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(71) Applicants:
- **Hi-Con A/S**
  9320 Hjallerup (DK)
- **Pieters Bouwtechniek B.V.**
  2012 JB Haarlem (NL)

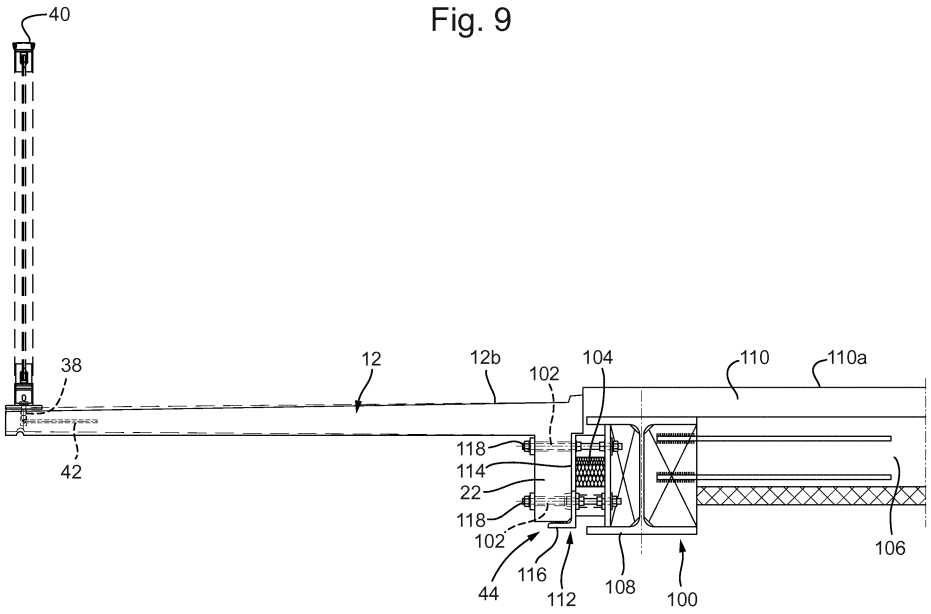
(72) Inventors:
- **van Nalta, Rogier Friso**
  2012 JB Haarlem (NL)
- **Hansen, Tommy Baek**
  9320 Hjallerup (DK)

(74) Representative: **V.O.**
P.O. Box 87930
2508 DH Den Haag (NL)

(54) BALCONY, BUILDING PROVIDED WITH SUCH A BALCONY, AND A METHOD FOR ATTACHING SUCH A BALCONY

(57) A balcony intended for attachment to a bearing construction part of a building and manufactured from ultra high performance fibre reinforced concrete. The balcony is provided with consoles manufactured from the same material as the balcony floor, which form a monolithic whole with the balcony floor, which extend near a proximal longitudinal edge of the balcony floor downwards from an underside of the balcony floor, and which, viewed from above, are situated substantially within the circumferential contours of the balcony floor. Each console is associated with a reinforcement assembly designed in a special manner, which comprises a series of first and second L-bars, the L-bars each comprising a reinforcement bar bent over through a right angle. Each reinforcement assembly comprises a cross connection reinforcement which mutually interconnects the vertical legs of the L-bars.

Fig. 9



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Description

FIELD

[0001] The invention relates to an ultrathin balcony, to a building provided with such a balcony, and to a method for attaching such a balcony to a building. A balcony in this context should also be understood to encompass a gallery. A gallery is in fact a balcony that makes the apartment accessible. Stated differently: a gallery is a balcony adjacent to which are front doors, while a balcony is mostly on the other side of a building and, for instance, is adjacent to a balcony door which leads to a living room, bedroom, kitchen or similar room. Structurally, there is no difference between a balcony and a gallery.

BACKGROUND

[0002] Applicant has already used ultrathin balconies in practice. For this, see for instance:

http://bouwwereld.nl/nieuws/ultradunne-en-ultrasterke-balkons-in-delft/
http://www.cementonline.nl/Ultradunne **balkons**?download=true
http://www.pietersbouwtechniek.nl/pdf/multipage item/291/publication ult rasterke balkonplaat slechts 65mm dik.pdf

[0003] A problem that is discussed and is solved in these publications relates to the fact that the thickness of the new balcony floor is so small that when the top surface of the balcony floor is positioned approximately at the same height as the top surface of a finishing floor in a building, there is insufficient overlap of the balcony floor with the construction floor or bearing construction of the building located under the finishing floor.

[0004] To solve this problem, in the original design, consoles were used which are attached to the balcony floor near a proximal longitudinal edge of the balcony floor and formed a monolithic whole therewith and in which reinforcement was incorporated. The known consoles extend obliquely downwards, about 240 mm proximally from the proximal longitudinal edge of the balcony floor. This configuration was chosen at that time to provide for a good transmission of the forces exerted by and on the balcony floor to the bearing construction located behind it.

[0005] The consequence of this is that the facade cladding, such as, for instance, a brick facade cladding or facade plating, has to be set up at least 240 mm before the bearing construction, unless the console can be partly received in the bearing construction, which is mostly not the case. When a thermal bridge interruption is used, this distance is even increased to about 320 mm. These are considerable distances, which are mostly undesirable. An alternative possibility is to allow the consoles to be visible and not to arrange the facade cladding in front of the consoles but, instead, to arrange it around the consoles. This, however, is often undesirable for aesthetic reasons.

SUMMARY OF THE INVENTION

[0006] The object of the invention is to provide a balcony which has the advantages of the above-described ultrathin balconies and which can be mounted closer to a bearing construction of a building and, preferably, then does not take up more mounting space than is available in a usual cavity construction, so that a facade cladding can also be arranged nearer to the bearing construction of the building while the consoles for attaching the balcony are still concealed behind the facade cladding in the cavity.

[0007] To this end, the invention provides a balcony intended for attachment to a bearing construction part of a building, the balcony comprising:

- a balcony floor which extends in an X direction and a Y direction of an XYZ coordinate system, wherein a width of the balcony floor extends in the X direction and wherein a depth of the balcony floor extends in the Y direction, wherein a Z direction extends substantially perpendicularly to the balcony floor, wherein the balcony floor has circumferential contours which are defined by a proximal longitudinal edge and a distal longitudinal edge each extending parallel to the X direction and two opposite transverse edges extending parallel to the Y direction, wherein the balcony floor in Z direction has a thickness of 150 mm at a maximum, wherein the balcony floor is manufactured from Ultra High Performance Fibre Reinforced Concrete (UHPFRC), wherein the concrete strength class of the ultra high performance concrete is expressed according to NEN-EN 206-1 and NEN 8005 with the designation C $f_{ck,cyl}/f_{ck,cube}$, wherein
  - ~ C stands for *concrete,*
  - ~ $f_{ck,cyl}$ is the characteristic cylinder compressive strength in N/mm^2, and
  - ~ $f_{ck,cube}$ is the characteristic cube compressive strength in N/mm^2,

  and wherein $f_{ck,cyl}$ is greater than 90 N/mm^2 and $f_{ck,cube}$ is greater than 105 N/mm^2, so that the concrete strength class is higher than C 90/105;

wherein the balcony further comprises:

- at least one console manufactured from the same material as the balcony floor and which forms a monolithic whole with the balcony floor, wherein the at least one console is connected with the balcony floor near the proximal longitudinal edge, wherein the at least one console extends from an underside of the balcony floor in Z direction downwards and, viewed in Z direction from above, is situated substantially

within the circumferential contours of the balcony floor, such that the at least one console is not, or hardly so, visible from above, wherein the at least one console is provided with a fastening provision for attaching the balcony to a bearing construction;

wherein the or each console is associated with:

- a reinforcement assembly which comprises:
  - a series of first L-bars, each first L-bar comprising a reinforcement bar bent in a right angle, including a leg extending in a first horizontal plane in Y direction within the balcony floor, and including a leg extending in a first vertical plane in Z direction within the corresponding console;
  - a series of second L-bars, each second L-bar comprising a reinforcement bar bent in a right angle, including a leg extending in a second horizontal plane in Y direction within the balcony floor, and including a leg extending in a second vertical plane in Z direction within the corresponding console;

wherein the first horizontal plane is above the second horizontal plane and wherein the first and the second vertical plane each extend parallel to the XZ plane of the XYZ coordinate system and wherein the first vertical plane is closer to the proximal longitudinal edge than the second vertical plane, wherein each reinforcement assembly which is associated with a console further comprises:

- a cross connection reinforcement which mutually interconnects the legs extending in Z direction in the console, of the first and second L-bars.

