



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.08.2008 Bulletin 2008/34

(51) Int Cl.:
E06B 3/96 (2006.01)

(21) Application number: **07108251.5**

(22) Date of filing: **15.05.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Vest-Wood Sverige AB**
265 81 Astorp (SE)

(72) Inventor: **Bresman, Jonas**
260 60, Kvidinge (SE)

(74) Representative: **Bergquist, Kjell Gunnar**
Albihns AB
P.O. Box 142
401 22 Göteborg (SE)

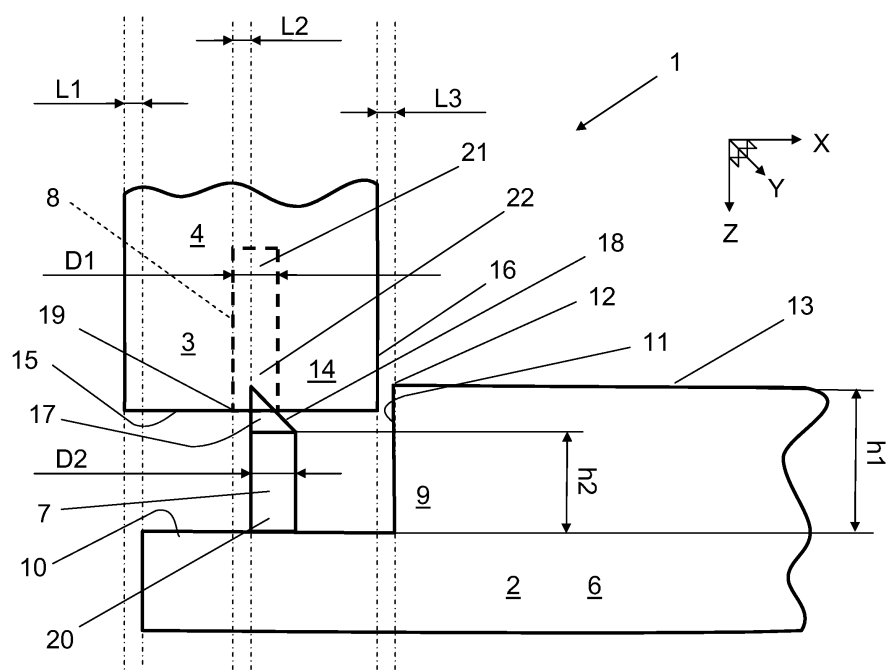
(30) Priority: **19.02.2007 SE 0700417**

(54) **Leak proof frame assembly**

(57) Frame assembly (1) comprising at least a first frame member (2) joined together with a second frame member (4). The first frame member (2) comprises a stepped first end section (9) comprising a first end surface (10) and a second end surface (11) at an angle to the first end surface (10). The second frame member (4) comprises a third end surface (15) perpendicular to the fourth end surface (16). The first end surface (10) comprises a pin (7) intended to be inserted into a hole (8) in the third end surface (15), or vice versa. The pin (7) and/or the hole (8) comprises an upper part (17, 22) that is chamfered in such a way that, when the pin (7) is inserted into the hole (8) and the third end surface (15) is moved towards the first end surface (10), the second frame member (4) is moved in the direction towards the second end surface (11) by the action of the chamfered upper part (17, 22).

prises a pin (7) intended to be inserted into a hole (8) in the third end surface (15), or vice versa. The pin (7) and/or the hole (8) comprises an upper part (17, 22) that is chamfered in such a way that, when the pin (7) is inserted into the hole (8) and the third end surface (15) is moved towards the first end surface (10), the second frame member (4) is moved in the direction towards the second end surface (11) by the action of the chamfered upper part (17, 22).

Fig. 2



Description

TECHNICAL FIELD

[0001] The present invention relates to a frame assembly comprising at least a first frame member joined together with a second frame member. The first frame member comprises a stepped first end section comprising a first end surface and a second end surface at an angle to the first end surface. The second end surface has a vertical extent from the first end surface to an edge with an extent in a plane that is parallel to the first end surface. The second frame member comprises a second end section comprising a third end surface parallel to the first end surface and the fourth end surface with an extent essentially perpendicular to the third end surface. The first end surface comprises a pin intended to be inserted into a hole in the third end surface. Alternatively, the third end surface comprises a pin intended to be inserted into a hole in the first end surface. The invention also relates to a method for joining together frame members.

BACKGROUND ART

[0002] For a long time, the construction of a frame assembly by joining together a pair of vertical frame members (jambs) and a top frame member and a bottom frame member has been known. The four parts are assembled at the corners of the frame assembly by a joint comprising at least a pin and a corresponding hole. The previously known assembly is shown in Figure 1 and will be discussed in greater detail below in the description of embodiments. In Figure 1, the bottom frame member and the top frame member are provided with pins and the vertical frame members are provided with holes. The bottom frame member and the top frame member also comprise a stepped first end section comprising a first end surface and a second end surface perpendicular to the first end surface. The pin is arranged on the first end surface. The second end surface has an extent from the first end surface to an edge with an extent in a plane that is parallel to the first end surface.

[0003] Figure 1 shows an encircled part A and an encircled part B that both show the problem with previously known technology where the hole in the vertical frame member is to be matched to the pin on the bottom frame member at the same time as the second end section of the frame member is to be matched to the space in the stepped first end section of the bottom frame member.

[0004] Part A illustrates the case where the frame is too large for the stepped end section, that is the distance between the pin and the second end surface is less than the distance between the hole and the fourth end surface. The second end section is thus too large to be fitted into the stepped first end section, which means that the third end surface will be in contact with the edge of the bottom frame member, which in turn means that the vertical frame member can not be fitted into the stepped first end

section.

[0005] Part B illustrates the case where the frame is too small for the stepped end section, that is the distance between the pin and the second end surface is larger than the distance between the hole and the fourth end surface. The second end section has thus been reduced in order to enable it to fit into the stepped first end section. The result is that the fourth end surface will be at a distance from the second end surface, which has the adverse effect that water, etc., can seep into the crack between the fourth end surface and the second end surface. In order to avoid such a crack, it is customary to carry out an additional treatment to the assembly by the application of a sealing compound into the crack, which is both expensive and time-consuming.

[0006] There is thus a need to find an improved method for frame assembly that avoids the abovementioned problem.

DISCLOSURE OF INVENTION

[0007] The present invention is intended to solve the abovementioned problem by means of a frame assembly comprising at least a first frame member joined together with a second frame member. The first frame member comprises a stepped first end section comprising a first end surface and a second end surface at an angle to the first end surface. The second end surface has an extent from the first end surface to an edge with an extent in a plane that is parallel to the first end surface. The second frame member comprises a second end section comprising a third end surface parallel to the first end surface and the fourth end surface with an extent essentially perpendicular to the third end surface. The first end surface comprises a pin intended to be inserted into a hole in the third end surface. Alternatively, the third end surface comprises a pin intended to be inserted into a hole in the first end surface.

