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(71) Applicant: **Rockwool International A/S**
2640 Hedehusene (DK)

(72) Inventor: **Wuts, Peter Willem Gerard George**
6075 BH Herkenbosch (NL)

(74) Representative: **Elmeros, Claus et al**
Hoiberg A/S
St. Kongensgade 59A
1264 Copenhagen K (DK)

(54) A device and system for suspending a building panel

(57) The invention concerns a system for suspending one or more building panels (6) from a building structure (1), such as a suspended ceiling, said system including a plurality of mounting brackets (3), at least one of said brackets (3) having a first end (31) for anchoring the bracket (3) to a beam (2) or the like of the building structure (1), and a second end (32) to which a mounting profile (5) is attachable, at least one mounting profile (5) on which at least one building panel (6) is mountable, and insulation material slabs (7) fitted between the building structure (1) and the building panels (6), wherein the mounting bracket (3) is provided with sound absorbing means (4) for providing acoustic insulation between the building panels (6) and the building structure (1). Hereby, there is provided a system for insulating a roof or wall structure having superior thermal and acoustic insulation properties.

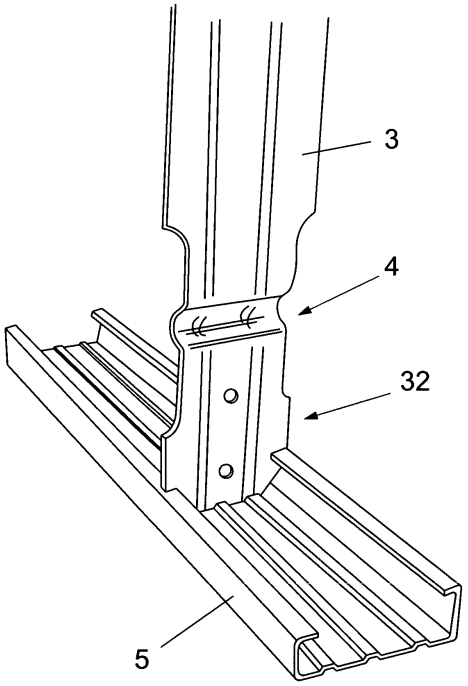


Fig. 1

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Description

[0001] The present invention relates to a system for suspending one or more building panels from a building structure, such as a suspended ceiling, said system including a plurality of mounting brackets, at least one of said brackets having a first end for anchoring the bracket to a beam or the like of the building structure, and a second end to which a mounting profile is attachable, at least one mounting profile on which at least one building panel is mountable, and insulation material fitted between the building structure and the building panels. The invention also relates to a bracket for use in such system.

[0002] Systems for suspended ceiling installations of such kind are well known in the building construction and design industry. In such system, a number of mounting brackets are fastened to rafters or the like of the roof structure of a building. A number of ceiling mounting profiles are secured to the brackets and ceiling panels, such as gypsum plaster boards, wooden panels or the like, are mounted to the mounting profiles. Hereby, the ceiling panels are hanging from the roof structure by the mounting brackets. Insulation material may be fitted around the brackets in the space between the roof structure and the ceiling panels. Besides cellings of this type, this construction may also be used in wall constructions.

[0003] This suspended ceiling system is advantageous in relation to building renovations where thermal insulation of the inside of a roof or the like must be added to meet modem building insulation requirements. However, the known systems are not particular suitable for fitting to the inside of a pitched roof structure.

[0004] The drawback of the suspended ceiling system is that the many mounting brackets also act as thermal bridges which may be a problem if the amount of brackets is relatively high. The advantage of having a high number of mounting brackets per square meter is that a relative rigid insulating suspended ceiling system may be provided. However, another drawback is that the brackets may also transmit vibrations, in particular acoustic vibrations through the insulation material in the suspended ceiling system, such as sound from outside the building to the inside and vice versa.

[0005] Inside buildings, the recommended maximum average for indoor background noise levels is 35 dB (A). In practice many tenants suffer from noise above this level because their building has not been sufficiently sound proofed. Further improvements of national requirements - and especially their implementation - are needed.

[0006] It is not unusual to see noise reduction building standards that have not been improved for several decades. Lack of sound proofing not only reduces the quality of life of the tenants in the building as well as the neighbour. It also prevents many from free expression of music and other noisy activities.

[0007] On this background, it is an object of the invention to provide a simple and easy to use system for insulating a roof or wall structure having superior thermal and acoustic insulation properties.