[0008] First of all, it is noted that after mounting of the balcony to a bearing construction part of a building, the proximal longitudinal edge will extend generally parallel to the facade and is close to the facade, while the distal longitudinal edge will be at a distance from the facade. Accordingly, after mounting of the balcony, the X direction therefore extends generally parallel to the facade. The Y direction is also referred to as cantilever direction in the building profession.

[0009] The insight underlying the invention is that as a result of the extremely high strength of the ultra-high performance concrete, reinforcement constructions can be realized within very limited concrete volumes and with a particularly small concrete cover. Such reinforcement constructions are impossible with weaker concrete. Normalized regulations for calculating reinforcement constructions are not available for ultra-high performance concrete. The average skilled person will look to the normalized regulations for calculating reinforcement constructions and then arrives at a console configuration as is known from the above-described prior art.

[0010] The inventor, by providing the balcony according to the invention, has managed to design a console configuration and an associated reinforcement construction which can effectively transmit the forces exerted by and on the balcony floor to a bearing construction which is situated below the top surface of a finishing floor. Moreover, the at least one console then extends fully under the balcony floor, so that a proximal edge of the balcony floor can be positioned close to a longitudinal edge of a finishing floor. Further, a facade cladding can be placed at a small distance before the bearing construction while still extending before the consoles and hence concealing the fastening construction from view, which is desirable for aesthetic reasons. By virtue of the configuration according to the invention, the consoles can be received fully, i.e. incorporated completely within the cavity of the wall. Moreover, the height (in Z direction) of the balcony floor including the console, at a console, is such that the balcony floor with console can fall within the height dimension of the construction behind it (consisting of a bearing construction in the form of a bearing floor and/or beams and any finishing floors arranged thereon). This provides the advantage that the fastening construction, that is, the consoles of the balcony floor, does not extend below the ceiling of the underlying construction while yet the top of the balcony floor can be positioned at substantially the same level as the top of the finishing floor which the balcony floor is to adjoin. The maximum thickness of the balcony floor in Z direction referred to above concerns the thickness of the balcony floor itself and not of any upstanding edges such as, for instance, ridges which may be arranged, for instance, at the perimeter of the balcony floor.

[0011] The invention also provides a building provided with a bearing construction and provided with at least one balcony according to the invention, the balcony being connected with the bearing construction of the building using the fastening provision of the balcony.

[0012] Such a building has a fine appearance owing to the presence of the ultrathin balconies and moreover the facade cladding can be arranged at a small distance before the bearing construction while yet the fastening construction of the balconies to the bearing construction of the building is concealed from view.

[0013] Further, the invention provides a method for attaching a balcony to a building, the method comprising:

- providing a balcony according to the invention;
- providing a building which is provided with a bearing construction;
- positioning the balcony with respect to the bearing construction; and
- connecting the balcony with the bearing construction with the aid of the fastening provision.

[0014] With such a method, the prefabricated balconies according to the invention can be connected with a new or existing building in an efficient manner.

[0015] Embodiments of the invention are described in the subclaims and will hereinafter be clarified in more detail on the basis of an example which is represented in the drawings.

BRIEF DESCRIPTION OF THE FIGURES

[0016]

Fig. 1 shows a perspective view of an example of a balcony according to the invention;
Fig. 2 shows a rear view of the example represented in Fig. 1;
Fig. 3 shows a bottom view of the example represented in Fig. 1;
Fig. 4 shows a cross section along the line IV-IV of Fig. 2;
Fig. 5 shows the detail V of Fig. 4;
Fig. 6 shows the perspective view of Fig. 1 with the concrete omitted;
Fig. 7 shows the detail VII of Fig. 6;
Fig. 8 shows the detail VIII of Fig. 6 with the balcony floor reinforcement omitted, so that only the reinforcement of the console is represented;
Fig. 9 shows a side view of the balcony represented in Fig. 1 attached to a bearing construction of a building.

DETAILED DESCRIPTION

[0017] Figs. 1-9 show in various elevational views and cross sections an example of a balcony or gallery according to the invention in which various embodiments as described in the subclaims are embodied. It is noted that the embodiments can also be used independently of each other and that the invention is not limited to the examples that are shown in the figures. Hereinafter, various embodiments will be described, reference to the figures being made using reference numerals. The reference numerals are used herein for clarification but have no limiting effect. An embodiment may also be implemented in a different manner than represented in the example that is shown in the figures.

[0018] In the most general terms, a balcony 10 is provided which is intended for attachment to a bearing construction part 100 of a building. The balcony 10 comprises a balcony floor 12 which extends in an X direction and a Y direction of a XYZ coordinate system. The width of the balcony floor 12 extends in the X direction. The depth, or cantilever direction, of the balcony floor 12 extends in the Y direction. The Z direction of the XYZ coordinate system extends substantially perpendicularly to the balcony floor 12. The balcony floor 12 has circumferential contours which are defined by a proximal longitudinal edge 14 and a distal longitudinal edge 16 which each extend parallel to the X direction and two opposite transverse edges 18, 20 which extend parallel to the Y direction. In the Z direction the balcony floor 12 has a thickness of 150 mm at a maximum, excluding any upstanding edges such as, for instance, peripheral floor ridges. The balcony floor 12 is manufactured from Ultra High Performance Fibre Reinforced Concrete (UHPFRC). The concrete strength class of the ultra high performance concrete is expressed according to NEN-EN 206-1 and NEN 8005 with the designation C $f_{ck,cyl}/f_{ck,cube}$, wherein

- C stands for *concrete,*
- $f_{ck,cyl}$ is the characteristic cylinder compressive strength in N/mm^2, and
- $f_{ck,cube}$ is the characteristic cube compressive strength in N/mm^2.

[0019] Here, $f_{ck,cyl}$ is greater than 90 N/mm^2 and $f_{ck,cube}$ is greater than 105 N/mm^2, so that the concrete strength class is higher than C 90/105. Further, the balcony comprises at least one console 22 which is manufactured from the same material as the balcony floor 12 and which forms a monolithic whole with the balcony floor 12. The at least one console 22 is connected with the balcony floor 12 near the proximal longitudinal edge 14 of the balcony floor 12. The at least one console 22 extends from an underside 12a of the balcony floor in Z direction downwards and, viewed in Z direction from above, is situated substantially within the circumferential contours 14, 16, 18, 20 of the balcony floor 12, such that the at least one console 22 is not, or hardly so, visible from above. The at least one console 22 is provided with a fastening provision for attaching the balcony 10 to a bearing construction 100. The or each console 22 is associated with a reinforcement assembly 26 (see Figs. 4-8). Each reinforcement assembly 26 comprises a series of first L-bars 28. Each first L-bar 28 comprises a reinforcement bar bent in a right angle, which includes a leg 28a extending in a first horizontal plane H1 in Y direction within the balcony floor 12, and which includes a leg 28b extending in a first vertical plane V1 in Z direction within the corresponding console 22. Further, each reinforcement assembly 26 comprises a series of second L-bars 30. Each second L-bar 30 comprises a reinforcement bar bent in a right angle, which includes a leg 30a extending in a second horizontal plane H2 in Y direction within the balcony floor 12, and which includes a leg 30b extending in a second vertical plane V2 in Z direction within the corresponding console 22. The first horizontal plane H1 is above the second horizontal plane H2. The first and the second vertical planes V1, V2 each extend parallel to the XZ plane of the XYZ coordinate system. The first vertical plane V1 is closer to the proximal longitudinal edge 14 than is the second vertical plane V2. Each reinforcement assembly 26 which is associated with a console 22 further comprises a cross connection reinforcement 32 which mutually interconnects the legs 28b, 30b extending in Z direction in the console 22, of the first and second L-bars 28, 30.

[0020] A thus configured balcony has a balcony floor top surface 12b which can be placed at approximately

the same level as the top surface of a finishing floor, while with the aid of the downwardly extending console, which is situated under and, viewed from above, within the circumferential contours of, the balcony floor, the balcony can be attached to a bearing construction situated under the finishing floor, such as, for instance, a construction floor or a concrete or steel supporting beam. Due to the particular design of the reinforcement assembly, the thickness of the console viewed in Y direction can be relatively small, so that a facade cladding can be placed relatively closely against the bearing construction while yet, behind it, the at least one console and hence the balcony fastening can be concealed. The balcony according to the invention provides a building with a fine appearance in that the balcony is of particularly thin design and the fastening construction of the balcony, more particularly the consoles 22 with the fastening provision, can be completely concealed from view without concessions needing to be made in respect of the type of facade cladding used.

