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(54) Beam for supporting floor elements

(57) The invention relates to a beam (1) for supporting floor elements (2), having a bottom side, a top side and two lateral sides. The inventive beam (1) consists of a bottom plate (8) and two separate, identical combined plates (10a,10b), each of which is folded in a longitudinal direction so as to form a lateral side and half the top side of the beam. Preferably, two edges (9a,9b) of the bottom plate (8) are folded in such a way that two re-entrant angles are formed into which the combined plates(10a, 10b) may be fitted.

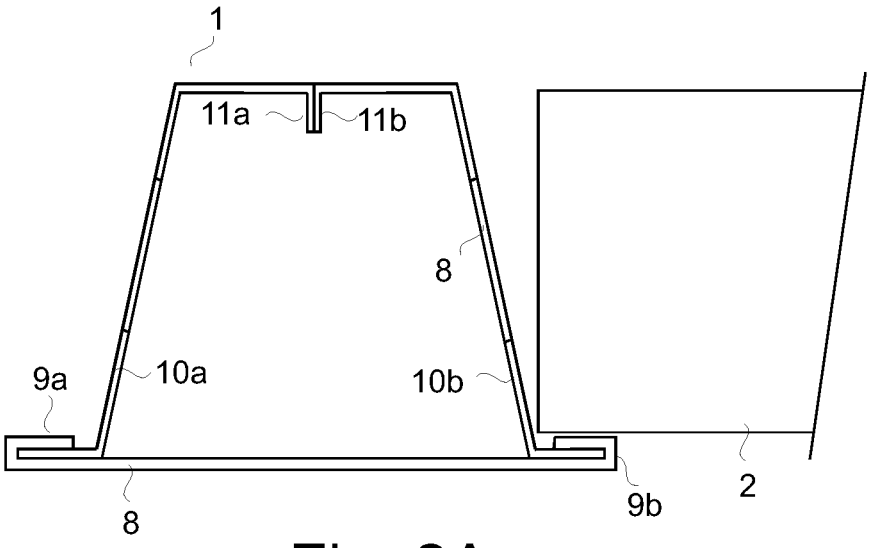


Fig. 2A

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Description

[0001] The invention relates to a beam made of steel, for supporting floor elements, consisting of a bottom plate, a top plate and two side plates. Beams of this type are known. The known beams have a bottom plate, a top plate and side plates which have been welded together during manufacturing and they can be supplied in a number of different embodiments, to be used for different types of floors. The disadvantage of the known beams is that the delivery time is long, as it is unattractive for the manufacturer to have all these different types in stock in large numbers. Moreover the storage costs and the transportation costs are high, as a beam consists for the greater part of empty space.

[0002] The beam according to the invention substantially obviates this disadvantage and is characterised in that the beam comprises a bottom plate and two identical combined plates, which combined plates each are folded in a longitudinal direction, such that they comprise a side plate and half a top plate, as well as means of attachment for attaching the combined plates to the bottom plate. It is enough then to have a number of standardised bottom plates and a number of different combined plates in stock, which are stackable so that they require little storage space and which moreover may be transported in a cheap and simple manner. A significant additional advantage is that the bottom plate may be given a special finishing if desired, which is important as the bottom plate usually remains visible. In this respect one may think of hot clip galvanizing, but also of regular galvanizing or spray-painting, in such a way that further finishing may be omitted.

[0003] A favourable embodiment of the inventive beam, for which the combined plates may be connected to the bottom plate in a simple manner, is characterised in that the means of attachment comprise sides of the bottom plate, folded so as to form angles, as well as folded first sides of the combined plates, which may be slid into these angles. Preferably, a combined plate is moreover folded such that at least part of a folded first side extends parallel to the bottom plate, as a result of which this folded side adds to the strength of the bottom plate and may be taken into account while performing the calculation of strength.

[0004] A further favourable embodiment of the inventive beam is characterised in that second sides of the combined plates are bent at substantially right angles, so as to obtain edges with which the half top plates may rest against one another, in such a way that a mutual connection of the top plates may be left out if desired.

[0005] A further favourable embodiment of the inventive beam is characterised in that an angle between the folded sides of the bottom plate and the bottom plate measures at least substantially 180 degrees. In this way, the edges of the combined plates will be enclosed, which results in a very rigid construction which may substantially add to the strength of the beam.

