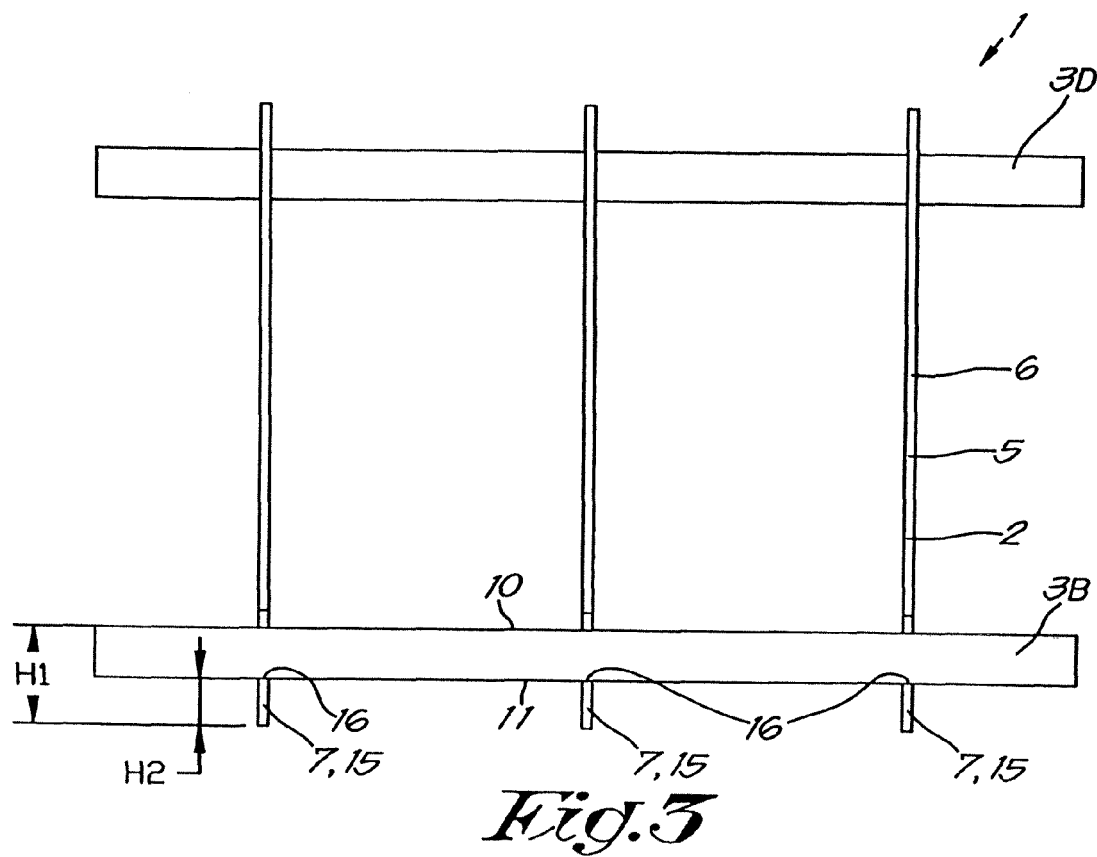