[0021] In an embodiment, of which an example is shown in the figures, a cross section of the at least one console 22 along a plane parallel to the YZ plane can have a substantially rectangular configuration (see cross sections in Figs. 4 and 5).

[0022] Such a rectangular configuration leads to a minimum overall depth and the balcony fastening in this way can be received in a cavity of usual width between facade cladding and bearing construction.

[0023] In an embodiment of the invention, of which an example is shown in the figures, the cross connection reinforcement 32 can comprise a series of sets of stirrups 32_1, 32_2, 32_3, 32_4, 32_5. The respective sets 32_1, 32_2, 32_3, 32_4, 32_5 of stirrups of the series then extend in a number of planes located horizontally above each other.

[0024] The stirrups 32_1, 32_2, 32_3, 32_4, 32_5 can have a configuration which, seen in top plan view, is substantially rectangular, the rectangular configuration having been obtained by thus bending over a bar element four times. Each stirrup 32_1, 32_2, 32_3, 32_4, 32_5 may be connected with the legs 28b, 30b extending in Z direction, of the L-bars 28, 30. Thus, a console reinforcement assembly 26 is obtained with which the compressive and tensile forces occurring in the console 22 can be suitably taken up and transferred to the bearing construction 100 to which the balcony 10 is attached.

[0025] In an embodiment, a thickness of the layer of concrete from the reinforcement 28b, 30b, 32 to a nearest outer surface of the console 22 associated with the reinforcement can be in the range of 10-20 mm. In the building profession, this thickness is referred to as concrete cover.

[0026] Such a thickness is particularly small with respect to the concrete cover prescribed in the codes. However, due to the density of ultra high performance fibre reinforced concrete being particularly high, such a concrete cover has proven to be sufficient to obtain a durable console construction, even when the balcony 10 is used in severe environmental conditions of, for instance, a maritime climate. Due to this low concrete cover, the thickness of the console 22, viewed in Y direction, can be particularly small, so that the console can be completely incorporated in the space between the bearing construction 100 and the facade cladding, i.e., in the cavity.

[0027] In an embodiment, of which an example is shown in the figures, the fastening provision of the at least one console 22 can comprise at least one hole 24 which extends in Y direction through the console 22. In such an embodiment, the hole 24 is configured for passing therethrough a bolt or threaded end 102 for attachment of the balcony 10 to a bearing construction 100.

[0028] The threaded ends or the bolts 102 can be a fixed part of the bearing construction 100 or may be received in a corresponding hole in the bearing construction 100.

[0029] In a further elaboration of this embodiment, of which an example is shown in the figures, the or each console 22 may be provided with at least two holes 24 located above each other, extending in Y direction through the console 22, which are each configured for passing therethrough a bolt or threaded end 102 for attachment of the balcony 10 to a bearing construction 100.

[0030] Such a configuration of through-holes 24 provides a simple and firm fastening possibility. Preferably, each console 22 is provided with at least two sets of two holes 24 located above each other, the sets being spaced apart viewed in the X direction and being at the same level viewed in Z direction.

[0031] In the exemplary embodiment shown, each console 22 is provided with four holes 24, in other words, with two sets of two holes 24 located above each other.

[0032] In addition to the holes 24, or instead thereof, in an alternative embodiment the fastening provision of the at least one console 22 can comprise at least one threaded end or reinforcement element protruding out from the concrete of the console 22.

[0033] The at least one protruding threaded end or reinforcement element is hence over a part of its length cast-in in the concrete of the console 22. During connection to the bearing construction 100, the stub can be inserted through a corresponding hole in the bearing construction and be connected to the bearing construction 100 with nuts. In the case of the protruding reinforcement element, the reinforcement element may be cast-in in concrete in the bearing construction 100 when connecting the balcony 10 to the bearing construction. For that matter, such casting-in in concrete of the bearing construction is also possible with protruding threaded ends.

[0034] In an embodiment, the balcony floor 12 of the balcony 10 may be provided with a reinforcement in the form of two reinforcement nets 34, 36 located above each other. The smallest distance between a top surface 12b of the balcony floor 12 and the upper reinforcement net 34, also referred to as concrete cover, can be in the range of 10-20 mm. The concrete cover at the underside of the

balcony floor 12, that is, the smallest distance between an undersurface 12a of the balcony floor 12 and the lower reinforcement net 36, can be in the range of 10-20 mm.

[0035] According to a further elaboration of the invention, the legs 28a extending in Y direction of the series of first L-bars 28 can be longer than the legs 30a extending in Y direction of the series of second L-bars 30. Calculations have shown that the legs 28a extending in Y direction of the series of first L-bars 28 have to transmit the greatest forces and therefore require a greater contact surface to be able to transmit the forces on the concrete than do the legs 30a extending in Y direction of the series of second L-bars 30.

[0036] In an embodiment, of which an example is shown in the drawings, a top surface 12b of the balcony floor 12 can include a small angle with the XY plane, so that a slope is created. The slope may have a configuration such that rainwater flows to the distal longitudinal edge 16. In such an implementation, the presence of a rainwater drain, for instance in the form of a drainpipe, can be dispensed with. In an alternative design, the slope may also have a configuration such that rainwater flows to the proximal longitudinal edge 14. In the latter case, a rainwater drain needs to be arranged near the proximal longitudinal edge 14.

[0037] In the variant where the slope is implemented such that the rainwater flows to the distal longitudinal edge 16, such slope may be created in that the thickness of the balcony floor 12 at the proximal longitudinal edge 14 is greater than the thickness of the balcony floor 12 at the distal longitudinal edge 16. Thus, not only the slope is created, but also concrete is saved in such a way that where the forces in the concrete are highest, the thickness of the balcony floor 12 is high and there where the forces in the concrete are smaller, the thickness of the balcony floor 12 is smaller.

[0038] In an embodiment, of which an example is shown in the figures, at least at the distal longitudinal edge 16 of the balcony floor 12, fastening means 38 for a balustrade 40 may be connected with the balcony floor 12. Such fastening means 38 may be connected with a reinforcement 42 which is embedded in the balcony floor 12.

[0039] Due to the presence of the fastening means 38, in a simple and robust manner, a balustrade 40 can be connected with the balcony floor 12.

[0040] Fig. 9 shows a part of a building which is provided with a bearing construction 100 and which is provided with an example of a balcony 10 according to the invention. The balcony 10 is connected with the bearing construction 100 of the building with the aid of the fastening provision. In the example shown, the fastening provision of each console 22 is designed with four holes 24 which extend through the console 22 in Y direction. With the aid of threaded ends or bolts 102 which extend through the holes 24 in the console 22, a connection with the bearing construction 100 has been realised.

[0041] Such a connection can be easily realised and the balcony 10 is a prefabricated part which can be manufactured in a factory.

[0042] In an embodiment, of which an example is shown in Fig. 9, between the console 22 and the bearing construction 100 a thermally insulating element 104 may be included, such as, for instance, a thermal break element.

[0043] With such an insulating element, leakage of heat from the building to the relatively cold balcony 10 is prevented. This is advantageous for technical reasons of energy management and building physics.

[0044] In an embodiment, which is also embodied in the example represented in Fig. 9, the bearing construction 100 can be a construction floor 106 or a construction beam 108 extending at the level of the construction floor. On the construction floor 106 a finishing floor 110 of a particular thickness may be provided. The at least one console 22 extending under the balcony floor 12 is connected with the construction floor 106 or the construction beam 108. The construction beam 108 is a steel construction beam 108 in the example shown. It is also possible, however, that the construction beam 108 is a concrete construction beam. In the example shown, the console 22 shown is connected with a construction beam 108 via an insulation basket 104. The attachment is such that a top surface 12b of the balcony floor 12 is substantially at the same level or at a small distance below a top surface 110a of the finishing floor 110. A resident or user of the building can thus step out of the room onto the balcony floor 12 with a minor step up or down. In this manner, the balcony 10 seems to be, as it were, a continuation of the inside floor.

