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(54) **Beam and panel provided with this beam**

(57) A beam (13), comprising a longitudinal metallic body (4), having the shape of an open trapezoidal profile in cross section, where, a longitudinal distance keeping reinforcing element is fixed to each of its end flanges, which element is formed by at least one longitudinal metallic profile (3) having shape of the letter C in cross section, where the stem of the profile (3) is provided with perforations along its whole length, wherein, the longitudinal metallic profile (3) is of width corresponding to the

width of the flange of the trapezoidal profile of said longitudinal metallic body (4), and its stem is placed in the region above the transfer of this flange into the oblique wall of the open trapezoidal profile of said longitudinal body (4).

A panel determined to be used preferably for building of roofs or for claddings of structures, with large span of the carrying and supporting elements is provided with at least one beam (13).

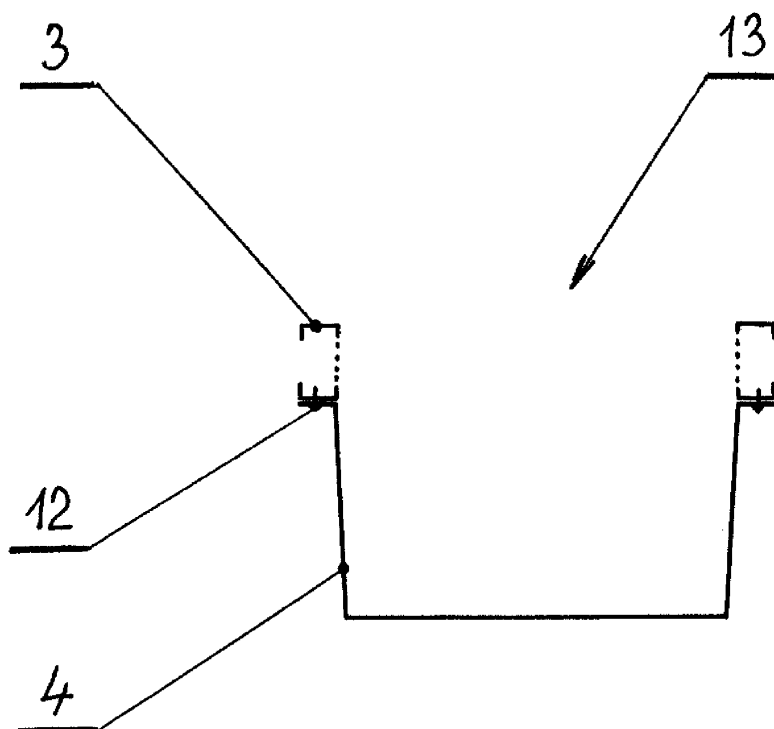


Fig. 1

Description

Field of the Invention

[0001] The present invention relates to a beam and a panel provided with this beam, preferably determined for building of roofs or for claddings of structures with large span of the carrying and supporting elements.

Background of the Invention

[0002] The US specification No. 4,346,544 from the year 1982 discloses a beam comprising a longitudinal metallic body having in cross section the shape of an upwards open trapezoidal profile, where a longitudinal wooden distance keeping reinforcing element is fixed to each of its upper horizontal flange.

[0003] A disadvantage of this prior art beam is that the distance keeping reinforcing element is made of wood, the price of which is higher year by year. Moreover, wood is material which can be attacked by moulds or ligniperdous insects, so that it can be destroyed with time.

Summary of the Invention

[0004] The above mentioned deficiencies are removed by a beam comprising a longitudinal metallic body having the shape of an open trapezoidal profile in cross section, where, a longitudinal distance keeping reinforcing element is fixed to each of its end flanges, according to the present invention, which is characterized in that each longitudinal distance keeping reinforcing element is formed either by at least one longitudinal metallic profile having shape of the letter C in cross section, where the stem of said profile is provided with perforations along its whole length or by one longitudinal metallic profile (3) having shape of rectangularly cranked letter Z in cross section, where the stem of the profile is provided with perforations along its whole length.