[0008] This object is achieved by a system and a bracket of the Initially mentioned kind, wherein the mounting bracket is provided with sound absorbing means for providing acoustic insulation between the building panels and the building structure.

[0009] Hereby, the mounting bracket can absorb sound vibrations from e.g. the outside of the roof structure and prevent such vibrations from being transmitted to the suspended ceiling even if the ceiling panels thereof are hanging from relatively few mounting brackets. The system and the brackets Is simple in design and inexpensive to produce and easy to install in a short time.

[0010] Preferably, the bracket is made in a planar blank of metal sheet material and the sound absorbing means is a bulge protrusion formed in the metal sheet blank. In particular, the bracket may be made from a thin sheet metal material, such as galvanised steel or the like, having a thickness of between 0.8 to 2 mm, and wherein the thickness of the sheet metal is substantially the same throughout the entire bracket, including the bulge portion. A mounting bracket or clips of such kind are particular inexpensive to produce in large quantities and in a reliable quality. The bulge allows the bracket to flex and thereby absorb vibrations so that the acoustic vibrations are not transferred from one end of the bracket to the other. Moreover, the improved flexibility that the bulge ensures on the bracket provides another advantage in relation to heat resistance, and in particular with regard to fire retarding properties. Due to the bulge, the bracket is able to flex if exposed to extreme heat, e.g. in case of fire, and this extra flexibility delays the time of collapse of the suspended ceiling structure and thereby when the fire starts burning through the ceiling. By this improved fire retarding property, valuable time to vacate the building in case of fire may be gained.

[0011] In a preferred embodiment, the bulge is formed with smooth bending of the sheet metal in a manner adapted for absorbing acoustic vibrations applied to either the first or the second end of the bracket. Hereby, build-up of tensional stress in the bulge portion is limited whereby the risk that the bracket is damaged is reduced.

[0012] By the invention, it is realised that the building structure to which the system may be applied to may be a ceiling, e.g. the inside of a pitched roof, a wall construction or the like. The building panels may be ceiling plaster boards, gypsum fibre boards or wooden panels.

[0013] The mounting profiles in a system according to the invention are preferably C-profiles. The insulation material is preferably a fibrous insulation board, such as stone wool or glass wool.

[0014] In the following, the invention is described in more detail with reference to some preferred embodiments, shown in the accompanying drawings, in which:

Fig. 1 is a perspective view of a detail of a mounting system for a suspended ceiling;

fig. 2 is a perspective view of a mounting bracket according to a first embodiment;
fig. 3 is a top view of a mounting bracket according to a second embodiment:
fig. 4a)-g) are schematic side views showing different bulge protrusion geometries;
fig. 5 is a schematic cross-section side view of a suspended insulation system according to the invention;
fig. 6 is a schematic cross-section end view of a suspended insulation system according to the invention;
fig. 7 shows the fitting of insulation in a system according to the invention; and
fig. 8 is a schematic cross-section of a preferred bulge protrusion.

[0015] With reference to the figures, in particular figures 5 and 6, a roof structure 1 is supported by one or more rafters 2 or the like. The mounting brackets 3 are fastened to the rafters 2 at the first end 31 of said brackets 3 (see fig. 2 and 3). The brackets 3 are provided with acoustic springs 4. At the second end 32 of the brackets 3, they are provided with profile receiving means 33 in the form of slots or hook-like side protrusions for receiving and retaining the mounting profiles 5. The profiles 5 are thereby suspended with an orientation generally perpendicular to the rafters 2 in the embodiment shown in figures 5 and 6, but it is realised that other orientations are possible. Building panels 6, such as ceiling gypsum plaster boards, gypsum fibre boards, wooden panels or the like, are mounted to the mounting profiles 5. In the space between the building structure 1 and the mounting profiles 5 and the suspended building panels 6, insulation slabs 7 are fitted, filling up the space and thereby providing a thermal insulation of the building structure. This suspended insulation system is particularly suited for renovation projects in buildings where a roof or wall structure needs extra thermal and/or acoustic insulation to meet modem building requirements in this regard and to improve the acoustical comfort of the building.

[0016] The insulation material slabs 7 are preferably provided with a small over-dimension, for instance approx. 10 mm more than the rafter distance for ensuring a tight clasping between the rafters 2. Moreover, at each end of the insulation panel 7, a cut-away 7a is provided which have a width of half the rafter thickness. The insulation panels 7 are hereby adapted to filling out the entire space above the suspended ceiling 6 offering a comprehensive insulation layer at the inside of the building structure. Alternatively, an insulation panel 7 without cut-aways could be used and then a separate insulation material element could be palced underneath the rafters to fill out this space.

