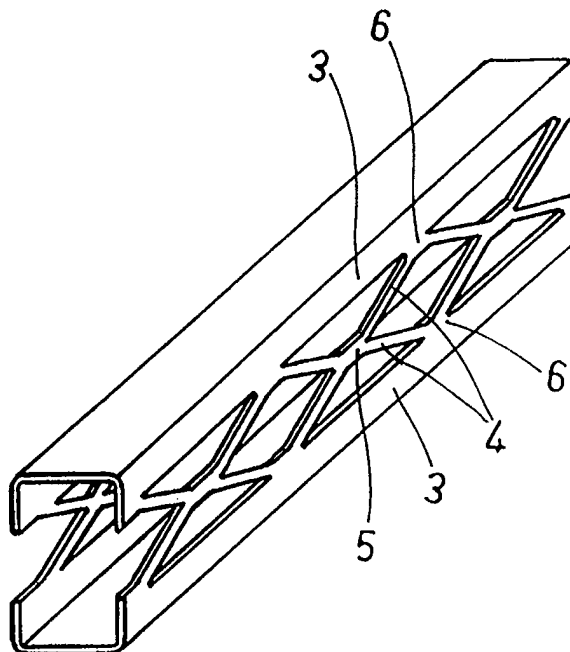




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: METHOD FOR MANUFACTURING A LATTICE STRUCTURE



(57) Abstract

The invention relates to a method for manufacturing a flat or three-dimensional lattice structure. The structure comprises at least two booms (3), made of a sheet-like material and tied together with diagonal braces (4). The sheet material of a boom (1) extending between the booms is cut to provide it with slits (2) substantially parallel to the booms (3) and the booms are distanced from each other, whereby the sections between the slits (2) turn and stretch into the diagonal braces (4) connecting the booms (3).

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Method for manufacturing a lattice structure

The present invention relates to a method for manufacturing a lattice structure, said structure comprising at least two
5 booms, made of a sheet-like material and tied together with diagonal braces.

The invention relates also to a method for manufacturing a hollow three-dimensional lattice structure, especially a
10 lattice-structured girder, pole, or mast.

The method of the invention can be used for manufacturing a lattice structure from steel or or some other material possessing remarkable toughness. The structure can be flat
15 or three-dimensional.

A conventional way of manufacturing lattice structures is that the most-stressed components of the structure, e.g. in the case of a horizontal girder, the top and bottom boom
20 thereof, are tied together with diagonal braces, which have been manufactured in separate pieces and then connected to the booms and possibly to each other, e.g. by welding.

An object of the invention is to provide a manufacturing
25 method, wherein all the components of a lattice structure, namely the booms and the diagonal braces therebetween, can be manufactured from the same material without joints.

As for flat structures, this object is achieved on the
30 basis of the characterizing features set forth in the appended claim 1 and, as for three-dimensional structures, on the basis of the characterizing features set forth in the appended claim 2. The non-independent claims define preferred embodiments for a three-dimensional lattice
35 structure.

One exemplary embodiment of the invention will now be described in more detail with reference made to the accom-

panying drawing, in which

fig. 1 shows a blank for manufacturing a lattice-structured girder and

5

fig. 2 shows a finished lattice-structured girder manufactured by means of a method of the invention.

Fig. 1 depicts a tubular blank 1, used in the manufacture of a girder and provided with plate-like walls. The opposite walls of the blank 1 are provided with slits 2, the number, length, and relative disposition thereof being selected in view of diagonal braces 4 to be formed. Thus, the diagonal braces 4 and booms 3 visible in fig. 2 are manufactured from a single blank 1 in such a way that there are no welding joints at crossing points 5 of the diagonal braces and at junctions 6 between the same and the booms. This has been made possibly by means of the slits 2 cut in the blank 1, which are disposed in such an arrangement that, as the blank 1 is stretched from the booms 3 in a direction substantially perpendicular to the slits 2, the diagonal braces 4 shall stretch to an extent sufficient for achieving a desired cross-sectional dimensioning for the girder. Hence, the direction and positioning of the slits 2 is such that, at the stretching stage of the blank 1, the diagonal braces 4 must develop neither flattening nor bending.

The boom members 3 extend longitudinally of the structure and are made of a continuous sheet material. An essential feature in the invention is that the slits 2 between the booms 3 are made first and then the entire sheet section between the booms is stretched in a single operation. During the stretching, the plane of the diagonal braces remains substantially coincident with the original plane of the sheet.

A flat lattice structure can be manufactured in the same

way as the lattice-structured side of a square girder as shown in fig. 2.

5 In three-dimensional elements, the lists 2 are provided on desired sides and, respectively, the stretching of a blank is effected in different directions.

10 The method of the invention can be used e.g. for manufacturing tapered or conical girders, poles, or masts. Thus, the extent of stretching is unequal in different parts of the lattice structure. Likewise, the sizing of slits may vary even in one and the same lattice structure, e.g. in such a manner that the lengths, distances thereof and/or the number of adjacent slits are different in various
15 lateral and longitudinal sections of the structure.

