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(54) **NODE COUPLER FOR ATTACHING HORIZONTAL AND DIAGONAL BARS TO A VERTICAL BAR IN A SCAFFOLDING SYSTEM**

(57) A node connection (1) for attaching horizontal and diagonal struts (50) to a vertical strut (40) in a scaffolding system, the node connection (1) comprising a cage mounted on the vertical strut (40) and configured for receiving the fastening members (51) of the horizontal and diagonal struts. The cage takes the form of a generally circular rim plate (5) having an inner circumference (5a) surrounding the vertical strut (40) and a wavy/undulated outer circumference (5b) with a number of hole formations (8, 9) between the inner and outer circumferences (51, 5b) for receiving the fastening members (51) of the various horizontal and vertical struts.

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Description

[0001] The present invention relates to a node connection for attaching horizontal and diagonal struts to a vertical strut in a scaffolding system, the node connection comprising a cage mounted on the vertical strut and configured for receiving the fastening members of the horizontal and diagonal struts.

[0002] Currently, coupling devices for joining structural parts as mentioned above are known wherein a cage arrangement located on the vertical structural part is used for receiving a hook means located on the horizontal structural part. In addition, structural parts in the form of wedge elements, for example, are used which are blown into the connection area in order to stiffen the connection.

[0003] Typically, the prior art coupling devices of the above type are specially designed, intended for their unique scaffolding system only. Thus, a scaffolding system cannot be used together with different scaffolding systems.

[0004] Another problem with the prior art solutions is that the wedge element is a separate part which is not permanently attached or easily accessible during assembly of the coupling device.

[0005] Also, the insertion and removal of the wedge element into/from the coupling device may be difficult, hence presenting a great challenge for the operator.

[0006] An object of the present invention is to provide a node connection for attaching horizontal and diagonal struts to a vertical strut preferably in a scaffolding system, the node connection being designed so as to be adapted for use with most major scaffolding types such as spire scaffolding, frame scaffolding, rolling scaffolding, stair towers, framework for tarpaulin covering, tents, plastic halls and support/formwork. Hence, the different systems shall be useable together with each other in different load classes and for different purposes.

[0007] Another object of the present invention is to provide a coupling device that is reliable and stable and provides a rigid interconnection.

[0008] Another object is that an operator shall be able to assemble the coupling in a simple and quick manner.

[0009] Moreover, the coupling device shall not be comprised of detached structural parts. Each structural part needed shall be bound to the structural parts to be assembled so that the operator does not have to spend time locating unattached elements during assembly. A further object is that the coupling shall allow for a simple and quick disassembly. This applies in particular to the removal of the wedge element, which may often present a great challenge to the operator.

[0010] The objects of the present invention are achieved by a node connection for attaching horizontal and diagonal struts to a vertical strut in a scaffolding system, the node connection comprising a cage mounted on the vertical strut and configured for receiving the fastening members of the horizontal and diagonal struts, characterized in that the cage takes the form of a generally circular rim plate having an inner circumference surrounding the vertical strut and a wavy/undulated outer circumference with a number of hole formations between the inner and outer circumferences for receiving the fastening members of the various horizontal and vertical struts.

[0011] Preferred embodiments of the node connection are set forth with more particularity in claims 2 through 10.

[0012] The present invention will now be explained in more detail with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of an embodiment of a node connection according to the invention for attaching horizontal and diagonal struts to a vertical strut in a scaffolding system.
Fig. 2 shows the node connection in a top view,
Fig. 3 shows the cage to be mounted on the vertical rod,
Figs. 4a-d show a horizontal strut having a fastening member according to the invention in the various positions, i.e. from the resting to locking positions,
Fig. 5 shows a perspective view of the cage used for receiving fastening members of another existing scaffolding system,
Fig. 6 shows the node connection of Fig. 5 in a top view, and
Fig. 7 shows the cage of Fig. 5 in a top view.

[0013] Referring to Figs. 1 and 2, an embodiment of a node connection 1 is shown used in the joining of horizontal struts 350 to a vertical strut 40 in a scaffolding system. The vertical strut 40 has a cage in the form of a circular rim plate 5 mounted thereon. The horizontal strut 50 with fastening members 51 is shown fixedly mounted or locked to rim plate 5 so that a reliable and stable node connection is obtained. Rim plate 5 is also shown to include additional hole formations 9 for receiving any fastening members of other systems.

[0014] Referring to Fig. 3, the rim plate 5 is shown with its characteristic form having an inner circumference 5a surrounding the vertical strut 40 and a wavy outer circumference 5b. The above-indicated hole formation 9 for receiving other types of systems is shown. Also shown, with arrows, are hole formations 8 for receiving fastening member 51. The hole formations 9 are formed in such a manner that fastening members of other systems can also be used in said hole formations, providing flexibility with respect to use with other systems. In the embodiment, the rim plate 5 shown has eight hole formations 8, 9 adapted so as to be useable with fastening members of most existing scaffolding systems etc. Said eight hole formations 8, 9 include four first hole formations 8 and four second hole formations 9, with the first and second hole formations 8, 9 being different from one another. Said first four hole formations 8 and four second hole formations 9, respectively, are offset 90 degrees from each other. Said four first and four second hole forma-

tions 8, 9 are offset 45 degrees from each other. Typically, rim plates 5 will be mounted to the vertical strut 40 with a spacing of preferably 0.5 meters. Normally, rim plate 5 will have a thickness of preferably 10-15 millimetres.