[0045] To facilitate mounting of the balcony, in an embodiment, of which an example is shown in Fig. 9, between the bearing construction 100 and the console 22 an angle 112 may be mounted which is connected with the bearing construction 100. The angle 112 can have a vertical leg 114, and, near a lower edge of the vertical leg 114, may be provided with a horizontal leg 116. An underside of the at least one console 22 rests, at least during mounting of the balcony 10, on the horizontal leg 116, possibly with use of adjustment plates 44 such as shims.

[0046] By the presence of the angle 112 and the use of adjustment plates, the balcony 10, during mounting thereof, can be accurately positioned with respect to the bearing construction. In the embodiment where the fastening provision of each console 22 is implemented as a set of holes 24 extending in Y direction through the console 22, the holes 24 in the console 22 can be accurately positioned opposite the threaded ends or bolts 102, whereupon the balcony 10 can then be moved towards the bearing construction 100, so that the threaded ends 102 reach through the holes 24 and the definitive connection can be effected with nuts 118.

[0047] The invention further provides a method for attaching a balcony 10 to a building. This method comprises:

- providing a balcony 10 according to the invention;
- providing a building which is provided with a bearing construction 100;
- positioning the balcony 10 with respect to the bearing construction; and
- connecting the balcony 10 with the bearing construction 100 with the aid of the fastening provision.

[0048] Thus, in an efficient manner, attachment of a balcony 10 to a bearing construction 100 of a building can be realized.

[0049] In an embodiment, of which an example is shown in the figures, the fastening provision of the at least one console 22, as already set out above, can comprise at least one hole 24 which extends in Y direction through the console 22 and which is configured for passing therethrough a bolt or threaded end 102 for attachment of the balcony 10 to a bearing construction 100. The bearing construction may then be provided with holes through which bolts or threaded ends 102 can be fitted or the bearing construction may be provided with bolts or threaded ends 102 which are connected with the bearing construction 100, while the positions of the holes, bolts or threaded ends 102 of the bearing construction 100 correspond to the at least one hole 24 which is provided in the at least one console 22 of the balcony 10 to be connected with the bearing construction 100. With such an embodiment, positioning may be carried out such that the at least one hole 24 in the at least one console 22 is in line with the holes, bolts or threaded ends 102 of the bearing construction 100. Connecting can comprise the tightening of nuts 118 on the threaded ends or bolts 102 for attaching the balcony 10 to the bearing construction 100.

[0050] In an alternative embodiment of the method, in which the fastening provision of the at least one console 22 comprises at least one threaded end or reinforcement element protruding from the concrete of the console 22, connecting may comprise the casting-in of the protruding threaded end or reinforcement element in concrete of the bearing construction 100.

[0051] In another alternative embodiment of the method, use can be made of a balcony 10 where the fastening provision of the at least one console 22 comprises at least one threaded end protruding from the concrete of the console 22. The bearing construction 100 may then be provided with holes through which the corresponding protruding threaded ends can be fitted. The positions of the holes of the bearing construction 100 correspond to the positions of the at least one protruding threaded end which is provided in the at least one console 22 of the balcony 10 to be connected with the bearing construction 100. For the use of the method with such a balcony 10, positioning is carried out such that the at least one protruding threaded end of the at least one console 22 is in line with the corresponding hole of the bearing construction 100. The eventual connecting then comprises the tightening of nuts 118 on the threaded ends 102 for attachment of the balcony 10 to the bearing construction 100.

[0052] In an embodiment of the method, prior to the positioning of the balcony 10, first an angle 112 including a horizontal leg 116 and a vertical leg 114 can be connected with the bearing construction 100. Positioning of the balcony 10 can comprise, among other steps, resting an underside of the console 22 on the horizontal leg 116 and can further comprise placing adjustment plates, as desired, between the console 22 and the horizontal leg 116. With this further elaboration of the invention, it can be suitably accomplished that the holes 24 in the at least one console 22 can be brought into line with the threaded ends or bolts 102 of the bearing construction 100 or with the holes in the bearing construction 100 through which eventually such threaded ends or bolts 102 are fitted.

[0053] The invention is not limited in any way to the example shown in the figures. Thus, instead of three separate consoles 22 the balcony 10 may also be provided with one continuous console 22 which extends over a considerable part of the length of the proximal longitudinal edge 14. It will be clear that instead of three consoles 22, also two or more than three consoles 22 can be present. Also, the depth of the balcony 10 and the width of the balcony 10 may vary. As said, the term balcony should be understood to cover a gallery. Also a very thin or ultrathin canopy or platform that is constructed in the above-described manner of the balcony is understood to fall within the scope of protection of the claims cited below.

[0054] The various embodiments described above can be used independently of each other and be combined with each other in different ways. The reference numerals in the detailed description and the claims do not limit the description of the embodiments and the claims and serve for clarification only.

Claims

1. A balcony (10) intended for attachment to a bearing construction part (100) of a building, the balcony (10) comprising:

   - a balcony floor (10) which extends in an X direction and a Y direction of an XYZ coordinate system, wherein a width of the balcony floor (12) extends in the X direction and wherein a depth of the balcony floor (12) extends in the Y direction, wherein a Z direction extends substantially perpendicularly to the balcony floor (12), wherein the balcony floor (12) has circumferential contours which are defined by a proximal longitudinal edge (14) and a distal longitudinal edge (16) each extending parallel to the X direction and two opposite transverse edges (18, 20) extending parallel to the Y direction, wherein the balcony floor (12) in Z direction has a thickness of

150 mm at a maximum, wherein the balcony floor (12) is manufactured from Ultra High Performance Fibre Reinforced Concrete (UHP-FRC), wherein the concrete strength class of the ultra high performance concrete is expressed according to NEN-EN 206-1 and NEN 8005 with the designation C $_{fck,cyl}/f_{ck,cube}$, wherein

~ C stands for *concrete,*
~ $f_{ck,cyl}$ is the characteristic cylinder compressive strength in N/mm^2, and
~ $f_{ck,cube}$ is the characteristic cube compressive strength in N/mm^2,

and wherein $f_{ck,cyl}$ is greater than 90 N/mm^2 and $f_{ck,cube}$ is greater than 105 N/mm^2, so that the concrete strength class is higher than C 90/105;

wherein the balcony further comprises:

- at least one console (22) manufactured from the same material as the balcony floor (12) and which forms a monolithic whole with the balcony floor (12), wherein the at least one console (22) is connected with the balcony floor (12) near the proximal longitudinal edge (14), wherein the at least one console (22) extends from an underside (12a) of the balcony floor in Z direction downwards and, viewed in Z direction from above, is situated substantially within the circumferential contours (14, 16, 18, 20) of the balcony floor (12), such that the at least one console (22) is not, or hardly so, visible from above, wherein the at least one console (22) is provided with a fastening provision for attaching the balcony (10) to a bearing construction (100);

wherein the or each console (22) is associated with:

- a reinforcement assembly (26) which comprises:

- a series of first L-bars (28), each first L-bar (28) comprising a reinforcement bar bent in a right angle, including a leg (28a) extending in a first horizontal plane (H1) in Y direction within the balcony floor (12), and including a leg (28b) extending in a first vertical plane (V1) in Z direction within the corresponding console (22);
- a series of second L-bars (30), each second L-bar (30) comprising a reinforcement bar bent in a right angle, including a leg (30a) extending in a second horizontal plane (H2) in Y direction within in the balcony floor (12), and including a leg (30b) extending in a second vertical plane (V2) in Z direction within the corresponding console (22);

wherein the first horizontal plane (H1) is above the second horizontal plane (H2) and wherein the first and the second vertical planes (V1, V2) each extend parallel to the XZ plane of the XYZ coordinate system and wherein the first vertical plane (V1) is closer to the proximal longitudinal edge (14) than the second vertical plane (V2), wherein each reinforcement assembly (26) which is associated with a console (22) further comprises:

- a cross connection reinforcement (32) which mutually interconnects the legs (28b, 30b) extending in Z direction in the console (22), of the first and second L-bars (28, 30).

2. The balcony according to claim 1, wherein a cross section of the at least one console (22) along a plane (V3) parallel to the YZ plane has a substantially rectangular configuration.

3. The balcony according to claim 1 of 2, wherein the cross connection reinforcement (32) comprises a series of sets of stirrups (32_1, 32_2, 32_3, 32_4), wherein the respective sets of stirrups of the series extend in a number of planes located horizontally above each other.

4. The balcony according to any one of claims 1-3, wherein a thickness of the layer of concrete from the reinforcement (28b, 30b, 32) to a nearest outer surface of the console (22) associated with the reinforcement, referred to as concrete cover in the building profession, is in the range of 10-20 mm.

