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FUNDAMENTELEMENT UND GEBÄUDEFUNDAMENT

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Description

Field of the invention

[0001] The invention relates to a foundation element having an inner surface and an outer surface, a lower edge and an upper edge, as well as a first end and a second end, the first end and/or the second end being provided with a fastening groove in the longitudinal direction of the end. The invention further relates to a building foundation comprising foundation elements according to the invention.

Prior art

[0002] Detached houses are normally constructed on shallow groundwork, so-called foundations. The foundations can be made by laying foundation blocks or by casting concrete on site. A method faster than on-site casting and laying is to make foundations of prefabricated foundation elements which are joined to assemble the foundation at the construction site. Using prefabricated foundation elements can make the building of the foundation of a detached house significantly faster, and simultaneously the risk of substandard work on site is reduced.

[0003] Concrete foundation elements of prior art may be blocks having dimensions of several meters, which are joined at their ends either in alignment with or at an angle to each other. For joining the foundation elements, the ends of the foundation elements can be provided with pre-cast joining plates of metal which make it possible to join the elements by welding. Another common method of joining foundation elements is to provide the surfaces of the elements to be joined with a recess into which the reinforcing steel bars embedded in the foundation element extend. At the building site, concrete is cast in the cavity bounded by the recesses in the elements arranged against each other, the concrete joining the elements when it hardens.

[0004] Problems are involved in prior art methods of joining foundation elements. Before forming the joint, the elements must be supported at precisely the correct distance from each other to make the joint between the elements in the correct width. Dimensional errors in a single joint between elements cumulate in the next joint and render it difficult to stay within the production tolerances for the foundation. Moreover, prior art methods of making joints are slow, prolonging the time of construction of the foundation.

[0005] Publication GB 444762 presents a structure for joining concrete wall elements, wherein the joint surfaces of wall elements are provided with a groove that opens to the joint surface and whose mouth has a width smaller than the width of the bottom part. The elements are connected together by an elongated connecting piece which extends into the grooves placed opposite each other and engages the grooves in a so-called dovetail joint. Because of the properties of concrete, it is very difficult to make a groove with accurate dimensions in the joint surface of a concrete element, which is why an additional clearance or lack of space is easily created in said joint, hampering the work of making the joint. Moreover, concrete edge parts of the groove break off easily during installation of the connecting piece, which impairs the strength and the appearance of the joint.

[0006] Publication JP H11323958 A discloses a concrete element whose both end surfaces are provided with an end piece made of plastic or metal and having a groove that opens to the end surface of the concrete element, for a connecting piece. The concrete element is intended for use as a supporting wall or a flower bed wall. Document JP2010 070903 A discloses precast concrete foundation comprising a female foundation material provided with a female joint rail and a male foundation material provided with a male joint rail. The joint rails are preconstituted to be fitted together with a space between enabling the foundation materials to be easily connected together on a construction site.

[0007] Document JP 2997569 B2 discloses a foundation of a building including a footing member and an upright member both made of precast concrete. The upright members are connected together by metallic connection tools using male-female - fitting.

[0008] Document JP 2013 227787 A discloses footing beams connected together with metallic male-female fittings.

[0009] Document JP S47 11504 U discloses a joint for joining foundation concrete blocks. It is an aim of this invention to present a foundation element and a foundation, whereby problems involved in the prior art can be reduced. The aims of the invention are achieved with a foundation element according to appended claim 1 and a building foundation according to appended claim 10. Some advantageous embodiments of the invention are presented in the dependent claims.

Brief summary of the invention

[0010] The invention relates to a foundation element having an inner surface and an outer surface, a lower edge and an upper edge, as well as a first end and a second end. The first end and/or the second end are provided with a fastening groove extending in the longitudinal direction of the end. At the first end and/or the second end of the foundation element, at least one end piece is provided, in which said fastening groove is formed. Preferably, the foundation element is made primarily of concrete, such as fiber-reinforced concrete.

[0011] The end piece has a substantially flat end surface and a contact surface, and said fastening groove is provided with a mouth that opens to the end surface and an expansion channel spaced from the mouth and opening to the lower and/or upper edge of the foundation element. The width of the expansion channel is greater than the width of the mouth. The end surface of the end

piece is provided with a sealing groove for receiving a joint seal. The joint seal can be attached to the end surface of one of the two foundation elements to be joined, already before joining the foundation elements. Alternatively, an elastic joint seal can be inserted in the gap between end surfaces of the foundation elements after the foundation elements have been joined to each other.

[0012] In another preferred embodiment of the foundation element according to the invention, a neck section is provided between the mouth and the expansion channel, the neck section comprising two substantially flat side surfaces arranged at a constant distance from each other.

[0013] In yet another preferred embodiment of the foundation element according to the invention, the end surface of the end piece is at a substantially right angle to the outer surface. Foundation elements equipped with such end pieces can be joined at their ends in such a way that the foundation elements to be joined are aligned. Alternatively, the end surface of the end piece may be at an angle of substantially 45 degrees or substantially 135 degrees with respect to the outer surface. Foundation elements equipped with such end pieces can be joined at their ends in such a way that the foundation elements to be joined form a right angle with each other.

[0014] In yet another preferred embodiment of the foundation element according to the invention, the side surfaces of the neck section are at a substantially right angle to the end surface of the end piece. Alternatively, the side surfaces of the neck section may form an angle of substantially 45 degrees to the end surface of the end piece.

[0015] In yet another preferred embodiment of the foundation element according to the invention, the contact surface of the end piece is provided with engagement protrusions for engaging the cast concrete.

[0016] In yet another preferred embodiment of the foundation element according to the invention, a thermal insulation board is provided between the inner surface and the outer surface, extending to the contact surface of the end piece and comprising a vertical edge fitted firmly between the engagement protrusions. The thermal insulation board makes up a so-called insulated cavity foundation to improve the thermal insulation capacity of the foundation element. The engagement protrusions support the vertical edge of the thermal insulation board delimited by the contact surface in the lateral direction, whereby the thermal insulation board remains stationary during the manufacture of the foundation element.

[0017] In yet another preferred embodiment of the foundation element according to the invention, the end piece extends from the lower edge to the upper edge of the foundation element, and at its one edge to the outer surface of the foundation element. In other words, the length of the end piece is substantially equal to the height of the foundation element, and the end piece extends, at its one edge, to the outer surface of the foundation element over substantially the entire length of the end piece. Preferably, the material of the end piece is metal, such as aluminium.

[0018] The building foundation according to the invention comprises at least two foundation elements joined together at their ends. Said foundation elements are foundation elements according to the invention.

[0019] In a preferred embodiment of the foundation according to the invention, said foundation elements are joined together at their ends by at least one connecting piece, the connecting piece being provided with a first bulge fitted into the expansion channel in the end piece of the first foundation element to be joined, and a second bulge fitted into the expansion channel in the end piece of the second foundation element to be joined, and a web section connecting the first and second bulges.