[0006] A favourable alternative embodiment of the inventive beam is characterised in that an angle between the folded sides of the bottom plate and the bottom plate measures at least substantially 270 degrees. In this case, the edges of the combined plate will be completely enclosed and a very rigid construction will be obtained.

[0007] A further favourable embodiment of the inventive beam is characterised in that additional means of attachment are provided for attaching the combined plates to the bottom plate and/or for mutually connecting the half top plates.

[0008] A further favourable embodiment of the inventive beam is characterised in that the combined plates are provided with body holes, via which the inside of the beam may be reached while being installed and via which wiring and piping and reinforcement may pass.

[0009] A further favourable embodiment of the inventive beam is characterised in that the combined plates are provided with holes for letting pass support rods. The support rods may be used for supporting reinforcement extending in a longitudinal direction, but they may also form part of the means of attachment. By adding reinforcement in this manner, it becomes possible to manufacture the bottom plate and the combined plates from identical steel plate, which may further reduce manufacturing costs.

[0010] The invention also relates to a bottom plate or a combined plate or a support rod, as part of a beam as disclosed in the previous paragraphs.

[0011] The invention will now be further explained with a reference to the following figures, in which:

Fig. 1 represents a beam according to the state of the art;
Fig. 2A represents a beam according to the invention in cross section;
Fig. 2B represents an alternative beam according to the invention in cross section;
Fig. 2C represents a further alternative beam according to the invention in cross section;
Fig. 3A represents a beam provided with support rods in cross section ;
Fig. 3B schematically represents a possible attachment of a combined plate to a bottom plate;
Fig. 4A represents a beam according to the invention in side view;
Fig. 4B represents an alternative beam according to the invention in side view;
Fig. 5A represents a further alternative beam according to the invention in cross section;
Fig. 5B represents a further alternative beam according to the invention in cross section;
Fig. 5C represents a further alternative beam according to the invention in cross section.

[0012] Fig. 1 represents a beam 1 made of steel according to the state of the art in side view, where beam 1 forms part of a floor to be casted and onto which floor

elements 2a,2b are placed, as well as concrete columns 3 onto which beam 1 rests. In the embodiment shown here, beam 1 has an at least substantially trapezial cross section and consists of a bottom plate 4, a top plate 5 and side plates 6a,6b which are welded together. Side plates 6a,6b are usually provided with a number of holes 7, in such a way that beam 1 may be filled up with concrete together with the space between the floor elements 2a, 2b if desired. Beam 1 is available in different sizes, usually with the same bottom plate 4 and with a height that can be selected dependent upon the height of the floor elements 2a,2b.

[0013] Fig. 2A represents a beam according to the invention in cross section, consisting of a bottom plate 8 with two folded edges 9a,9b and two identical combined plates 10a,10b of which the lower edges are slid into folded edges 9a,9b of bottom plate 8. The top sides of combined plates 10a,10b have been bent at right angles 11 a, 11 b which may rest against one another. The height of the compound beam is determined by the height of combined plates 10a,10b. It is therefore enough to have a number of different sizes of it in store. Important additional advantages are that there is no welding to be performed and that the constituent parts may be transported while stacked in a compact manner. Fig. 2B represents an alternative beam according to the invention in cross section, consisting of a bottom plate 8 with two edges 9a,9b which have been folded twice and two identical combined plates 10a,10b of which the lower edges 12a, 12b, which have been bent at right angles, are slid into the folded edges 9a,9b of bottom plate 8. The top sides of combined plates 10a,10b have been bent at right angles 11 a,11 b which may may rest against one another. An important additional advantage is here that the double bent edges 9a,9b and the perpendicular edges 12a,12b substantially contribute to the strength of the compound beam.

[0014] Fig. 2C represents a further alternative beam according to the invention in cross section, consisting of a bottom plate 8 with two edges 9a,9b which have been folded three times and two identical combined plates 10a, 10b of which the lower edges 12a,12b, which have been bent at right angles, are slid into the folded edges 9a,9b of bottom plate 8. The top sides of combined plates 10a, 10b have been bent at right angles 11 a,11 b which may support one another. An important additional advantage is here that the three times bent edges 9a,9b and the perpendicular edges 12a,12b substantially contribute to the strength of the compound beam. Schematically shown is also a clamp 13 made of strip, which may be clipped over folded edges 11 a,11 b in order to mutually fix these edges.