5. The balcony according to any one of the preceding claims, wherein the fastening provision of the at least one console (22) comprises at least one hole (24) which extends in Y direction through the console (22) and which is configured for passing therethrough a bolt or threaded end (102) for attachment of the balcony (10) to a bearing construction (100).

6. The balcony according to claim 5, wherein the or each console (22) is provided with at least two holes (24) located above each other, extending in Y direction through the console (22), which are each configured for passing therethrough a bolt or threaded end (102) for attachment of the balcony (10) to a bearing construction (100).

7. The balcony according to claim 6, wherein each console (22) is provided with at least two sets of two holes (24) located above each other, the sets being spaced apart viewed in X direction and being located at the same level viewed in Z direction.

8. The balcony according to any one of the preceding claims, wherein the fastening provision of the at least one console (22) comprises at least one threaded end or reinforcement element protruding from the concrete of the console (22).

9. The balcony according to any one of the preceding claims, wherein the balcony floor (12) of the balcony (10) is provided with a reinforcement in the form of two reinforcement nets (34, 36) located above each other, wherein the smallest distance between a top surface (12b) of the balcony floor (12) and the upper reinforcement net (34), referred to as concrete cover in the building profession, is in the range of 10-20 mm, wherein the smallest distance between an undersurface (12a) of the balcony floor (12) and the lower reinforcement net (36) is in the range of 10-20 mm.

10. The balcony according to any one of the preceding claims, wherein the legs (28a) extending in Y direction of the series of first L-bars (28) are longer than the legs (30a) extending in Y direction of the series of second L-bars (30).

11. The balcony according to any one of the preceding claims, wherein a top surface (12b) of the balcony floor (12) includes a small angle with the XY plane, so that a slope is created.

12. The balcony according to any one of the preceding claims, wherein the thickness of the balcony floor (12) at the proximal longitudinal edge (14) is greater than the thickness of the balcony floor (12) at the distal longitudinal edge (16).

13. The balcony according to any one of the preceding claims, wherein at least at the distal longitudinal edge (16), fastening means (38) for a balustrade (40) are connected with the balcony floor (12), the fastening means (38) being connected with a reinforcement (42) which is embedded in the balcony floor (12).

14. A building provided with a bearing construction and provided with at least one balcony (10) according to any one of the preceding claims, wherein the balcony (10) is connected with the bearing construction (100) of the building with the aid of the fastening provision.

15. The building according to claim 14, wherein between the console (22) and the bearing construction (100) a thermally insulating element (104) is included, such as, for instance, a thermal break element.

16. The building according to claim 14 or 15, wherein the bearing construction (100) is a construction floor (106) or a construction beam (108) extending at the level of the construction floor, wherein on the construction floor (106) a finishing floor (110) of a particular thickness is provided, wherein the at least one console (22) extending under the balcony floor (12) is connected with the construction floor (106) or the construction beam (108) and wherein a top surface (12b) of the balcony floor (12) is situated substantially at the same level or at a small distance below a top surface (110a) of the finishing floor (110).

17. The building according to any one of claims 14-16, wherein between the bearing construction (100) and the console (22) an angle (112) is mounted which is connected with the bearing construction (100) and which is provided with a vertical leg (114) and, near a lower edge of the vertical leg (114), is provided with a horizontal leg (116), while an underside of the at least one console (22), at least during mounting of the balcony (10), rests on the horizontal leg (116), possibly with interposition of adjustment plates (44).

18. A method for attaching a balcony (10) to a building, the method comprising:

- providing a balcony (10) according to any one of claims 1-13;
- providing a building which is provided with a bearing construction (100);
- positioning the balcony (10) with respect to the bearing construction (100);
- connecting the balcony with the bearing construction with the aid of the fastening provision.

19. The method according to claim 18, wherein the fastening provision of the at least one console (22) comprises at least one hole (24) which extends in Y direction through the console (22) and which is configured for passing therethrough a bolt or threaded end (102) for attachment of the balcony (10) to a bearing construction (100), wherein the bearing construction is provided with holes through which bolts or threaded ends (102) can be arranged or is provided with bolts or threaded ends (102) which are connected with the bearing construction (100), wherein the positions of the holes, bolts or threaded ends (102) of the bearing construction (100) correspond to the at least one hole (24) which is provided in the at least one console (22) of the balcony (10) to be connected with the bearing construction (100), wherein positioning is carried out such that the at least one hole (24) in the at least one console (22) is in line with the holes, bolts or threaded ends (102) of the bearing construction (100), wherein connecting comprises the tightening of nuts (118) on the threaded ends or bolts (102) for attachment of the balcony (10) to the bearing construction (100).

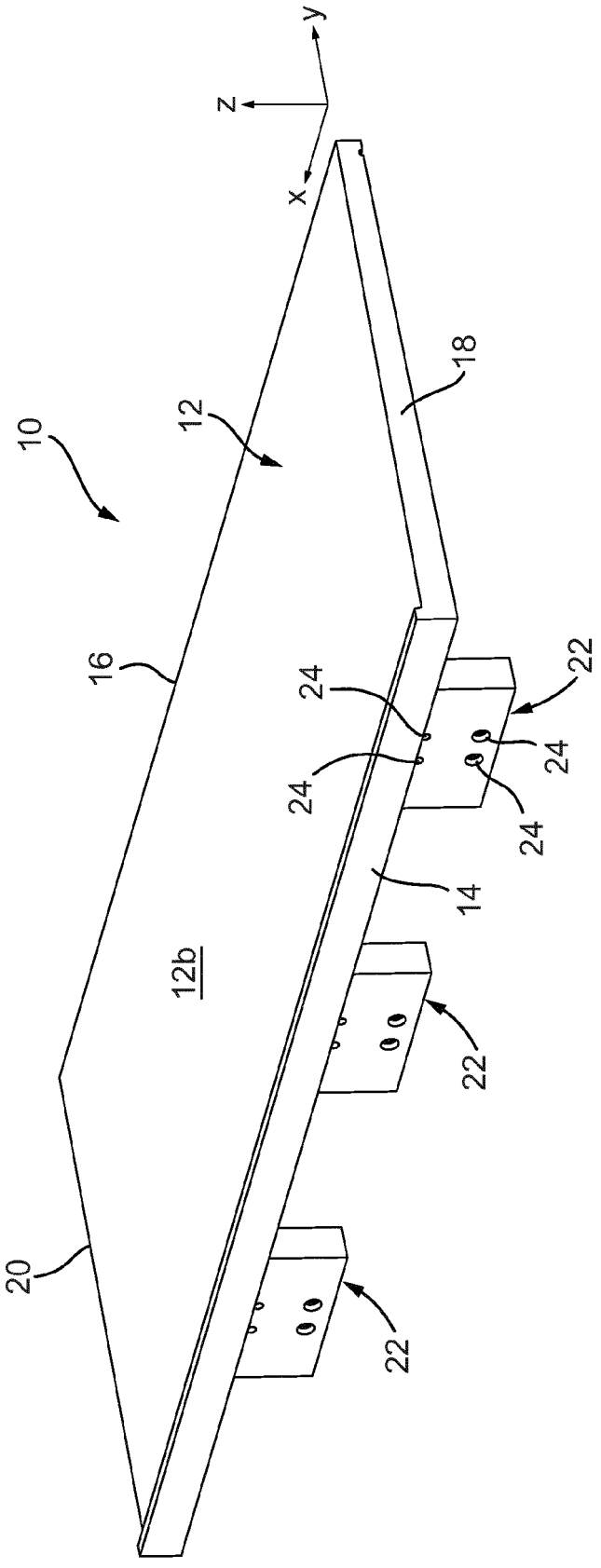
20. The method according to claim 18, wherein the fastening provision of the at least one console (22) com-

prises at least one threaded end or reinforcement element protruding from the concrete of the console (22), wherein connecting comprises casting-in of the protruding threaded end or reinforcement element in the concrete of the bearing construction (100).

21. The method according to claim 18, wherein the fastening provision of the at least one console (22) comprises at least one threaded end protruding out from the concrete of the console (22), wherein the bearing construction is provided with holes through which the corresponding protruding threaded ends can be arranged, the positions of the holes of the bearing construction (100) corresponding to the positions of the at least one protruding threaded end which is provided in the at least one console (22) of the balcony (10) to be connected with the bearing construction (100), wherein positioning is carried out such that the at least one protruding threaded end of the at least one console (22) is in line with the corresponding hole of the bearing construction (100), wherein connecting comprises the tightening of nuts (118) on the threaded ends (102) for attachment of the balcony (10) to the bearing construction (100).