[0020] In yet another preferred embodiment of the foundation according to the invention, said at least two foundation elements are joined together at their ends by two connecting pieces, the first connecting piece being arranged at the lower edge of the foundation elements to be joined, and the second connecting piece being arranged at the upper edge of the foundation elements to be joined. The overall length of the connecting pieces may thus be substantially smaller than the height of the foundation element. Alternatively, said two foundation elements can be joined together at their ends by a single connecting piece whose length is substantially equal to the height of the foundation element.

[0021] In yet another preferred embodiment of the foundation according to the invention, said connecting pieces comprise a first end and a second end, and the surfaces of the connecting pieces are provided with ribs extending from the first end and pointing at the second end, the height of the ribs decreasing from the first end towards the second end. Such a connecting piece is fitted, the second end first, in the fastening grooves in the end pieces of the foundation element, whereby the connecting piece is keyed and tightened by the ribs into place in the fastening grooves of the foundation elements.

[0022] In yet another preferred embodiment of the foundation according to the invention, the connecting pieces are aluminium castings or aluminium profiles.

[0023] The invention has the advantage of reducing the time needed for joining the foundation elements, whereby the building of the foundation at the construction site becomes faster. This results in savings in labour costs.

[0024] Furthermore, the invention has the advantage of improving the quality and strength of the joints between the foundation elements, because all the joints are made in the same way by using standardized connecting pieces.

[0025] Yet another advantage of the invention is that it reduces complaints and need for repair due to poor workmanship and assembly mistakes.

Brief description of the drawings

[0026] In the following, the invention will be described in detail. In the description, reference will be made to the appended drawings, in which

Fig. 1a shows, by way of example, a foundation element according to the invention in a cross-sectional view;

Fig. 1b shows, by way of example, the foundation element of Fig. 1a seen from above;

Fig. 1c shows, by way of example, a connecting piece for use in a joint between foundations elements, seen diagonally from below;

Fig. 2a shows, by way of example, a butt joint between two aligned foundation elements, seen from above;

Fig. 2b shows, by way of example, a corner joint between two foundation elements, seen from above; and

Fig. 3 shows, by way of example, a building foundation constructed from foundation elements according to the invention, seen from above.

Detailed description of the invention

[0027] Figure 1a shows, by way of example, a foundation element 101 according to the invention in a cross-sectional view. The foundation element according to the invention is a rectangular building element made primarily of concrete, having an inner surface 10 and an outer surface 12, and an upper edge 20 and a lower edge 18. In the finished foundation, the outer surface constitutes the outermost surface of the foundation, that is, the surface exposed to open air. In the finished foundation, the inner surfaces of the foundation elements remain inside the perimeter bounded by the outer surfaces. The foundation elements are assembled at the construction site so that the inner and outer surfaces of the foundation elements are arranged in a vertical position, and the lower edges of the foundation elements are placed against a compacted soil layer, a hard frost insulation mounted on the compacted soil layer, or a footing cast on the compacted soil layer. The outer walls of the building are mounted on the upper edge of the foundation elements.

[0028] Between the inner surface and the outer surface, two thermal insulation boards 34 are provided, substantially parallel to the inner and outer surfaces. The first thermal insulation board is close the outer surface 12 so that a layer of concrete, having a thickness of 40 mm, is left between the thermal insulation board and the outer surface. The second thermal insulation layer is right on the inside of the foundation element; in other words, the inner surface of the thermal insulation board is flush with the inner surface of the foundation element. At their upper edges, the thermal insulation boards extend to the upper edge 20 of the foundation element, but their lower edges remain spaced from the lower edge 18 of the foundation element. The material of the thermal insulation boards may be any hard thermal insulation material suitable for use as thermal insulation for ground-supported construction elements, such as EPS board, extruded polystyrene or polyurethane. The thickness of the thermal insulation boards can be selected to provide the foundation element with a desired thermal insulation capacity. Preferably, the first thermal insulation board has a thickness of 50 mm and the second thermal insulation board has a thickness of 120 mm.

[0029] A concrete layer is provided between the first and second thermal insulation boards, acting as the primary load-bearing structure of the foundation element. The thickness of the concrete layer depends on the thickness of the outer wall to be built on the foundation, and the loads to which the foundation will be subjected. Preferably, the thickness of the concrete layer is 120 mm. The concrete used in the foundation element may be concrete having normal density, or so-called lightweight concrete.

[0030] Preferably, the concrete is fiber-reinforced concrete; in other words, it contains short thin fibers which improve the tensile strength of the concrete. Two parallel reinforcing bars 46 extend around the edges of the foundation element. The height of the foundation element, that is, the distance between the upper edge and the lower edge, can be selected according to the building project. Preferably, the height of the foundation element is at least 900 mm.

[0031] Figure 1b shows the foundation element 101 of Fig. 1a in a view from above. The foundation element has two ends: a first end 14 and a second end 16. Both ends are provided with an end piece made of metal, preferably aluminium, and having a substantially flat end surface 25 forming the outermost surface of the end of the foundation element, and a contact surface 27 facing the inside of the foundation element. The end pieces extend from the upper edge to the lower edge of the foundation element, and at their one edge to the outer surface of the foundation element over the entire length of the end piece.

[0032] In the foundation element shown in Fig. 1b, the end surface of the end piece 24 at the first end 14 forms a substantially right angle to the outer surface 12 of the foundation element, and the end surface of the end piece 26 at the second end 16 forms an angle of 45 degrees to the outer surface. An end piece arranged at a right angle is primarily used in such ends of a foundation element that are joined to an end of another, substantially aligned foundation element. End surfaces of end pieces are arranged at an angle of 45 degrees when an end of a foundation element is joined to an end of another foundation element so that the joined foundation elements form a right angle with each other. Thus, the position of the end

pieces at the ends of the foundation elements depends on the size and shape of the foundation, as well as on the location of a single foundation element in the finished foundation. A single foundation element may thus comprise an end surface at a right angle to the outer surface at one end or both ends, or an end surface at an angle of 45 degrees at one end or both ends. The end pieces are cast onto the foundation element in connection with casting of the concrete of the foundation element. At the stage of manufacture of the foundation elements, the end pieces may be used as part of the casting mould for the foundation element.

[0033] Figure 1c shows, by way of example, a connecting piece 40c for use in a joint between foundation elements, seen diagonally from below. The connecting piece shown in the figure is a casting made of aluminium, having a plate-like web section 43 whose first edge comprises a first bulge 42 and whose second edge comprises a second bulge 44. The connecting piece has a first end 45a and a second end 45b, the distance between them determining the length of the connecting piece. The length of the connecting piece may be, for example, 10 to 20 cm. The bulges have a substantially circular cross-section so that their part extending from the first end 45a has a cylindrical shape and their terminal part tapers conically when approaching the second end.

[0034] Both surfaces of the web section of the connecting pieces are provided with four ribs 48 having a triangular cross-section. The ribs extend in parallel with the bulges from the first end 45a of the connecting piece towards the second end 45b. However, the ribs do not extend all the way to the second end. The height of the ribs is greatest at the first end and decreases from the first end towards the second end 45b. Identical ribs are provided on both opposite surfaces of the web section with respect to the bulges.