[0015] Fig. 3A represents a compound beam provided with support rods 14,15 in cross section, onto which extra reinforcement rods 16 may be placed. Support rod 15 moreover is a means of attachment for combined plates 10a,10b, as the lower edges cannot slip out of folded edges 9a,9b now.

[0016] Fig. 3B schematically represents a possible attachment of an edge 9b of a combined plate 10b as shown in Fig. 2A to a bottom plate 8. In edge 9b an opening 17 is made, in such a way that a lip 18 is formed. In the bottom plate 8 positioned below it a hole 19 is made. With for example a hammer, lip 18 can be knocked downward, after which edge 9b is fixed.

[0017] Fig. 4A represents a beam as shown in Fig. 2A in side view, with edge 9a, combined plate 10a and folded edge 11a, as well as body holes 20a,20b,.. and holes 21 for accommodating support rods.

[0018] Fig. 4B represents an alternative beam as shown in Fig. 2B or Fig. 2C in side view, with edge 9a, combined plate 10a and folded edge 11 a, as well as body holes 20a,20b,.. and holes 21 for accommodating support rods.

[0019] Fig. 5A, Fig. 5B and Fig. 5C represent compound beams according to the invention in cross section, which completely correspond to the beams shown in Fig. 2A, Fig. 2B and Fig. 2C, with the exception of the combined plates 10a,10b which are now positioned perpendicular to bottom plate 8.

Claims

1. Beam made of steel, for supporting floor elements, consisting of a bottom plate, a top plate and two side plates, **characterised in that** the beam comprises a bottom plate and two identical combined plates, which combined plates each are folded in a longitudinal direction, such that they comprise a side plate and half a top plate, as well as means of attachment for attaching the combined plates to the bottom plate.

2. Beam according to claim 1, **characterised in that** the means of attachment comprise sides of the bottom plate, folded so as to form angles, as well as folded first sides of the combined plates, which may be slid into these angles.

3. Beam according to claim 2, **characterised in that** at least part of a folded first side extends parallel to the bottom plate.

4. Beam according to claim 2 or 3, **characterised in that** second sides of the combined plates are bent at substantially right angles, so as to obtain edges with which the half top plates may rest against one another.

5. Beam according to one of the claims 2 to 4, **characterised in that** an angle between the folded sides of the bottom plate and the bottom plate measures at least substantially 180 degrees.

6. Beam according to one of the claims 2 to 4, **characterised in that** an angle between the folded sides

of the bottom plate and the bottom plate measures at least substantially 270 degrees.

7. Beam according to claim 5, **characterised in that** additional means of attachment are provided for attaching the combined plates to the bottom plate and/or for mutually connecting the half top plates.

8. Beam according to one of the previous claims, **characterised in that** the combined plates are provided with body holes.

9. Beam according to one of the previous claims, **characterised in that** the combined plates are provided with holes for letting pass support rods.