22. The method according to any one of claims 18-21, wherein prior to the positioning of the balcony (10), first an angle (112) provided with a horizontal leg (116) and a vertical leg (114) is connected with the bearing construction (100), wherein the positioning of the balcony (10) comprises, among other steps, resting an underside of the console (22) on the horizontal leg (116) and further comprises placing adjustment plates, as desired, between the console (22) and the horizontal leg (116).

Fig. 1



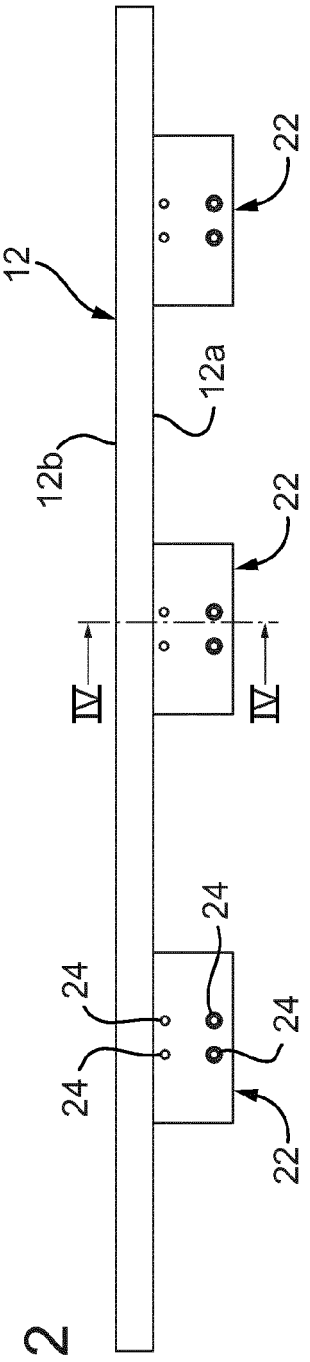


Fig. 2

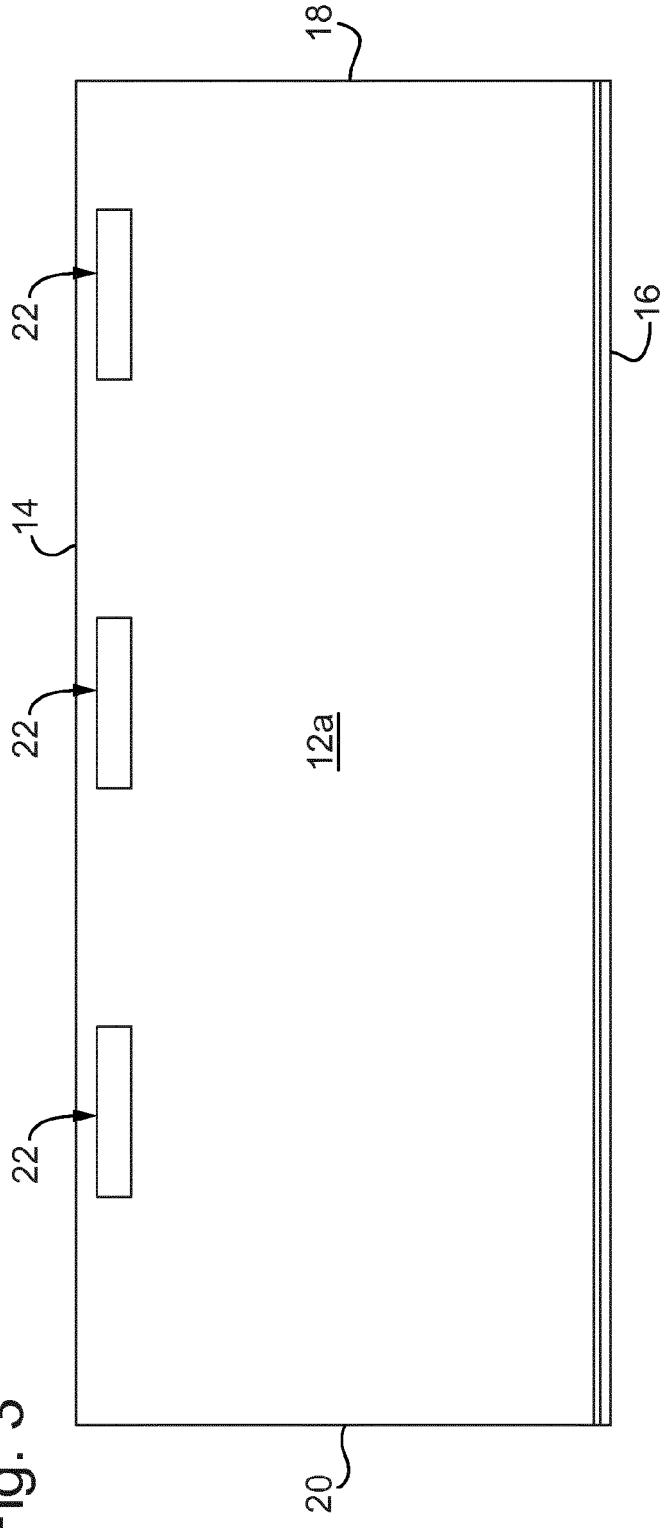


Fig. 3

Fig. 4

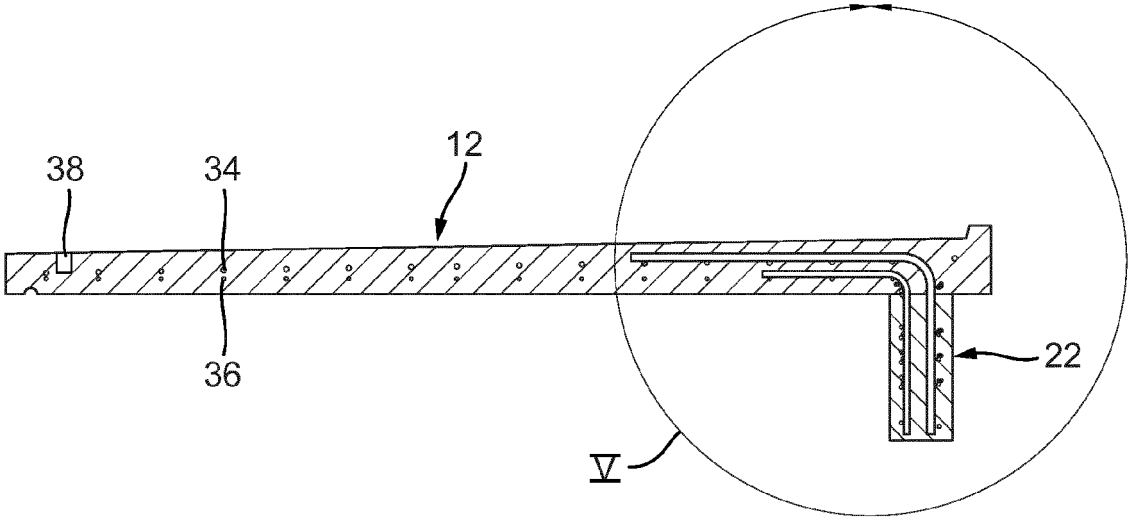

38
34
12
36
22
V

Fig. 5

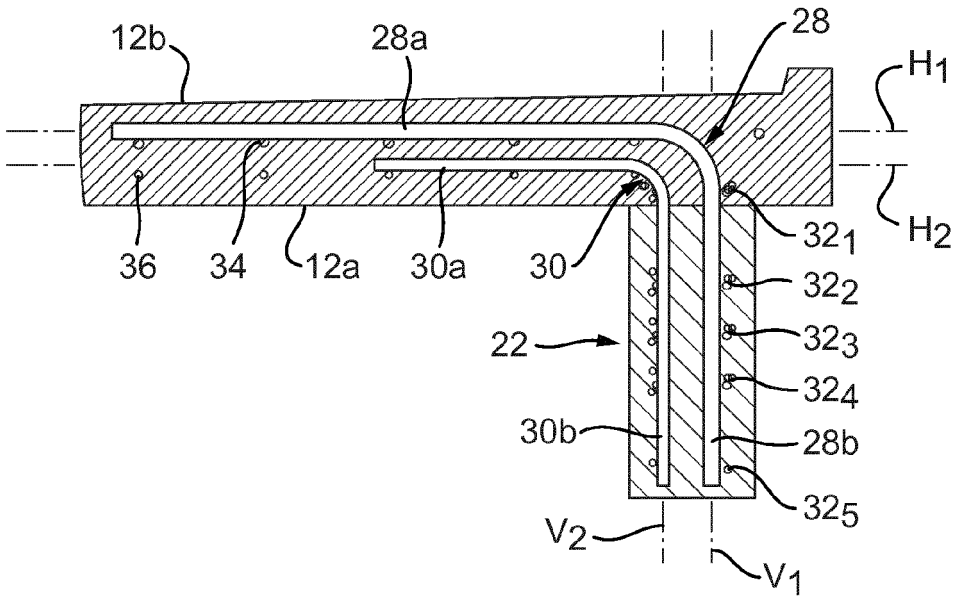
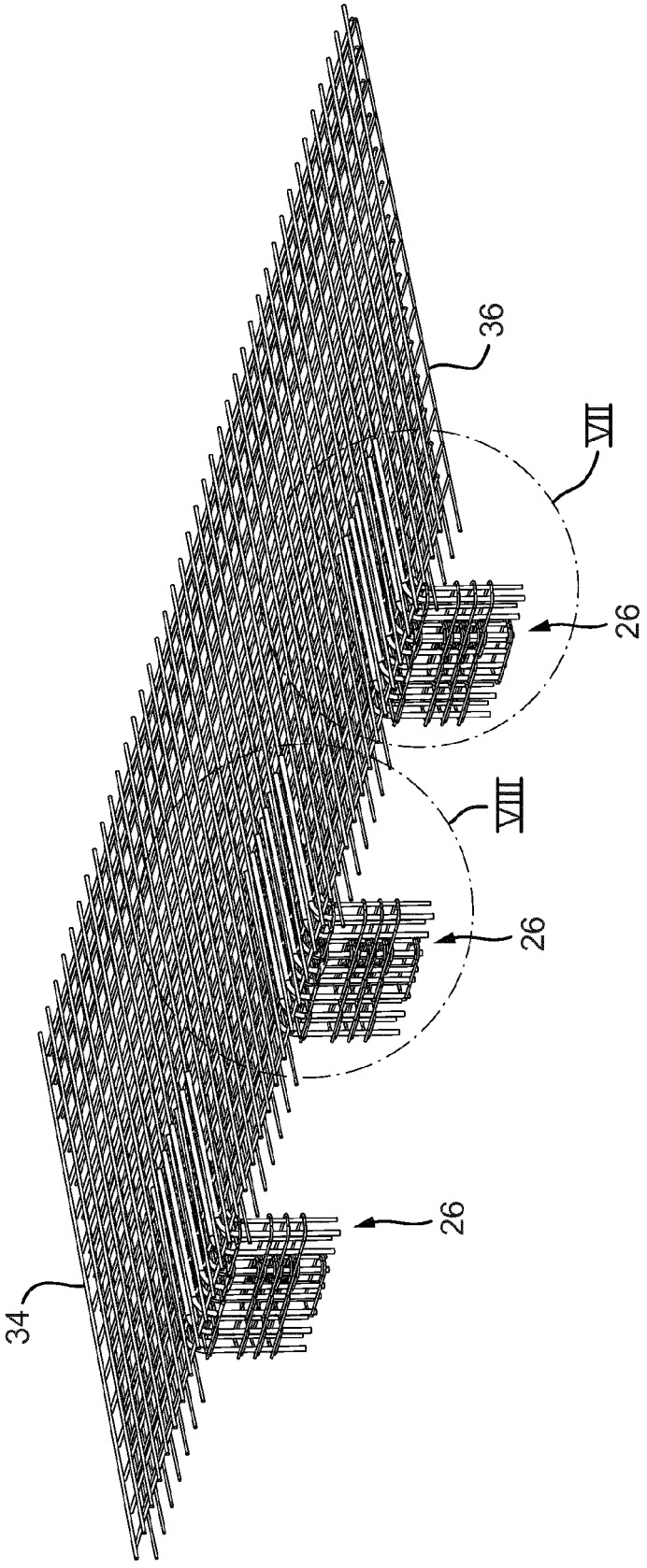

