(19) DANMARK

(10) **DK/EP 2093335 T3**

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***E 04 B 1/26 (2006.01)*** ***A 47 B 96/06 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2016-07-04**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2016-04-13**

(86) Europæisk ansøgning nr.: **09250470.3**

(86) Europæisk indleveringsdag: **2009-02-23**

(87) Den europæiske ansøgnings publiceringsdag: **2009-08-26**

(30) Prioritet: **2008-02-22 GB 0803274**

(84) Designerede stater: **AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR**

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(54) Benævnelse: **Vinkelbeslag i et stykke til at fastgøre et første konstruktionselement til et anden konstruktionselement**

(56) Fremdragne publikationer:
CH-A- 84 404
DE-U1- 29 707 800
FR-A1- 2 773 568
GB-A- 254 434
US-A- 1 398 371
US-A- 2 264 290

DESCRIPTION

[0001] The present invention relates to a one-piece angle bracket for fastening a first construction element to a second construction element, said angle bracket comprising:

- a first section having a first free end, a first free side and a second free side and being arranged in a first plane, said first section having a first centre axis perpendicular to the first free end,
- a second section having a second free end, a first free side and a second free side and being arranged in a second plane, said second section having a second centre axis perpendicular to the first free end of the second section,
- a number of apertures for receiving means for fastening the first section of the angle fastener to a first construction element and the second section of the angle fastener to a second construction element
- an embossment extending along the centre axis of the first section and along the centre axis of the second section via an embossed section of a common bending section,
- at least one of the apertures being placed with its centre substantially on the centre axis of the first or the second section,
- the embossment (5) is extending into the area of said at least one of the apertures (11, 12) with its centre substantially on the centre axis (7, 9) of the first (2) or the second section (3), and that both the first section (2) and the second section (3) are arranged with an aperture (11, 12) in the embossment (5) extending along the centre axis (7) of the first section (2) and along the centre axis (9) of the second section (3),
  characterised in that
- said first section (2) and said second section (3) are arranged essentially perpendicular to each other via the common bending section (4), and- the embossment (5) is extending substantially the entire length of the sections.

[0002] Angle brackets are used in various places e.g. when building a house. The angle brackets are used to join two construction elements with each other such as a rafter and a wall plate, a girder and a joist or a stud and a sill. Great effort is made in order to achieve that the workers, e.g. carpenters, have positioned and mounted the angle brackets in the right way. Unfortunately, the test for the quality of this work is often a storm or similar stress in which the building should provide shelter instead of being likely to collapse.

[0003] If an area along the central axis of the first or the second section is left without embossment this area will have a smaller moment of inertia and therefore be an area where the angle bracket will deform during stress.

[0004] In general, it is preferred that at least one of the apertures is placed essentially along the central axis of the sections of the angle bracket. This is due to the fact that e.g. timber is less likely to split when the fastening means is positioned close to the centre of the timber element.

[0005] Fastening means, such as a connector screw or threaded rods with a nut, necessitates a certain flat space around the apertures in order to achieve a proper contact between the angle bracket and the head of the connector screw or the nut. Therefore, the angle bracket is left without an embossment around such apertures and especially around the central apertures, in order to achieve such flat space for the fastening means.

[0006] German utility model DE 202004006321 U1 discloses an angle bracket. This angle bracket is formed with a number of smaller embossments shaped as a "Y" and a "V". However, there is a risk that the bracket will deform when subjecting the bracket to a load forcing the angle from 90° to an acute or obtuse angle. This is due to the embossments not being in a straight line from the bent region towards the free ends, but shaped as either a "V" or a "Y" and as such adapted to withstand loads perpendicular to the axis from the bent region towards the free ends, i.e. loads parallel to the bending axis of the angle bracket.

[0007] DE 297 07 800 discloses an angle bracket having supporting side ribs. Furthermore, the angle bracket comprises a centrally placed support rib. The centrally placed support rib does not show that holes may be placed in or near the rib. Side ribs are introduced in order to gain further strength.