[0035] The connecting piece shown in Fig. 1c is designed to be installed in fastening grooves opening to the upper and lower edges of the foundation element, the second end 45b of the connecting piece first. The cross-sectional shape of the second end of the connecting piece can be dimensioned slightly smaller than the dimensions of the fastening grooves in the end pieces, whereby the connecting piece is first easily received in the fastening grooves. When the connecting piece is pushed deeper in the fastening grooves and the first end of the connecting piece approaches the plane of the upper edge or the lower edge of the foundation element, the connecting piece is firmly keyed and tightened by the ribs into place in the fastening grooves of the foundation elements. The connecting piece is pushed so deep in the fastening grooves that its first surface becomes substantially flush with the upper edge or the lower edge of the foundation element.

[0036] Figure 2a shows a partial enlarged view of the first end 14 of the foundation element 101 shown in Fig. 1b, connected to the second end 16 of another foundation element aligned with it. The end surfaces 25 of the end pieces 24 at the ends of the foundation elements to be joined form a substantially right angle to the outer surfaces 12 of the foundation element 101. In the middle section of the end piece, a straight fastening groove 22 extending in the longitudinal direction of the end piece is provided, whose first end comprises a mouth that opens to the end surface and whose second end comprises an expansion channel 28. Between the mouth and the expansion channel, a neck section 30 is provided, whose width is equal to the width of the mouth. The neck section has an equal width over its whole length and width, and its side surfaces are flat surfaces parallel to each other. The expansion channel is cylindrical and has a diameter substantially greater than the width of the neck section.

[0037] The contact surface 27 of the end piece comprises three strip-like engagement protrusions 29 arranged in parallel with the fastening groove and spaced from each other. The engagement protrusions improve the engagement between the end piece and the concrete. Two engagement protrusions closest to the outer surface 12 are arranged on both sides of the thermal insulation board 34 close to the outer surface. These engagement protrusions support the vertical edge of the thermal insulation board at the manufacturing stage of the foundation element, particularly during casting of the concrete. A third engagement protrusion is provided at the interface between the thermal insulation board bordering the inner surface of the foundation element, and the concrete layer. The function of the third engagement protrusion is particularly to prevent the edge of the end piece from coming off the foundation element.

[0038] The edge strip of the end piece bordering the outer surface 12 of the foundation bends at an angle of 45 degrees away from the end surface 25. The bending edge strip constitutes a bevelled surface forming an angle of 45 degrees at the corner between the end surface and the outer surface of the foundation element. Next to the bevelled surface, a sealing groove 36 is provided which opens to the end surface and in which a joint seal 38 is received.

[0039] Figure 2a shows a butt joint between two parallel and aligned foundation elements which are joined by an elongated connecting piece 40a comprising a plate-like web section, a cylindrical first bulge 42 at the first edge of the web section and a similar second bulge 44 at the second edge of the web section. The material of the connecting piece is metal, preferably aluminium. The bulges and the web of the connecting piece are dimensioned in such a way that the connecting piece can be inserted from above into the fastening grooves 22 opening to the upper edge of the foundation element, whereby the first bulge is received in the expansion channel of the end piece of the first foundation element to be joined, and the second bulge is received in the expansion channel of the end piece of the second foundation element to be joined. The metal end piece and the connecting piece have accurate dimensions and flat surfaces, which is why only a small clearance is sufficient between the outer

surface of the connecting piece and the inner surfaces of the fastening grooves to enable the installation of the connecting piece, whereby the joint between the foundation elements is, in practice, a rigid joint. Naturally, the web and the bulges of the connecting piece have to be dimensioned to provide the connecting piece with sufficient structural strength and rigidity. It has been found in practice that sufficient structural strength and rigidity can be obtained with a connecting piece of aluminium having an overall width of approximately 210 mm, a web thickness of 8 mm and a bulge diameter of 23 mm.

[0040] The space between the end surfaces of the adjacent end pieces can be filled with insulating joint foam, such as polyurethane foam. The elastic joint seal 38 installed in the sealing groove prevents the joint foam from being discharged onto the outer surface of the foundation elements at the stage of mounting the elements. In the finished foundation, the joint seal prevents rainwater from entering the joint structure.

[0041] Figure 2b shows a partial enlarged view of the joint between the end of the foundation element shown in Fig. 1b and the end of another foundation element at a right angle. The end surfaces 25 of the end pieces 26 at the ends of the foundation elements to be joined are at an angle of substantially 45 degrees to the outer surfaces 12 of the foundation elements, whereby these end pieces are wider than the end pieces shown in Fig. 2a. The end pieces shown in Fig. 2b comprise the same structural elements as the end piece shown in Fig. 2a; in other words, a fastening groove 22 is provided in the middle part of the end piece, its first end having a mouth opening to the end surface and its second end having a cylindrical expansion channel 28. A neck section 30 having a width equal to the width of the mouth is provided between the mouth and the expansion channel, comprising flat side surfaces. In the joint shown in Fig. 2b, the side surfaces of the neck section 30 are parallel to the outer surface 12 of the foundation element, forming an angle of 45 or 135 degrees to the end surface 25.

[0042] The contact surface 27 of the end piece comprises three strip-like engagement protrusions 29 arranged in parallel with the fastening groove and spaced from each other. The engagement protrusions improve the engagement between the end piece and the concrete, and support the vertical edge of the thermal insulation board 34 placed between them. The engagement protrusions are parallel to the outer surface of the foundation elements, whereby they also form an angle of 45 or 135 degrees to the end surface 25. The edge strip of the end piece 26, limited to the outer surface 12 of the foundation, bends at an angle of 45 degrees away from the end surface 25. The bending edge strip constitutes a bevelled surface forming an angle of 45 degrees at the corner between the end surface and the outer surface of the foundation element. Adjacent to the bevelled surface, a sealing groove 36 is provided which opens to the end surface and in which an elastic joint seal 38 is fitted. The gap between the end surfaces is filled with joint foam, preferably polyurethane foam.

[0043] In the corner joint of foundation elements, shown in Fig. 2b, the foundation elements are joined by a connecting piece 40b comprising a plate-like web section 43 and a cylindrical first bulge 42 at the first edge of the web section and a similar second bulge 44 at the second edge of the web section. The connecting piece 40b shown in Fig. 2b deviates from the connecting piece 40a shown in Fig. 2a in that a right-angled bend is provided in the middle of the web section of the connecting piece; in other words, the web section has the shape of a corner profile. Thanks to the bend, the connecting piece can be used for joining such end pieces of foundation elements, in which the fastening grooves are arranged at a right angle to each other. The connecting piece is installed in the fastening grooves by pushing it in place from above or in the fastening grooves opening to the upper edge of the foundation elements, or by laying the foundation elements onto the connecting piece arranged at the site of mounting the foundation so that the connecting piece is received in the fastening grooves opening to the lower edge of the foundation element.