[0017] In figure 1, an example of a mounting system according to an embodiment of the invention is shown and in figures 2 and 3 two examples of brackets for use in such system are shown. The mounting bracket 3 is provided with a bulge protrusion 4 which acts as an acoustic spring dampening vibrations and thereby preventing the transfer of sound vibrations from one end of the bracket to the other end.

[0018] The mounting profile 5 is preferably a C-profile as shown in fig. 1 with an inwardly oriented collar portion that can slide in the receiving slots 33 of the mounting bracket 3.

[0019] The acoustic spring, i.e. bulge protrusion 4 may be formed with different geometries. Examples of different geometries of the bulge acoustic spring 4 are shown in figure 4. As shown, some acoustic springs 4 may be provided by sharp folds in the sheet material in which the bracket 3 is made. In other examples, the bulge is provided by smooth bends. In the example shown in fig. 4 g), the bulge 4 is rounded and substantially semicircular in shape with rounded transition bends.

[0020] In figure 8, a preferred embodiment of the bulge 4 is shown. This substantially semi-circular shape is provided with a length L of approx. 5-15 mm, more preferably approx. 10 mm, and a height H, of approx. 5-15 mm, more preferably approx. 8 mm.

[0021] In a further embodiment (see fig. 6), the first end 31 of the bracket 3 could be provided with a measurement scale 34 to facilitate the mounting of the brackets 3 in the same predetermined height so that the mounting profiles 5 are hanging in a straight line, such as horizontally or parallel to the roof structure 1.

[0022] Above, various aspects of the invention are described with reference to a preferred embodiment where the system is used for mounting an insulated suspended ceiling. However, it is realised that other embodiments of the invention may be provided without departing from the scope of the invention as defined by the accompanying claims, For instance the system may be used for a vertical or inclined wall structure.

Claims

1. A system for suspending one or more building panels (6) from a building structure (1), such as a suspended ceiling, said system including

- a plurality of mounting brackets (3), at least one of said brackets (3) having a first end (31) for anchoring the bracket (3) to a beam (2) or the like of the building structure (1), and a second end (32) to which a mounting profile (5) is attachable,
- at least one mounting profile (5) on which at least one building panel (6) is mountable, and
- insulation material slabs (7) fitted between the building structure (1) and the building panels (6),

characterised in that
the mounting bracket (3) is provided with sound absorbing means (4) for providing acoustic insulation

between the building panels (6) and the building structure (1).

2. A system according to claim 1, wherein the bracket (3) is made in a planar blank of metal sheet material and the sound absorbing means is a bulge protrusion (4) formed in the metal sheet blank.

3. A system according to claim 1 or 2, wherein the building structure (1) is a roof.

4. A system according to any of the preceding claims, wherein the building panels (6) may be ceiling plaster boards, gypsum fibre boards or wooden panels.

5. A system according to any of the preceding claims, wherein the mounting profile (5) is a C-profile.

6. A system according to any of the preceding claims, wherein the insulation material slabs (7) are fibrous insulation boards, such as stone wool or glass wool.

7. A bracket (3) for use in a system for suspending a building panel (6), such as a ceiling, from a building structure (1), where the bracket (3) is made from a generally planar metal sheet material, said bracket (3) comprising a first end (31) for anchoring the bracket (3) to a beam (2) or the like of the building structure (1), and a second end (32) to which a mounting profile (5) is attachable for carrying at least one building panel (6),
characterised in that
the bracket (3) is provided with sound absorbing means (4) for providing acoustic insulation between the building panels (6) and the building structure (1).

8. A bracket (3) according to claim 7, wherein the sound absorbing means is a bulge protrusion (4) formed in the metal sheet blank.

9. A bracket (3) according to claim 7 or 8, wherein the bracket (3) is made from a thin sheet metal material, such as galvanised steel or the like, having a thickness of between 0.8 to 2 mm.

10. A bracket (3) according to any of claims 7 to 9, wherein the thickness of the sheet metal is substantially the same throughout the entire bracket, including the bulge portion (4).

11. A bracket (3) according to any of claims 7 to 10, wherein the bulge (4) is formed with smooth bending of the sheet metal in a manner adapted for absorbing acoustic vibrations applied to either the first or the second ends (31, 32) of the bracket (3).

12. A bracket (3) according to claim 11, wherein the bulge (4) is rounded and substantially semicircular in shape with rounded transition bends.