[0015] Figs. 4a-d show the fastening member 51 fitted to the horizontal strut 50. Fastening member 51 has a generally C-profile configuration comprised by a web plate 52 with a fixed upper flange plate 53 and an articulated lower flange plate 60. The upper and lower flange plates 53, 60 are provided with slit openings 54, 61 for receiving a wedge body 70. Fig. 4a shows fastening member 51 in a resting position in which wedge body 70 of the fastening member is in a resting position in a groove in the upper region of vertical strut 50. Figs. 4b and 4c show the C-profile as it is inserted around rim plate 5, whereby the wedge body 70 is displaced from the resting position and passed through upper flange plate 53, hole formation 8 of rim plate 5, and lower flange plate 60, respectively, whereby the fastening member is locked to rim plate 5 as shown in Fig. 4d. In order to move the wedge body 70 from the resting position to the locking position the articulated lower flange plate 60 is provided with grooves 62 at the lateral edges thereof for receiving a movable fork device 80, where the shaft 82 of fork device extending through a longitudinal slit opening 52a of the web plate 52. The shaft 82 is movably mounted to wedge body 70, whereby, when the fork device 80 impacts the rim plate 5 during insertion, the wedge body 70 is moved from a horizontal resting position over upper flange plate 53 to a vertical locking position in which fastening member 51 is locked to rim plate 5. Hence, when inserted around the rim plate, fastening member 51 will automatically lock thereto. Optionally, to further secure the connection, the wedge 70 may be given a light blow at the upper end thereof. During disassembly of the node connection the lower end of the wedge can be given a light blow using a hammer, which will loosen and push the wedge upwardly, after which wedge 5 can be pulled up and laid back into the resting position.

[0016] Referring to Figs. 5 and 6, the cage according to the invention is shown mounted on a vertical strut and used with fastening members of a different scaffolding system. In this case, the hole formations 9 of rim plate 5 are used and a stable and reliable connection is obtained. Fig. 7 shows, with arrows, the hole formations 9 for receiving the fastening members of this system.

[0017] The node connection 1 has a wide area of application as it can also be used in connection with a large number of existing systems. Moreover, through the use of the disclosed fastening member 51, a simple and time-saving "automatic" locking between the rim plate and strut will be achieved with no detached structural parts.

Claims

1. A node connection (1) for attaching horizontal and diagonal struts (50) to a vertical strut (40) in a scaffolding system, the node connection (1) comprising a cage mounted on the vertical rod (40) and configured for receiving the fastening members (51) of the horizontal and diagonal struts, the cage taking the form of a generally circular rim plate (5) having an inner circumference (5a) surrounding the vertical rod (40) and a wavy/undulated outer circumference (5b) with a number of hole formations (8, 9) between the inner and outer circumferences (5a, 5b) for receiving the fastening members (51) of the various horizontal and vertical struts, **characterized in that** the fastening members (51) of the horizontal and diagonal struts have a generally C-profile configuration comprised of a web plate (52) with an associated fixed upper flange plate (53) and an articulated lower flange plate (60), said upper and lower flange plates (53, 60) being provided with slit openings (54, 61) for receiving a wedge body (70), said articulated lower flange plate (60) being provided with grooves (62) at the lateral edges thereof for receiving a movable fork device (80), the shaft (82) of the fork device extending through a longitudinal slit opening (52a) of the web plate (52) and said shaft (82) being movably mounted to the wedge body (70), whereby, when the fork device (80) is introduced over and impacts the rim plate (5), said wedge body (70) will move from a horizontal resting position above the upper flange plate (53) to a vertical locking position in which said fastening member (51) is locked to the rim plate (5).

2. The node connection (1) of claim 1, **characterized in that** the rim plate (5) has eight hole formations (8, 9).

3. The node connection (1) of claim 2, **characterized in that** said eight hole formations (8, 9) comprise four first hole formations (8) and four second hole formations (9), said first and second hole formations (8, 9) being different from each other.

4. The node connection (1) of claim 3, **characterized in that** said four first hole formations (8) are offset 90 degrees from each other.

5. The node connection (1) of claims 2 or 3, **characterized in that** said four second hole formations 5 (9) are offset 90 degrees from each other.

6. The node connection (1) of claims 2-5, **characterized in that** said four first and four second hole formations (8, 9), respectively, are offset 45 degrees from each other.

7. The node connection (1) of any one of the preceding claims, **characterized in that** the rim plates (5) are mounted to the vertical strut (40) with a spacing of preferably 0.5 m.