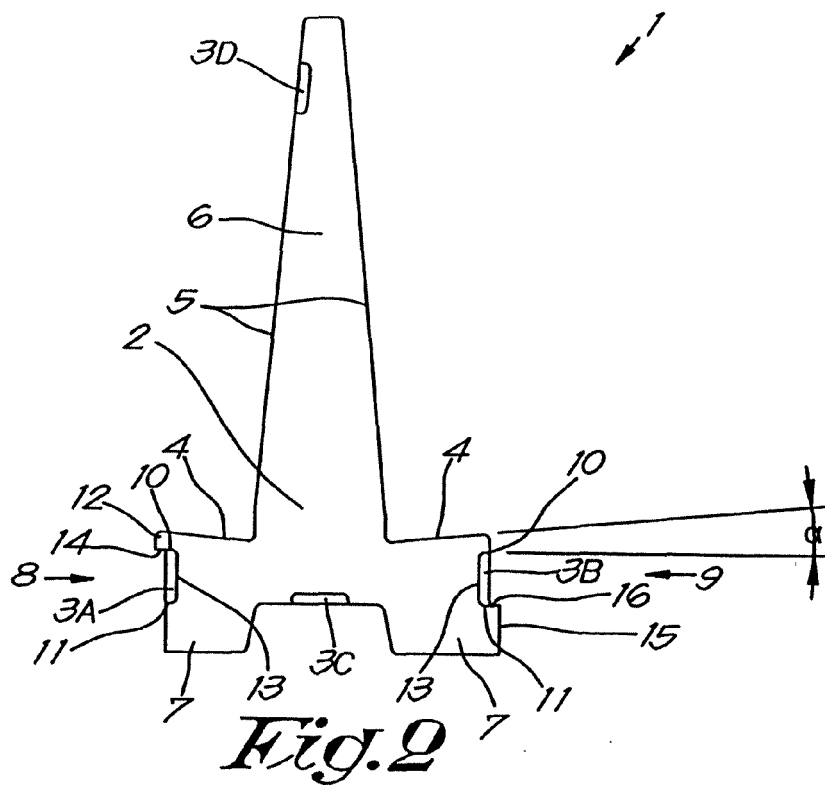
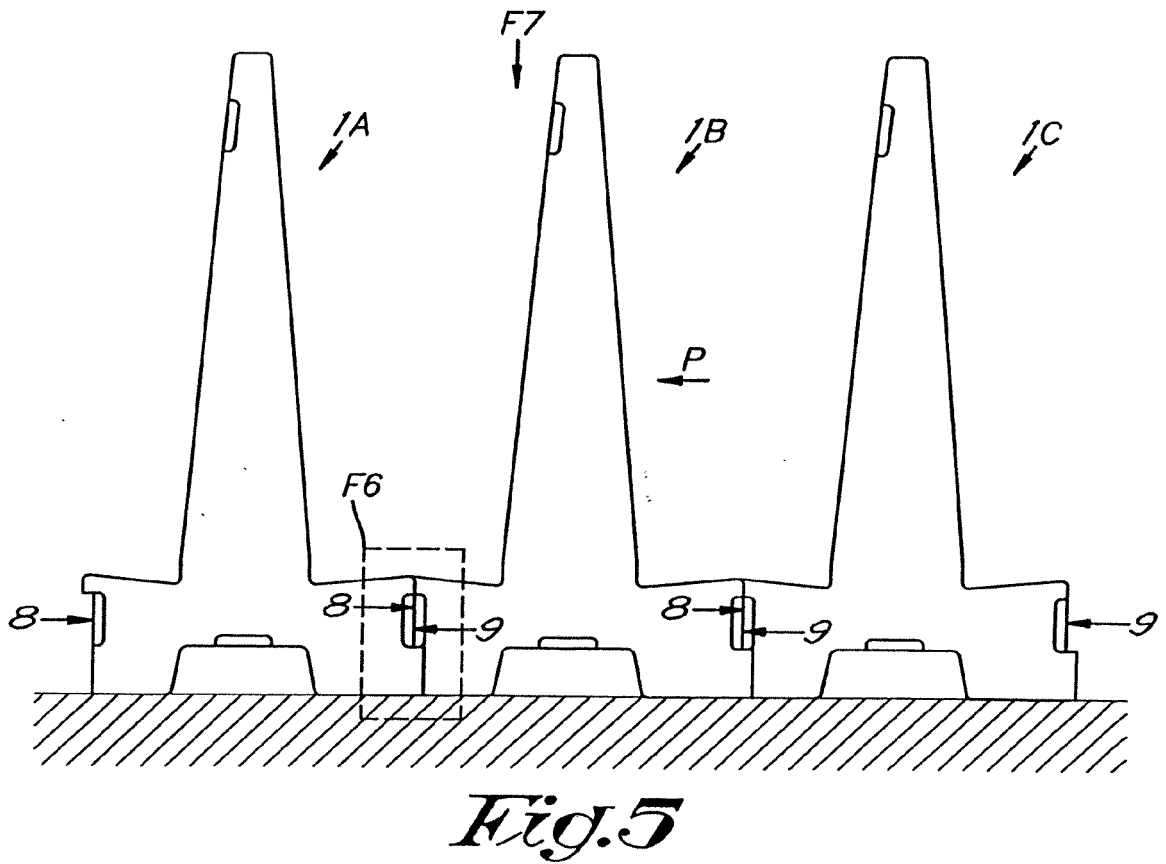