10. Bottom plate or combined plate or support rod, as part of a beam according to one of the previous claims.

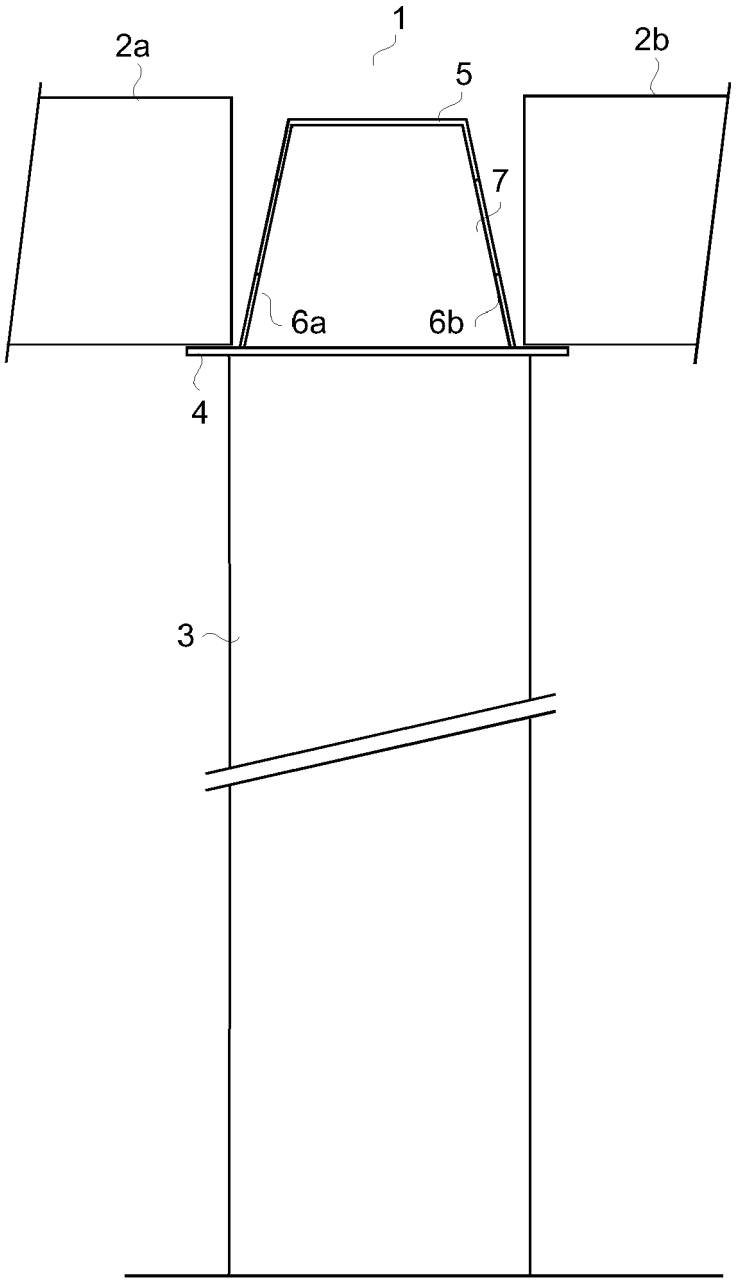


Fig. 1

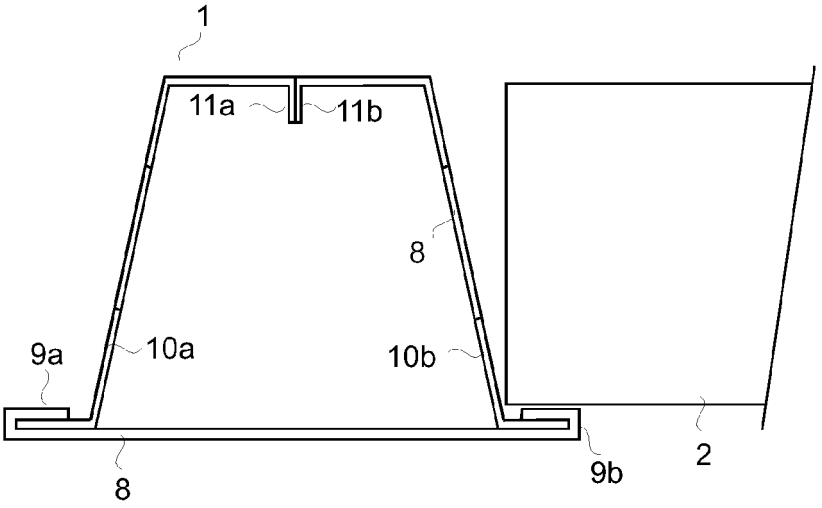


Fig. 2A