[0008] US 2,264,290 discloses a greenhouse of a light and portable type. The greenhouse comprises metal brackets and wooden braces. In combination, the wooden braces and the metal brackets bring the side panels and the roof panel together. The metal brackets comprise strips of sheet metal with central ridges or embossed portions. The central ridge or embossment does not extend to the end portion of the metal bracket. Furthermore, the metal bracket does not have the ridge or embossment surrounding the holes or near the bracket ends.

[0009] CH84404 discloses a bracket made of sheet metal angle pieces and formed with a channel-shaped cross-section.

Descrption of the invention

[0010] The present invention provides a new angle bracket that addresses the disadvantages of the angle bracket mentioned above, and provides an improved angle bracket that minimises the risk of incorrect mounting and is safer for the worker to use.

[0011] The present invention provides, in a first aspect, an angle bracket where the embossment is extending into the area of said at least one of the apertures with its centre substantially on the centre axis of the first or the second section.

[0012] The embossment of the angle bracket is contributing to raise the moment of inertia of the angle bracket, and the preferred central placement of the apertures along the central axis results in the preferred situation of having embossed material around the apertures. This way, the angle bracket has achieved the desired properties of both the embossment and the benefit from having the apertures placed in a preferred position. Furthermore, it is ensured that the worker mounting the bracket is given the best opportunities to mount the bracket.

[0013] According to the invention both the first section and the second section are provided with an aperture in the embossment extending along the centre axis of the first section and along the centre axis of the second section.

[0014] Having an aperture in the embossment of both the first and second section together with other smaller apertures gives the worker the opportunity to choose freely from the more different fastening means.

[0015] According to a preferred embodiment of the invention the diameter of the aperture of the embossment of the first section can differ from the diameter of the aperture of the embossment of the second section.

[0016] When the diameters of the apertures differ from each other and only one of the central apertures is to be used, the worker is free to orient the angle bracket in accordance with the available fastening means.

[0017] This way it is avoided that workers try to adjust an aperture of an angle bracket using unstable, instant set-ups, e.g. holding the bracket with the hands or standing on it with a high risk of the angle bracket starting to rotate together with the drill of the drilling machine.

[0018] Furthermore, it is achieved that the fastening means and the apertures of the angle bracket can have a tight fit and therefore unable to move in relation to each other.

[0019] Preferably, according to an embodiment of the invention the embossment may be provided with a flat top in the area around the at least one aperture.

[0020] In order to achieve a tight connection between the fastening means and the bracket it is important to ensure that the surface surrounding the aperture and the fastening means are aligned correctly. The head of the fastening means and the surface surrounding the aperture should be parallel. When considering that the head of the fastening means Is perpendicular to the main body of the fastening means the aligning of the fastening means is merely a matter of aligning the main body of the fastening means perpendicular to the structure it self.

[0021] Thus, the easiest determinable angle is one of 90° between the fastening means and the bracket, because the body of the fastening means could be held in relation to the full construction element instead of just a small surface on the bracket.

[0022] In another embodiment of the present invention the diameter of the aperture of the embossment of the first section could be 11 mm and the diameter of the aperture of the embossment of the second section could be 13 mm.

[0023] Diameters of 11 mm and 13 mm respectively are commonly used in the construction Industry and therefore they are the most likely to fulfil the needs. Thus, in order to prevent both injuries of the workers as well as poor quality of the structure such difference of 2 mm between the apertures Is preferred. In order to emphasise the difference in size, the apertures are marked with their dimensions.

[0024] In a preferred embodiment the angle bracket may according to the invention be made from a single piece of sheet metal.

[0025] Producing the angle brackets from a single piece of sheet metal is beneficial due to the fact that the metal can be delivered in e.g. coils. Thereby, It is possible to determine a certain width of the coil that is necessary to form the angle bracket, thus reducing the amount of waste material.

[0026] In another embodiment the sheet metal may be galvanised steel.

