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(54) Angle bracket for fastening a first construction element to a second construction element and method for producing an angle bracket

(57) Angle bracket (1) for joining a first construction element (30) to a second construction element (31). The angle bracket (1) comprises a first leg (2) placed in a first plane. Said first leg (2) has a first free end part (4), a first side rib (7), and a second side rib (8). Moreover, the angle bracket (1) comprises a second leg (3) placed in a second plane. Said second leg has a second free end part (5), a first side rib (9), and a second side rib (10). The first leg (2) and the second leg (3) are arranged essentially perpendicular to each other via a common bending section (6), said common bending section (6) connecting the side ribs of the first (2) and second leg (3). Furthermore, a number of apertures (11, 12, 13) is arranged for receiving means (32) for fastening the first leg (2) of the angle bracket (1) to a first construction element (30) and the second leg (3) of the angle bracket (1) to a second construction element (31). The width of the angle bracket (1) along the axis of the common bending section (6) is smaller than the width of the angle bracket at the free ends (4, 5) of the legs (2, 3). Furthermore, a method for producing an angle bracket (1) is provided.

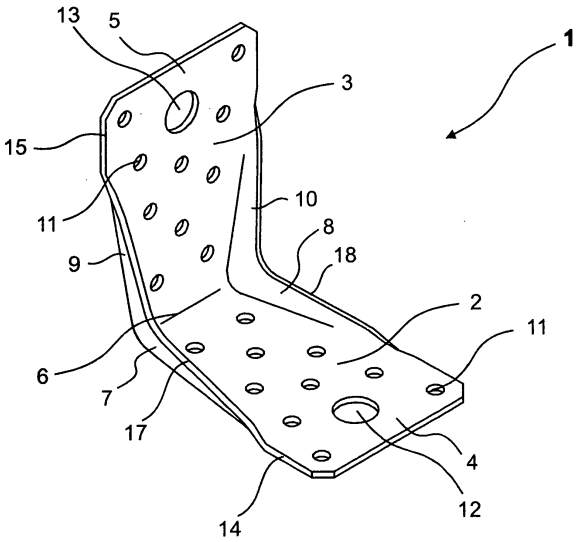

Fig.1

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Description

[0001] The present invention relates to an angle bracket for fastening a first construction element to a second construction element. Furthermore, the present invention relates to a method for producing an angle bracket.

Background Art

[0002] Angle brackets are used in various places, e.g. when building a house. The angle brackets are used to join two construction elements to each other e.g. a rafter and a wall plate, a girder and a joist, or a stud and a sill. The contact between the angle bracket and the construction elements to be joined is important in order to achieve a proper connection. Thus, the joining of upstanding planks or similar timber is difficult because a plank standing on its small side has a high moment of inertia, but a small surface to connect to other construction elements. An angle bracket having only a small surface for connecting such two elements with a high moment of inertia needs to be adapted for this purpose in order to achieve both the necessary moment of inertia and sufficient space for connecting the angle bracket to the elements.

[0003] A high moment of inertia could be achieved by embossing a part of the angle bracket and in this way provide a heighten the moment of inertia. However, such embossment creates a large space with uneven surface due to mere nature of the embossment. It is preferably avoided to have apertures arranged in the embossment because this would necessitate the fastening means to be longer if used in the embossed areas. Such dependency of different types of fastening means must be avoided due to the risk of misplacing, e.g. in case of a too short fastening means in an embossed area of the angle bracket. Furthermore, apertures in the embossment weaken the embossment, and thus the moment of inertia of the angle bracket.

Description of the invention

[0004] The present invention provides a new angle bracket that addresses the problems of the angle brackets mentioned above and provides an improved angle bracket that is cheap to produce from sheet metal.

[0005] The present invention provides, in a first aspect, an angle bracket, where the angle bracket comprises:

- a first leg placed in a first plane, said first leg having
  - a first free end part,
  - a first side rib, and
  - a second side rib,
- a second leg placed in a second plane, said second leg having
  - a second free end part,
  - a first side rib, and
  - a second side rib,
- said first leg and said second leg being arranged essentially perpendicular to each other via a common bending section, said common bending section connecting the side ribs of the first and second leg,
- a number of apertures for receiving means for fastening the first leg of the angle bracket to a first construction element and the second leg of the angle bracket to a second construction element, and
- the width of the angle bracket along the axis of the common bending section is smaller than the width of the angle bracket at the free end parts of the legs.