[0005] The longitudinal metallic profile, having shape of the letter C in cross section, is of width corresponding to the width of the flange of the trapezoidal profile of the longitudinal metallic body, and its stem is placed in the region above the transfer of this flange into the oblique wall of the open trapezoidal profile of the longitudinal metallic body.

[0006] The stem of the longitudinal metallic profile, having shape of rectangularly cranked letter Z in cross section, is adjacent to the external edge of the end forming flange of the trapezoidal profile of the longitudinal metallic body, wherein, width of this body corresponds to the width of the adjacent supporting part of the longitudinal metallic profile.

[0007] Further, it is necessary to consider as essential for this beam that the perforation is formed by rows of longitudinal openings, oriented one after the other, arranged so that each opening of the row has a gap formed by two longitudinal openings of the adjacent row situated

on at least one of its lateral sides.

[0008] In a preferable embodiment, each distance keeping reinforcing element is formed by two longitudinal metallic profiles, having shape of the letter C in cross section, which profiles are arranged next to each other and are oriented so that their perforated stems are at the more distant positions with regard to each other, which profiles have width, which is the same or smaller than that of the flange with of the trapezoidal profile of the longitudinal metallic body.

[0009] In the next preferable embodiment, between the longitudinal metallic profiles, , fixed to the flanges of the trapezoidal profile of the longitudinal metallic body, a similarly arranged further longitudinal metallic profile, having shape of the letter C in cross section, is placed in the same plane, which profile is fixed to one supporting part of the longitudinal metallic strut having shape of the rectangularly cranked letter Z in cross section, which strut is connected with the bottom of the trapezoidal profile of said longitudinal metallic body (4) with its second supporting part, wherein, the connecting part of the longitudinal metallic strut and the perforated stem of the longitudinal metallic profile fixed to it are arranged in one plane, wherein, width of the longitudinal metallic profile corresponds to the width of the adjacent supporting part of the longitudinal metallic strut.

[0010] A panel, preferably for building of roofs or for claddings of structures, with large span of the carrying and supporting elements, comprising at least one longitudinal profiled beam, which beam is provided with plates having covering on one side, and having antifire covered with decorative plates on the opposite side, wherein the space between the plates with covering and the antifire insulation, including at least one longitudinal profiled beam, is filled up with thermal insulation placed on a PE film, is, according to this invention, characterized in that the longitudinal profiled beam is the beam described above.

[0011] Advantages of this beam structure, and those of a panel provided with this beam, is the zero consumption of the more and more expensive wood for production of the longitudinal distance reinforcing elements, elimination of the possible destruction of the elements after they have been attacked by moulds or ligniperdous insects, and last but not least also improvement in stiffness and bearing capacity of the whole panel.

Brief Description of the Drawings

[0012] Examples of beam embodiments according to this invention are shown in cross sections on the attached Figures 1 to 3, and Figure 4 shows a panel in cross section, wherein two beams from Figure 1 are used.

Examples of Embodiments of the Invention

[0013] As it can be seen in Fig. 1, in one of the possible embodiments, a beam 13 comprises of a longitudinal me-

tallic body 4 having the shape of an upwards opened trapezoidal profile in cross section, where, to each of its upper horizontal flanges one longitudinal metallic profile 3 is fixed by screws 12, which profile 3 has shape of the letter C in cross section and stem of the profile 3 is provided with perforations along its whole length. In an unshown embodiment, one longitudinal metallic profile 3 having the shape of the rectangularly cranked letter Z in cross section and a stem, which is perforated along its whole length, can be fixed to each of the upper horizontal flanges of the longitudinal metallic body 4, which body 4 has shape of upwards opened trapezoidal profile in cross section. The stem is adjacent to the outside edge of the ending flange of the trapezoidal profile of the longitudinal body 4. Width of the body 4 corresponds to width of the adjacent supporting part of the longitudinal metallic profile 3.

[0014] The perforations are formed by rows of longitudinal openings oriented one after the other, which openings are arranged so that each opening of the row has a gap on at least on one of lateral sides, which gap is formed between two longitudinal openings of the adjacent row.

