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(71) Applicant: **Unda Maris Holding N.V. Willemstad, Curacao (AN)**
 (72) Inventor: **Snel, Wilhelmus Jan Reinier Karel 1657 AD Abbekerk (NL)**
 (74) Representative: **Hooiveld, Arjen Jan Winfried Arnold & Siedsma Bezuidenhoutseweg 57 2594 AC The Hague (NL)**

(54) **WALL SYSTEM WITH COLUMNS OF METAL**

(57) Wall system comprising a plurality of columns (1) arranged on a ground surface and wall panels (2) arranged between adjacent columns (1), with the special feature that the columns (1) are manufactured from metal and are mutually identical, wherein each column (1) comprises a U-shaped cross-section with two parallel legs (4) and a base (3) located therebetween, and wherein the legs (4) and the base (3) of the U-shaped cross-section are provided with a strengthening profile.

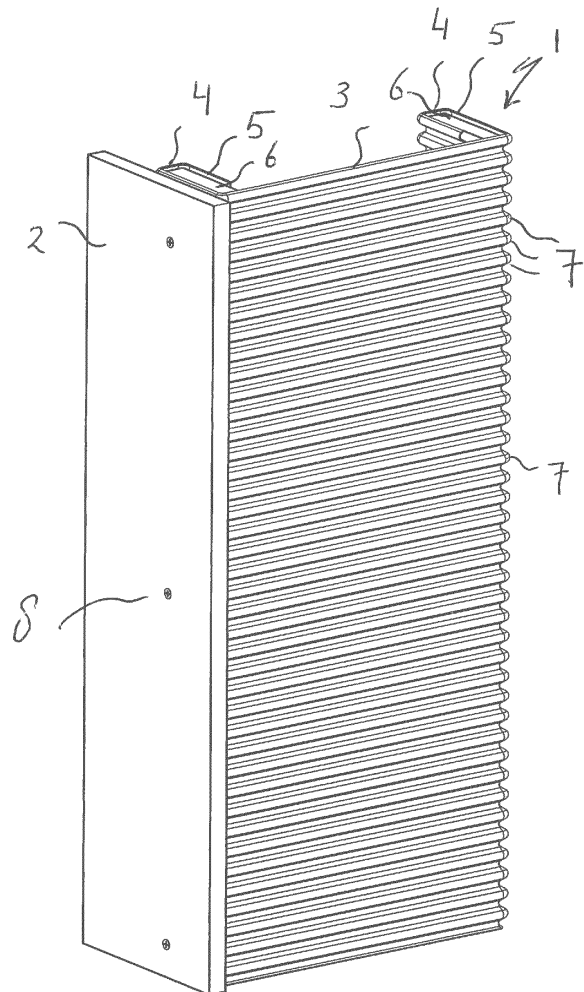


FIG. 1

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Description

[0001] The invention relates to a wall system comprising a plurality of columns arranged on a ground surface and wall panels arranged between adjacent columns.

[0002] Such a wall system is generally known. In the known wall system use is made of columns to be arranged on a floor as well as plasterboard wall panels. The columns have a U-shaped cross-section against which the wall panels are mounted using screws.

[0003] A drawback of the known wall system is that the fire resistance thereof is inadequate in practice. It is found particularly in practice that the columns of the known wall system collapse (too) quickly in the case of fire, so that the resistance thereof to fire penetration (flames pass through the wall system) does not meet increasingly higher safety standards. The screws in the known wall system are more particularly found to conduct the heat created during a fire very effectively, which results in heating of the respective plaster wall panel and the respective leg (flange) of the U-shaped cross-section of the column in question. The U-shaped cross-section thereof thereby bends (bimetal effect) and the plaster wall panel breaks away therefrom.

[0004] The object of the present invention is to obviate the drawbacks of the prior art, i.e. to provide a wall system with columns and wall panels which is safer in the case of fire in the sense that the columns thereof have a greater resistance to fire penetration.

[0005] For this purpose a wall system of the type stated in the preamble has the special feature according to the invention that the columns are manufactured from metal and are mutually identical, wherein each column comprises a U-shaped cross-section with two parallel legs and a base located therebetween, and wherein the legs and the base of the U-shaped cross-section are provided with a strengthening profile. The strengthening profile ensures that the columns remain intact longer in the case of fire, as the metal can in that case expand more easily in various directions without the integrity of the columns being compromised in the case of fire. The columns are preferably formed from a flat sheet material, wherein the U-shaped cross-section thereof is realized by local bending of the sheet material. Weakened portions such as crease lines or perforation lines are optionally arranged in the sheet material in order to facilitate the local bending of the material. The strengthening profile likewise enables the use of less thick sheet material, for instance 0.20 to 0.25 mm thick steel instead of 0.5 mm thick steel as in the prior art, without compromising rigidity.