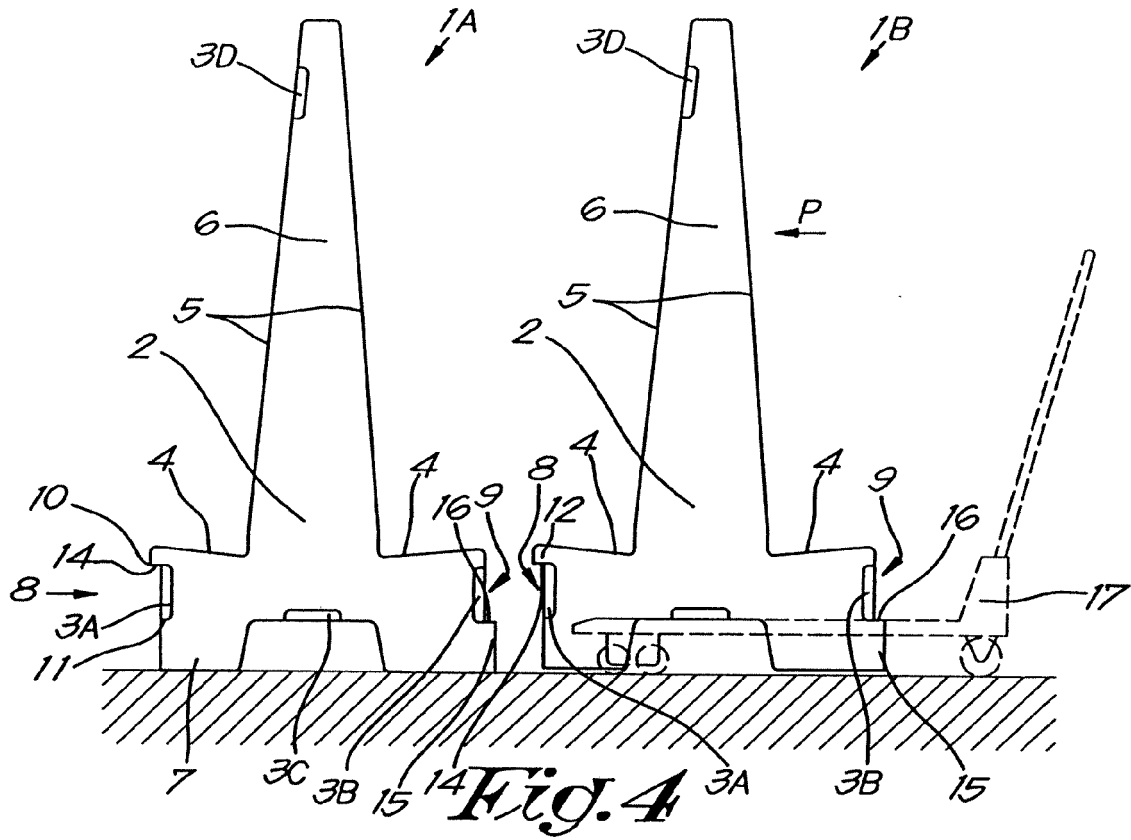