[0006] The ribs of both sides of the angle bracket connected via the ribs of the common bending section are significantly heightening the moment of inertia of the angle bracket perpendicular to the common bending section. Having the ribs projecting in the sides of the angle bracket leaves a central surface area of each leg free of ribs and arranged with apertures in order to receive fastening means e.g. nails or screws. Because the apertures are arranged in the central surface area of the legs and thus facilitating that the apertures are positioned towards the centre of the timber surface, the risk of splitting the timber is minimised.

[0007] In a preferred embodiment according to the invention, the width of the angle bracket along the axis of the common bending section can be less than 80% of the width of the free end part of a leg.

[0008] If the width of the angle at the common bending section is less than 80% of the width of the free end part of a leg, more material could be used for forming the rib. In this way, it is possible to achieve on the one hand a preferred height of the ribs and thus the moment of inertia of the angle bracket and on the other hand still have a surface in which apertures for fastening means can be positioned.

[0009] In yet another embodiment according to the invention, at least one of the apertures of the first leg or the second leg may be larger than the others. In this way it is provided that different types of fastening means could be used, e.g. nails and screws for the smaller apertures and a connector screw for the larger aperture.

[0010] In another embodiment according to the invention, the at least two apertures can be larger than the others, said two larger apertures having diameters that differ from each other. Preferably, the at least two apertures could be placed on each leg. If only one of the larger apertures is used, it is achieved that the worker is free to orient the angle bracket according to the fastening means at hand. Furthermore, specifications could demand the use of certain fastening means, and the angle bracket being provided with apertures of different diameters would in this way be more likely to support the specifications.

[0011] In a preferred embodiment according to the in-

vention, the angle bracket can be made from a rectangular piece of sheet metal. In this way only the material punched out from the apertures is wasted. Furthermore, it is possible to use e.g. coils as raw material.

[0012] In a preferred embodiment according to the invention, the angle bracket can be made of galvanised high strength steel. In yet another embodiment, the sheet metal can have a thickness of 0,5-5 mm, preferably 1-3,5 mm, most preferably 1,5-2 mm.

[0013] By using galvanised steel, it is achieved that the angle bracket is adapted in a better way for withstanding corrosion. However, the combination of high strength steel with a thickness of e.g. 1,5 mm and the galvanisation makes it possible to reduce the thickness of the material used for the angle bracket. Using thinner material makes it possible to achieve higher ribs during the same process time and furthermore, with less risk of the galvanisation to peel or get scratched off. The preferred quality of the steel may be S250GD + Z275 according to EN10326:2004.

[0014] In yet another preferred embodiment according to the invention the one leg of the angle bracket may be longer than the other. If an angle bracket is used with a sill, on which a pillar or a stud is to be fastened, it is preferred that the one leg of the angle bracket extends the full distance from the lower part of the sill to a certain height on the pillar. The other leg does not necessarily need to be of the same length as the first if it is e.g. fastened by e.g. a threaded rod in concrete stemwalls.

[0015] In a preferred embodiment according to the invention the side ribs can be bent to an angle of at least 65° in relation to the free end parts via a curved edge section, said curved edge section extending for a maximal distance of 35 mm. In this way, an unbroken continuous edge of the sides is provided, and the risk of undesired cracking is minimised. In another embodiment according to the invention, a slit could be provided at the start of the rib.

[0016] According to the present invention the angle bracket can preferably be produced by a method comprising the steps:

- providing sheet metal, e.g. galvanised sheet metal from coils,
- punching out apertures,
- punching out a rectangular piece of sheet metal from the coil,
- bending the rectangular piece of sheet metal to an angle of essentially 90° by a common bending section, and
- bending side sections so as to form side ribs extending essentially from a first free end part of the one leg to a second free end part of the second leg via the common bending section.