The invention offers essential benefits over the prior known lattice structures. There is no need for welding joints and the structural variation is easy. The method
20 also improves the exploitation of the properties of a material through shape-strengthening and, thus, lightens the structure.

Claims

1. A method for manufacturing a lattice structure, said structure comprising at least two booms (3), made of a sheet-like material and tied together with diagonal braces (4), **characterized** in that the sheet material of a blank (1) extending between the booms (3) is cut to provide it with slits (2) substantially parallel to the booms (3) and the booms (3) are distanced from each other, whereby the sections between the slits (2) turn and stretch into the diagonal braces (4) connecting the booms (3).
2. a method for manufacturing a hollow three-dimensional lattice structure, especially a lattice-structured girder, pole, or mast, said structure comprising at least two booms (3), made of a sheet-like material and tied together with diagonal braces (4), **characterized** in that a pipe (1) of a sheet-like material is provided with slits (2), extending substantially lengthwise of the pipe, and the pipe members (3) on the opposite sides of the slits are distanced from each other, the sections between the slits (2) turning and stretching into the diagonal braces (4), connecting the boom members (3) consisting of a sheet material integral therewith.
3. A method as set forth in claim 2, **characterized** in that the slits (2) are made in the opposite sides of a square pipe and the other two sides of the pipe (1) are distanced to a sufficient extent for achieving a desired dimensioning for the structure.
4. A method as set forth in claim 2 or 3, **characterized** in that the pipe members are distanced to the extent that varies over the various lengthwise sections of the pipe (1) for producing a tapered girder, pole, or mast.
5. A method as set forth in any of claims 2-4, **characterized** in that the sizing of the slits (2) varies in various

parts of the pipe blank.

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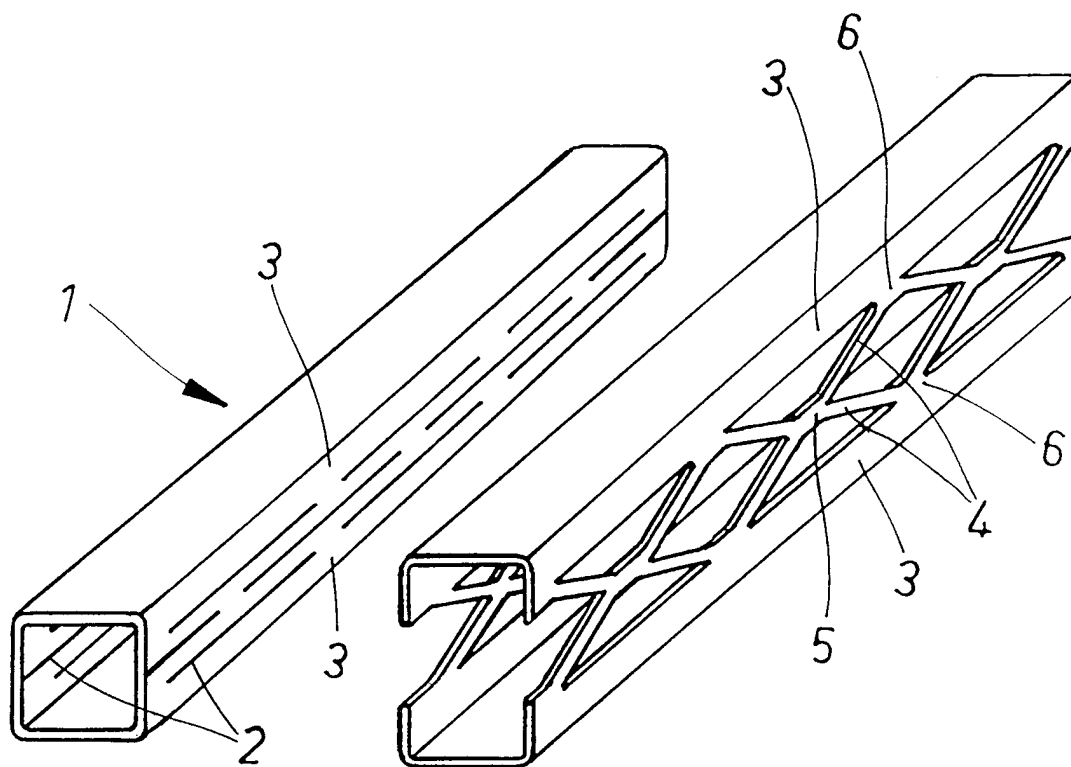


Fig. 1

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00709

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E04C 3/09, B21D 47/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B21D, E04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3108406 A (J.J. ELLIS), 29 October 1963 (29.10.63), column 5, line 14 - line 57, figures 4, 8 --	1-3
X	AT 369479 B (HULEK, A.), 10 January 1983 (10.01.83), page 3, line 5 - line 51, figures 1-11 --	1-4
X	US 3812558 A (H. WATANABE), 28 May 1974 (28.05.74), column 11, line 52 - column 12, line 57, figures 18-24 --	1-3

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Date of the actual completion of the international search

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

07/01/98

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PCT/FI 97/00709

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