Fig. 1





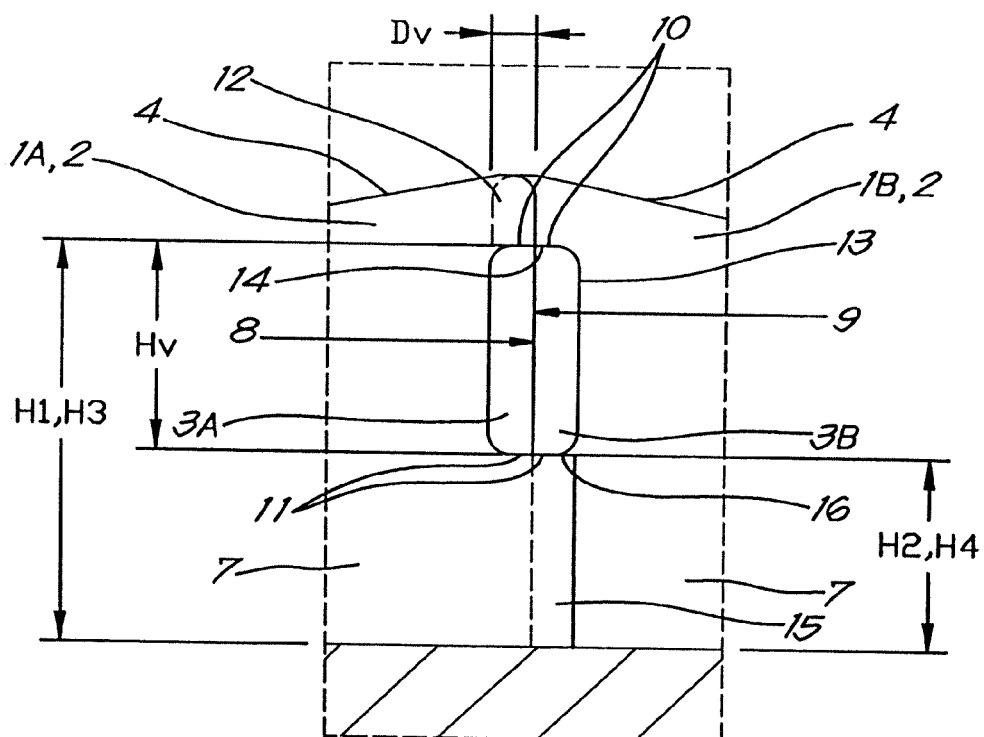


Fig. 6

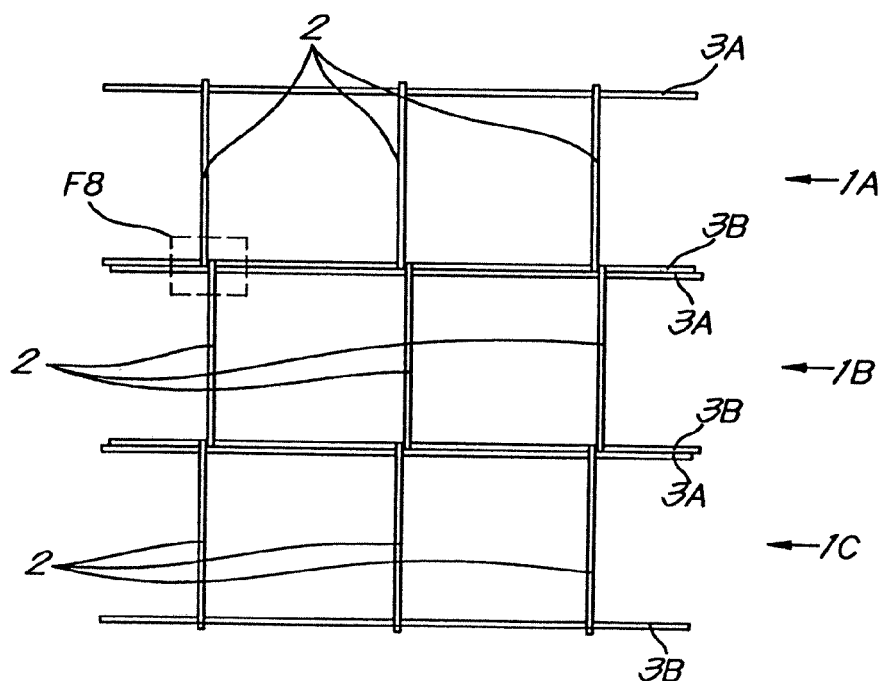


Fig. 7