[0017] In this way of producing the angle bracket a cheap and efficient method of producing is obtained. Raw material, e.g. coils, is supplied in a desired width so as to avoid scrap material. The method could e.g. be carried out as a progressive die operation or as a transfer die operation. It is important to notice that the angle bracket can be produced from galvanised sheet metal and in which case the angle brackets are ready for use when leaving the final die.

Brief description of the drawings

[0018] Preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of the angle bracket according to the invention,

Fig. 2 shows a side view of the angle bracket of Fig. 1,

Fig. 3 shows a perspective view of the angle bracket of Fig. 1 in its installed position joining two constructional elements, and

Fig. 4 shows an embodiment of the angle bracket in which the one leg is longer than the other.

[0019] The invention is described below by way of example with the assumption that the angle bracket is used to join two construction elements. However, within the scope of the invention the angle bracket can be used in other applications as well.

Fig. 1 shows an angle bracket 1. The angle bracket 1 comprises a first leg 2 and a second leg 3. The first leg 2 has a first free end part 4. The second leg 3 has a second free end part 5. The fist leg 2 and the second leg 3 are connected via a common bending section 6. The first leg 2, is provided with side ribs 7 and 9. The second leg 3 is provided with side ribs 8 and 10. The side rib 7 and the side rib 9 are connected by the common bending section 6 and will in the following be referred to with the joint reference numeral 7. Likewise, the side rib 8 and the side rib 10 are connected by the common bending section 6 and will in the following be referred to with the joint reference numeral 8. Thus, each side rib 7, 8 extends from the first free end part 4 to the second free end part 5. The ribs 7, 8 provide a rigidity of the angle bracket 1 and thus heighten the moment of inertia of the angle bracket 1. The first leg 2 and the second leg 3 are provided with a number of smaller apertures 11 (only two of the smaller apertures are marked with the reference numeral) and two larger apertures 12, 13. The smaller apertures 11 could e.g. have a diameter of 5 mm. In this embodiment of the invention, the larger apertures 12, 13 have the same size e.g. 13 mm. However, the larger apertures 12, 13 could have different diameter e.g. one of them could have a diameter of 11 mm and the other a diameter of 13

mm. The first free end part 4 has an edge 14 where no side ribs project. Likewise, the second free end part 5 has an edge 15 where no side ribs project. The edge 14 of the first free end part 4 and the edge 15 of the second free end part 5 are connected by an edge 17, 18 of the side ribs 7 ,8.

Fig. 2 shows a side view of the angle bracket 1 of Fig. 1. It is shown that the side rib 7 (similar to rib 8, not shown) is extending from an area of the first free end part 4 with no side rib to an area of the second free end part 5 with no side rib. In order to provide a continuous edge of the side rib 7 from the area of the first free end part 4 to the area of the second free end part 5, the side rib 7 is at its starting point at the free end part 4, twisted or bend via a curved edge section 20. The curved edge section 20 could e.g. be extending over a distance d of maximal 35 mm. The curved edge section 20 and thus the rib 7 may e.g. be bent to an angle of at least 65° in relation to the free end parts 4, 5 of the legs 2, 3. Furthermore, it is shown that the rib 7 is extending via the common bending section 6 without slits or cuts and the rigidity of the angle bracket 1 is thus kept as high as possible.

Fig. 3 shows an angle bracket 1 in its installed position. The angle bracket 1 is joining a first construction element 30 to a second construction element 31. It is shown that fastening means 32 are arranged in a number of the smaller apertures 11 of both the first leg 2 and the second leg 3. Furthermore, it is shown that the angle bracket 1 enables a positioning of the fastening means 32 in the apertures 11, 12, 13 of the angle bracket toward the centre of the construction element 30. If the construction element 30 is made from e.g. timber, this central placement of the fastening means minimises the risk of splitting the timber. In this installation, it is shown that none of the larger apertures 12, 13 are used. However, the central position of the larger apertures 12, 13 results in the same benefit of minimising the risk of splitting the timber if e.g. connector screws were used.