[0027] In order to obtain the best properties of the angle bracket, the material could be steel, e.g. S250 GD and Z275 according to EN10328. It is achieved that the relation between the thickness and thereby the weight Is optimised. When building large constructions, the weight of the various material to be carried around on the site is reduced.

[0028] in yet another embodiment of the invention the sheet metal may have a thickness of 0,5 - 4,5 mm, preferably 1 - 3,5 mm, most preferred 1,5 - 2,5 mm.

[0029] The moment of inertia of the angle bracket Is partly dependent on the thickness of the material. Thus, in order to achieve a high moment of inertia, the thickness of the material could be increased. Considering the height of the embossment combined with the thickness of the material, it is a matter of achieving the necessary moment of inertia that complies with standards and costumer needs. A material thickness of e.g. 2 mm having an embossment of at least 15 mm at the highest point of the embossment from a section shows a sufficient moment of inertia.

[0030] According to a preferred embodiment of the invention, the height of the embossment, when seen in cross section, can be embossed at least 15 mm from the section. The moment of Inertia is dependent on the height of the embossment, and therefore it is preferred to have an embossment of at least 15 mm. The embossment extends along the central axis of the sections essentially from the free end of the first section via the common bend section to the free end of the second section. With the embossment extending the entire length along the central axis of the sections, a high moment of inertia is achieved.

Brief description of the drawings

[0031] 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 an angle bracket according to the invention,

Fig. 2 shows a perspective view of the angle bracket of the present invention in its installed position joining two constructional elements,

Fig. 3 shows a side view of the angle bracket of Fig. 1, and

Fig. 4 shows a front view of the angle bracket of Fig. 1.

[0032] The invention is described below by way of example with the assumption that the one-piece angle bracket is used to join two construction elements. However, within the scope of the invention the one-piece angle bracket can be used in other applications as well.

[0033] In Fig. 1 a one-piece angle bracket 1 has a first section 2 and a second section 3 connected by a common bending section 4. An embossment 5 is extending from the first free end 6 of the first section 2 along the central axis 7 of the first section 2 to the second free end 8 of the second section 3 along the central axis 9 of the second section 3.

[0034] The angle bracket 1 has a number of apertures 10 (only two of the apertures 10 are marked with a preference numeral) for receiving fastening means such as screws or nails. Furthermore, a first larger aperture 11 is arranged in the embossment 5 near the first free end 6 and a second larger aperture 12 is arranged near the second free end 8. These larger apertures 11, 12 are adapted to receive e.g. connector screws or a threaded rod with a nut The first large aperture 11 and the second large aperture 12 are arranged essentially on the central axis 7, 9 of their respective sections 2, 3. This way the apertures 12,13 are positioned in the best place in order for the worker to position the angle bracket 1 correctly on the elements to be joined. Furthermore, it Is achieved that the worker has the best possible working conditions when tightening the fastening means

because the wrench or similar tool is lifted the height of the embossment in relation to the other fastening means in that section. In Fig. 1 it is shown that the one of the apertures 12, 13 has a diameter larger than the other.

[0035] Fig. 2 shows the angle bracket 1 in an installed situation joining a first construction element 14 to a second construction element 15. As shown, a larger fastening means 16, a connector screw, is arranged in one of the larger apertures for connecting the first section 2 to the first construction element 14. Furthermore, a number of smaller fastening means 17 are arranged in most of the small apertures 10. The diameter of the small apertures 10 is e.g. 5 mm. The distance from the free sides 18, 19, 20, 21 to the small apertures could be 8 -15 mm. The small apertures 10 are arranged in such way that the distances from the adjacent side are different. This way, the risk of splitting e.g. a timber construction element Is minimised. The angle bracket 1 could be joining construction elements of various kinds such as wood, wood fibre composites, concrete etc.