[0008] The invention is characterized in that the pin and/or the hole comprises an upper part that is chamfered in such a way that, when the pin is inserted into the hole and the third end surface is moved towards the first end surface, the second frame member is moved in a direction towards the second end surface by the action of the chamfered upper part. By the words "by the action of" it is meant here that the chamfered upper part of the pin is shaped in such a way that an edge of the hole or an inner surface of the hole slides on the chamfered upper part in such a way that a movement arises in a lateral direction, the X-direction, of the second frame member when the pin is inserted into the hole in a direction, the Z-direction, essentially perpendicular to the lateral direction, the X-direction. It should be mentioned that "by the action of" also relates to the case when the pin does not have a chamfered upper part, but when the hole comprises such a chamfered upper part, or when both the pin and the hole comprise a chamfered upper part.

[0009] An advantage of the invention is that the fourth

end surface of the second frame member can initially be placed at a distance from the second end surface, as the chamfered upper part is narrower than the diameter of the hole. The upper part of the pin can thus be inserted into the hole even if the second frame member is slightly "incorrectly placed". When the second frame member is moved in a direction towards the first surface, that is in the Z-direction, the chamfered upper part will guide the second frame member in the direction towards the second end surface, that is in the X-direction.

[0010] The simultaneous translatory movement in the X-direction means that the second frame will be placed "correctly" in relation to the second end surface when the pin is inserted into the hole, provided that the upper chamfered part has a transition to a lower part of the pin and/or the hole. It should be mentioned that both the hole and the pin can have a chamfered upper part and a lower part. Alternatively, only the hole or only the pin has an upper chamfered part. In the latter case, if the pin has a chamfered upper part, the hole consists of an essentially uniform channel, or, if the hole has a chamfered upper part, the pin consists of an essentially uniform peg. The peg can, however, comprise radial flanges that increase the contact between the lower part of the hole and the lower part of the peg so that a press joint or friction joint is created. For the same reason, the channel can comprise fluting or grooving, etc.

[0011] The pin and the hole thus each comprise lower parts that are matched in relation to each other in such a way that a press joint is created between the lower parts of the hole and the pin when essentially the whole pin has been inserted into the hole.

[0012] The lower parts are matched to each other in such a way that the fourth end surface creates a press joint with at least a part of the second end surface. When the assembly is completed, the third end surface is arranged essentially in association with the first end surface. The third end surface can thus be caused to make direct contact with the first end surface, but the third end surface can also be allowed to be a very short distance from the first end surface. This latter case can depend on tolerances, irregularities, etc, but the distance must not be so great that the assembly is unstable.

[0013] In an embodiment of the invention, the pin consists of the chamfered upper part and the lower part, and the lower part is shorter than the vertical extent of the second end surface. This means that the third end surface has passed the edge when the lower part of the hole or, when the hole is uniformly shaped, the upper part of the hole, is guided via the lower part of the pin, which coincides with the fourth end surface being in contact with the second end surface. In this position and while the second frame member continues to be pressed in a direction towards the first end surface, the fourth end surface will be pressed towards the second end surface, which ensures the creation of a leak proof press joint between the second end surface and the fourth end surface.

[0014] If the pin is uniformly shaped with regard to the upper and lower part, the upper part of the hole is chamfered with an extent in the Z-direction that enables the upper part to receive the pin to such an extent that the third end surface has passed the edge before the fourth edge is pressed towards the second edge.

[0015] The upper part of the pin and/or the hole is conical, or in the form of a half cylinder; or oval, or triangular, or other suitable shape in order to be able to guide the second frame member.

[0016] The first frame member can be a bottom frame member or a top frame member and the second frame member can be a vertical frame member. Alternatively, the second frame member can be a bottom frame member or a top frame member and the first frame member can be a vertical frame member.

[0017] For both of these two alternatives, the frame assembly comprises two first frame members that are opposite each other and two second frame members that are opposite each other, which first and second frame members are assembled in such a way that the first and second frame members together create a rectangle.

[0018] In an embodiment of the invention, the second end surface is arranged at an acute angle to the first end surface so that the edge is in contact with the fourth end surface, at least when the third end surface is arranged in association with the first end surface. This embodiment ensures that irregularities in the second end surface, or the fourth end surface but distances the edge from the fourth end surface.

[0019] According to a second embodiment, the second end surface is arranged perpendicular to the first end surface so that the second end surface is in contact with the fourth end surface, at least when the third end surface is arranged in association with the first end surface. This embodiment provides the most leak proof joint, as essentially the whole of the second end surface is in contact with the fourth end surface.

BRIEF DESCRIPTION OF DRAWINGS

[0020] The invention will be described below in association with a number of drawings, in which:

Figure 1 shows schematically a frame assembly according to previously known technology;

Figure 2 shows schematically a section of a corner part of a frame assembly before joining together of the parts comprised in the frame assembly according to an embodiment of the invention;

Figure 3 shows schematically a section of a corner part of a frame assembly after joining together of the parts comprised in Figure 2, according to a first embodiment of the invention;

Figure 4 shows schematically a section of a corner

part of a frame assembly after joining together of the parts comprised in Figure 2, according to a second embodiment of the invention;

Figure 5 shows schematically a section of a corner part of a frame assembly before joining together of the parts comprised in the frame assembly according to an embodiment of the invention.

Figure 6 shows schematically a section of a corner part of a frame assembly before joining together of the parts comprised in the frame assembly according to an embodiment of the invention, and;

Figure 7 shows a frame assembly assembled according to the invention.

MODES FOR CARRYING OUT THE INVENTION

[0021] In the drawings, there is an ortho-standardized coordinate system with the axes X, Y and Z. The coordinate system is included in order to simplify the description of the invention.

[0022] Figure 1 shows schematically a frame assembly 1 according to previously known technology. The frame assembly 1 comprises a pair of second frame members 2 in the form of vertical frame members 3 and a pair of first frame members 4 in the form of a top frame member 5 and a bottom frame member 6. The latter is also called a sill. The four parts are assembled at the corner sections of the frame assembly 1 via a joint comprising at least a pin 7 and a corresponding hole 8. In Figure 1, the bottom frame member 6 and the top frame member 5 are provided with pins 7 and the vertical frame members are provided with holes 8. It can equally well be the other way round, that is the vertical frame members are provided with pins and the bottom frame member and the top frame member are provided with holes. The part of the frame assembly 1 that comprises the pin 7 also comprises a stepped first end section 9 comprising a first end surface 10 and a second end surface 11 perpendicular to the first end surface 10. The pin 7 is arranged on the first end surface 10. The second end surface 11 has an extent from the first end surface 10 to an edge 12 with an extent in a plane 13 that is parallel to the first end surface 10. In Figure 1, it is the bottom frame member 6 and the top frame member 5 that comprise the stepped first end sections 9 with pins 7.

[0023] The pin can be made of wood, plastic, metal or other material that is suitable for the purpose.

[0024] Figure 1 shows that both the vertical frame members 3 comprise a pair of second end sections 14 comprising a third end surface 15 that is parallel to the first end surface 10 when the first and second frame members 2, 4 are assembled into the frame assembly 1. In addition, the second end section 14 comprises the fourth end surface 16 with an extent essentially perpendicular to the third end surface 15. In Figure 1, the first

end surface 10 thus comprises the pin 7 that is intended to be inserted into a hole 8 in the third end surface 15. In a second embodiment, the third end surface 15 can comprise a pin that is intended to be inserted into a hole 8 in the first end surface 10. The same problem arises, however, with the assembly of the various parts irrespective of which side the pin 7 and the hole 8 are on.