Fig. 4 shows another embodiment of the angle bracket 1. In this embodiment the angle bracket 1 is provided with a free end part 5 of the second leg 3 that extends longer than the first leg 2. The ribs 7, 8 are extending along the same distance and are arranged in the same manner as in the embodiment shown in Figs. 1-3 and these are thus not described in further detail. The larger aperture 12 is positioned closer to the common bending section 6 than shown in Figs. 1-3. This is due to the fact that angle brackets 1 having a longer second leg 3 can be used e.g. for joining a stud to a sill (not shown). However, this is often obtained by fastening the first leg 2 in a plane parallel to the lower side of e.g. a sill (not shown) while the second leg 3 extends up along the stud. In this situation it is found preferable to move the aperture 12 towards the common bending section 6.

Claims

1. An angle bracket (1) for joining a first construction element (30) to a second construction element (31) **characterised in that** the angle bracket (1) comprises:

   - a first leg (2) placed in a first plane, said first leg (2) having

     - a first free end part (4),
     - a first side rib (7), and
     - a second side rib (8),

   - a second leg (3) placed in a second plane, said second leg having

     - a second free end part (5),
     - a first side rib (9), and
     - a second side rib (10),

   - said first leg (2) and said second leg (3) being arranged essentially perpendicular to each other via a common bending section (6), said common bending section (6) connecting the side ribs of the first (2) and second leg (3),
   - a number of apertures (11) for receiving means (32) for fastening the first leg (2) of the angle bracket (1) to a first construction element (30) and the second leg (3) of the angle bracket (1) to a second construction element (31), and
   - the width of the angle bracket (1) along the axis of the common bending section (6) is smaller than the width of the angle bracket (1) at the free ends (4, 5) of the legs (2, 3).

2. An angle bracket (1) according to claim 1, **characterised in that** the width of the angle bracket (1) along the axis of the common bending section (6) is less than 80% of the width of the free end part (4, 5) of a leg (2, 3).

3. An angle bracket (1) according to claim 1 or claim 2, **characterised in that** at least one of the apertures of the first leg (2) or the second leg (3) is larger than the others.

4. An angle bracket (1) according to any one of claims 1, 2 or 3, **characterised in that** at least two of the apertures are larger than the others, said two larger apertures (12, 13) having diameters that differ from each other.

5. An angle bracket (1) according to any one of claims

1 to 4, **characterised in that** the angle bracket (1) is made from a rectangular piece of sheet metal.

6. An angle bracket (1) according to any one of claims 1 to 5, **characterised in that** the angle bracket (1) is made of a galvanised high strength steel.

7. An angle bracket (1) according to any one of claims 1 to 6, **characterised in that** the sheet metal has a thickness of 0,5 - 5 mm, preferably 1 - 3,5 mm, most preferably 1,5 - 2 mm.

8. An angle bracket (1) according to any one of claims 1 to 7, **characterised in that** the one leg (2, 3) of the angle bracket (1) is longer than the other.

9. An angle bracket (1) according to any one of claims 1 to 8, **characterised in that** the side ribs (7, 8,9 , 10) are be bend to an angle of at least 65° in relation to the free end parts (4, 5) via a curved edge section (20), said curved edge section (20) extending for a maximal distance (*d*) of 35 mm.

10. A method for manufacturing an angle bracket (1) according to any one of claims 1 to 9, **characterised in that** the method comprises the steps:

- providing sheet metal e.g. galvanised sheet metal from coils,
- punching out apertures (11, 12, 13),
- punching out a rectangular piece of sheet metal from the coil,
- bending the rectangular piece of sheet metal to an angle of essentially 90° by a common bending section (6), and
- bending side sections so as to form side ribs (7, 8, 9, 10) extending essentially from a first free end part (4) of the one leg (2) to a second free end part (5) of the second leg (3) via the common bending section (6).

11. An angle bracket (1) substantially as hereinbefore described with reference to or as shown in the accompanying drawings.

12. A method for manufacturing an angle bracket (1) substantially as hereinbefore described with reference to or as shown in the accompanying drawings.