[0044] Figure 3 shows, by way of an example, a building foundation according to the invention in a top view. The foundation has been built on a layer of crushed gravel or on a hard thermal insulation layer installed on a layer of crushed gravel at the building site. Depending on the load-bearing capacity of the soil and the loads on the building, it is sometimes necessary to cast a separate footing under the foundation, whereby the foundation elements are built on the footing. The foundation elements are installed in a vertical position in their locations defined in the construction plan, and joined at their ends as described above.

[0045] In the foundation shown in Fig. 3, three different types of foundation elements according to the invention are used. The shorter ends of the foundation are made of a single foundation element 102 in which the end surface at each end is arranged at an angle of 45 degrees to the outer surface of the foundation element. The first long side of the foundation is made of two foundation elements 101 in which the end surface at the first end is at a right angle and the end surface at the second end is at an angle of 45 degrees to the outer surface of the foundation element. The second long side of the foundation comprises three foundation elements. In the central foundation element 103 of these, the end surfaces at both ends are at a right angle to the outer surface of the foundation element. The two other foundation elements are, with respect to the end surfaces, similar to those on the first long side.

[0046] In Fig. 3, all the corners of the foundation have right angles. It is obvious that the end pieces of the foundation elements can also be made such that the angle between the foundation elements to be joined may also be different from a straight or right angle, for example an angle of 45, 60, 120 or 135 degrees. In the foundation shown in Fig. 2, the foundation elements are

joined to each other by end pieces at the ends of the foundation elements. If necessary, end pieces according to the invention may also be provided on the inner surface of the foundation element, at a desired space from the ends of the foundation element. It is thus possible to remove part of the thermal insulation layer from the inner surface of the foundation element, at the location of the end piece to be attached to the foundation element, so that the end piece is firmly attached to the cast concrete of the foundation element. Against an end piece on the inner or outer surface of the foundation, an end piece at the end of another foundation element can be placed, and the foundation elements can be joined by means of connecting pieces according to the invention. Such a joint can be used, for example, when building a foundation under a line of bearing intermediate walls within the framework delimited by the foundation.

[0047] Some advantageous embodiments of the foundation element and the building foundation according to the invention have been described above. The invention is not limited to the solutions described above, but the inventive idea may be applied in different ways within the scope of the claims.

List of reference numerals:

[0048]

10	inner surface
12	outer surface
14	first end
16	second end
18	lower edge
20	upper edge
22	fastening groove
24, 26	end piece
25	end surface
27	contact surface
28	expansion channel
29	engagement protrusion
30	neck section
34	thermal insulation board
36	sealing groove
38	joint seal
40a, 40b, 40c	connecting piece
42	first bulge
43	web section
44	second bulge
45a	first end
45b	second end
46	reinforcing bar
48	rib
101, 102, 103	foundation element

Claims

1. A foundation element (101, 102, 103) having an inner surface (10) and an outer surface (12), a lower edge (18) and an upper edge (20), as well as a first end (14) and a second end (16), wherein the first end (14) and/or the second end (16) is provided with a fastening groove (22) in the longitudinal direction of the end, the first end (14) and/or the second end (16) is provided with at least one end piece (24, 26), in which said fastening groove (22) is formed and the end piece (24, 26) has a substantially flat end surface (25) and a contact surface (27), and said fastening groove (22) is provided with a mouth opening to the end surface (25), as well as an expansion channel (28) spaced from the mouth and opening to the lower edge (18) and/or the upper edge (20), the width of the expansion channel (28) being greater than the width of the mouth, **characterized in that** the end surface (25) of the end piece (24, 26) is provided with a sealing groove (36) for receiving a joint seal (38).

2. The foundation element (101, 102, 103) according to claim 1, **characterized in that** a neck section (30) is provided between the mouth and the expansion channel (28), the neck section (30) comprising two substantially flat side surfaces arranged at a constant distance from each other.

3. The foundation element (101, 102, 103) according to claim 1 or 2, **characterized in that** said end surface (25) of the end piece (24, 26) is at a substantially right angle, at an angle of substantially 45 degrees, or at an angle of substantially 135 degrees with respect to the outer surface (12).

4. The foundation element (101, 102, 103) according to claim 2 or 3, **characterized in that** said side surfaces of the neck section (30) are at a substantially right angle to the end surface (25) of the end piece (24, 26), or at an angle of substantially 45 degrees to the end surface (25) of the end piece (24, 26).

5. The foundation element (101, 102, 103) according to any of the claims 1 to 4, **characterized in that** the contact surface (27) of the end piece (24, 26) is provided with engagement protrusions (29) for engaging the cast concrete.

6. The foundation element (101, 102, 103) according to claim 5, **characterized in that** a thermal insulation board (34) is provided between the inner surface (10) and the outer surface (12), extending to the contact surface (27) of the end piece (24, 26), and provided with a vertical edge fitted firmly between the engagement protrusions (29).

7. The foundation element (101, 102, 103) according to any of the claims 1 to 6, **characterized in that** the end piece (24, 26) extends from the lower edge (18) to the upper edge (20) of the foundation element, and at its one edge to the outer surface (12) of the

foundation element (101, 102, 103).

8. The foundation element (101, 102, 103) according to any of the claims 1 to 7, **characterized in that** the material of the end piece (24, 26) is metal, preferably aluminium.

9. The foundation element (101, 102, 103) according to any of the claims 1 to 8, **characterized in that** it is made primarily of concrete, preferably fiber-reinforced concrete.

10. A building foundation comprising at least two foundation elements (101, 102, 103) joined together at their ends, **characterized in that** said foundation elements (101, 102, 103) are foundation elements according to any of the claims 1 to 9.

11. The building foundation according to the claim 10, **characterized in that** said at least two foundation elements (101, 102, 103) are joined together at their ends by at least one connecting piece (40a, 40b, 40c), the connecting piece being provided with a first bulge (42) fitted into the expansion channel (28) of the end piece (24, 26) of the first foundation element (101, 102, 103) to be joined, and a second bulge (44) fitted into the expansion channel (28) of the end piece (24, 26) of the second foundation element (101, 102, 103) to be joined, and a web section (43) connecting the first and second bulges.

12. The building foundation according to the claim 11, **characterized in that** said at least two foundation elements (101, 102, 103) are joined together at their ends by two connecting pieces (40a, 40b, 40c), wherein the first connecting piece (40a, 40b, 40c) is arranged at the lower edge (18) of the foundation elements (101, 102, 103) to be joined, and the second connecting piece (40a, 40b, 40c) is arranged at the upper edge (20) of the foundation elements (101, 102, 103) to be joined.

13. The building foundation according to claim 11 or 12, **characterized in that** said connecting pieces (40a, 40b, 40c) are provided with a first end (45a) and a second end (45b), and the surfaces of the connecting pieces are provided with ribs (48) extending from the first end (45a) and pointing at the second end (48), the height of the ribs (48) decreasing from the first end (45a) towards the second end (45b).

14. The building foundation according to any of the claims 10 to 13, **characterized in that** the connecting pieces (40a, 40b, 40c) are aluminium castings or aluminium profiles.