[0015] The longitudinal metallic profile 3, having shape of the letter C in cross section, at the same time has width corresponding to the width of the horizontal flange of the trapezoidal profile of the longitudinal metallic body 4, and its stem is arranged in the area above the transfer of this horizontal flange into an oblique wall of the upwards opened trapezoidal profile of the longitudinal metallic body 4.

[0016] According to another possible embodiment (see Fig. 2), two, next to each other arranged metallic profiles 3 are fixed by screws 12 to each of the horizontal flanges of the trapezoidal profile of the longitudinal metallic body 4. The metallic profiles 3 have shape of the letter C in cross section and they are oriented with regard to their stems with perforations so that the stems are at the more distant positions with regard to each other. Width of each of this pair of next to each other arranged longitudinal metallic profiles 3 is smaller than what is the width of the horizontal flange of the trapezoidal profile of the longitudinal metallic body 4.

[0017] It is also possible to design the beam 13 so that another longitudinal metallic profile 3 is situated in the same horizontal plane, between the longitudinal metallic profiles 3, having shape of the letter C in cross section and fixed on flanges of the trapezoidal profile of the longitudinal metallic body 4, according to Fig. 1 or Fig. 2. The profile 3 is having shape of the letter C in cross section, and is fixed by means of screws 12 to the horizontal supporting part of the longitudinal metallic strut 14. The strut 14 is having the shape of the rectangularly cranked letter Z in cross section. The strut 14 is connected by its bottom supporting part with the bottom of the trapezoidal metallic body 4 by means of screws 12. Fig. 3 shows an example where the longitudinal metallic strut 14 with longitudinal metallic profile 3 is placed on the beam 13 shown on Fig. 2. It is also apparent from Fig. 3 that the

vertical connecting part of the longitudinal metallic strut 14 and the perforated stem of the longitudinal metallic profile 3 fixed on it are arranged in one plane, where, width of the longitudinal metallic profile 3 corresponds to the width of the upper supporting part of the longitudinal metallic strut 14.

[0018] Connecting of individual parts of the beam 13 to each other at the same time does not need to be necessarily carried out by means of screws 12 so as it is described above. To this connecting, it is also possible to use e.g. rivets or adhesive or another known principle of connecting.

[0019] Further, Fig. 4 shows construction of a panel in cross section, which panel is determined to be used mainly in building of roofs or for cladding of structures with large span of the carrying and supporting elements. The panel is provided with two beams 13, so as they are shown in Fig. 1. However, it is obvious that instead of the beams 13 from the Fig. 1, either the beams 13 from the Fig. 2 or the beams 13 from the Fig. 3 can be used in this panel.

[0020] On the side with the longitudinal metallic profiles 3, waterproof plywood 2 is screwed to the beams 13. The plywood 2 is covered with the covering 1, which covering 1 is the roofing in case of the roof panels. The horizontal plywoods 2 are connected by a bottom connecting slat 9 between the beams 13. Such slat 9 is also present at one of the longitudinal borders of the panel to allow connecting with the adjacent panel. Above the connecting place of the adjacent panels, the covering 1 is then provided with an overlap 11. On the sides, which are opposite to the sides with the longitudinal metallic profiles 3, the antifire insulation 7 is fixed. The antifire insulation 7 is covered by decorative plates 8. In case of a roof panel, the decorative plates 8 are any decorative ceiling plates. At the same time, each of the beams 13 is also provided with a firm cross-piece in the shape of the internal space of the beam 13 profile at each of its ends and at least one place between its ends.

[0021] Then, the whole internal space of the panel, i.e. the space between the waterproof plywood 2 and the antifire insulation 7, including that of the beams 13, is filled up with thermal insulation 5, which is placed e. g. on a PE film. The PE film acts as a moisture stop. The PE film 6 is pulled also over the lateral sides of the panel and is fixed to the internal surface area of the waterproof plywood 2. On one of these lateral sides, preferably on the side with the covering 1 overlap 11, the PE film 6 is provided with an adhesive tape 10, sticking on both sides. This tape is ready to be connected with the PE film 6 on the lateral side of the adjacent panel.