[0025] Figure 1 shows an encircled part A and an encircled part B that both show the problem with previously known technology where the hole 8 in the vertical frame member is to be matched to the pin 7 on the bottom frame member while at the same time the second end section 14 of the frame member is to be matched to the space in the stepped first end section 9 of the bottom frame member 6.

[0026] Part A illustrates the case where the second frame member 4 is too large for the stepped first end section 9, that is the distance between the pin 7 and the second end surface is smaller than the distance between the hole 8 and the fourth end surface 16. The second end section 14 is thus too large to be fitted into the stepped first end section 9, which means that the third end surface 15 will be in contact with at least the edge 12 of the bottom frame member 6, which in turn means that the vertical frame member 3 cannot be fitted into the stepped first end section 9.

[0027] Part B illustrates the case where the second frame member 4 is too small for the stepped first end section 9, that is the distance between the pin 7 and the second end surface 11 is larger than the distance between the hole 8 and the fourth end surface 16. The second end section 14 has thus been reduced in order to enable it to fit into the stepped first end section 9. The result is that the fourth end surface 16 will be at a distance from the second end surface 11, which has the adverse effect that water, etc, can seep into the crack between the fourth end surface 16 and the second end surface 11. In order to avoid such a crack, it is customary to carry out an additional treatment to the assembly by the application of a sealing compound into the crack, which is both expensive and time-consuming.

[0028] Figure 2 shows schematically a section of a corner part of a frame assembly 1 before joining together of the parts comprised in the frame assembly 1 according to an embodiment of the invention. The frame assembly shown in Figure 2 has the same reference numerals as in Figure 1 for identical parts.

[0029] Figure 2 shows a first frame member 2 that is to be joined at an angle to a second frame member 4. The first frame member 2 comprises a stepped first end section 9 comprising a first end surface 10 and a second end surface 11 at an angle to the first end surface 10. The second end surface 11 has an extent from the first end surface to an edge 12 with an extent in a plane 13 that is parallel to the first end surface 10. The second frame member 4 comprises a second end section 14 comprising a third end surface 15 parallel to the first end surface 10 and the fourth end surface 16 with an extent

essentially perpendicular to the third end surface 15. The first end surface comprises a pin 7 intended to be inserted into a hole 8 in the third end surface 15.

[0030] Figure 2 shows that the first frame member 2 has a thickness in the Z-direction, a length in the X-direction and a breadth in the Y-direction. The first frame member 2 is symmetrical with regard to its longitudinal extent and has thus two identical first end sections 9 on opposite sides of a centre line. The first frame member 2 has an inner part and an outer part that delimit the thickness. The first frame member has two opposing side edges that delimit the breadth. The two second end surfaces 11 delimit the inner part of the first frame member in the longitudinal direction. The two first end surfaces 10 lengthen the outer part of the first frame member in relation to the two second end surfaces 11. The first end surface 10 faces towards the inner part of the first frame member 2.

[0031] Figure 2 shows that the second frame member 4 has a thickness in the X-direction, a longitudinal extent in the Z-direction and a breadth in the Y-direction. The second frame member 4 is symmetrical with regard to its longitudinal extent and has thus two identical first end sections 14 on opposite sides of a centre line. The second frame member 4 has an inner part and an outer part that delimit the thickness. The second frame member has also two opposing side edges that delimit the breadth. The two third end surfaces 15 delimit the second frame member in the longitudinal direction. The fourth end surface 16 is located in the inner part of the second frame member 4.

[0032] The pin 7 comprises an upper part 17 that is chamfered in such a way that, when the pin 7 is inserted into the hole 8 and the third end surface 15 is moved towards the first end surface 10, the second frame member 4 is moved in the direction towards the second end surface 11 by the action of the chamfered upper part, at least when the third end surface 15 has passed the edge 12. Figure 2 shows that the chamfered upper part 17 comprises an inclined plane 18 that is in contact with an edge part 19 of the hole. The edge part 19 rides on/slides against the inclined plane 18 in such a way that a movement arises in the lateral direction, the X-direction, of the second frame member when the pin 7 is inserted into the hole 8 in a direction, the Z-direction, essentially perpendicular to the lateral direction, the X-direction.

[0033] Figure 2 shows that the pin 7 has a length with an extent in the Z-direction. The pin 7 and the hole 8 each comprise lower parts 20, 21 that are matched in relation to each other in such a way that a press joint is created between the lower parts 20, 21 of the hole 8 and the pin 7 when the whole pin 7 has been inserted into the hole 8.

[0034] Figure 2 shows that the pin 7 consists of the chamfered upper part 17 and the lower part 20 and that the lower part 20 is shorter than the vertical extent of the second end surface 11, that is in the Z-direction. This means that the third end surface 15 has passed the edge 12 of the first frame member 2 when the outer edge part

19 of the hole meets the lower part 20 of the pin 7, whereby the fourth end surface 16 is caused to make contact with the second end surface 11 in association with the said transition between the upper chamfered upper part 17 and the lower part 20. When the second frame member 4 is caused to continue to move in the Z-direction, the fourth end surface 16 will be pressed against the second end surface 11, which end surfaces 11, 16 will slide against each other during the movement of the second frame member 4 from the transition between the chamfered upper part 17 and the lower part 20, until the third end surface 15 is in contact with the first end surface 10.

[0035] In Figure 2, the hole 8 is round and symmetrical, that is it has the same radius for the whole of its longitudinal extent in the Z-direction. The outer edge 19 has thus the same radius as the inner surface of the hole 8, which means that the upper part 22 of the hole 8 and the lower part of the hole 8 have the same geometry and that the whole hole 8 can create a press joint with the lower part of the pin 7. Other embodiments of the invention will be described below, in which the hole 8 has a chamfered upper part 22 and in which the pin also has a chamfered upper part 17. The hole 8 and the pin 7 do not need to be restricted to cylindrical shapes, other shapes being possible, for example with oval cross sections, polygonal cross sections, etc.

[0036] Figure 2 shows a first distance L1 between the outer part of the second frame member 4 and the outer part of the first frame member 2, and a second distance L2 between the outer part of the hole 8 and the outer part of the pin 7, and a third distance L3 between the second end surface 11 and the fourth end surface 16. The relationship between the third distance L3 and the second distance L2 is decisive for how firmly the fourth end surface 16 is pressed towards the second end surface 11 when the assembly is completed. If the second distance L2 is larger than the third distance L3, the pressure increases as the second end frame member 4 is moved in the X-direction a greater distance than what the third distance L3 actually allows, which results in a firmer press joint. The first distance L1 is of importance for the frame assembly 1 in that if the first distance L1 and the second distance L3 are identical, an even and neat corner is created.

[0037] Figure 2 shows that the lower part 21 of the hole 8 has a first diameter D1 and that the lower part 20 of the pin 7 has a second diameter D2. The relationship between D1 and D2 determines the press joint between the pin and the hole. If the second diameter D2 is larger than the first diameter D1, the pin 7 must be pressed into the hole, so that a press joint is created.