Patentansprüche

1. Fundamentelement (101, 102, 103) mit einer Innenfläche (10) und einer Außenfläche (12), einer Unterkante (18) und einer Oberkante (20) sowie einem ersten Ende (14) und einem zweiten Ende (16), wobei das erste Ende (14) und/oder das zweite Ende (16) mit einer Befestigungsnut (22) in Längsrichtung des Endes versehen ist, das erste Ende (14) und/oder das zweite Ende (16) mit mindestens einem Endstück (24, 26) versehen ist, in dem die Befestigungsnut (22) ausgebildet ist und das Endstück (24, 26) eine im Wesentlichen ebene Endfläche (25) und eine Kontaktfläche (27) aufweist, und die Befestigungsnut (22) mit einer zur Endfläche (25) hin offenen Mündung sowie einem von der Mündung beabstandeten Expansionskanal (28) versehen ist, der zur Unterkante (18) und/oder zur Oberkante (20) hin offen ist, wobei die Breite des Expansionskanals (28) größer als die Breite der Mündung ist, **dadurch gekennzeichnet, dass** die Endfläche (25) des Endstücks (24, 26) mit einer Dichtungsnut (36) zur Aufnahme einer Fugendichtung (38) versehen ist.

2. Fundamentelement (101, 102, 103) nach Anspruch 1, **dadurch gekennzeichnet, dass** zwischen der Mündung und dem Expansionskanal (28) ein Halsabschnitt (30) vorgesehen ist, wobei der Halsabschnitt (30) zwei im Wesentlichen ebene Seitenflächen aufweist, die in einem konstanten Abstand zueinander angeordnet sind.

3. Fundamentelement (101, 102, 103) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Endfläche (25) des Endstücks (24, 26) in einem im Wesentlichen rechten Winkel, in einem Winkel von im Wesentlichen 45 Grad oder in einem Winkel von im Wesentlichen 135 Grad zur Außenfläche (12) steht.

4. Fundamentelement (101, 102, 103) nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** die Seitenflächen des Halsabschnitts (30) im Wesentlichen rechtwinklig zur Endfläche (25) des Endstücks (24, 26) oder in einem Winkel von im Wesentlichen 45 Grad zur Endfläche (25) des Endstücks (24, 26) verlaufen.

5. Fundamentelement (101, 102, 103) nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Kontaktfläche (27) des Endstücks (24, 26) mit Eingriffsvorsprüngen (29) zum Eingreifen in den gegossenen Beton versehen ist.

6. Fundamentelement (101, 102, 103) nach Anspruch 5, **dadurch gekennzeichnet, dass** zwischen der Innenfläche (10) und der Außenfläche (12) eine Wärmedämmplatte (34) vorgesehen ist, die sich bis zur Kontaktfläche (27) des Endstücks (24, 26)

erstreckt und mit einer vertikalen Kante versehen ist, die fest zwischen den Eingriffsvorsprüngen (29) sitzt.

7. Fundamentelement (101, 102, 103) nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** sich das Endstück (24, 26) von der Unterkante (18) bis zur Oberkante (20) des Fundamentelements erstreckt und an seiner einen Kante bis zur Außenfläche (12) des Fundamentelements (101, 102, 103) reicht.

8. Fundamentelement (101, 102, 103) nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** das Material des Endstücks (24, 26) Metall, vorzugsweise Aluminium, ist.

9. Fundamentelement (101, 102, 103) nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** es hauptsächlich aus Beton, vorzugsweise faserverstärktem Beton, besteht.

10. Gebäudefundament, das mindestens zwei Fundamentelemente (101, 102, 103) umfasst, die an ihren Enden miteinander verbunden sind, **dadurch gekennzeichnet, dass** die Fundamentelemente (101, 102, 103) Fundamentelemente nach einem der Ansprüche 1 bis 9 sind.

11. Gebäudefundament nach Anspruch 10, **dadurch gekennzeichnet, dass** die mindestens zwei Fundamentelemente (101, 102, 103) an ihren Enden durch mindestens ein Verbindungsstück (40a, 40b, 40c) miteinander verbunden sind, wobei das Verbindungsstück eine erste Ausbuchtung (42), die in den Expansionskanal (28) des Endstücks (24, 26) des ersten zu verbindenden Fundamentelements (101, 102, 103) passt, und eine zweite Ausbuchtung (44), die in den Expansionskanal (28) des Endstücks (24, 26) des zweiten zu verbindenden Fundamentelements (101, 102, 103) passt, sowie einen Stegabschnitt (43) aufweist, der die erste und die zweite Ausbuchtung verbindet.

12. Gebäudefundament nach Anspruch 11, **dadurch gekennzeichnet, dass** die mindestens zwei Fundamentelemente (101, 102, 103) an ihren Enden durch zwei Verbindungsstücke (40a, 40b, 40c) miteinander verbunden sind, wobei das erste Verbindungsstück (40a, 40b, 40c) an der Unterkante (18) der zu verbindenden Fundamentelemente (101, 102, 103) und das zweite Verbindungsstück (40a, 40b, 40c) an der Oberkante (20) der zu verbindenden Fundamentelemente (101, 102, 103) angeordnet ist.

13. Gebäudefundament nach Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** die Verbindungsstücke (40a, 40b, 40c) mit einem ersten Ende (45a) und einem zweiten Ende (45b) versehen sind und die Oberflächen der Verbindungsstücke mit Rippen (48) versehen sind, die sich vom ersten Ende (45a) erstrecken und zum zweiten Ende (48) weisen, wobei die Höhe der Rippen (48) vom ersten Ende (45a) zum zweiten Ende (45b) hin abnimmt.

14. Gebäudefundament nach einem der Ansprüche 10 bis 13, **dadurch gekennzeichnet, dass** die Verbindungsstücke (40a, 40b, 40c) Aluminiumgussteile oder Aluminiumprofile sind.

Revendications

1. Élément de fondation (101, 102, 103) ayant une surface interne (10) et une surface externe (12), un bord inférieur (18) et un bord supérieur (20), ainsi qu'une première extrémité (14) et une seconde extrémité (16), dans lequel la première extrémité (14) et/ou la seconde extrémité (16) sont dotées d'une rainure de fixation (22) dans la direction longitudinale de l'extrémité, la première extrémité (14) et/ou la seconde extrémité (16) sont dotées d'au moins un embout (24, 26), dans lequel ladite rainure de fixation (22) est formée et l'embout (24, 26) a une surface d'extrémité sensiblement plate (25) et une surface de contact (27), et ladite rainure de fixation (22) est dotée d'une ouverture d'embouchure vers la surface d'extrémité (25), ainsi que d'un canal d'expansion (28) espacé de l'embouchure et s'ouvrant vers le bord inférieur (18) et/ou le bord supérieur (20), la largeur du canal d'expansion (28) étant supérieure à la largeur de l'embouchure, **caractérisé en ce que** la surface d'extrémité (25) de l'embout (24, 26) est dotée d'une rainure d'étanchéité (36) destinée à recevoir un joint d'étanchéité (38).

2. Élément de fondation (101, 102, 103) selon la revendication 1, **caractérisé en ce qu'**une section de col (30) est prévue entre l'embouchure et le canal d'expansion (28), la section de col (30) comprenant deux surfaces latérales sensiblement plates agencées à une distance constante l'une de l'autre.