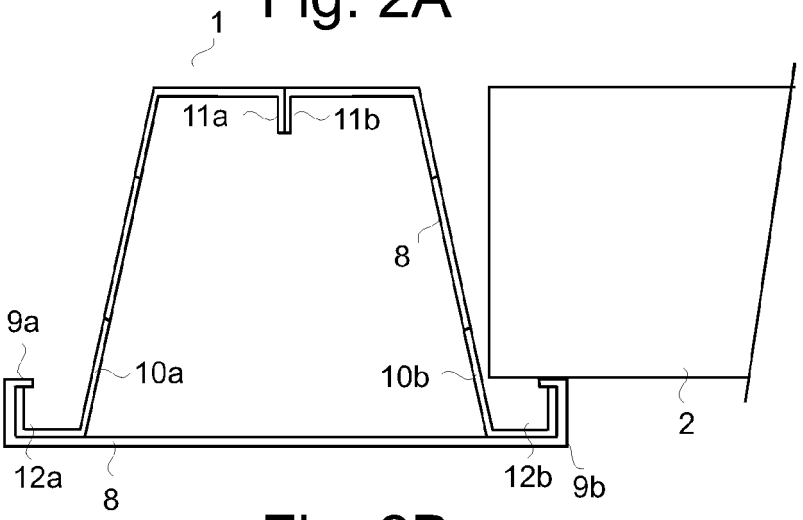


Fig. 2B

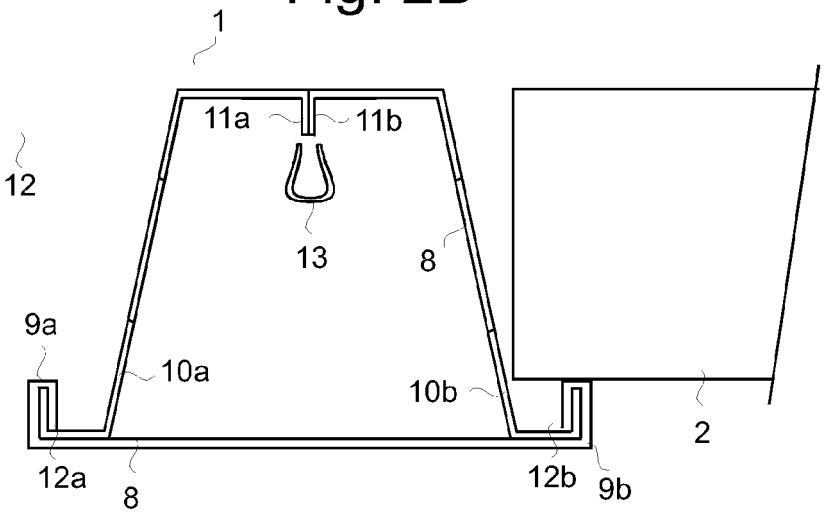


Fig. 2C

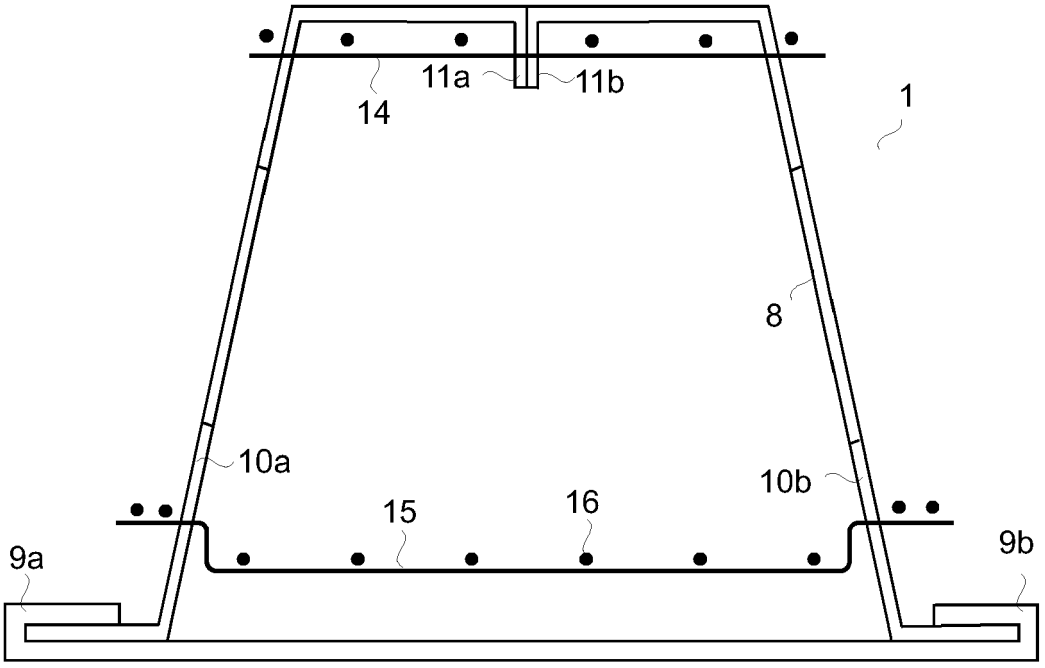


Fig. 3A

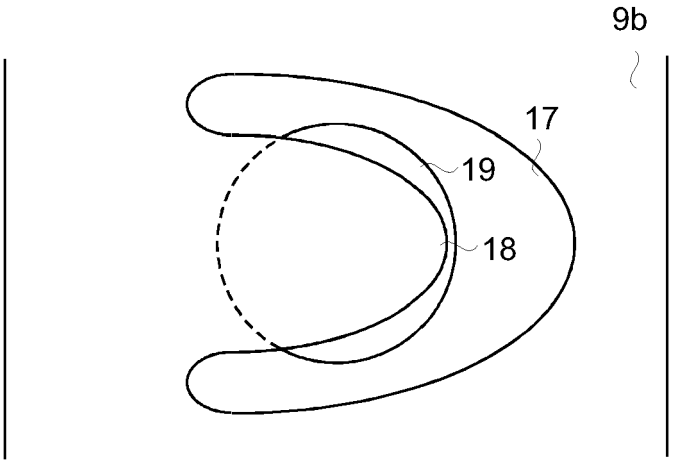


Fig. 3B

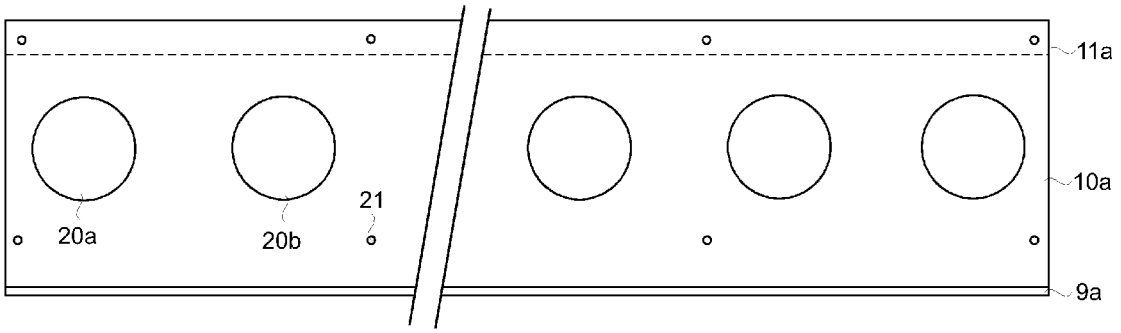