[0006] In the case of the known wall system, also referred to in practice as a metal stud wall, heat will be quickly transmitted in the case of fire to an adjacent flange (i.e. "leg") of the steel U-shaped cross-section (i.e. "U profile") of the respective column. In the first instance the heat transfer takes place via the heated screws, though shortly thereafter, due to the high temperature, also via the plaster of the respective wall panel. Because of the

asymmetrical heating of the U profile, it will act immediately as a kind of bimetal. The bulging of the wall is then not yet such that the wall then collapses. However, when the plaster has lost its cooling effect (in the case of fire the plaster first releases water which, as long as it has not yet evaporated, "cools" the wall), the U profile will begin to bend even more. Tests and cases in practice show bending of 30 to 40 cm at room height. The screws no longer hold the plaster in place, so that cracks and openings appear which give the fire free passage to an adjacent space.

[0007] According to the invention, the preferably transverse wave structure of the strengthening profile counteracts the expansion and bending of the wall to a very great extent through a "concertina effect". Tests at very high temperatures have demonstrated this. In addition, clamped fire-resistant strips (i.e. "slat-like fire-resistant material") have an extra cooling effect on the whole and screws in particular, as will be further elucidated below.

[0008] It is noted that the columns are preferably manufactured from galvanized steel, while the wall panels are preferably manufactured from a sheet material. In a preferred variant the columns are arranged at a fixed mutual distance of 60 cm on the ground surface. If a greater bending stiffness is required, this mutual distance amounts to 30 or 40 cm.

[0009] In a preferred embodiment of a wall system according to the invention the strengthening profile is rolled into the metal.

[0010] In a further preferred embodiment of a wall system according to the invention the strengthening profile is provided with mutually parallel ribs arranged at a distance from each other. The ribs particularly extend transversely of the longitudinal direction of each column. The ribs are preferably arranged here on the outer side and the inner side of each column, wherein a rib arranged on the outer side forms on the inner side a recess situated between two adjacent ribs on the inner side.

[0011] In a further preferred embodiment of a wall system according to the invention a fire-resistant material is arranged on the inner side of the legs of the U-shaped cross-section. The fire-resistant material is preferably a fibre-containing fire-resistant material, such as Fermacell (a mixture of plaster and paper fibres). The fire-resistant material is particularly glued to the legs of the U-shaped cross-section. The fire-resistant material can in addition or instead be clamped thereon. The fire-resistant material increases the resistance to fire penetration (the other side of the wall system may not become so hot that fire occurs there spontaneously), and therefore has a "cooling" effect.

[0012] In a further preferred embodiment of a wall system according to the invention the legs of the U-shaped cross-section are folded twice in order to form grooves for the fire-resistant material extending in the longitudinal direction of each column. The fire-resistant material is preferably slat-like, so that the slats can be mounted in the grooves.

[0013] In a further preferred embodiment of a wall system according to the invention the wall panels are arranged on the outer side of the legs of the U-shaped cross-section. The wall panels are particularly screwed onto the outer side of the legs of the U-shaped cross-section.

[0014] In a further preferred embodiment of a wall system according to the invention the wall panels are manufactured from a heat-insulating and/or sound-insulating material. The wall panels are preferably formed by plasterboard panels. In another preferred variant the wall panels are manufactured from Fermacell (a mixture of plaster and paper fibres) or from magnesium-reinforced glass fibre or fire-resistant chipboard or fire-resistant MDF (medium density fireboard, i.e. resin-bound wood fibres).

[0015] The invention likewise relates to a column as such for use in a wall system according to the invention, wherein the column is manufactured from metal and comprises a U-shaped cross-section with two parallel legs and a base located therebetween, wherein the legs and the base of the U-shaped cross-section are provided with a strengthening profile.

[0016] The invention will be further elucidated with reference to figures shown in a drawing, wherein:

- Figures 1, 2 and 3 are perspective and schematic views of an individual column with a wall panel part mounted thereon in a preferred variant of a wall system according to the invention;
- Figures 4, 6 and 7 are schematic cross-sections of a particular screw connection between the column and the wall panel of figures 1, 2 and 3; and
- Figure 5 is a perspective and schematic view of columns and wall panels of figures 1, 2 and 3, but now in mounted state.

[0017] Figures 1, 2 and 3 show diverse perspective and schematic views of a steel column 1 with only a part of a plaster wall panel 2 on only one side thereof, in order to not make the figures unnecessarily complicated. As shown, column 1 has a U-shaped cross-section with a base 3 and two legs 4. Legs 4 are here folded twice to form in each case a groove 5 in which a slat-like fire-resistant material 6 is mounted. The fire-resistant material 6 is optionally glued to column 1 in grooves 5. A rib profile is rolled into column 1 on both its inner and its outer side, wherein mutually parallel ribs 7 thereof extend transversely of the longitudinal direction of column 1. As shown, a rib 7' arranged on the outer side of column 1 forms a recess situated on the inner side thereof between two adjacent ribs 7" on its inner side.