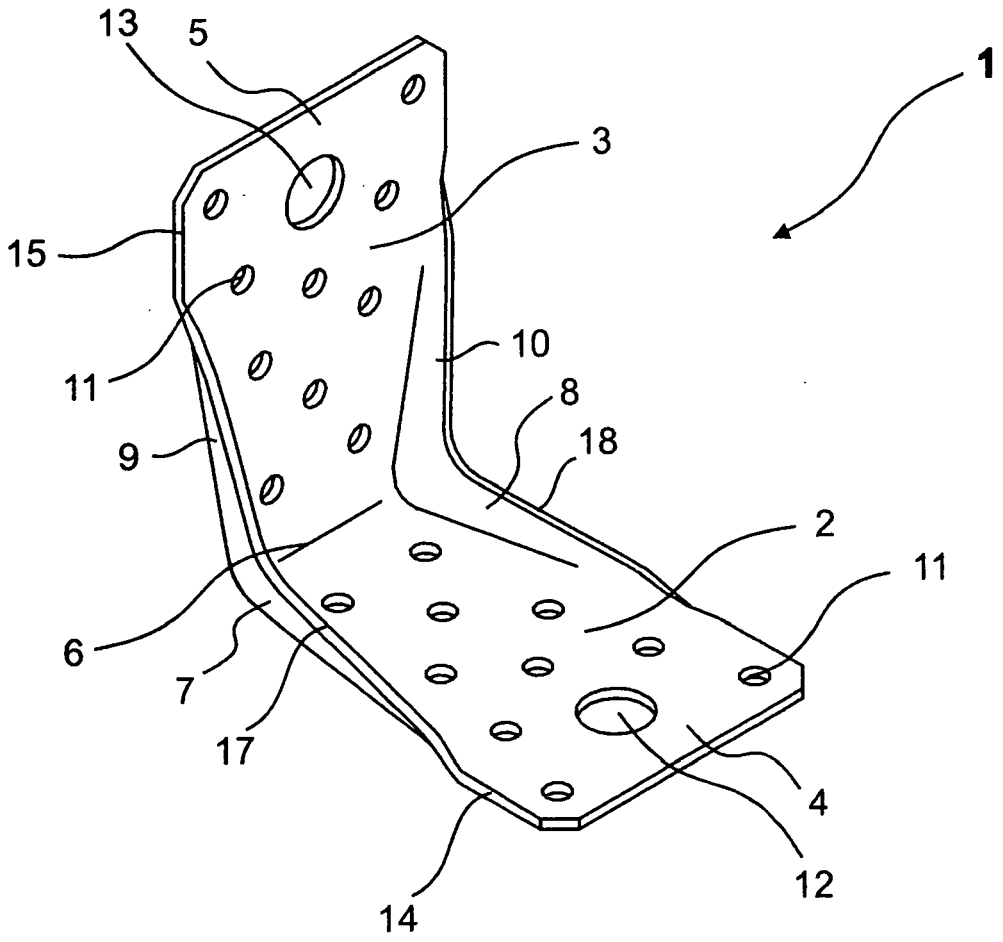

Fig.1