3. Élément de fondation (101, 102, 103) selon la revendication 1 ou 2, **caractérisé en ce que** ladite surface d'extrémité (25) de l'embout (24, 26) est à un angle sensiblement droit, à un angle de sensiblement 45 degrés, ou à un angle de sensiblement 135 degrés par rapport à la surface externe (12).

4. Élément de fondation (101, 102, 103) selon la revendication 2 ou 3, **caractérisé en ce que** lesdites surfaces latérales de la section de col (30) sont à un angle sensiblement droit par rapport à la surface d'extrémité (25) de l'embout (24, 26), ou à un angle de sensiblement 45 degrés par rapport à la surface

d'extrémité (25) de l'embout (24, 26).

5. Élément de fondation (101, 102, 103) selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** la surface de contact (27) de l'embout (24, 26) est dotée de saillies de mise en prise (29) destinées à venir en prise avec le béton coulé.

6. Élément de fondation (101, 102, 103) selon la revendication 5, **caractérisé en ce qu'**un panneau d'isolation thermique (34) est prévu entre la surface interne (10) et la surface externe (12), s'étendant jusqu'à la surface de contact (27) de l'embout (24, 26), et doté d'un bord vertical ajusté fermement entre les saillies de mise en prise (29).

7. Élément de fondation (101, 102, 103) selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** l'embout (24, 26) s'étend du bord inférieur (18) au bord supérieur (20) de l'élément de fondation et, au niveau de son bord, jusqu'à la surface externe (12) de l'élément de fondation (101, 102, 103).

8. Élément de fondation (101, 102, 103) selon l'une quelconque des revendications 1 à 7, **caractérisé en ce que** le matériau de l'embout (24, 26) est du métal, de préférence de l'aluminium.

9. Élément de fondation (101, 102, 103) selon l'une quelconque des revendications 1 à 8, **caractérisé en ce qu'**il est constitué principalement de béton, de préférence de béton fibré.

10. Fondation de bâtiment comprenant au moins deux éléments de fondation (101, 102, 103) reliés entre eux au niveau de leurs extrémités, **caractérisée en ce que** lesdits éléments de fondation (101, 102, 103) sont des éléments de fondation selon l'une quelconque des revendications 1 à 9.

11. Fondation de bâtiment selon la revendication 10, **caractérisée en ce que** lesdits au moins deux éléments de fondation (101, 102, 103) sont reliés entre eux au niveau de leurs extrémités par au moins une pièce de liaison (40a, 40b, 40c), la pièce de liaison étant dotée d'un premier renflement (42) emboîté dans le canal d'expansion (28) de l'embout (24, 26) du premier élément de fondation (101, 102, 103) à relier, et d'un second renflement (44) emboîté dans le canal d'expansion (28) de l'embout (24, 26) du second élément de fondation (101, 102, 103) à relier, et d'une section d'âme (43) reliant les premier et second renflements.

12. Fondation de bâtiment selon la revendication 11, **caractérisée en ce que** lesdits au moins deux éléments de fondation (101, 102, 103) sont reliés ensemble au niveau de leurs extrémités par deux pièces de liaison (40a, 40b, 40c), dans laquelle la première pièce de liaison (40a, 40b, 40c) est agencée au niveau du bord inférieur (18) des éléments de fondation (101, 102, 103) à relier, et la seconde pièce de liaison (40a, 40b, 40c) est agencée au niveau du bord supérieur (20) des éléments de fondation (101, 102, 103) à relier.

13. Fondation de bâtiment selon la revendication 11 ou 12, **caractérisée en ce que** lesdites pièces de liaison (40a, 40b, 40c) sont dotées d'une première extrémité (45a) et d'une seconde extrémité (45b), et les surfaces des pièces de liaison sont dotées de nervures (48) s'étendant à partir de la première extrémité (45a) et pointant vers la seconde extrémité (48), la hauteur des nervures (48) diminuant de la première extrémité (45a) vers la seconde extrémité (45b).

14. Fondation de bâtiment selon l'une quelconque des revendications 10 à 13, **caractérisée en ce que** les pièces de liaison (40a, 40b, 40c) sont des pièces moulées en aluminium ou des profilés en aluminium.