[0036] It is important to notice that the angle bracket 1 does not only hold the construction elements 14, 15 in relation to each other but serves to Join the construction elements 14, 15 as well. If In fact the element only were to be kept in a certain position in a static situation the shape of the angle bracket would be much simpler. However, in case of a building being subjected to external forces such as wind or snow, the loads on the angle bracket will change dramatically and therefore e.g, the maximal bending moment, which the angle bracket is able to withstand, is crucial to the quality of the structure. Therefore, the embossment 5 is extending the entire length of the sections 2, 3.

[0037] In Fig. 3 the angle bracket 1 is seen from the side. It Is seen that the embossment 5 is elevated the highest from the sections 2, 3 at the bisector *b* between the sections 2, 3. The height of the embossment 5 is gradually decreasing towards the free ends 8, 8. Within the last part of the embossment 5, near the free ends 6, 8 the top surface 30 is parallel to the section 2, 3 from which it is embossed. Thus, the embossed surface 31 around the apertures 11, 12 is parallel to the section from which it is embossed. Therefore, the fastening means, e.g. a connector screw or a nut, has a firm surface to abut The firm surface is important in order to ensure the quality of the joint, especially when dynamic loads are subjected to the joint. When the embossed surface 31 around the apertures is parallel to the sections 2, 3 it is easier for the worker to align the fastening means correctly because the worker will have the whole structure to measure from and not just a small surface on the angle bracket. Aligning the fastening means correctly with the angle bracket Is of major importance in ensuring a good quality of the joining.

[0038] Fig. 4 shows a front view of the angle bracket 1 showing that the apertures 10 are positioned in different distances from the centre axis of the section. The distance from the free sides 18, 99, 20, 21 to the small apertures could be 8 -15 mm. As indicated by the dotted helping lines 32 the small apertures 10 are arranged in such way that they do not have their centres on a straight line. This way the risk of cracking e.g. a wooden construction element is minimised. The angle bracket 1 could be joining construction elements of various kinds such as wood, wood fibre composites, concrete etc.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE202004006321U1 **[0006]**
- DE29707800 **[0007]**
- US2264290A **[0008]**
- CH84404 **[0009]**

Krav

1. Vinkelbeslag (1) i et stykke til at fastgøre et første konstruktionselement (14) til et anden konstruktionselement (15), og som omfatter,

- en første sektion (2), som har en første fri ende (6), en første fri side (18) og en anden fri side (19) og er anbragt i et første plan, og nævnte første sektion (2) har en første midterakse (7), der står vinkelret på den første frie ende (6),

- en anden sektion (3), som har en anden fri ende (8), en første fri side (20) og en anden fri side (21) og er anbragt i et anden plan, nævnte anden sektion (3) har en anden midterakse (9), der står vinkelret på den anden sektions (3) anden frie ende (8),

- et antal åbninger (10,11,12) til at modtage midler (17) til at fastgøre vinkelfastgørerens (1) første sektion (2) til et første konstruktionselement (14) og vinkelfastgørerens (1) anden sektion (3) til et anden konstruktionselement (15),

- en prægning (5), der strækker sig langs den første sektions (2) midterakse (7) og langs den anden sektions (3) midterakse (9) via en præget sektion på en fælles bukkesektion (4),

- mindst en af åbningerne (11,12) er anbragt med dens centrum i hovedsagen på den første (2) eller den anden sektions (3) midterakse,

- prægningen (5) strækker sig ind på nævnte mindst ene åbnings (11,12) område med dens midte i hovedsagen på den første (2) eller anden sektions (3) midterakse (7,9), og

at både den første sektion (2) og den anden sektion (3) er indrettet med en åbning (11,12) i den prægning (5), der strækker sig langs den første sektions (2) midterakse (7) og langs den anden sektions (3) midterakse (9).

kendetegnet ved, at

- nævnte første sektion (2) og nævnte anden sektion (3) er arrangeret i hovedsagen vinkelret på hinanden via den fælles bukkesektion (4), og

- prægningen (5) strækker sig i hovedsagen over sektionernes samlede længde.