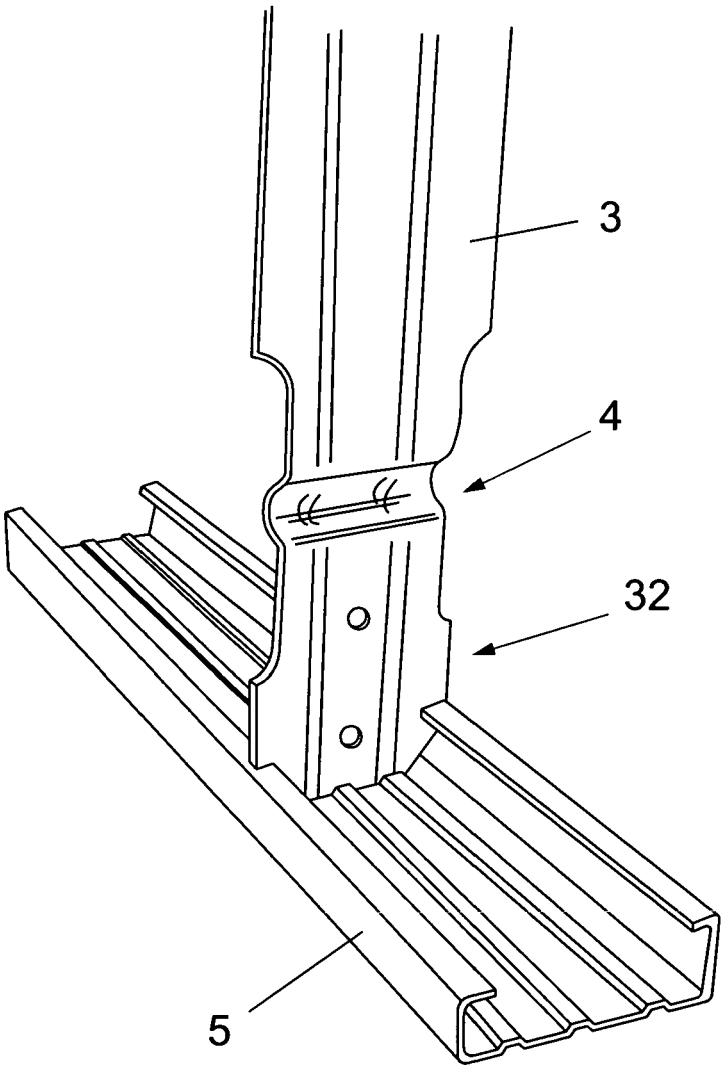


Fig. 1

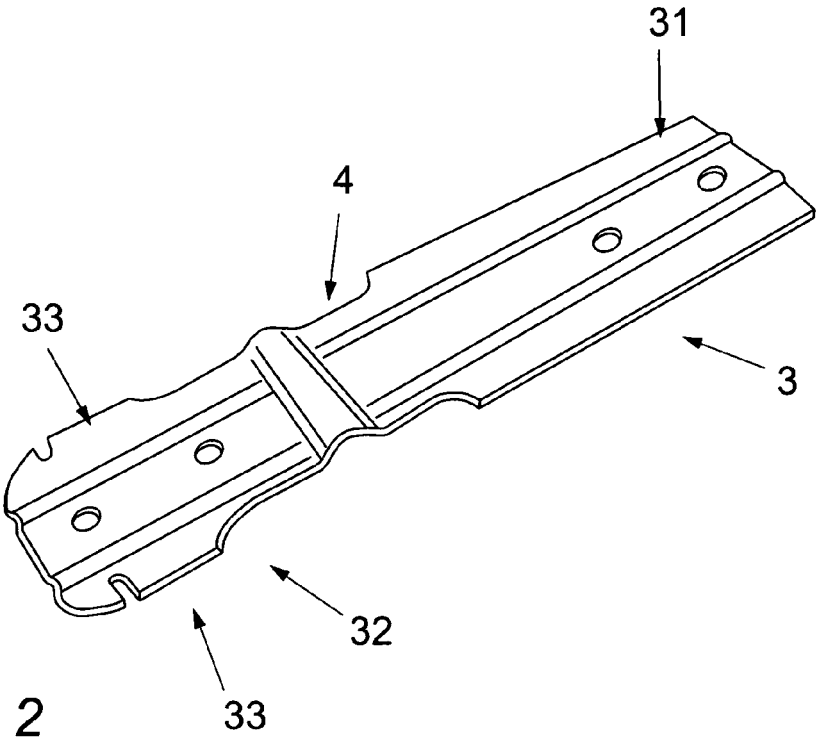


Fig. 2

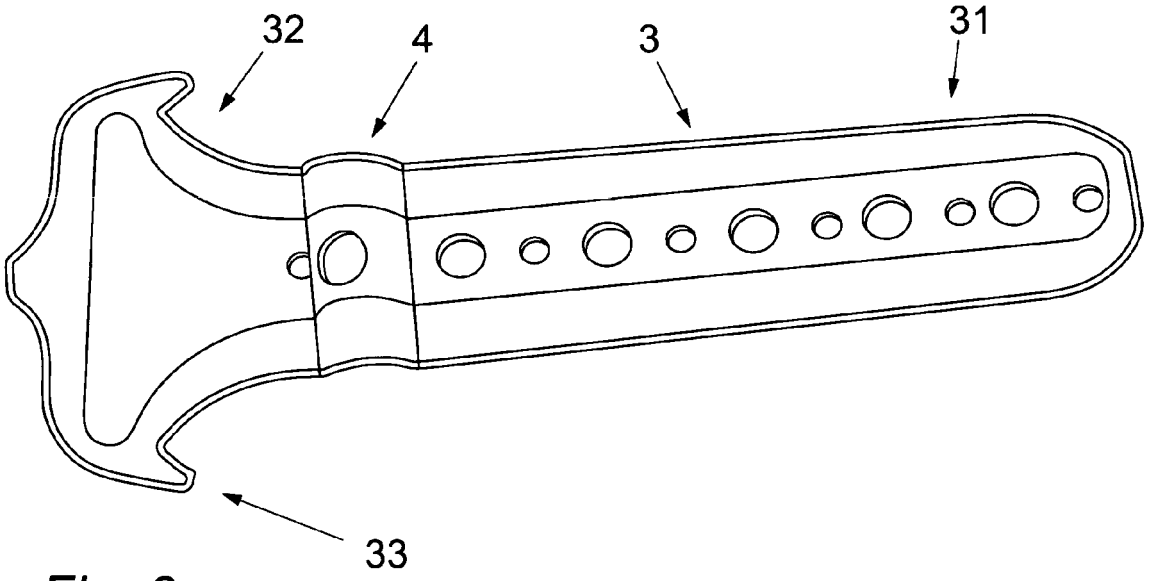