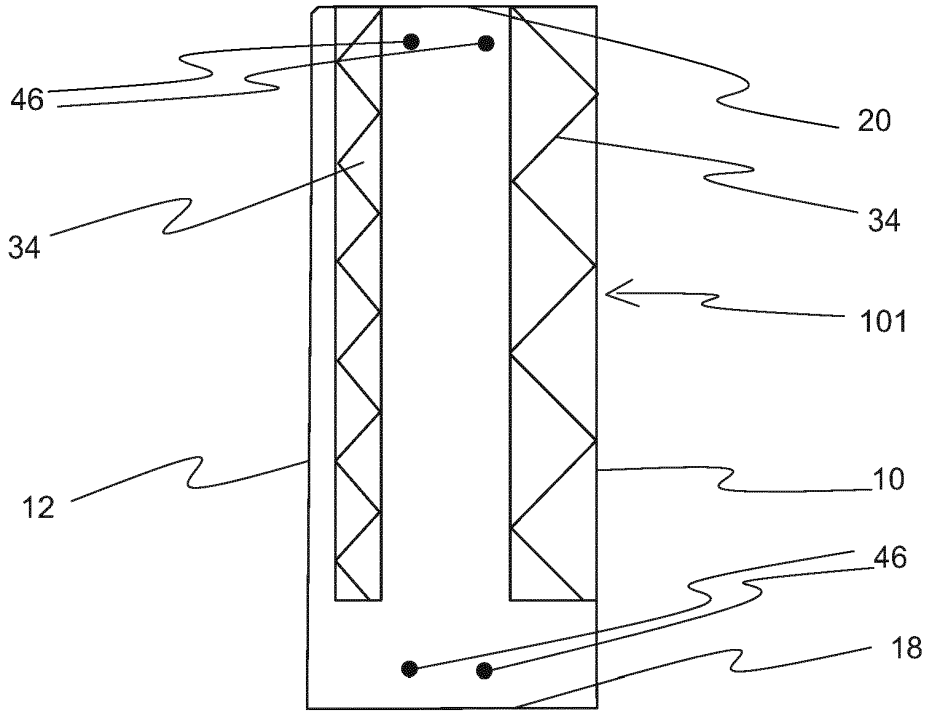


Fig. 1a

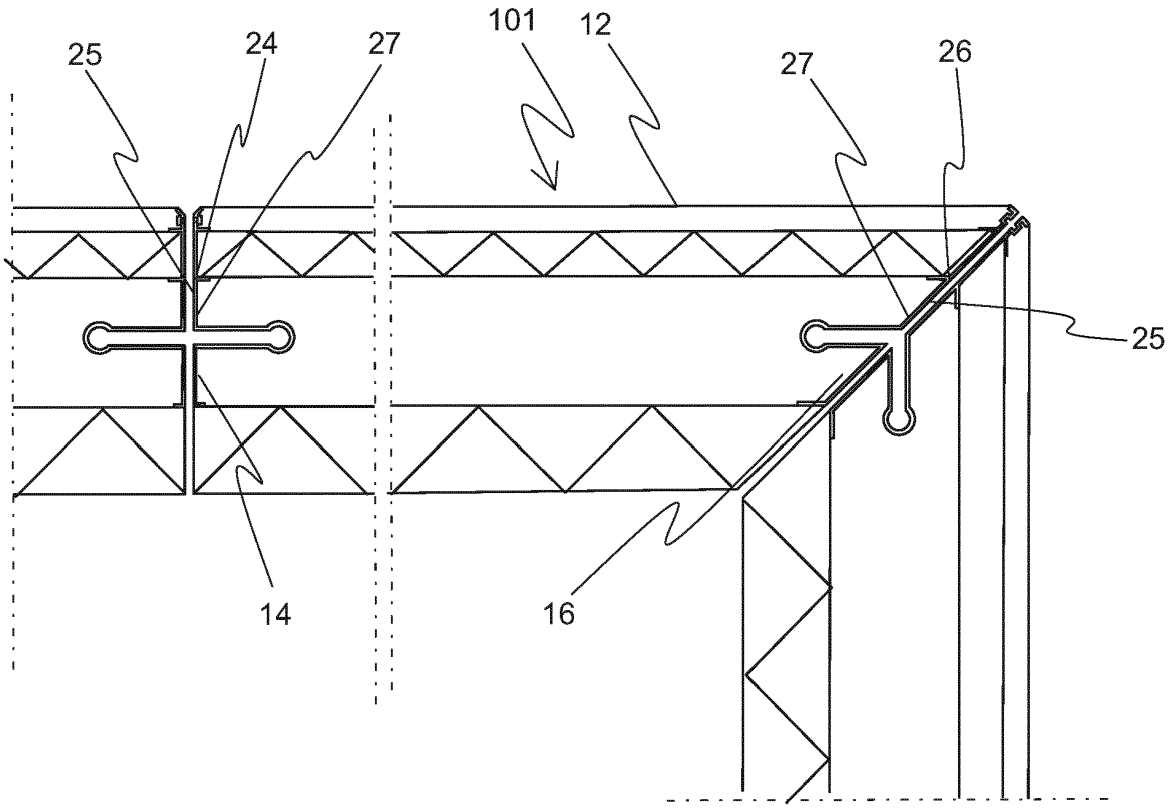
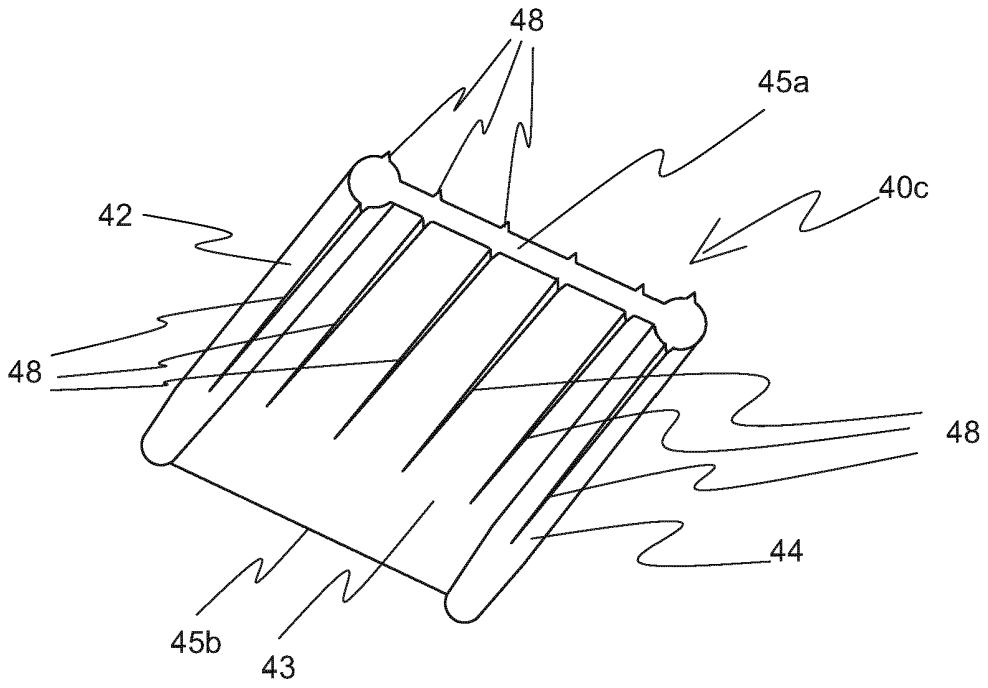


Fig. 1b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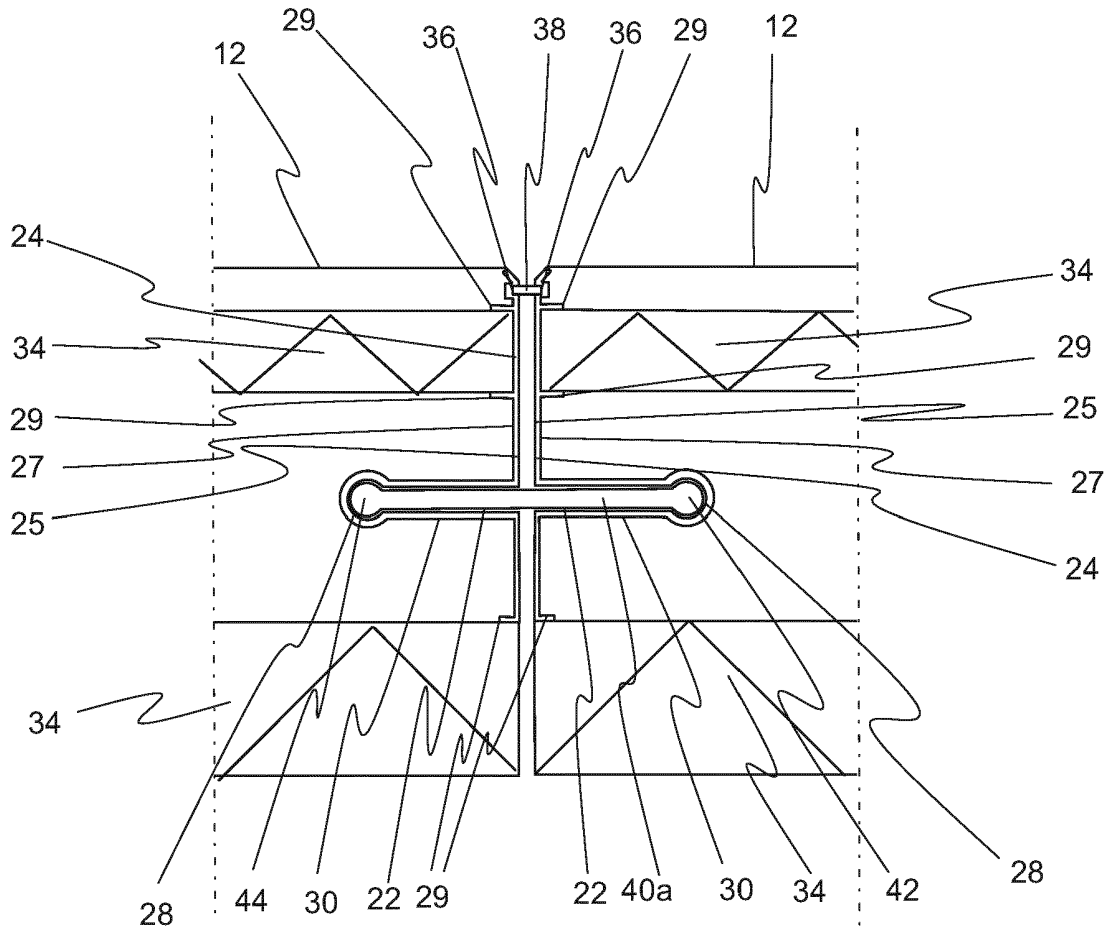
45a
40c
42
48
48
44
45b
43