2. Vinkelbeslag (1) i et stykke ifølge krav 1, **kendetegnet** ved at diameteren af åbningen (11) i den første sektions (2) prægning (5) og diameteren af åbningen i den anden sektions (3) prægning (5) adskiller sig fra hinanden.

3. Vinkelbeslag (1) i et stykke ifølge et hvilket som helst af krav 1 eller krav 2, **kendetegnet** ved at prægningen (5) er forsynet med en flad top (30) i området (31) omkring den mindst ene åbning.

4. Vinkelbeslag (1) i et stykke ifølge et hvilket som helst af kravene 1 til 3, **kendetegnet** ved at diameteren af åbningen i den første sektions (2) prægning (5) er 11 mm og diameteren af åbningen i den anden sektions (3) prægning (5) er 13 mm.

5. Vinkelbeslag (1) i et stykke ifølge et hvilket som helst af kravene 1 til 4, **kendetegnet** ved at vinkelbeslaget (1) er fremstillet af ét enkelt stykke metalplade.

6. Vinkelbeslag (1) i et stykke ifølge et hvilket som helst af kravene 1 til 5, **kendetegnet** ved at metalpladen består af galvaniseret stål.

7. Vinkelbeslag (1) i et stykke ifølge et hvilket som helst af kravene 1 til 6, **kendetegnet** ved at metalpladen har en tykkelse på 0,5 - 4,5 mm, fortrinsvis 1 - 3,5 mm, mest foretrukket 1,5 - 2,5 mm.

8. Vinkelbeslag (1) i et stykke ifølge et hvilket som helst af kravene 1 til 7, **kendetegnet** ved, at prægningen (5) er præget mindst 15 mm fra den fælles bukkesektion (4), målt langs vinkelhalveringslinien (b).