Industrial Use

[0022] A beam, and a panel with at least one such beam, can be used particularly in the civil engineering, and this in building of roofs or in making claddings of structures with large span of the carrying and supporting

elements, so as are for example warehouses or production, sporting and selling halls.

Claims

1. A beam (13), comprising a longitudinal metallic body (4), having the shape of an open trapezoidal profile in cross section, where, a longitudinal distance keeping reinforcing element is fixed to each of its end flanges, **characterized in that** each longitudinal distance keeping reinforcing element is formed by at least one longitudinal metallic profile (3) having shape of the letter C in cross section, where the stem of said profile (3) is provided with perforations along its whole length. 5 10
2. A beam (13), comprising a longitudinal metallic body (4), having the shape of an open trapezoidal profile in cross section, where, a longitudinal distance keeping reinforcing element is fixed to each of its end flanges, **characterized in that** each longitudinal distance keeping reinforcing element is formed by one longitudinal metallic profile (3) having shape of rectangularly cranked letter Z in cross section, where the stem of said profile (3) is provided with perforations along its whole length. 15 20 25
3. A beam (13) according to claim 1, **characterized in that** said longitudinal metallic profile (3) is of width corresponding to the width of the flange of the trapezoidal profile of said longitudinal metallic body (4), and its stem is placed in the region above the transfer of this flange into the oblique wall of the open trapezoidal profile of said longitudinal metallic body (4). 30 35
4. A beam (13) according to claims 1 or 2, **characterized in that** the perforations are formed by rows of longitudinal openings, oriented one after the other, arranged so that each opening of the row has a gap, arranged on at least one of its lateral sides, which gap is formed between two longitudinal openings of the adjacent row. 40
5. A beam (13) according to claim 1, **characterized in that** each distance keeping reinforcing element is formed by two longitudinal metallic profiles (3), arranged next to each other, which profiles (3) are oriented so that their stems are at the more distant positions with regard to each other. 45 50
6. A beam (13) according to claim 5, **characterized in that** said two next to each other arranged longitudinal metallic profiles (3) have width, which is the same or smaller than that of the flange of the trapezoidal profile of the longitudinal metallic body (4). 55
7. A beam (13) according to claims 1 and 3 to 6, **characterized in that** between said longitudinal metallic profiles (3), fixed to the flanges of the trapezoidal profile of said longitudinal metallic body (4), a similarly arranged further longitudinal metallic profile (3) is placed in the same plane, which profile (3) is fixed to one supporting part of the longitudinal metallic strut (14) having shape of the rectangularly cranked letter Z in cross section, which strut (14) is connected with the bottom of the trapezoidal profile of said longitudinal metallic body (4) with its second supporting part.
8. A beam (13) according to claim 7, **characterized in that** the stem of said longitudinal metallic strut (14) and the perforated stem of said longitudinal metallic profile (3), fixed to it, are arranged in one plane, wherein width of said longitudinal metallic profile (3) corresponds to width of the adjacent supporting part of said longitudinal metallic strut (14).
9. A beam (13) according to claim 2, **characterized in that** the stem of said longitudinal metallic profile (3) is adjacent to the external edge of the finalizing flange of the trapezoidal profile of said longitudinal metallic body (4), the width of which corresponds with the width of the adjacent supporting part of said longitudinal metallic profile (3).
10. A panel determined to be used preferably for building of roofs or for claddings of structures, with large span of the carrying and supporting elements, comprising at least one longitudinal profiled beam, which beam is provided with plates having covering on one side and having antifire insulation covered with decorative plates on the opposite side, wherein the space between the said plates with covering and said antifire insulation, including at least one longitudinal profiled beam, is filled up with thermal insulation placed on a PE film, **characterized in that** the longitudinal profiled beam is said beam (13) according to claims 1 to 9.