Fig. 1c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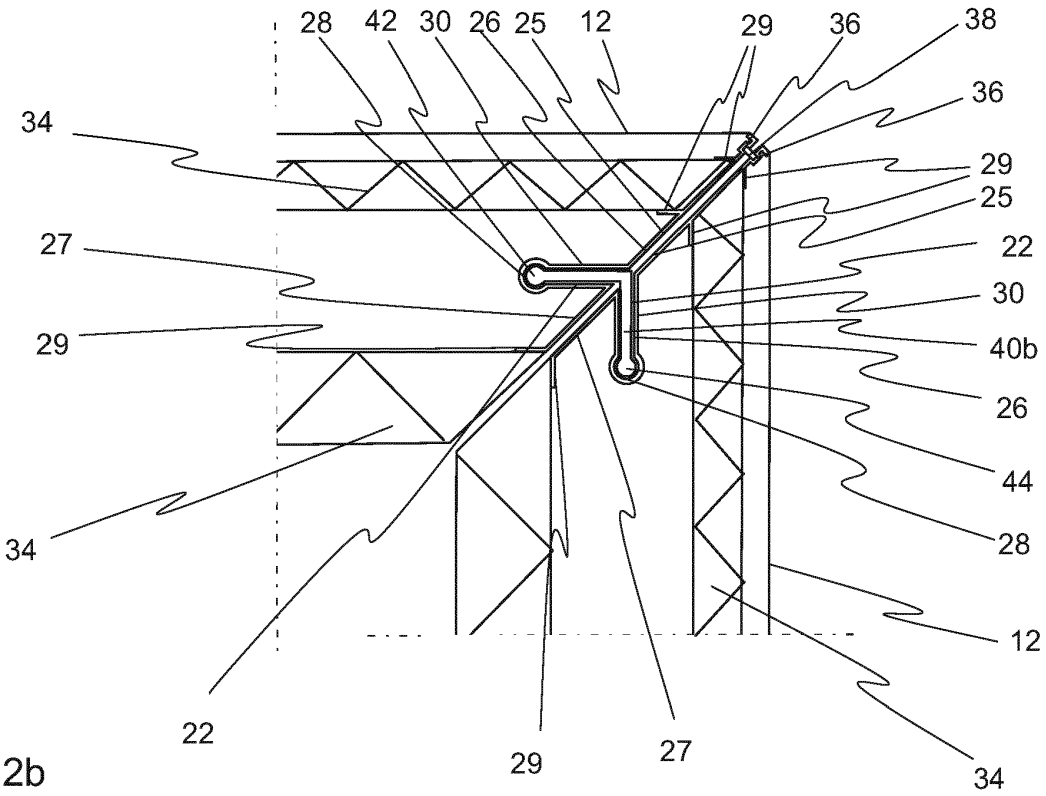
22
29
22
40a
30
34
42
28

Fig. 2a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12
29
36
38
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34
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22
30
29
40b
26
44
34
28
12
22
29
27
34

Fig. 2b

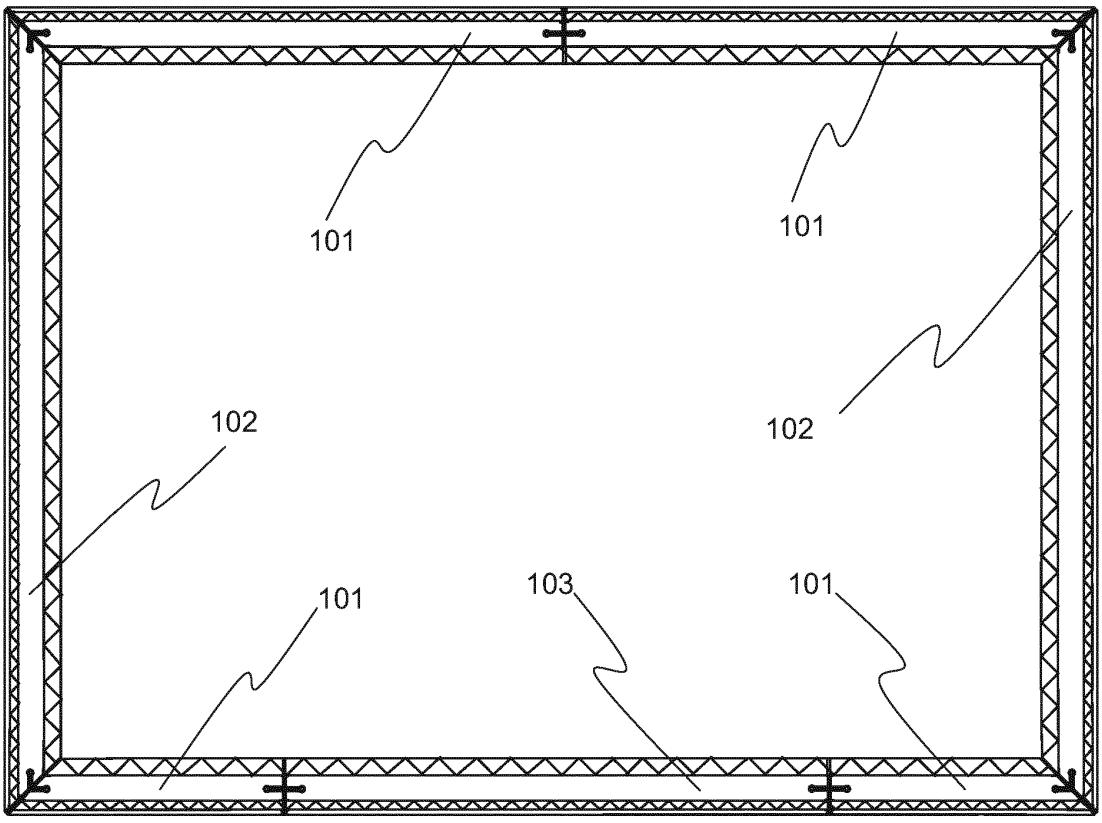
101
101
102
102
101
103
101

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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