DRAWINGS

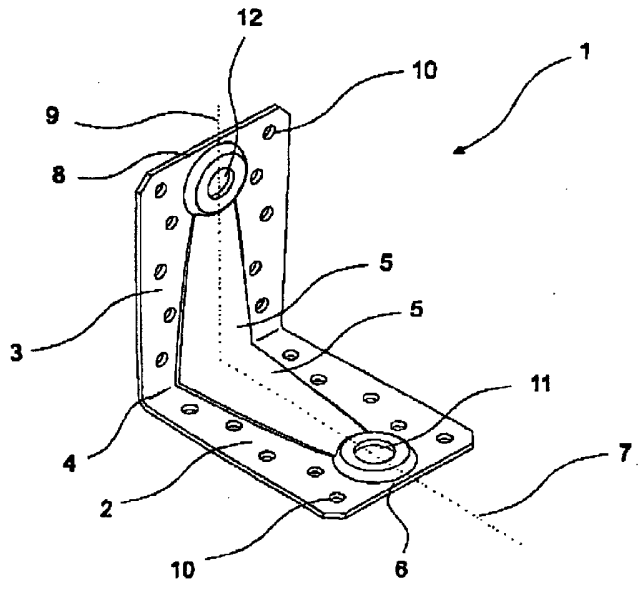


Fig.1

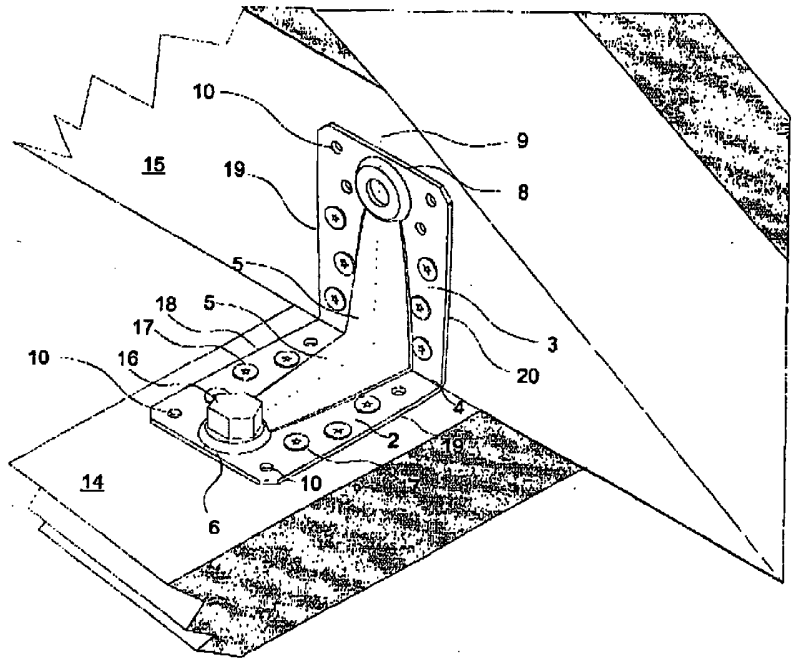


Fig.2

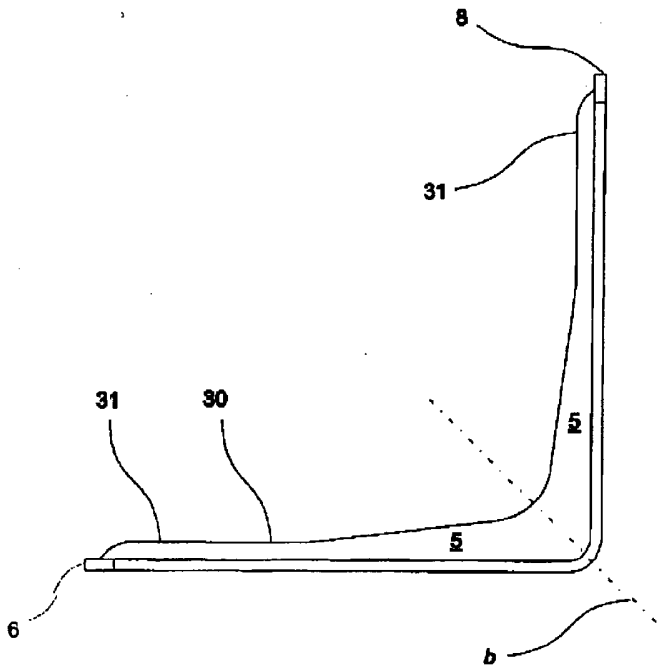


Fig.3

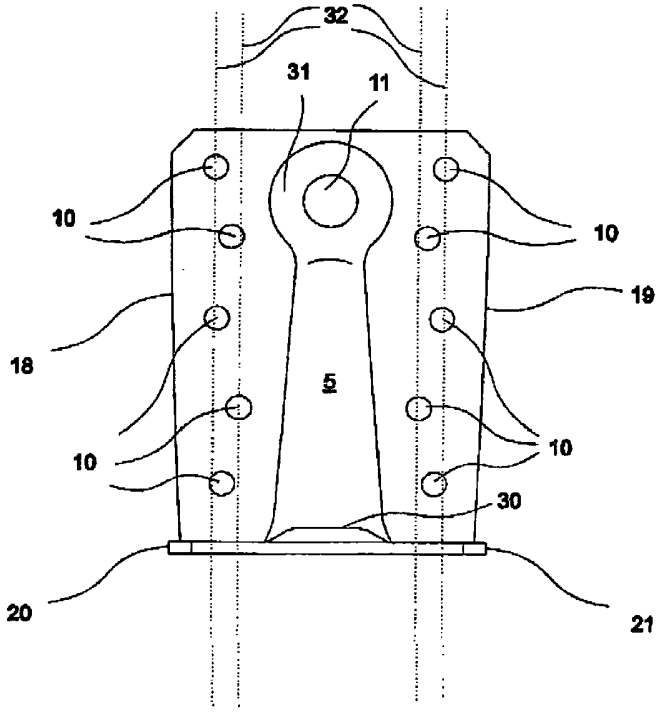


Fig.4