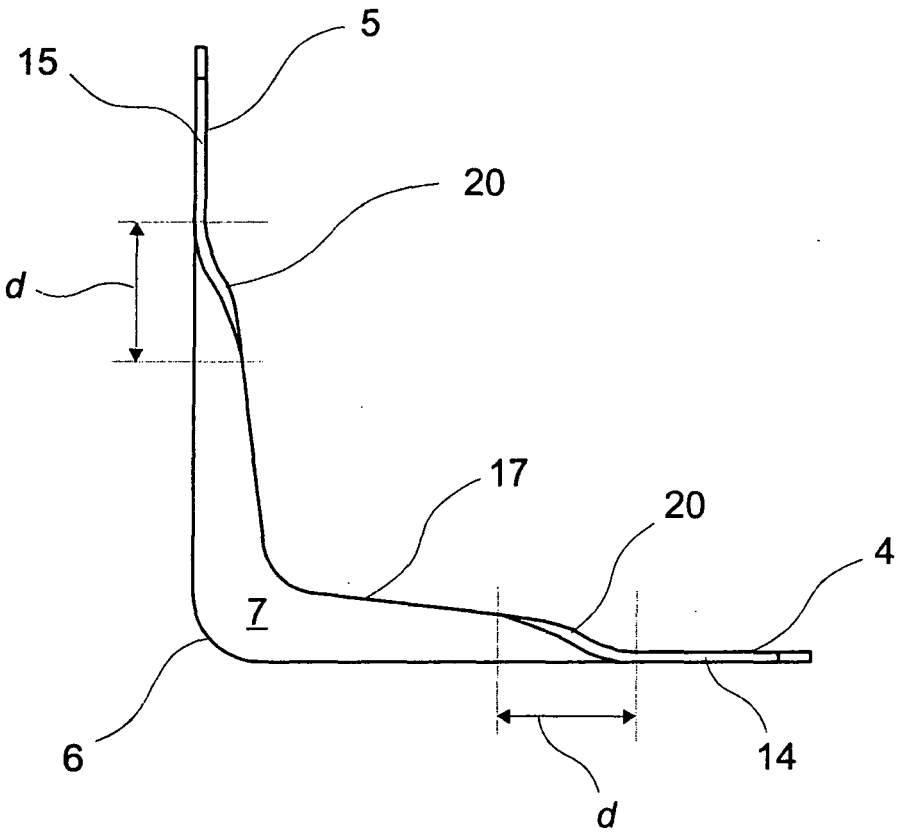

Fig.2

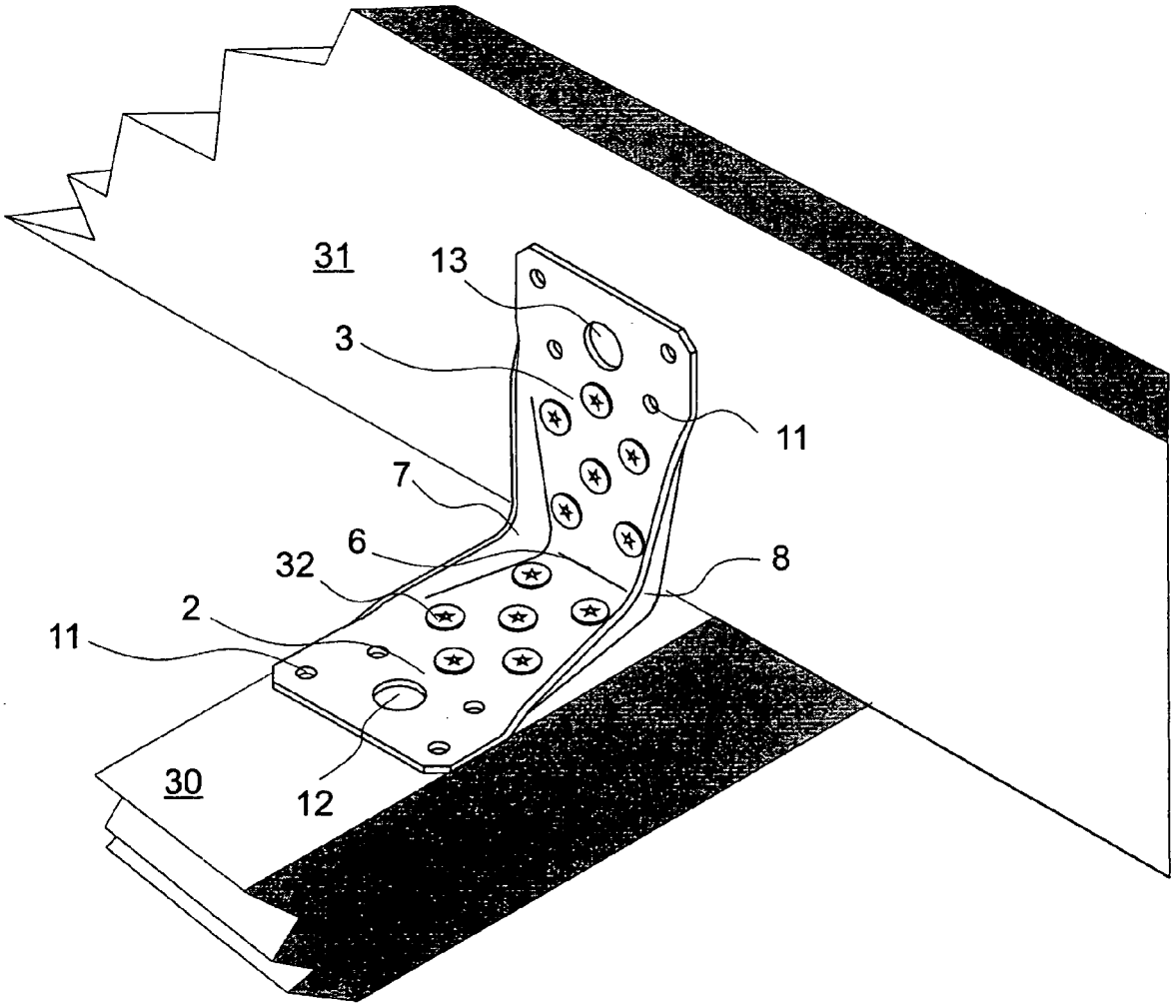