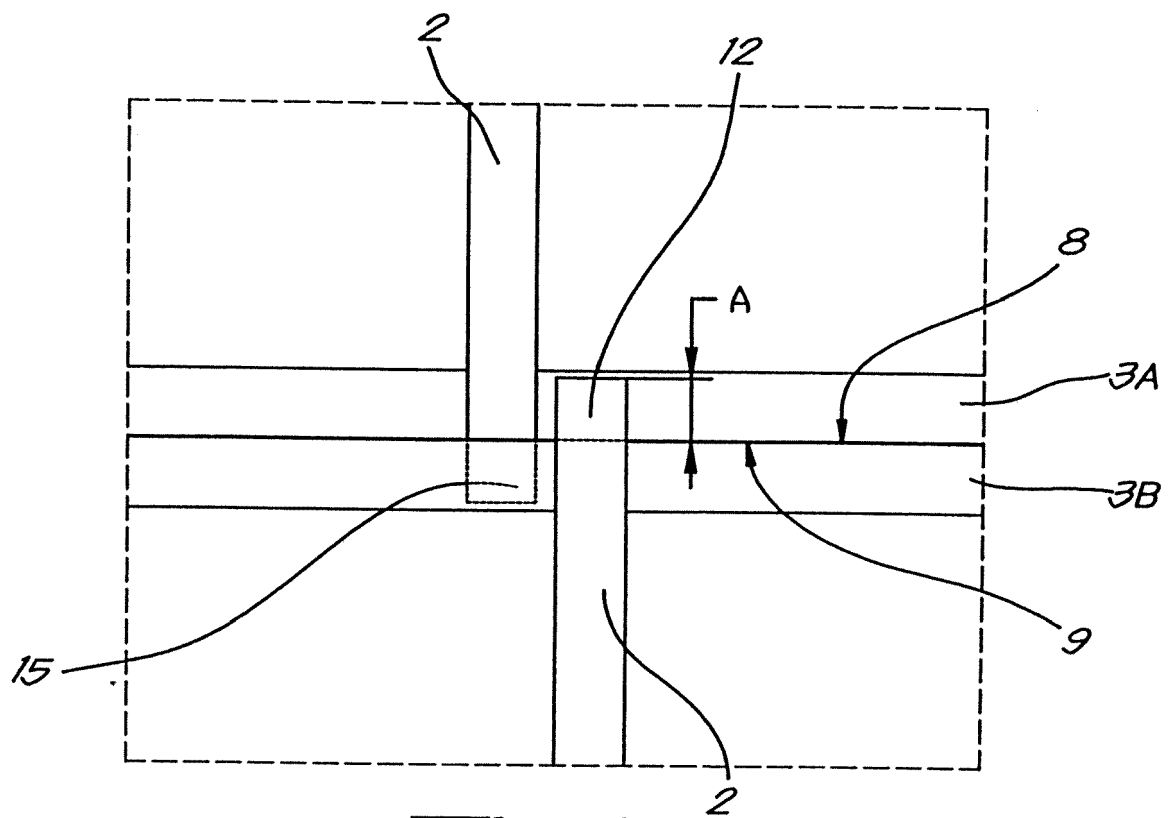


Fig. 8

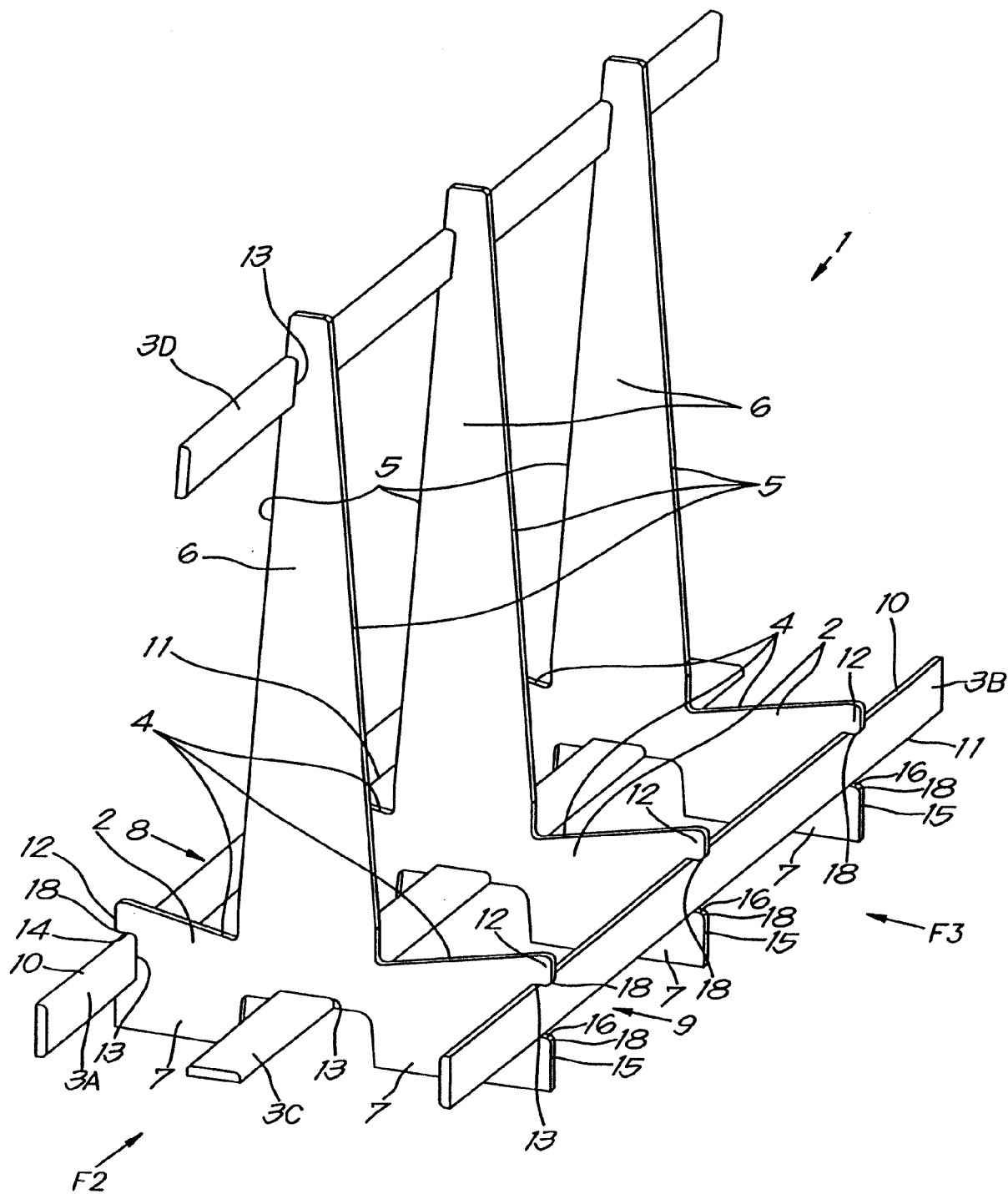


Fig. 9

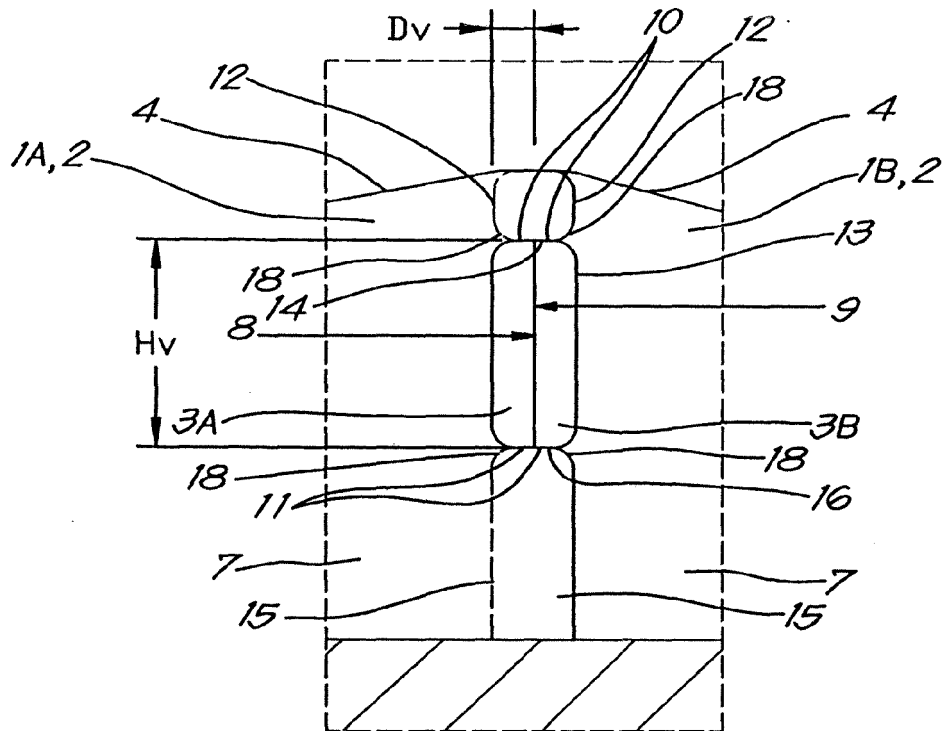