[0018] Referring to figures 4, 6 and 7, adjacent wall panels 2', 2" are mounted on a column 1 on either side thereof using one screw 8 at a time per wall panel 2', 2" (a total therefore of two screws 8 in each case on a lon-

gitudinal side of column 1), wherein screws 8 extend through the twice folded legs 4 of the U-shaped cross-section of column 1 and fire-resistant material 6 (figures 6 and 7). Panels 2', 2" together optionally form on their outer side a recess 9 in which first a glass web 10 is arranged, after which for instance plaster-like filler or mortar can be applied to the outer side of panels 2', 2". The join 11 between adjacent wall panels 2', 2" can thus be made invisible from the outside. In figure 4 wall panel 2 is screwed close to an outer end of a wall to a column 1.

[0019] Figure 5 is a perspective and schematic view of columns 1 and wall panels 2 of figures 1, 2 and 3, though now in mounted state, wherein corresponding parts are designated with the same reference numerals. For insulation purposes, insulating material 12 such as rockwool or glasswool is mounted between wall panels 2', 2" mounted opposite each other, so that a sandwich construction is obtained with a core of insulating material and with wall panels 2', 2" mounted on either side thereof as outer layers.

[0020] It is noted that the invention is not limited to the shown embodiment, but likewise extends to other preferred variants falling within the scope of the appended claims.

Claims

1. Wall system comprising a plurality of columns (1) arranged on a ground surface and wall panels (2) arranged between adjacent columns (1), **characterized in that** the columns (1) are manufactured from metal and are mutually identical, wherein each column (1) comprises a U-shaped cross-section with two parallel legs (4) and a base (3) located therebetween, and wherein the legs (4) and the base (3) of the U-shaped cross-section are provided with a strengthening profile.
2. Wall system as claimed in claim 1, wherein the strengthening profile is rolled into the metal.
3. Wall system as claimed in claim 1 or 2, wherein the strengthening profile is provided with mutually parallel ribs (7) arranged at a distance from each other.
4. Wall system as claimed in claim 3, wherein the ribs (7) extend transversely of the longitudinal direction of each column (1).
5. Wall system as claimed in claim 3 or 4, wherein the ribs (7) are arranged on the outer side and the inner side of each column (1), and wherein a rib (7) arranged on the outer side forms on the inner side a recess situated between two adjacent ribs (7', 7") on the inner side.
6. Wall system as claimed in any of the foregoing claims

1 to 5, wherein a fire-resistant material (6) is arranged on the inner side of the legs (4) of the U-shaped cross-section.