[0038] Figure 3 shows schematically a section of a corner part of a frame assembly 1 after joining together of the parts comprised in Figure 2 according to a first embodiment of the invention. Figure 3 shows that the fourth end surface 16 is caused to form a press joint with the whole second end surface 11 and that the third end surface 15 is arranged in association with the first end sur-

face 10.

[0039] Figure 3 shows that the second end surface 11 is arranged perpendicular to the first end surface 10 so that the second end surface 11 is in contact with the fourth end surface 16, at least when the third end surface 15 is arranged in association with the first end surface 10.

[0040] Figure 3 also shows that the upper part 22 and the lower part 21 of the hole 8 have formed a press joint with the lower part 20 of the pin 7.

[0041] An advantage of this embodiment is that a stable and leak proof joint is created between the first frame member 2 and the second frame member 4.

[0042] Figure 4 shows schematically a section of a corner part of a frame assembly 1 after joining together of the parts comprised in Figure 2 according to a second embodiment of the invention. The second end surface 11 is arranged at an acute angle α to the first end surface 10 so that the edge 12 is in contact with the fourth end surface 16, at least when the third end surface 15 is arranged in association with the first end surface 10. An advantage of this arrangement is that the edge 12 will form a seal against the fourth end surface 16 even if there are irregularities in either or both of the second 11 and fourth 16 end surfaces.

[0043] Figure 5 shows schematically a section of a corner part of a frame assembly 1 before joining together of the parts comprised in the frame assembly 1 according to an embodiment of the invention.

[0044] Figure 5 shows that both the pin 7 and the hole 8 comprise a chamfered upper part 17, 22. In another embodiment (not shown), the pin does not have a chamfered upper part, but the hole 8 comprises a chamfered upper part 22 according to Figure 5. The principle for all the abovementioned embodiments is the same, namely that there is to be a clearance between the pin 7 and the hole 8 at the upper part 17, 22 of the arrangement and that at least one of the pin 7 or the hole 8 is to have a chamfered part that enables the first 2 and the second 4 frame member to be guided in relation to each other in the lateral direction.

[0045] Figure 5 shows, however, that the hole 8 comprises an upper part 22 that is chamfered in such a way that, when the pin 7 is inserted into the hole 8 and the third end surface 15 is moved towards the first end surface 10, the second frame member 4 is moved in the direction towards the second end surface 11 by the action of the chamfered upper part 22, at least when the third end surface 15 has passed the edge, in such a way that the fourth end surface 16 creates a press joint with at least a part of the second end surface 11, at least when the third end surface 15 is arranged in association with the first end surface 10.

[0046] The invention is not restricted to any particular shape of the upper part, it is rather the case that the upper parts 17, 22 of the pin 7 and/or the hole 8 can be conical, or semi-cylindrical; or oval, or triangular, provided that the shape provides a diagonal movement of the first 2 or second 4 frame member during assembly.

[0047] Figure 6 shows schematically a section of a corner part of a frame assembly 1 before joining together of the parts comprised in the frame assembly 1 according to an embodiment of the invention. Figure 6 shows that the third end surface 15 comprises a pin 7 intended to be inserted into a hole 8 in the first end surface 10. As with the frame assembly 1 shown in Figure 5, the hole 8 can be provided with a chamfered upper part 22.

[0048] In the same way as in Figure 2, Figure 6 shows a first distance L1 between the outer part of the second frame member 4 and the outer part of the first frame member 2, and a second distance L2 between the outer part of the hole 8 and the outer part of the pin 7, and a third distance L3 between the second end surface 11 and the fourth end surface 16. Figure 6 also shows that the lower part 21 of the hole 8 has a first diameter D1 and that the lower part 20 of the pin 7 has a second diameter D2. The relationships between the distances L1-L3 and the diameters D1 and D2 have been discussed in association with Figure 2.

[0049] Figure 7 shows a frame assembly 1 assembled according to the invention. Figure 7 shows a frame assembly 1 in which the first frame member 2 is a bottom frame member 6 or a top frame member 5 and in which the second frame member 4 is a vertical frame member 3. The invention is not restricted to this embodiment, but rather it is the case that the second frame member can be a bottom frame member or a top frame member and that the first frame member can be a vertical frame member.

[0050] Figure 7 shows, however, that the frame assembly comprises the two first frame members 2 which are placed opposite each other and two second frame members 4 placed opposite each other, which first and second frame members 2, 4 are assembled according to any one of the above embodiments in such a way that the first 2 and second 4 frame members together form a rectangular frame.

[0051] Figure 7 shows in the upper left corner 23 of the frame assembly 1 that the vertical frame member 3 is joined together with the top frame member 5 and that the vertical frame member 3 is provided with a first end section 9 comprising the stepped part with the pin arranged on the first end surface 10 of the vertical frame member 3. Figure 7 shows in the upper right corner 24 of the frame assembly 1 that the vertical frame member 3 is joined together with the top frame member 5 and that the vertical frame member 3 is provided with a first end section 9 comprising the stepped part with the pin arranged on the first end surface 10 of the vertical frame member 3.

[0052] Figure 7 shows in the lower left corner 25 of the frame assembly 1 that the vertical frame member 3 is joined together with the bottom frame member 6 and that the bottom frame member 6 is provided with a first end section 9 comprising the stepped part with the pin arranged on the first end surface 10 of the bottom frame member 6. Figure 7 shows in the lower right corner 24

of the frame assembly 1 that the vertical frame member 3 is joined together with the bottom frame member 6 and that the bottom frame member 6 is provided with a first end section 9 comprising the stepped part with the pin arranged on the first end surface 10 of the bottom frame member 6.

[0053] Figure 7 shows various types of end section of one and the same frame member in order to illustrate the invention in a simple way. As mentioned above, the frame assembly can comprise vertical frame members with straight end sections or with stepped end sections and the pin or the hole can be arranged on or in the respective end section according to Figure 2 or 6. In the same way, the frame assembly can comprise top frame members or bottom frame members with straight end sections or with stepped end sections and the pin or the hole can be arranged on or in the respective end section according to Figure 2 or 6.

[0054] The invention is not restricted to the embodiments described above. For example, it can be mentioned that the first end section can be designed with a plurality of steps and the second end section with a corresponding number of steps. The chamfered parts will here interact as described above so that at least the fourth surface of the second frame member will be in contact with the part of the stepped arrangement that is closest to the inner surface of the frame assembly, that is in such a way that the joint between the first frame member and the second frame member is minimal.