Fig.3

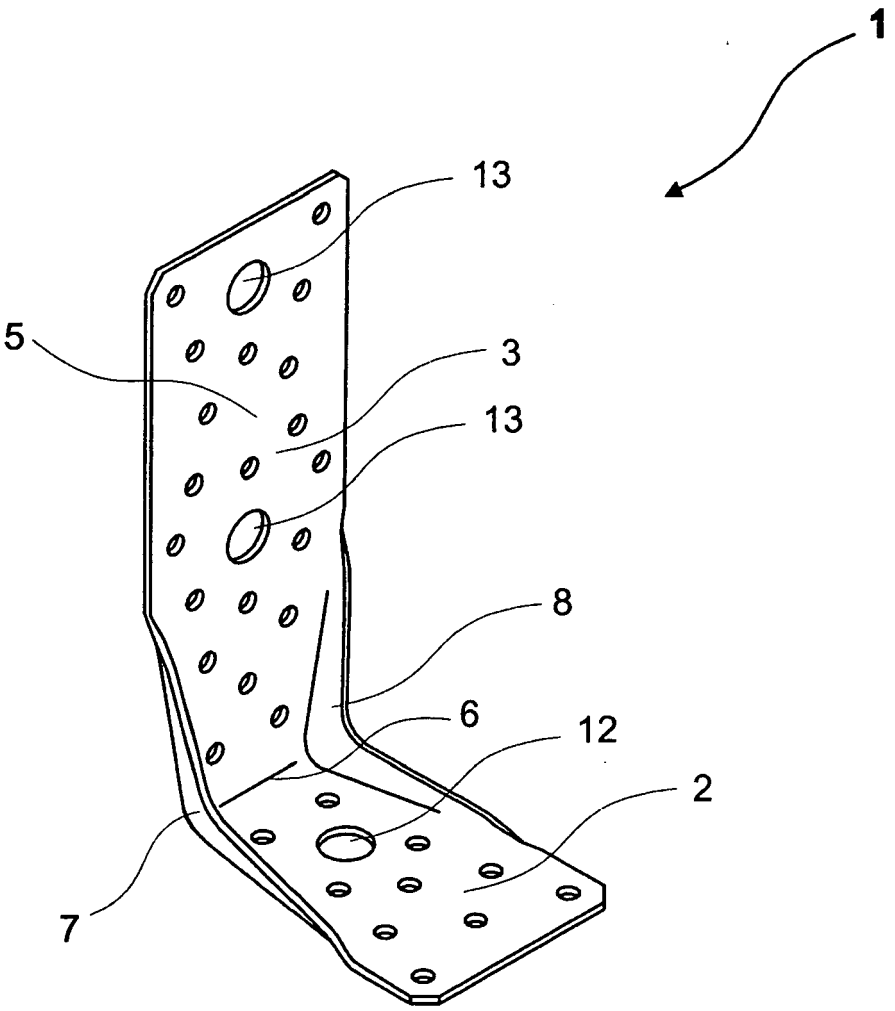

Fig.4