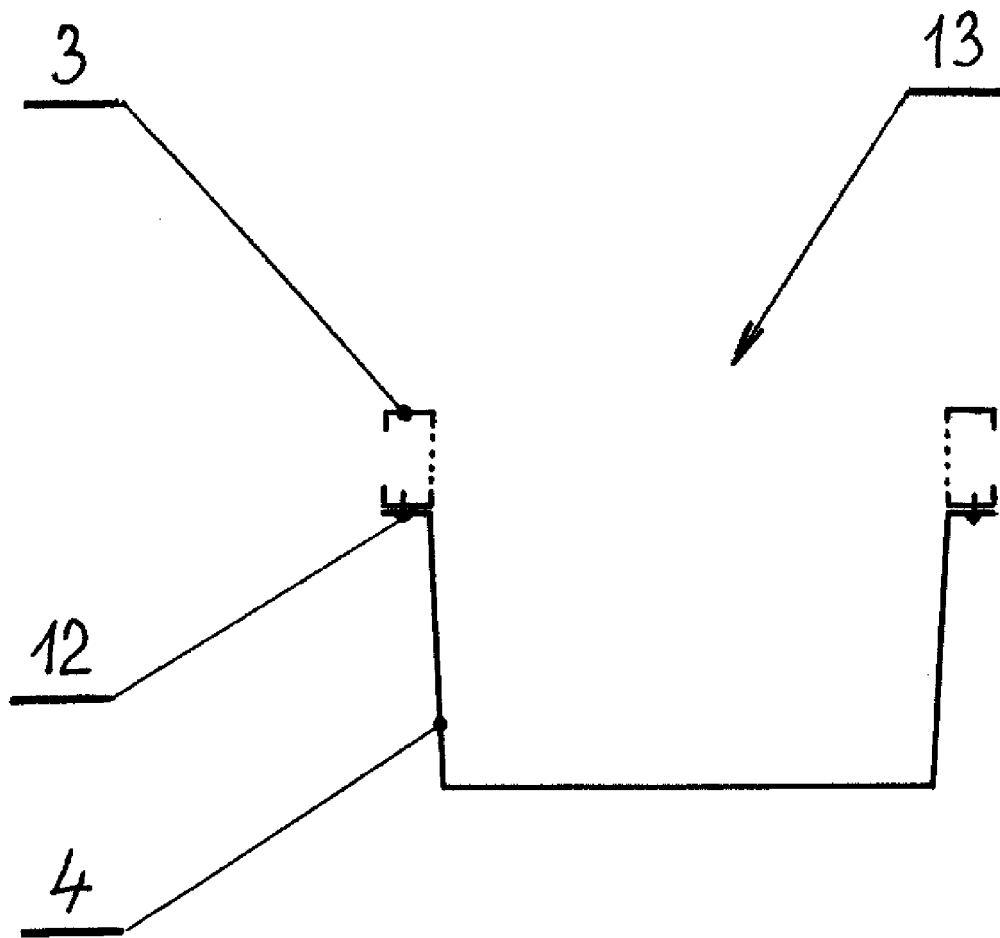


Fig. 1

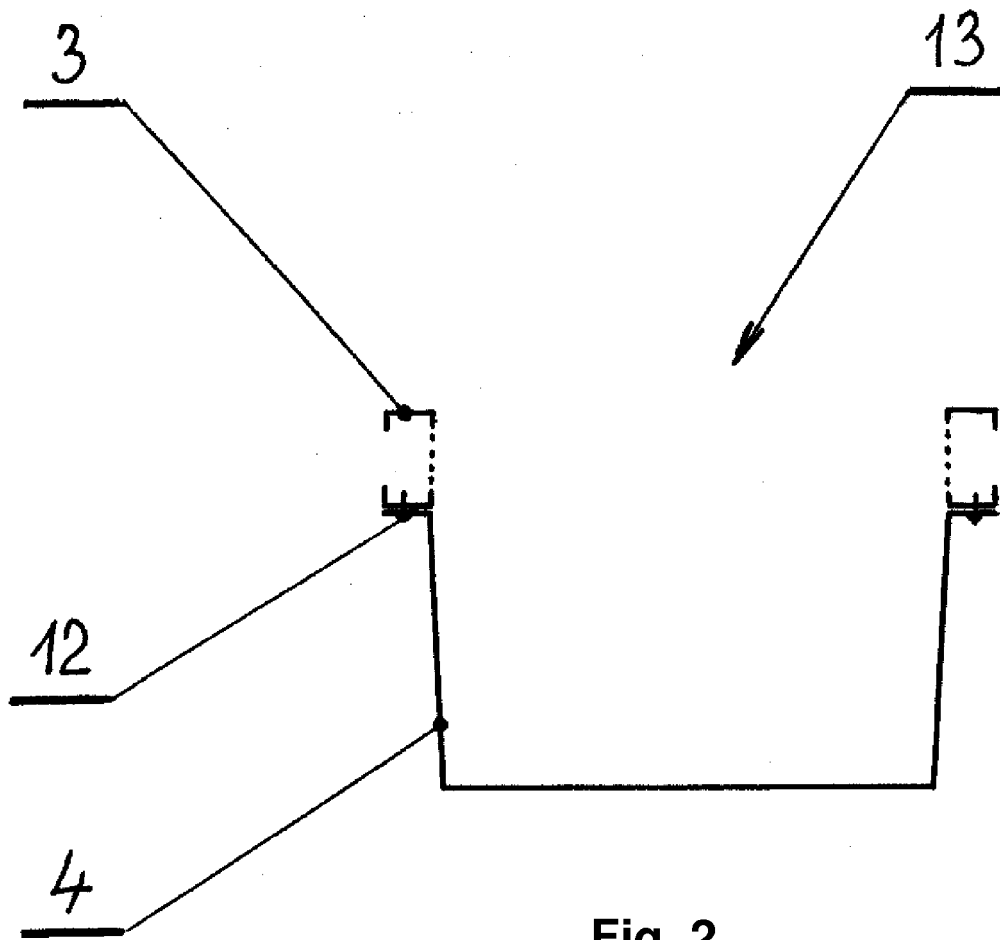


Fig. 2

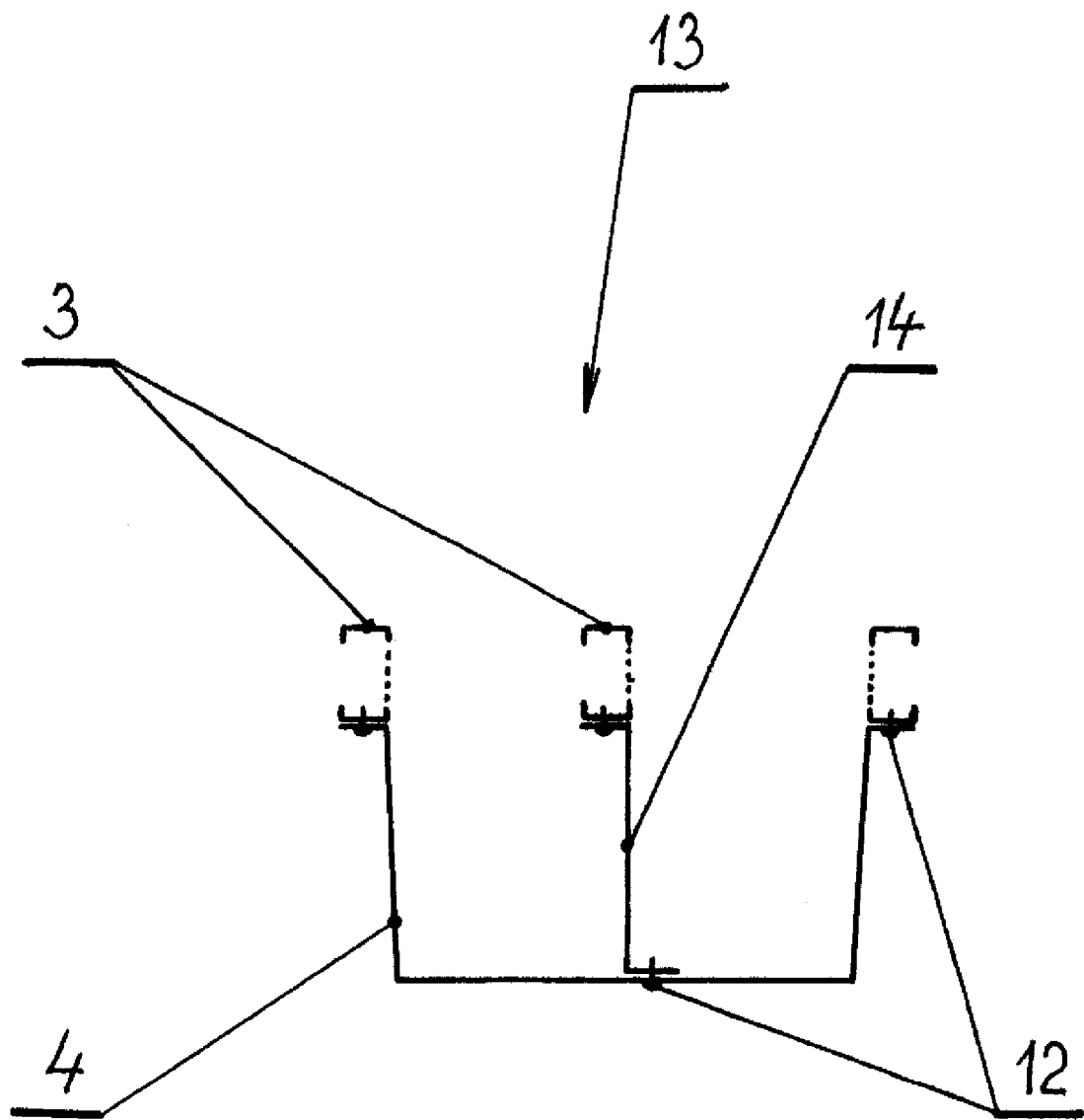


Fig. 3