Claims

1. Frame assembly (1) comprising at least a first frame member (2) joined together with a second frame member (4), with the first frame member (2) comprising a stepped first end section (9) comprising a first end surface (10) and a second end surface (11) at an angle to the first end surface (10), with the second end surface (11) having a vertical extent from the first end surface (10) to an edge (12) with an extent in a plane (13) that is parallel to the first end surface (10), with the second frame member (4) comprising a second end section (14) comprising a third end surface (15) parallel to the first end surface (10) and a fourth end surface (16) with an extent essentially perpendicular to the third end surface (15), with the first end surface (10) comprising a pin (7) intended to be inserted into a hole (8) in the third end surface (15), or with the third end surface (15) comprising a pin (7) intended to interact with a hole (8) in the first end surface (10), **characterized in that** the pin (7) and/or the hole (8) comprises an upper part (17, 22) that is chamfered in such a way that, when the pin (7) is inserted into the hole (8) and the third end surface (15) is moved towards the first end surface (10), the second frame member (4) is moved in the direction towards the second end surface (11) by the action of the chamfered upper part (17, 22), at least when the third end surface (15) has passed the edge (12), in such a way that the fourth end surface (16) creates a press joint with at least a part of the second end surface (11), at least when the third end surface (15) is arranged in association with the first end surface (10).
2. Frame assembly (1) according to Claim 1, **characterized in that** the pin (7) and the hole (8) each have lower parts that are matched in relation to each other in such a way that a press joint is created between the lower parts (20, 21) of the hole (8) and the pin (7) when the whole pin (7) has been inserted into the hole.
3. Frame assembly (1) according to Claim 2, **characterized in that** the pin (7) consists of the upper part (17) and the lower part (20) and **in that** the lower part (20) is shorter than the vertical extent of the second end surface (11).
4. Frame assembly (1) according to any one of Claims 1-3, **characterized in that** the upper part (17, 22) of the pin (7) and/or the hole (8) is conical, or semi cylindrical; or oval, or triangular.
5. Frame assembly (1) according to any one of Claims 1-4, **characterized in that** the first frame member (2) is a bottom frame member (6) or a top frame member (5) and that the second frame member (4) is a vertical frame member (3).
6. Frame assembly (1) according to any one of Claims 1-4, **characterized in that** the second frame member (4) is a bottom frame member (6) or a top frame member (5) and that the first frame member (2) is a vertical frame member (3).
7. Frame assembly (1) according to any one of the preceding claims, **characterized in that** the frame assembly (1) comprises two first frame members (2) opposite each other and two second frame members (4) opposite each other, which first (2) and second (4) frame members are assembled in such a way that the first (2) and second (4) frame members together create a rectangular frame.
8. Frame assembly (1) according to any one of the preceding claims, **characterized in that** the second end surface (11) is arranged at an acute angle (α) to the first end surface (10) so that the edge (12) is in contact with the fourth end surface (16), at least when the third end surface (15) is arranged in association with the first end surface (10).
9. Frame assembly (1) according to any one of Claims 1-7, **characterized in that** the second end surface

(11) is arranged perpendicular to the first end surface (10) so that the second end surface (11) is in contact with the fourth end surface (16), at least when the third end surface (15) is arranged in association with the first end surface (10).

10. Method for joining together a frame assembly (1), where the frame assembly (1) comprises at least a first frame member (2) that is joined to a second frame member (4), with the first frame member (2) comprising a stepped first end section (9) comprising a first end surface (10) and a second end surface (11) at an angle to the first end surface (10), with the second end surface (11) having a vertical extent from the first end surface (10) to an edge (12) with an extent in a plane (13) that is parallel to the first end surface (10), with the second frame member (4) comprising a second end section (14) comprising a third end surface (15) parallel to the first end surface (10) and a fourth end surface (16) with an extent essentially perpendicular to the third end surface (15), with the first end surface (10) comprising a pin (7) that is inserted into a hole (8) in the third end surface (15), or with the third end surface (15) comprising a pin (7) that interacts with a hole (8) in the first end surface (10), **characterized in that** the pin (7) and/or the hole (8) comprises an upper part (17, 22) that is chamfered in such a way that, when the pin (7) is inserted into the hole (8) and the third end surface (15) is moved towards the first end surface (10), the second frame member (4) is moved in the direction towards the second end surface (11) by the action of the chamfered upper part (17, 22), at least when the third end surface (15) has passed the edge (12), in such a way that the fourth end surface (16) creates a press joint with at least a part of the second end surface (11), at least when the third end surface (15) is arranged in association with the first end surface (10).
11. Method according to Claim 10, **characterized in that** the pin (7) and the hole (8) each comprise lower parts that are matched in relation to each other in such a way that a press joint is created between the lower parts (20, 21) of the hole (8) and the pin (7) when the whole pin (7) is inserted into the hole.
12. Method according to Claim 11, **characterized in that** the pin (7) consists of the upper part (17) and the lower part (20) and **in that** the lower part (20) is shorter than the vertical extent of the second end surface (11).
13. Method according to any one of Claims 10-12, **characterized in that** the upper part (17, 22) of the pin (7) and/or the hole (8) is conical, or semi cylindrical; or oval, or triangular.

14. Method according to any one of Claims 10-13, **characterized in that** the first frame member (2) is a bottom frame member (6) or a top frame member (5) and that the second frame member (4) is a vertical frame member (3).
15. Method according to any one of Claims 10-13, **characterized in that** the second frame member (4) is a bottom frame member (6) or a top frame member (5) and that the first frame member (2) is a vertical frame member (3).
16. Method according to any one of Claims 10-15, **characterized in that** the frame assembly (1) comprises two first frame members (2) opposite each other and two second frame members (4) opposite each other, which first (2) and second (4) frame members are assembled in such a way that the first (2) and second (4) frame members together create a rectangular frame.
17. Method according to any one of Claims 10-16, **characterized in that** the second end surface (11) is arranged at an acute angle (α) to the first end surface (10) so that the edge (12) is in contact with the fourth end surface (16), at least when the third end surface (15) is arranged in association with the first end surface (10).
18. Method according to any one of Claims 10-16, **characterized in that** the second end surface (11) is arranged perpendicular to the first end surface (10) so that the second end surface (11) is in contact with the fourth end surface (16), at least when the third end surface (15) is arranged in association with the first end surface (10).

Fig. 1
(Tidigare känd teknik)