Fig. 3

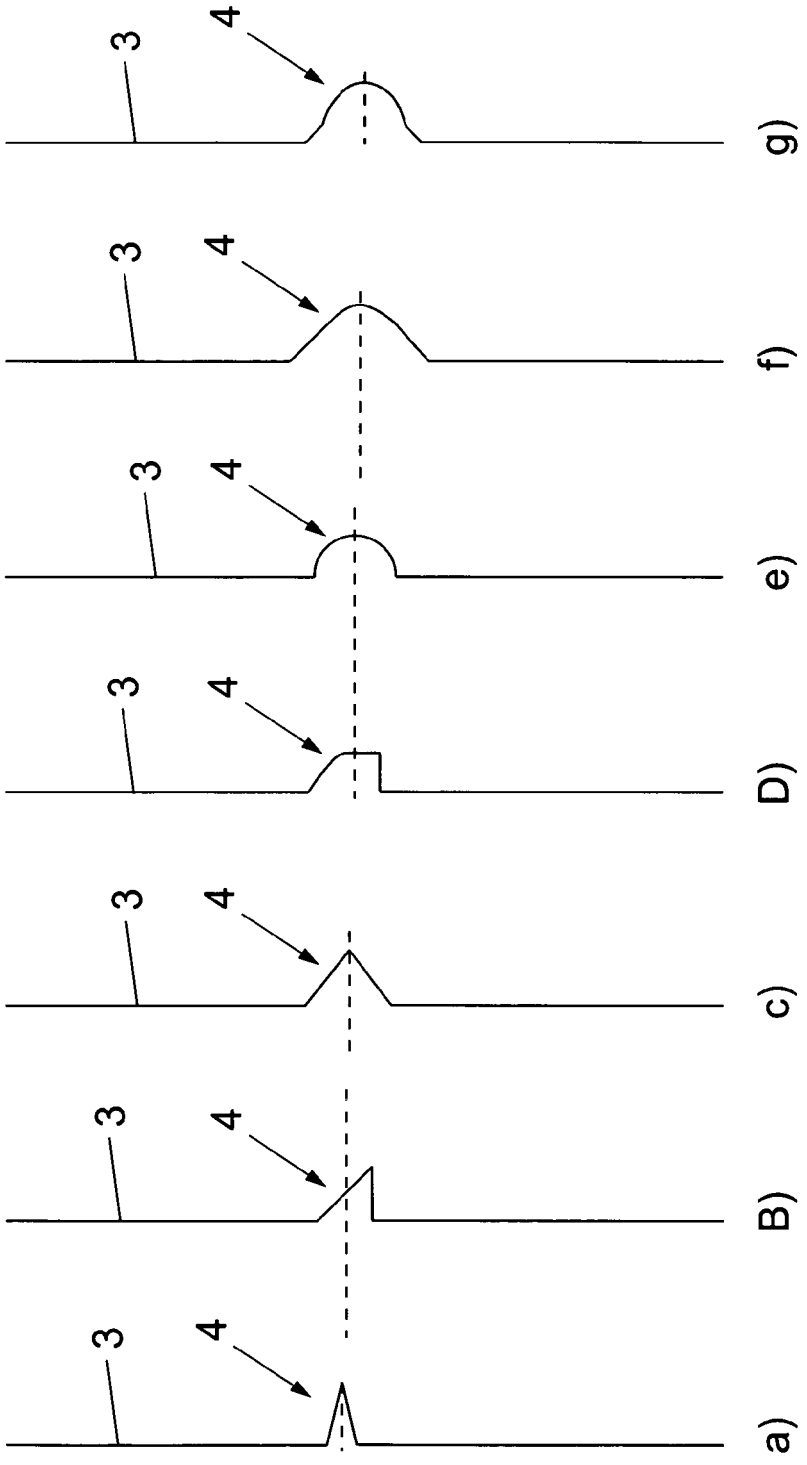


Fig. 4

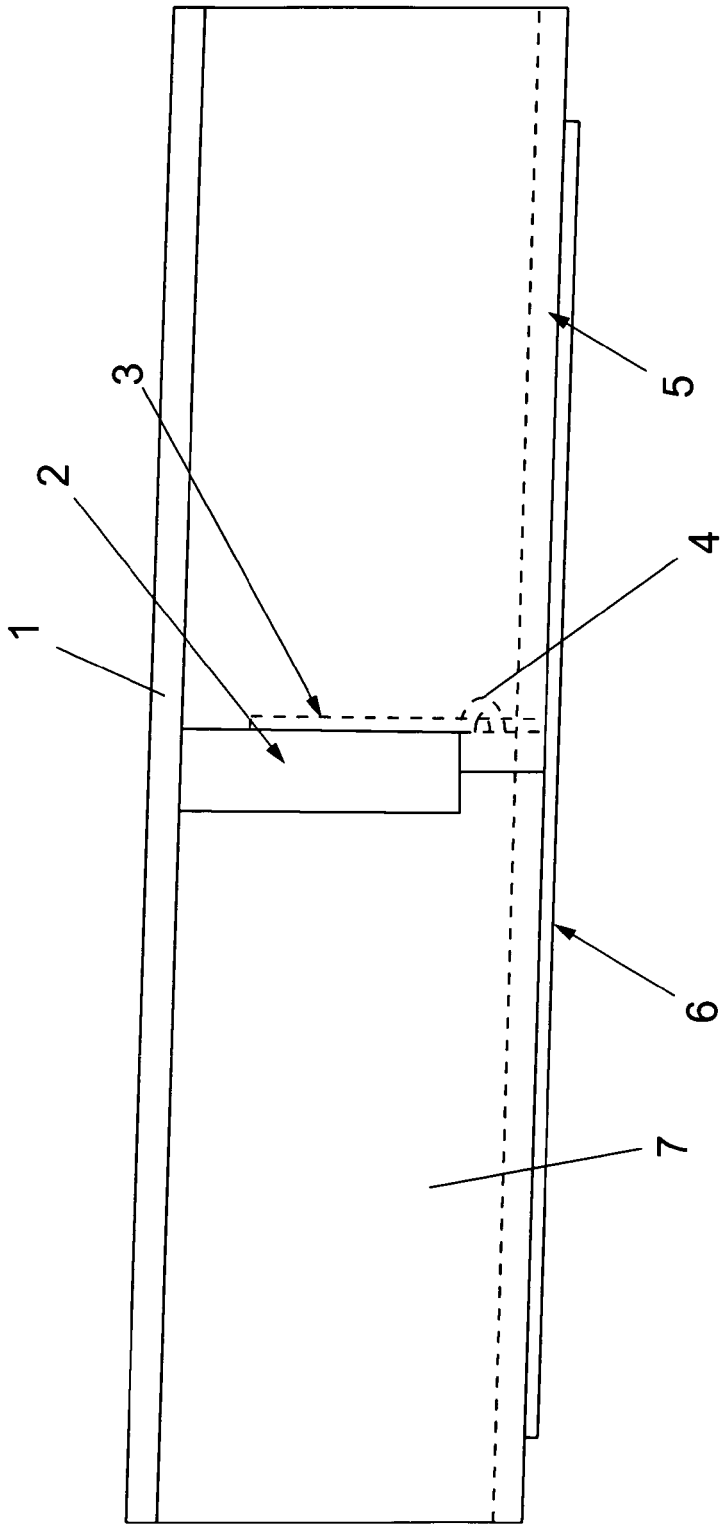


Fig. 5