7. Wall system as claimed in claim 6, wherein the fire-resistant material (6) is glued to the legs (4) of the U-shaped cross-section and/or clamped thereon. 5
8. Wall system as claimed in claim 6 or 7, wherein the legs (4) of the U-shaped cross-section are folded twice in order to form grooves (5) for the fire-resistant material (6) extending in the longitudinal direction of each column (1). 10
9. Wall system as claimed in claim 6, 7 or 8, wherein the fire-resistant material (6) is slat-like. 15
10. Wall system as claimed in any of the foregoing claims 1 to 9, wherein the wall panels (2', 2'') are arranged on the outer side of the legs (4) of the U-shaped cross-section. 20
11. Wall system as claimed in claim 10, wherein the wall panels (2', 2'') are screwed onto the outer side of the legs (4) of the U-shaped cross-section. 25
12. Wall system as claimed in any of the foregoing claims 1 to 11, wherein the wall panels (2) are manufactured from a heat-insulating and/or sound-insulating material. 30
13. Wall system as claimed in claim 12, wherein the wall panels (2) are formed by plasterboard panels.
14. Wall system as claimed in any of the foregoing claims 1 to 13, wherein the columns (1) are manufactured from galvanized steel. 35
15. Column (1) for use in a wall system as claimed in any of the foregoing claims 1 to 14, wherein the column (1) is manufactured from metal and comprises a U-shaped cross-section with two parallel legs (4) and a base (3) located therebetween, wherein the legs (4) and the base (3) of the U-shaped cross-section are provided with a strengthening profile. 40
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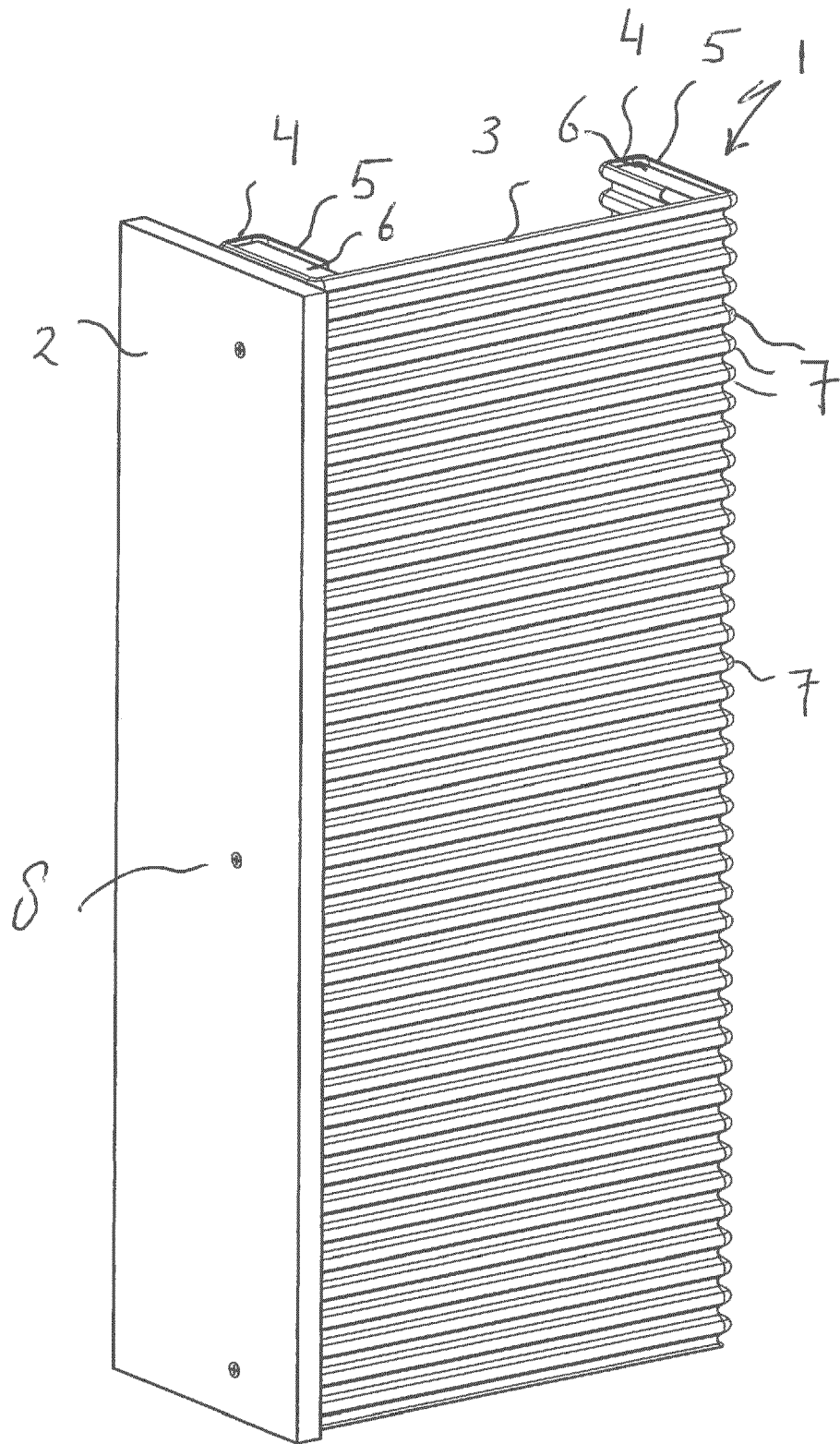