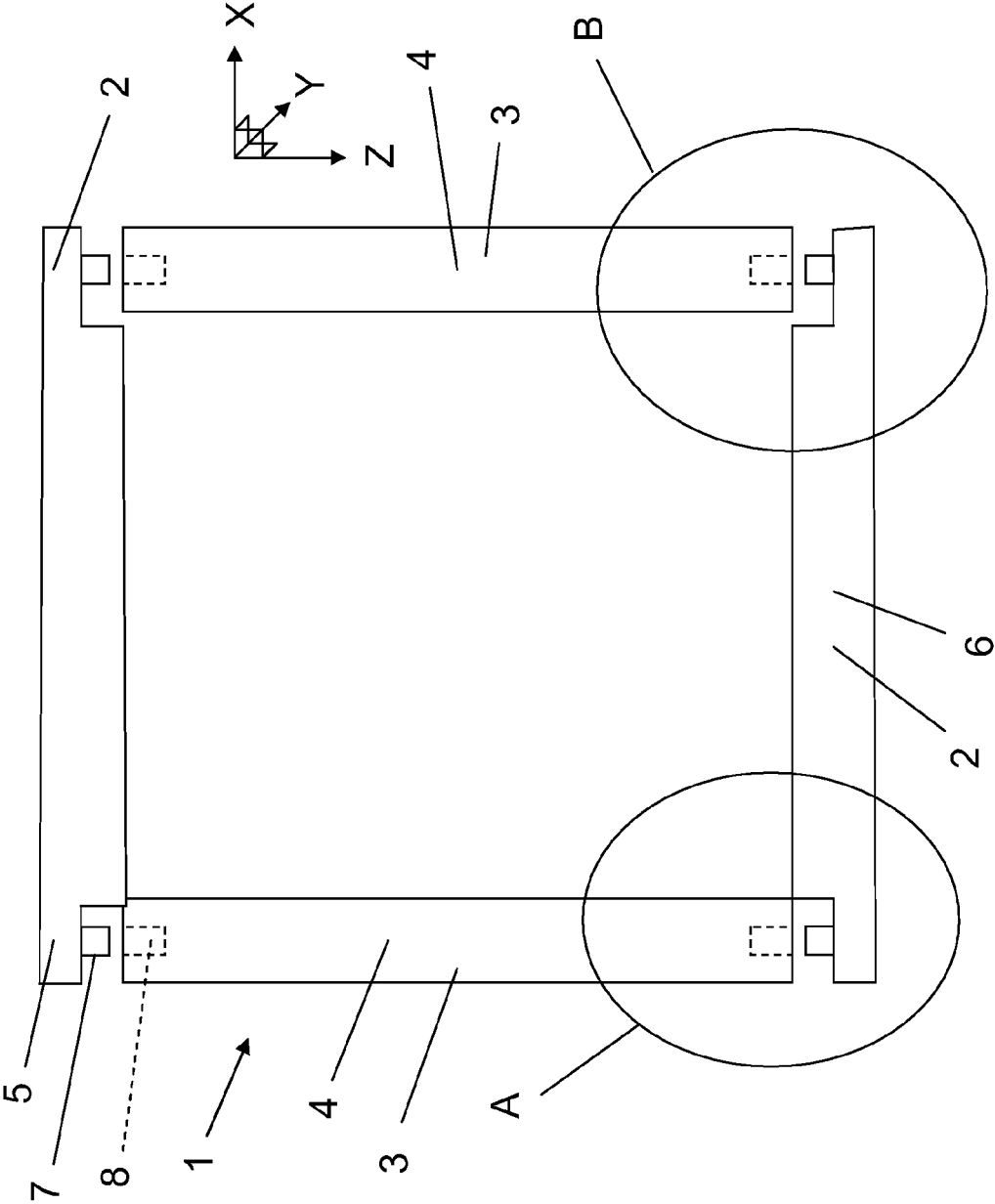


Fig. 2

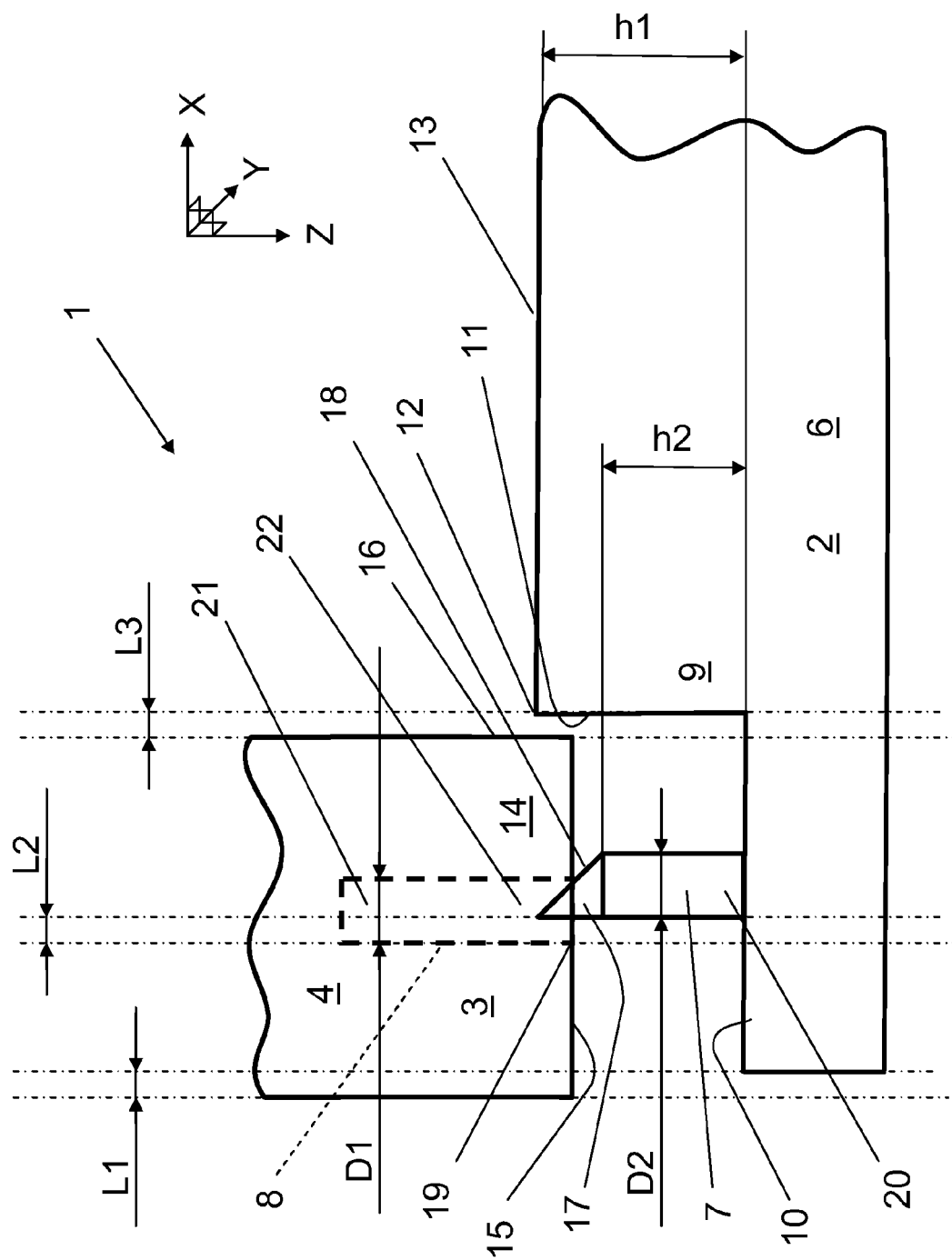


Fig. 3