Fig. 4A

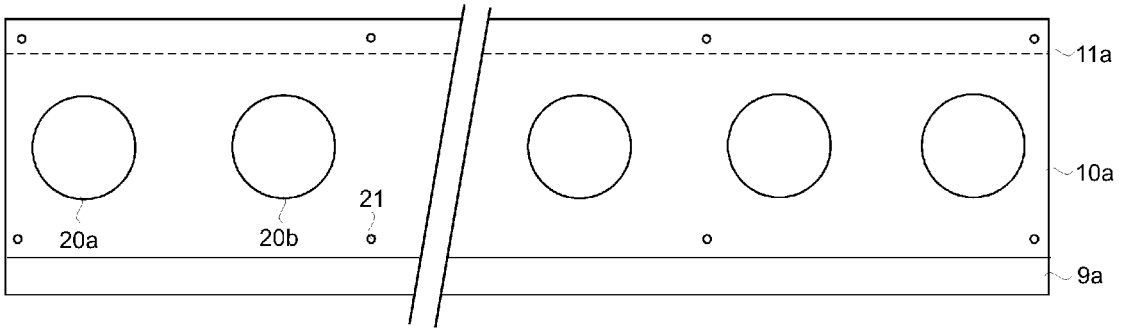


Fig. 4B

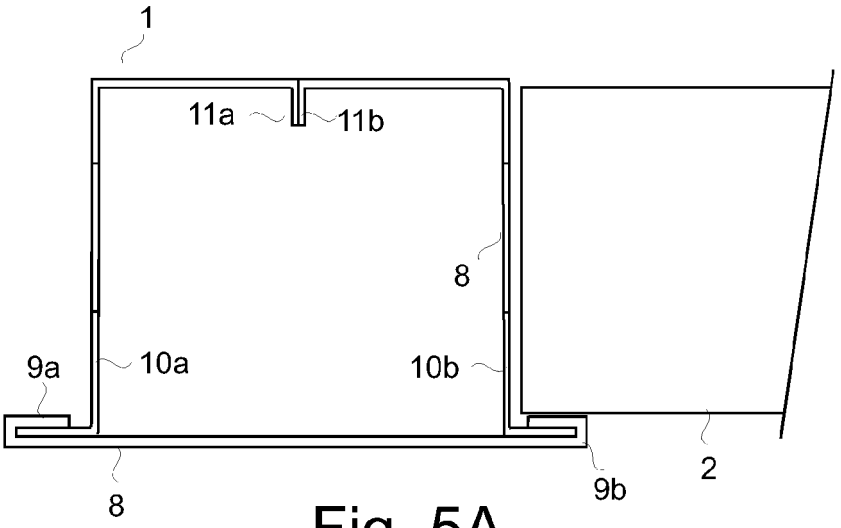


Fig. 5A

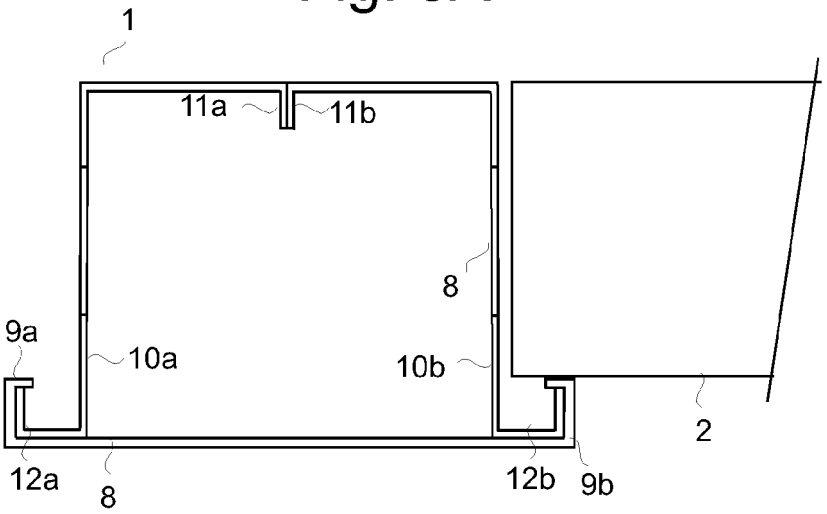


Fig. 5B

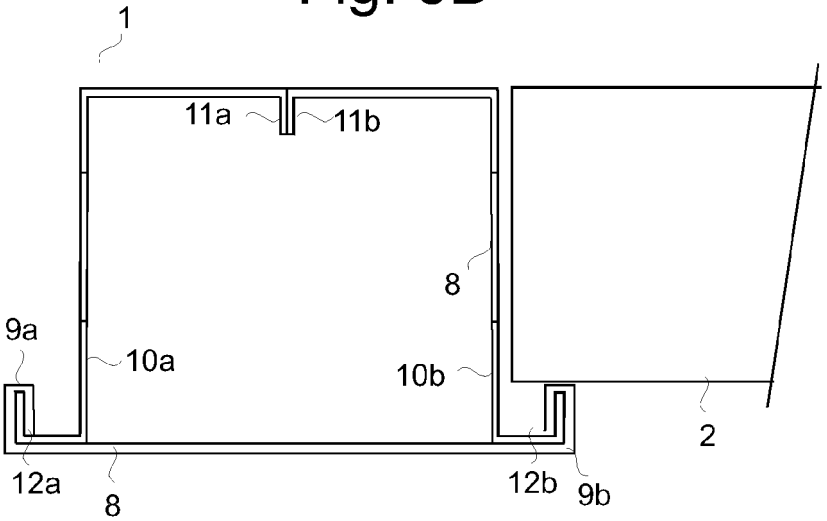


Fig. 5C

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 9056

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 September 2007	Vratsanou, Violandi

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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