FIG. 1

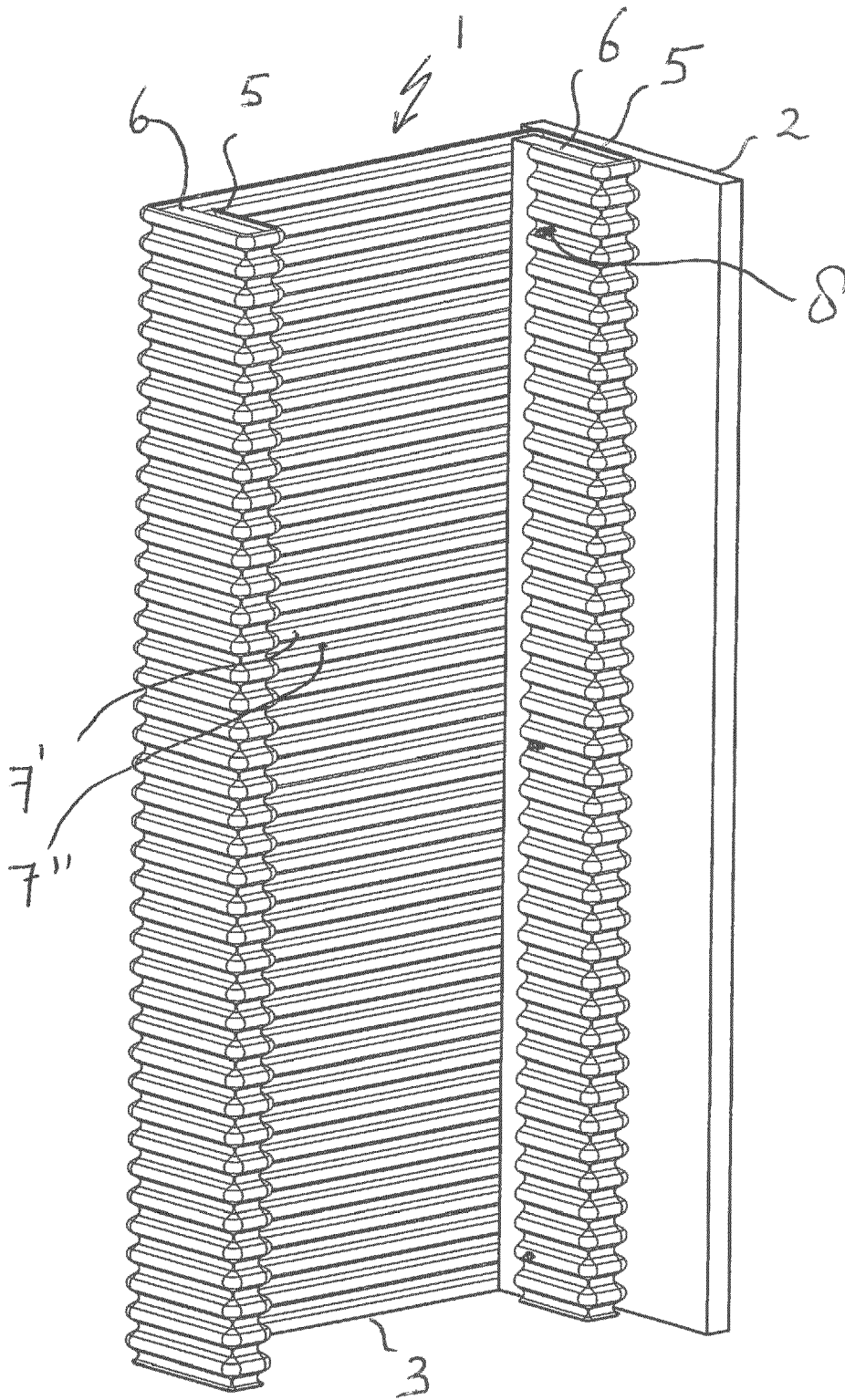


FIG. 2

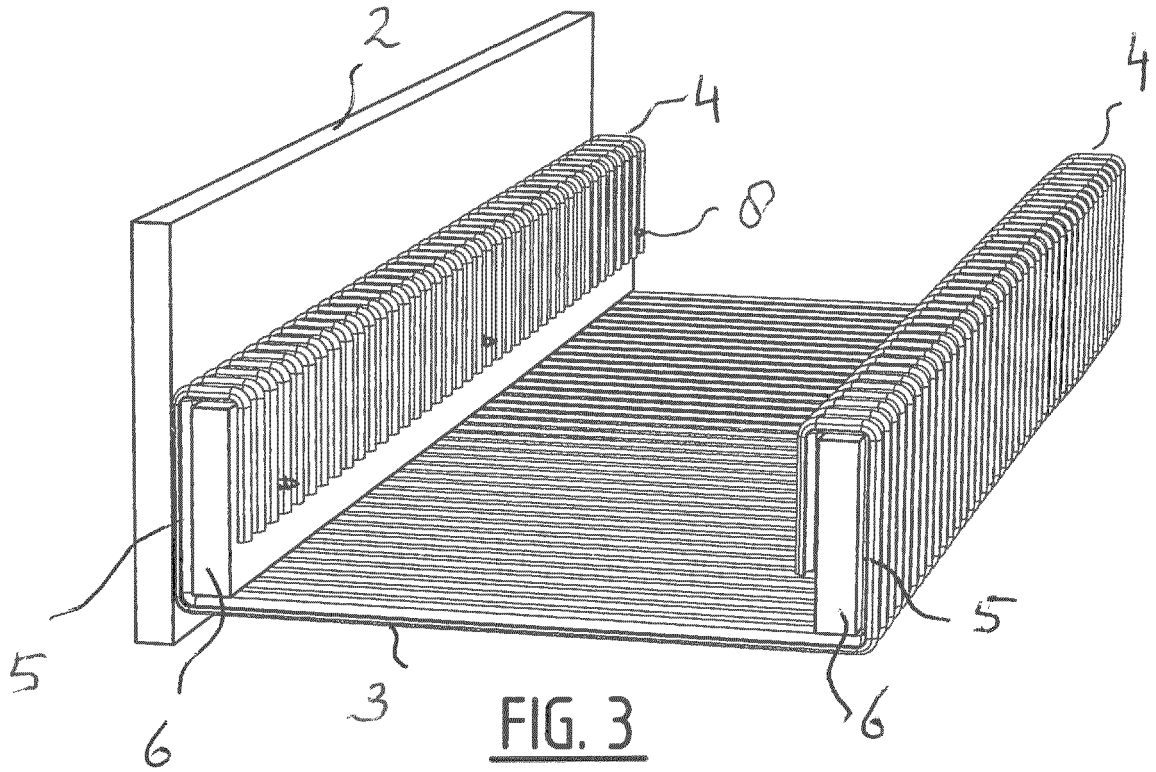


FIG. 3

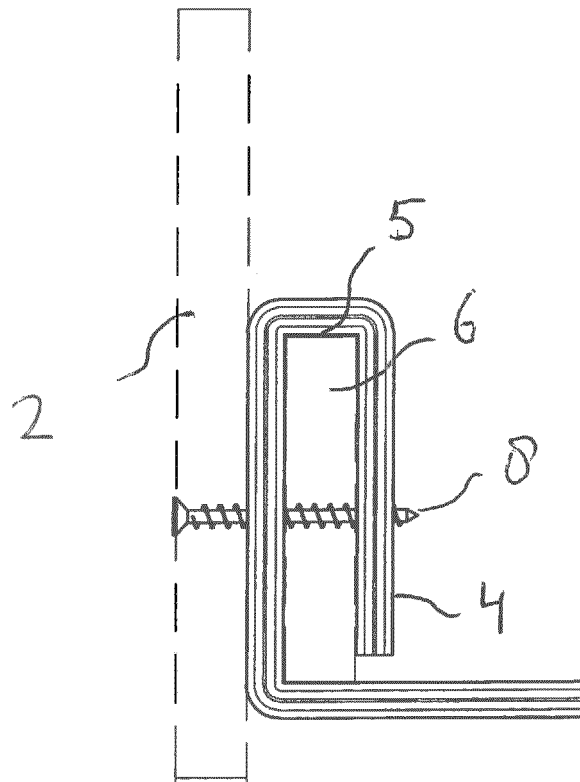


FIG. 4