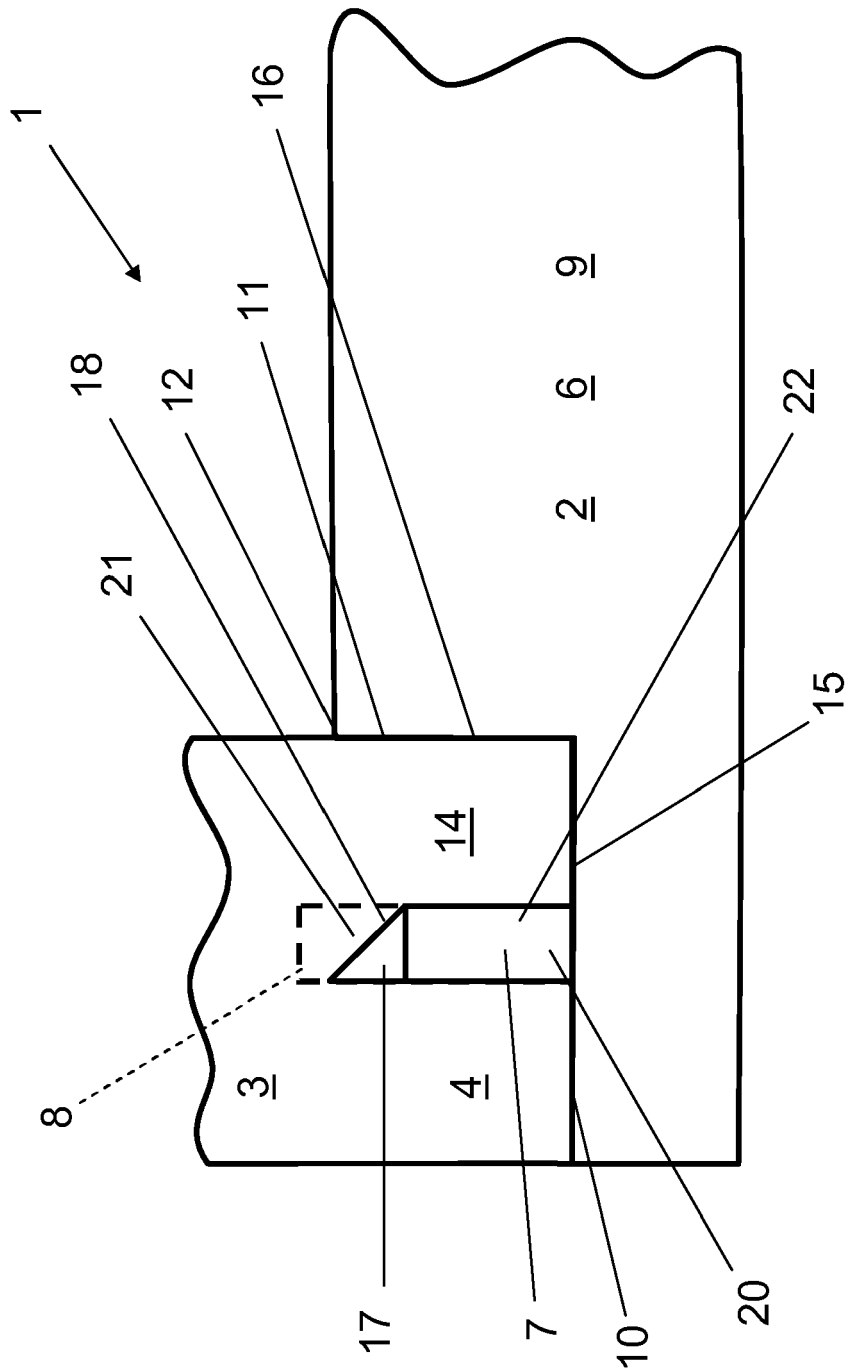


Fig. 4

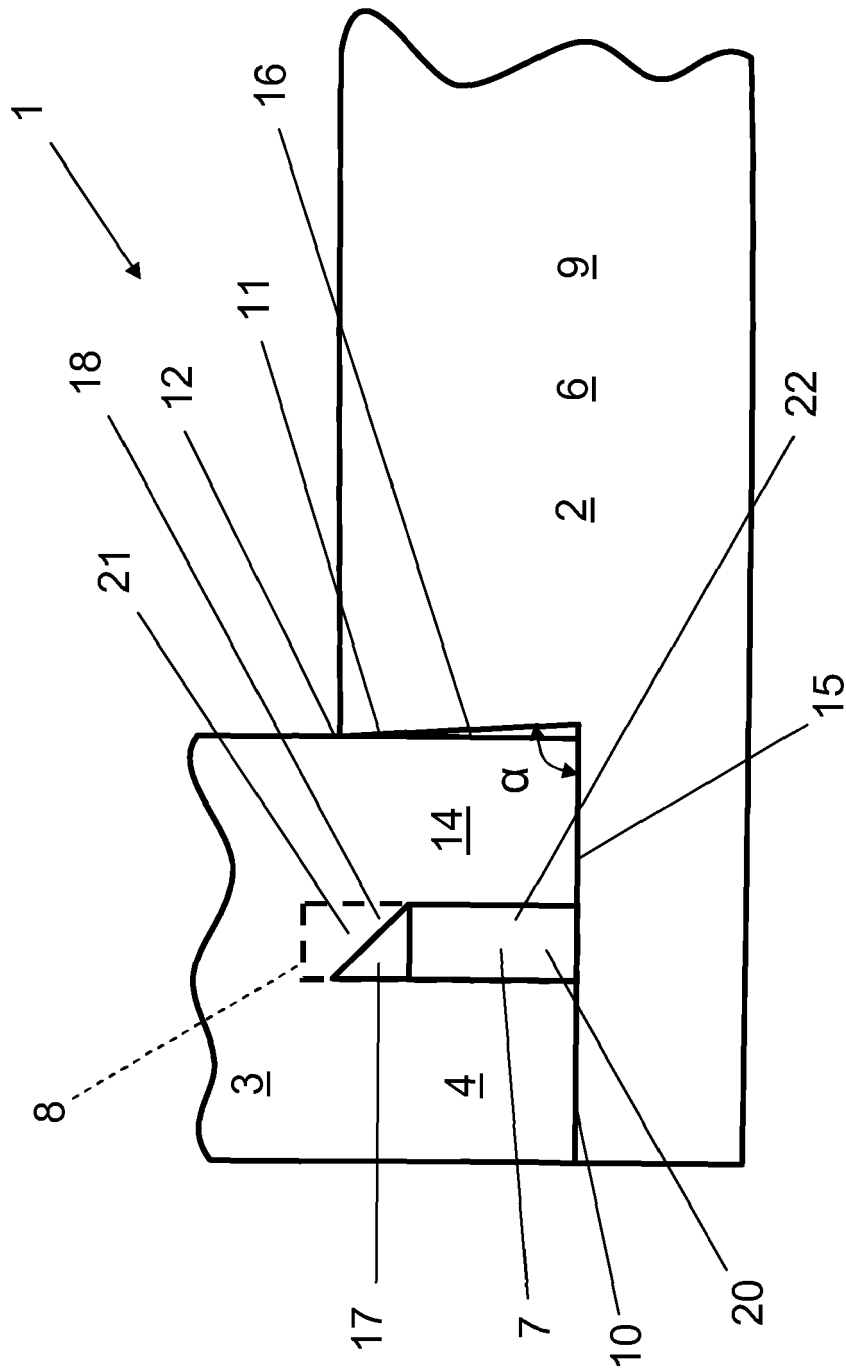


Fig. 5