12b
28a
28
H1
H2
36
34
12a
30a
30
32 1
32 2
32 3
32 4
32 5
22
30b
28b
V2
V1

Fig. 6



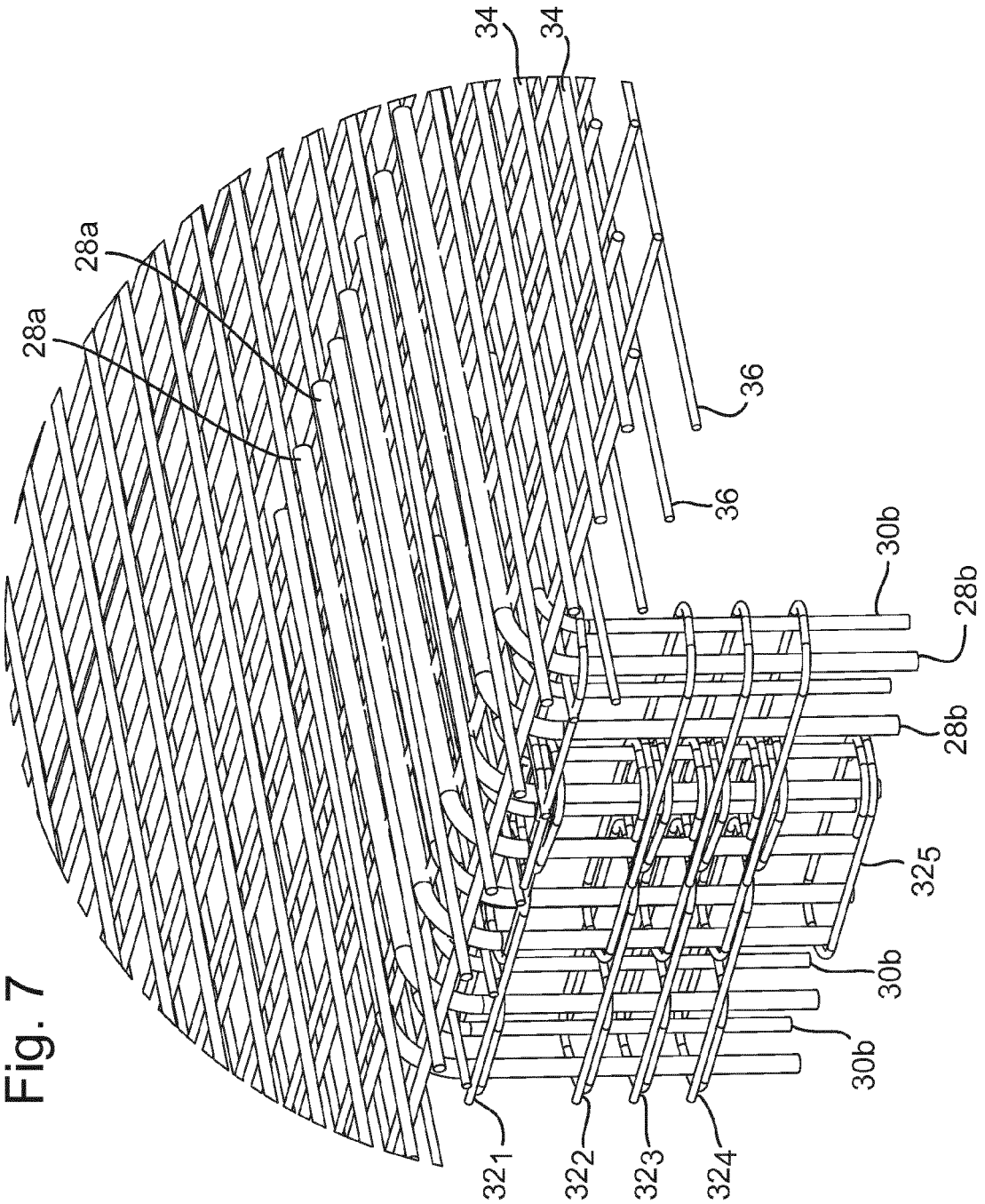


Fig. 7

Fig. 8

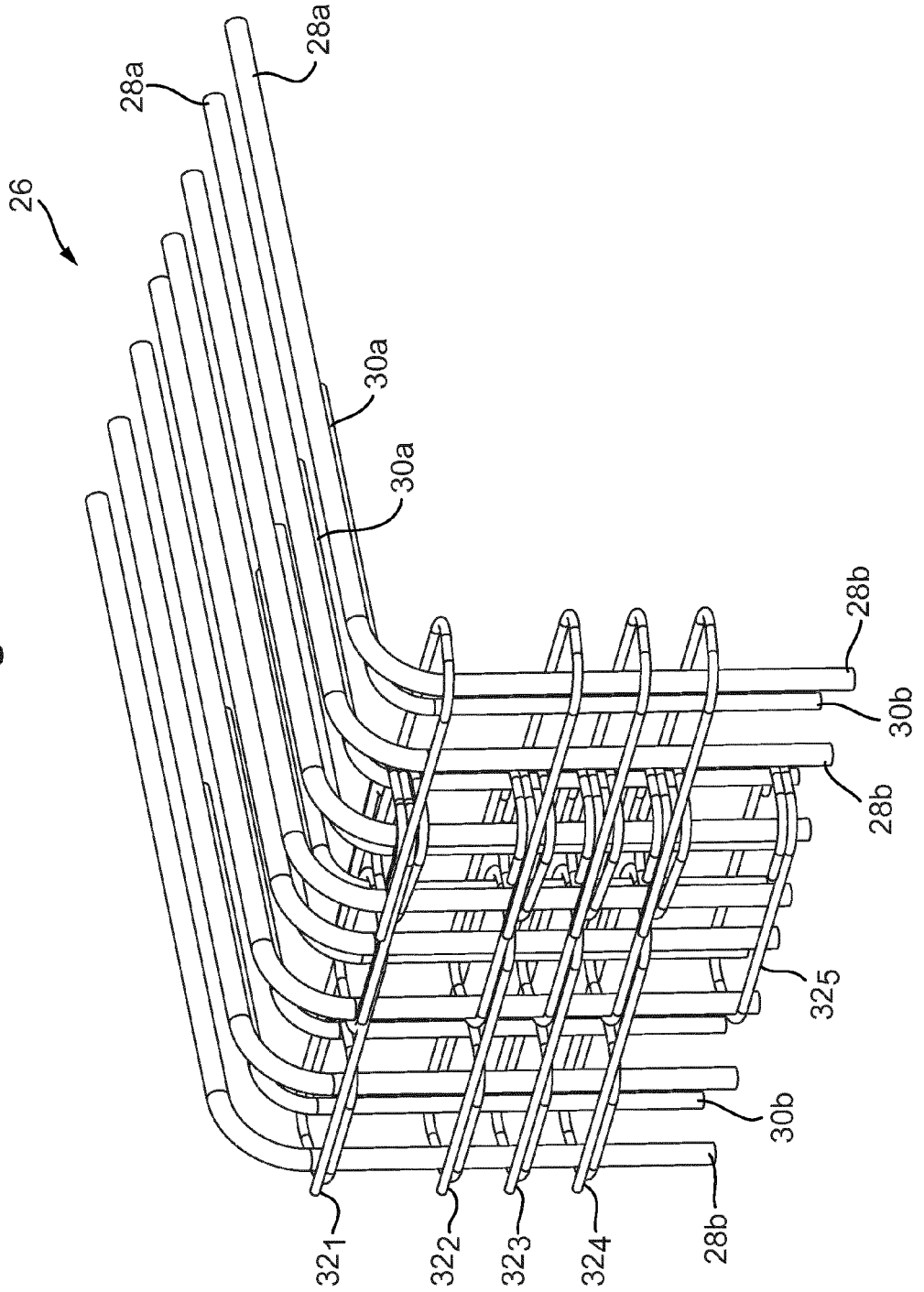
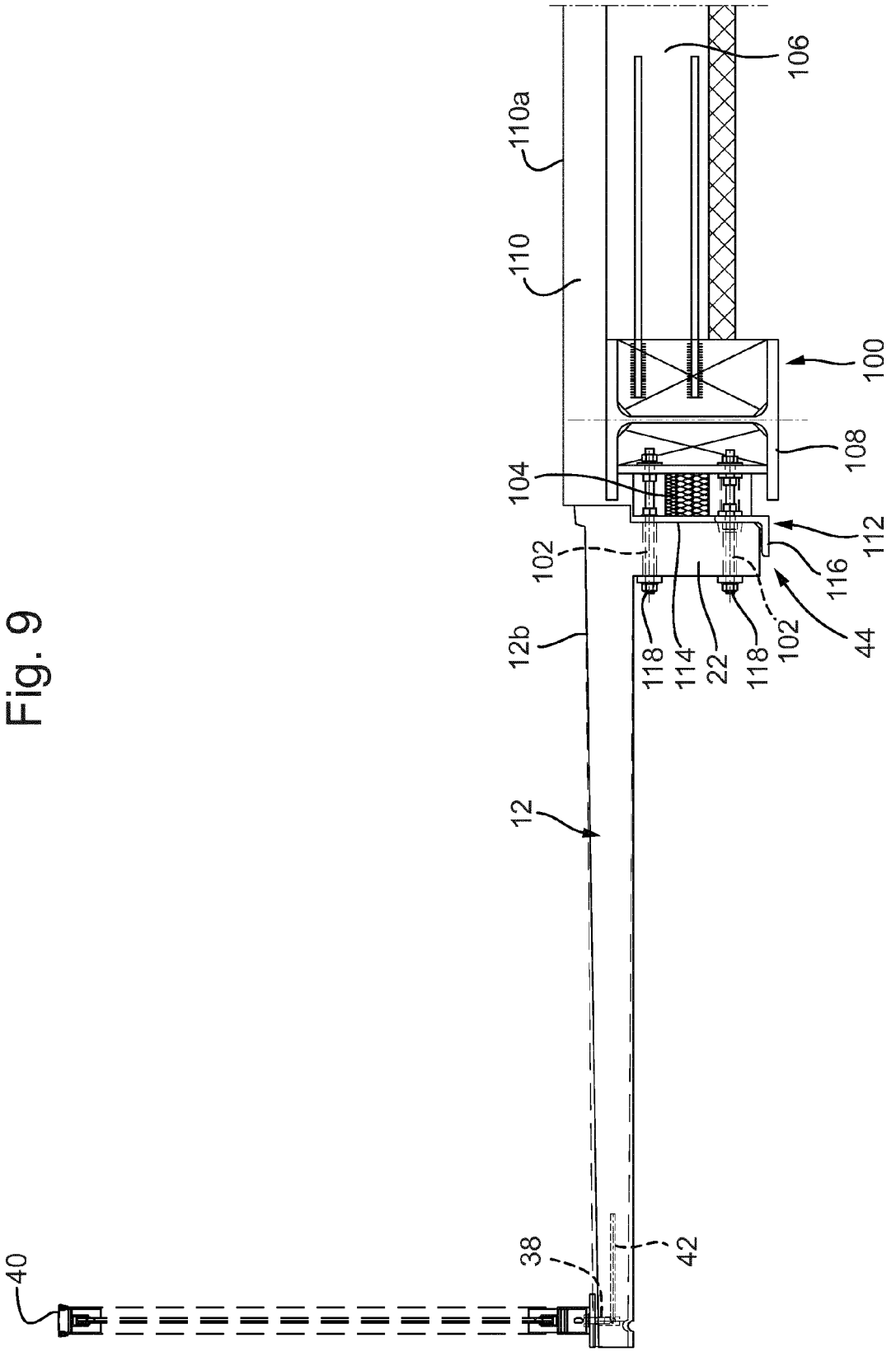


Fig. 9


106
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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 1997

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	"Afbeelding 4, Bouwkundig aansluitdetail Schöck Isokorf® KST met Hi-Con balkonplaat", , 6 May 2014 (2014-05-06), XP002739005, Retrieved from the Internet: URL:http://www.nbd-online.nl/#news_item/176298/Schck_innovaties_maken_achteraf_montage_mogelijk/html [retrieved on 2015-04-22] * figure afbeelding 4 * -----	1-22	INV. E04B1/00 ADD. E04C5/06

TECHNICAL FIELDS SEARCHED (IPC)
E04B
E04C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 November 2015	Dieterle, Sibille

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons
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