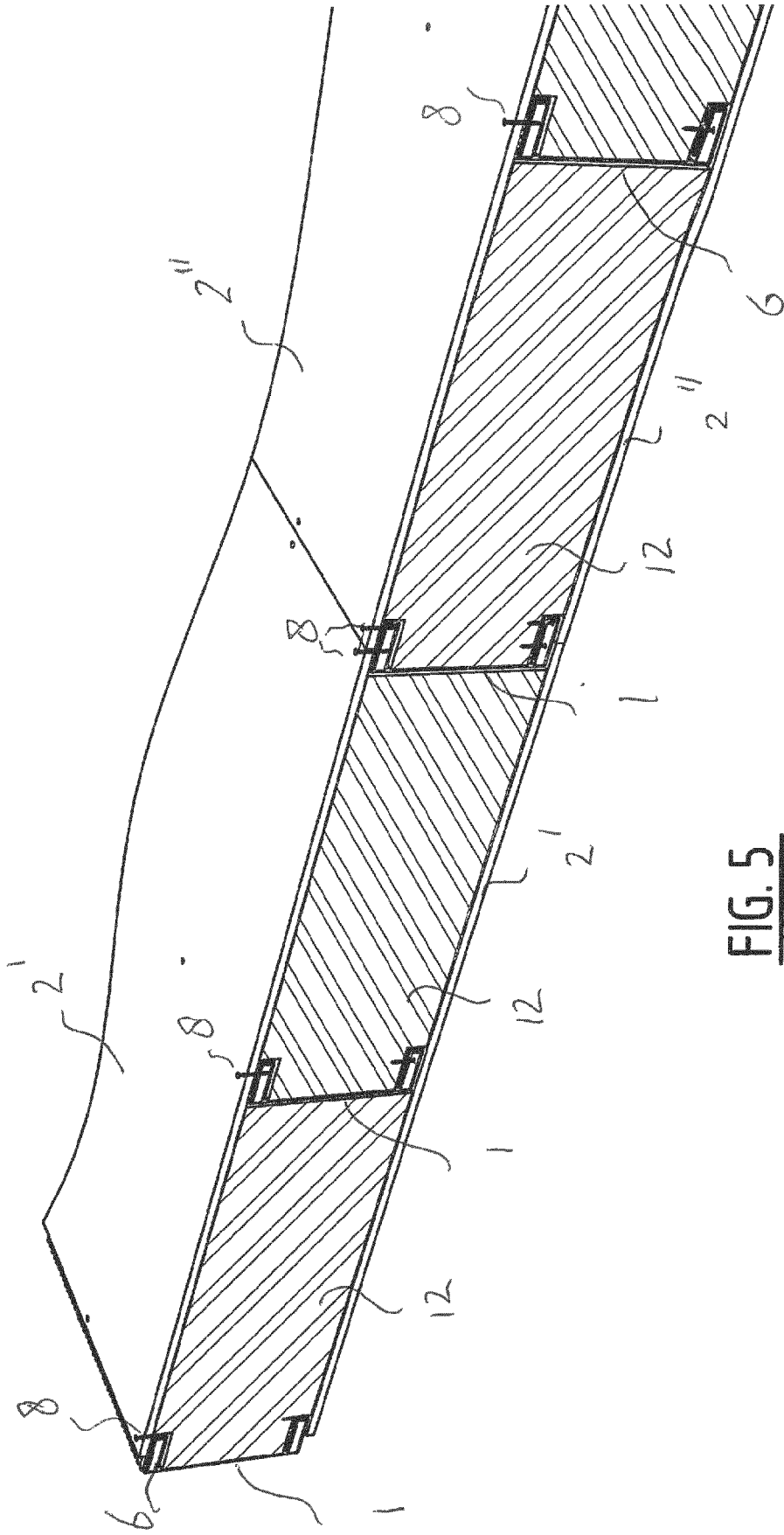


FIG. 5

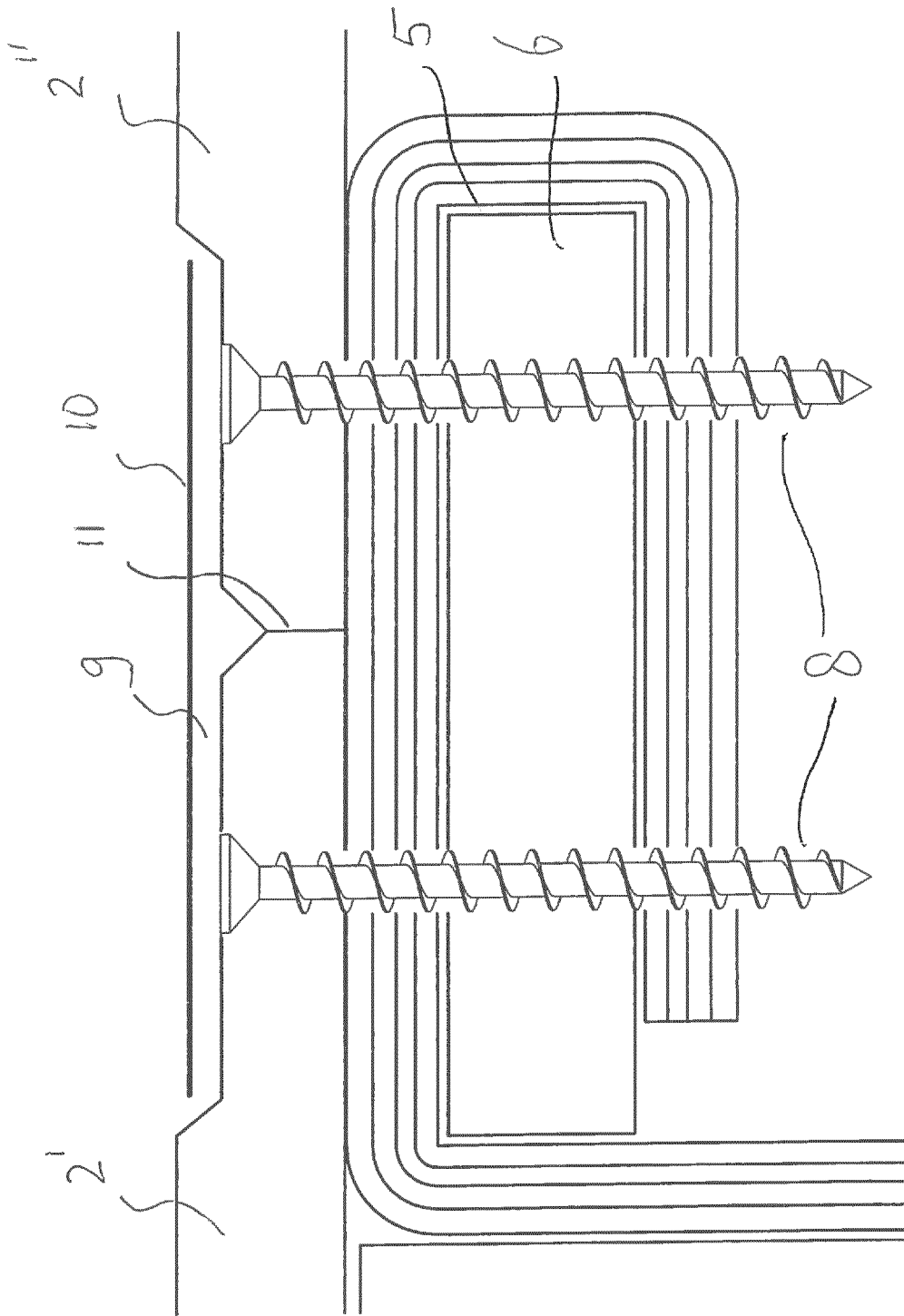


FIG. 6

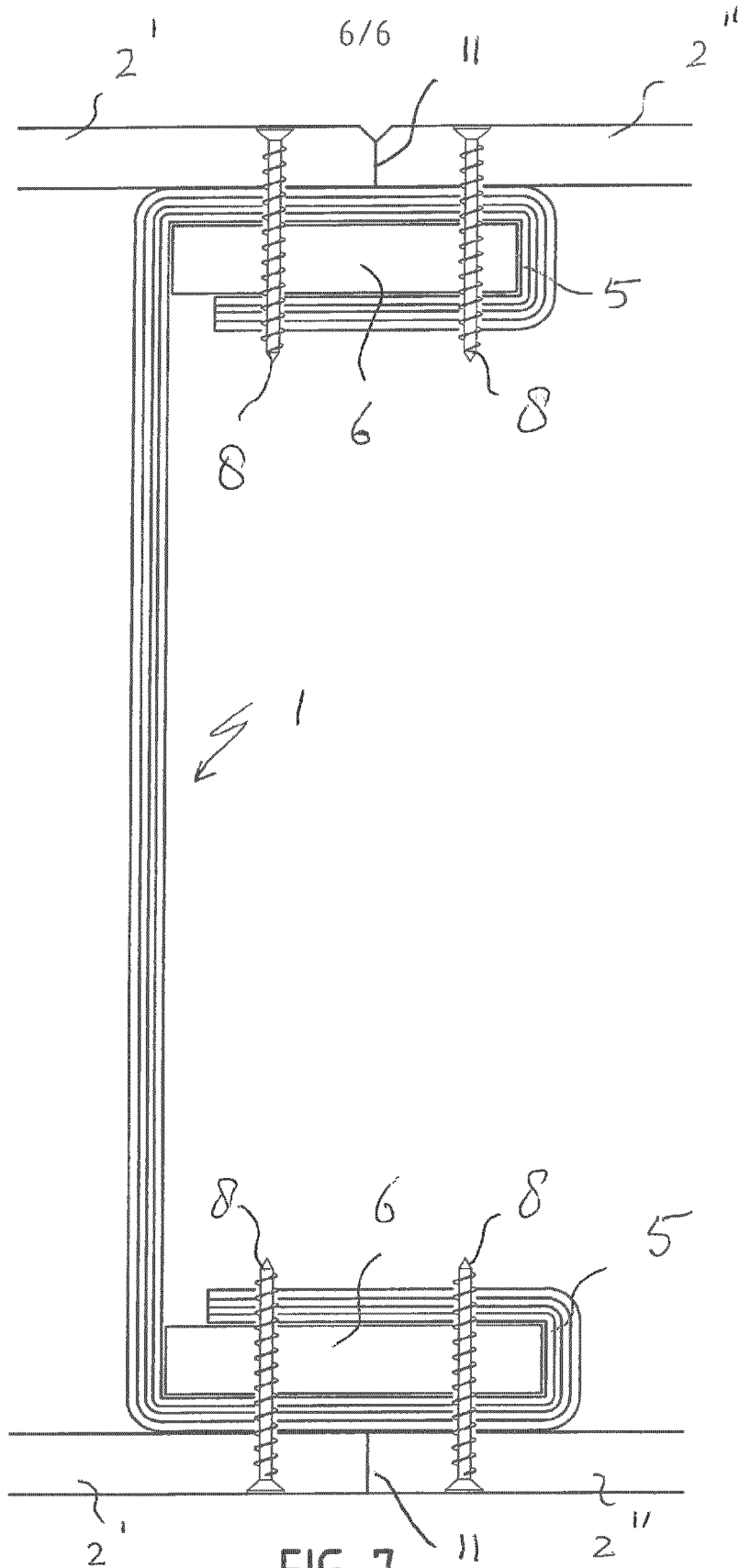


FIG. 7



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Application Number
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Place of search Munich		Date of completion of the search 29 January 2018	Examiner Giannakou, Evangelia
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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