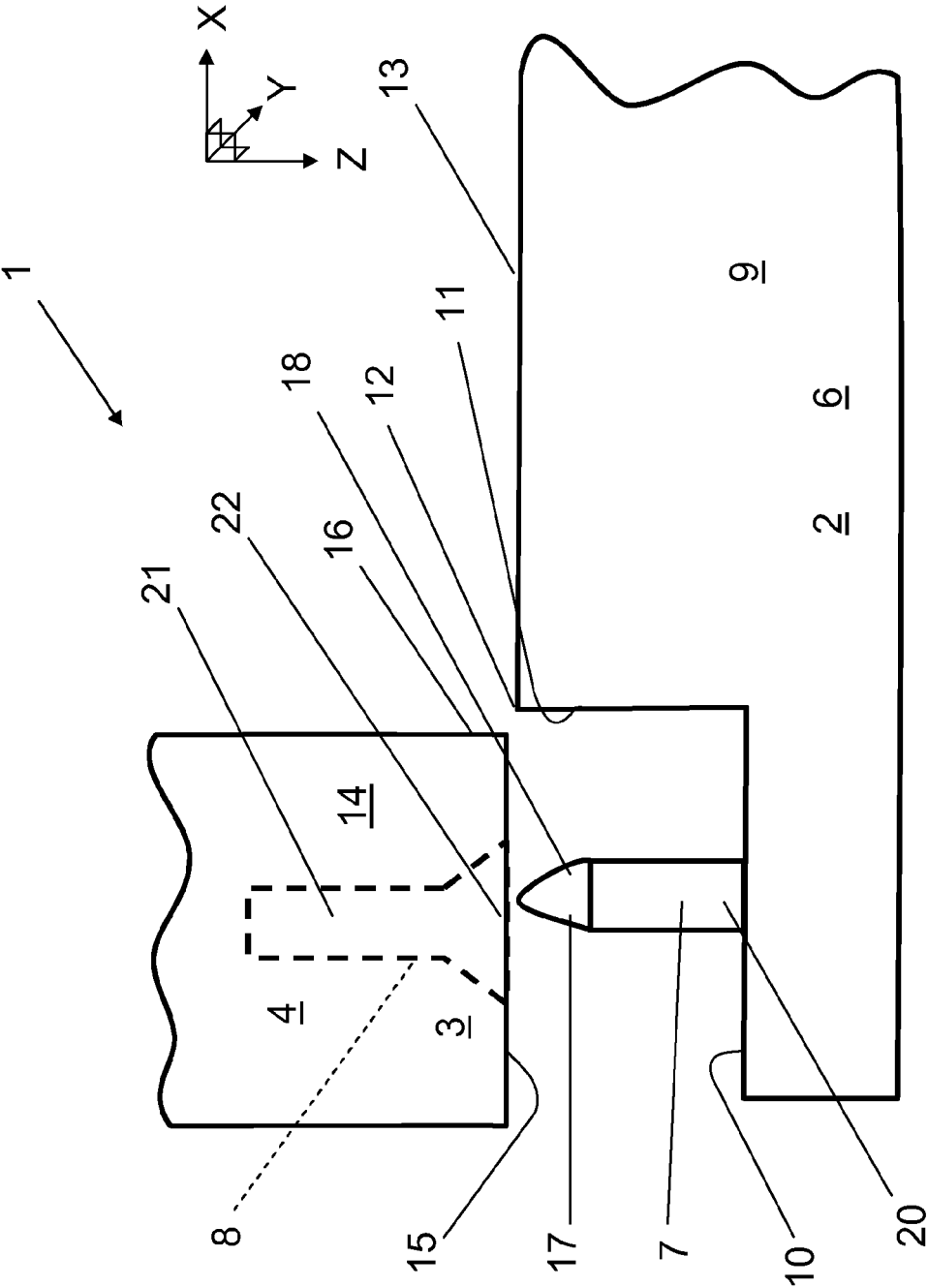


Fig. 6

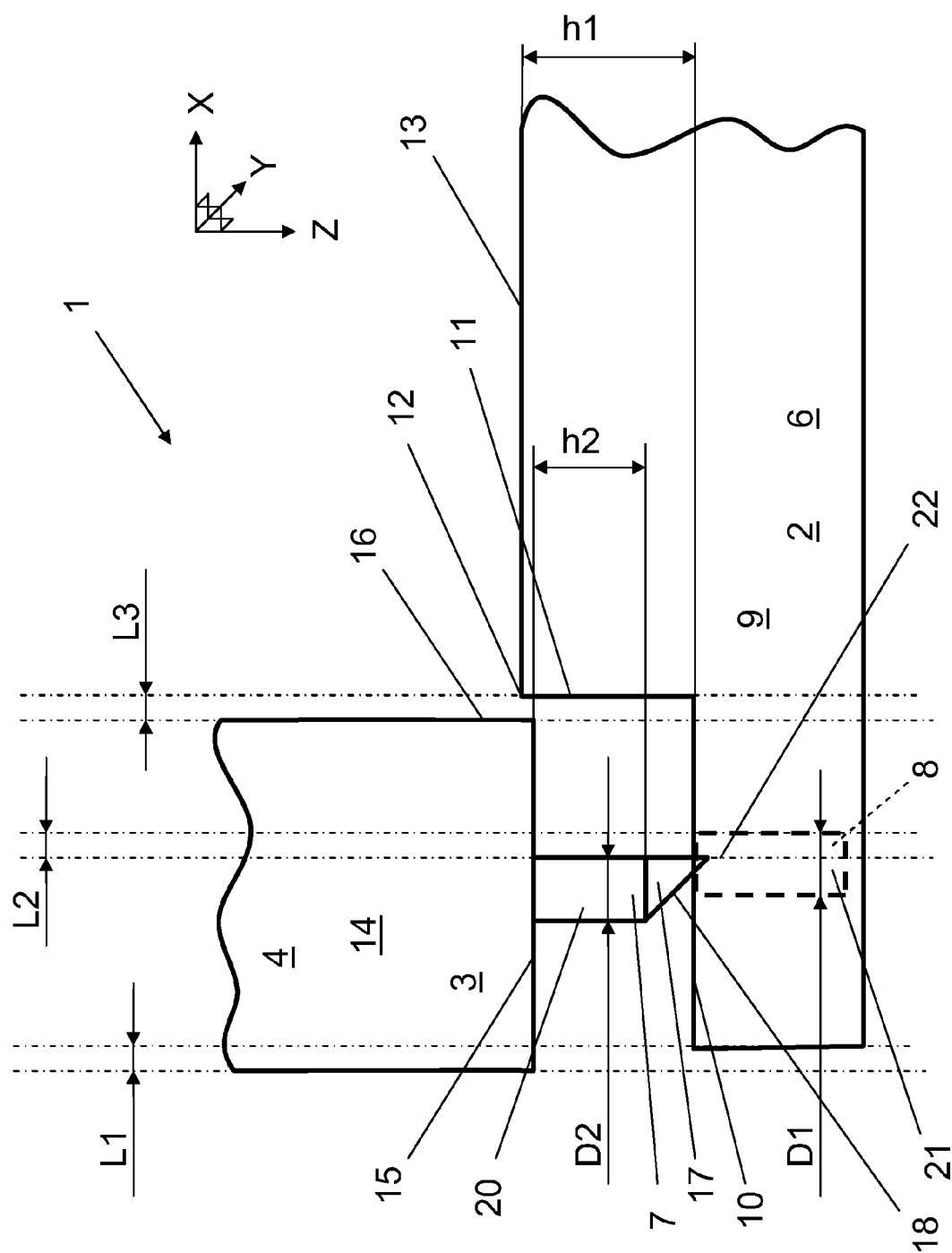


Fig. 7