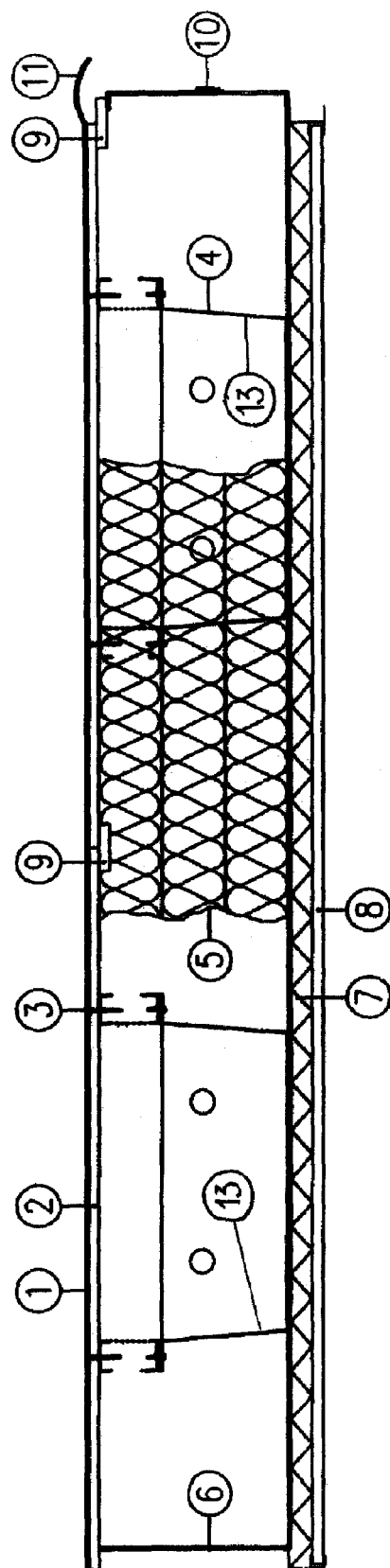


Fig. 4



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 10 0485

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 June 2008	Examiner Demeester, Jan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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