Fig. 10

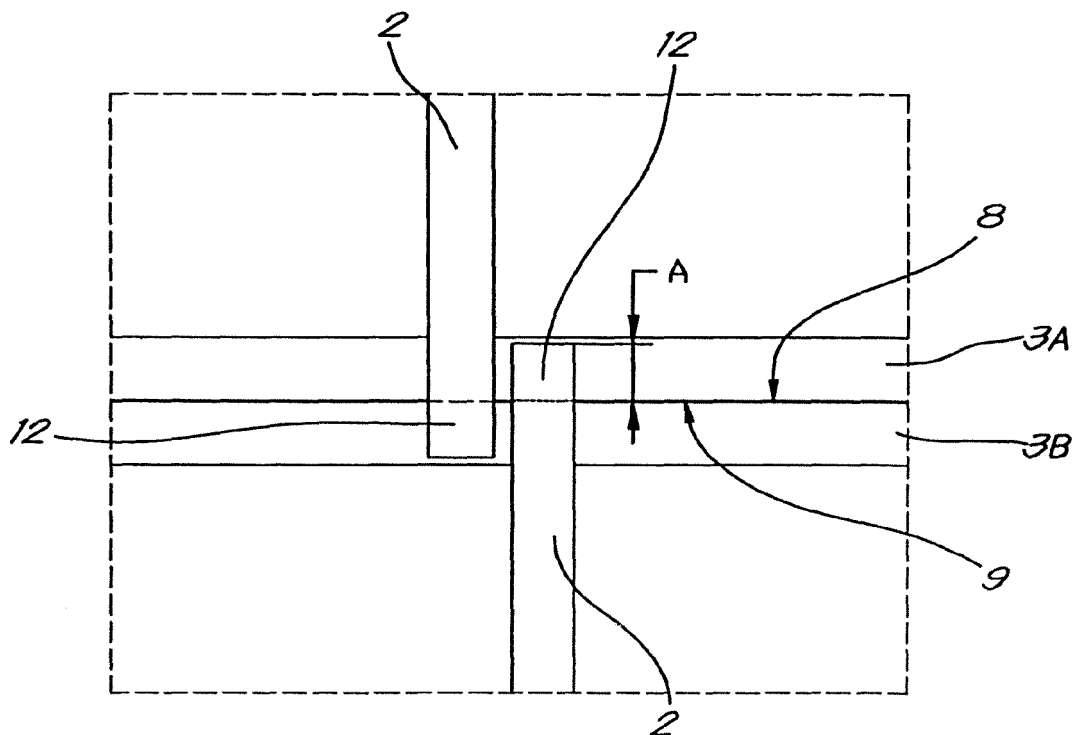


Fig. 11



EUROPEAN SEARCH REPORT

 Application Number
 EP 14 07 5017

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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