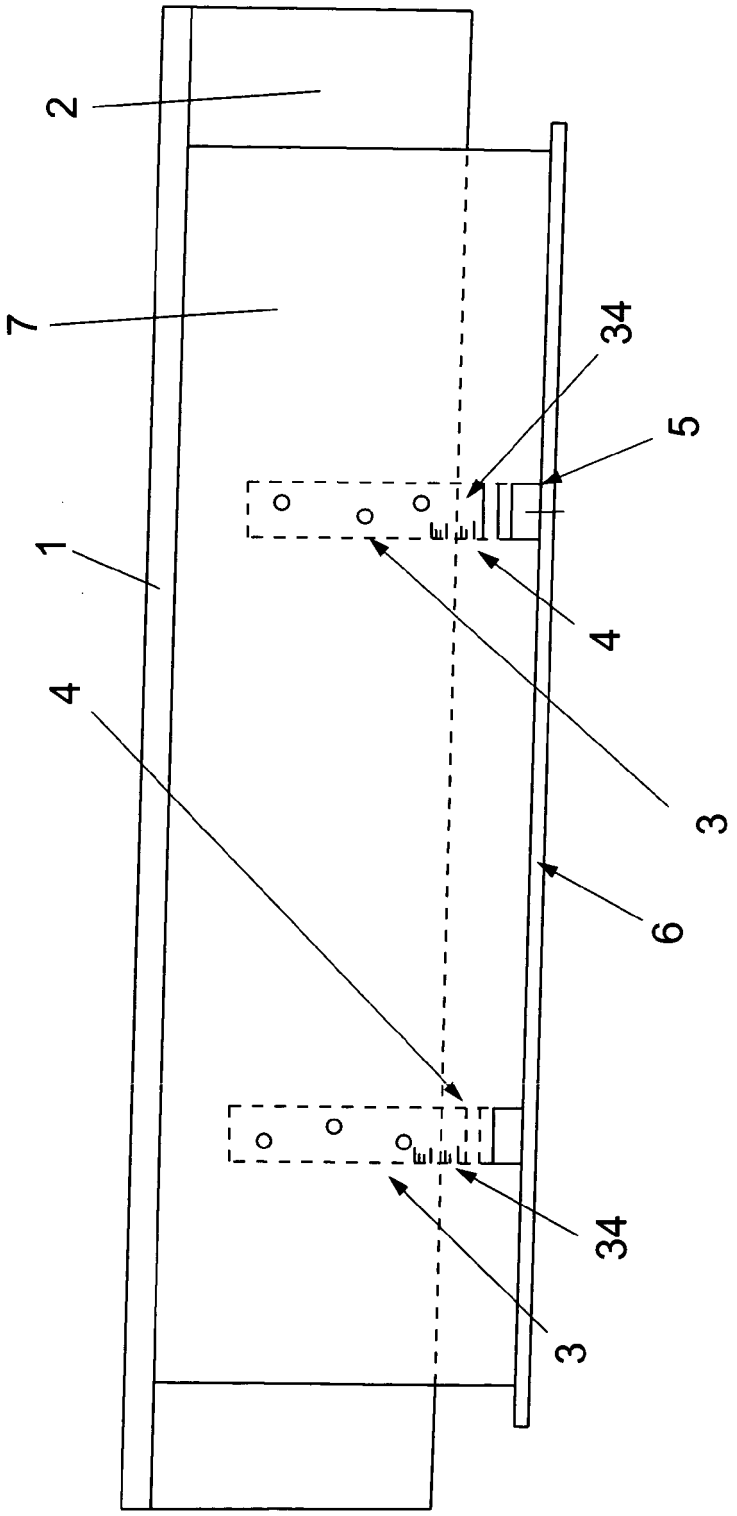


Fig. 6

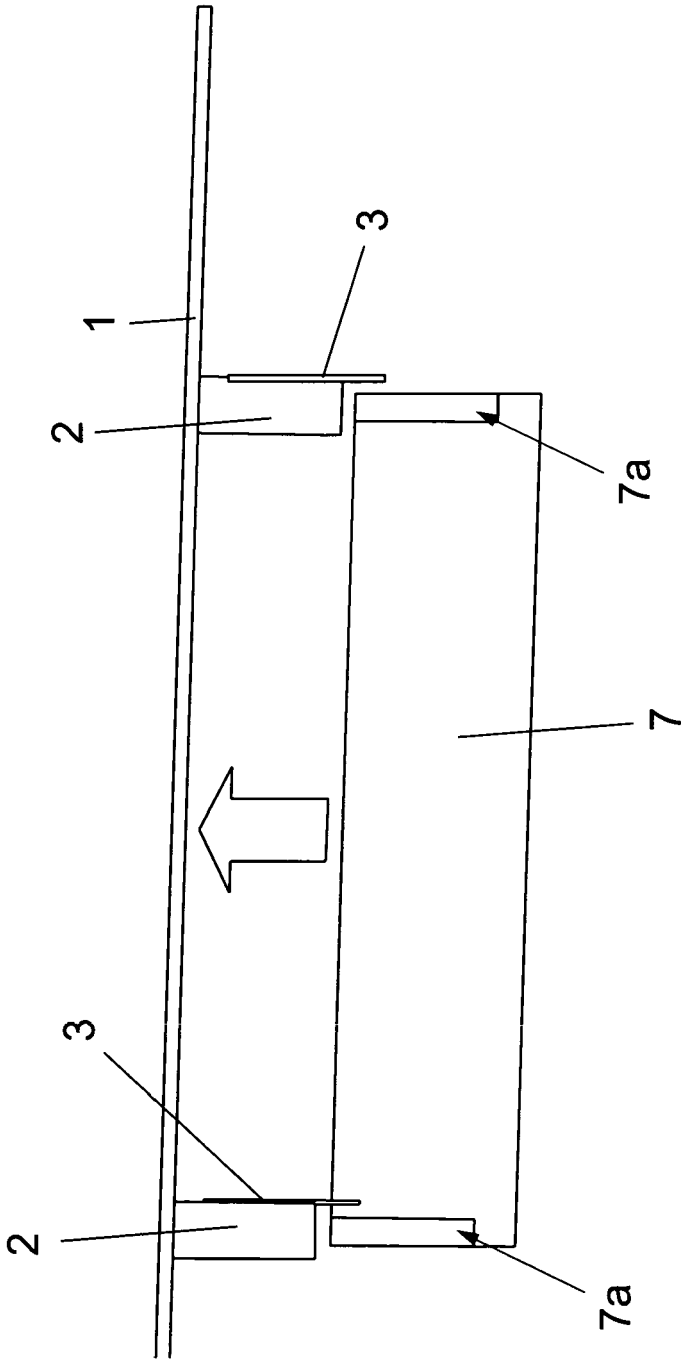


Fig. 7

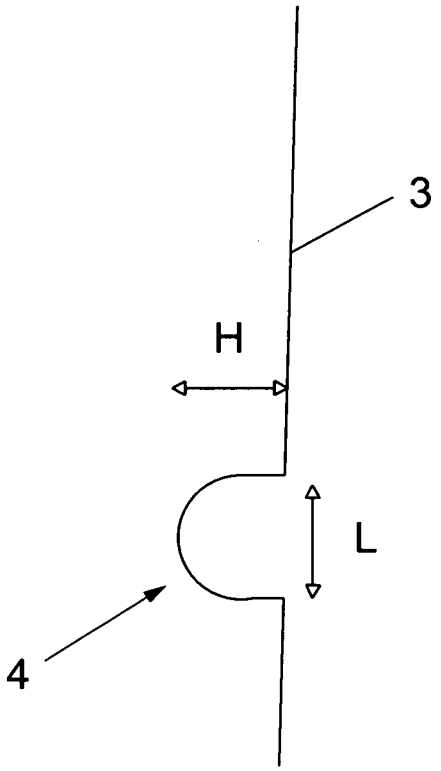


Fig. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 07 5814

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 January 2007	Rosborough, John

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 07 5814

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82