8. The node connection (1) of any one of the preceding claims,
characterized in that the rim plate (5) has a thickness of preferably 10 to 15 mm.

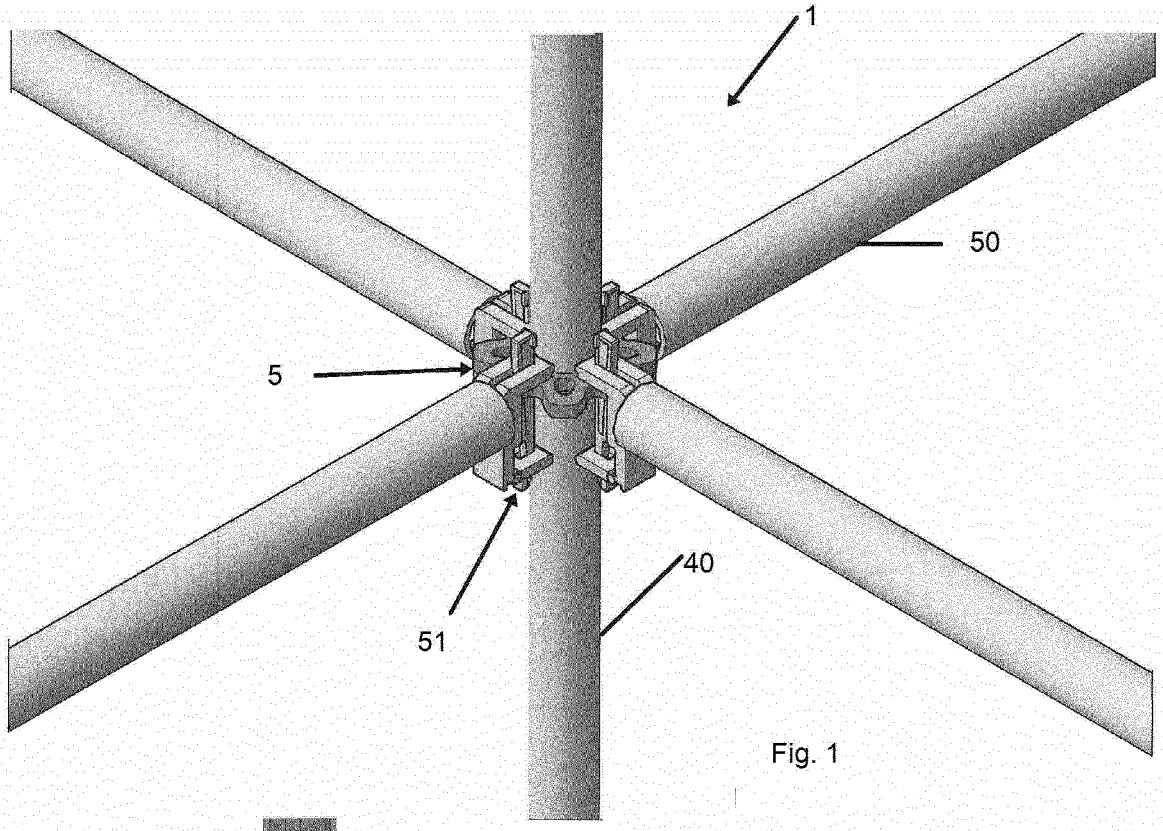

Fig. 1

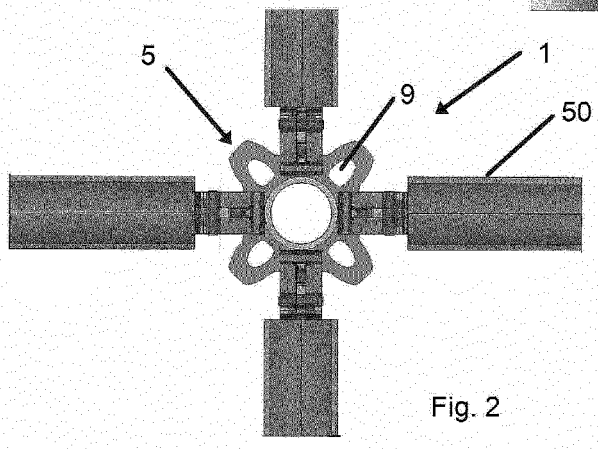

Fig. 2

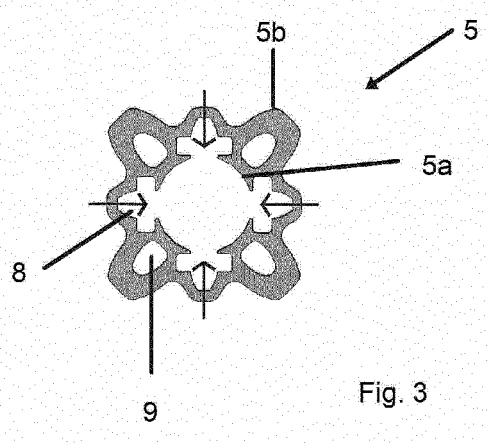

Fig. 3

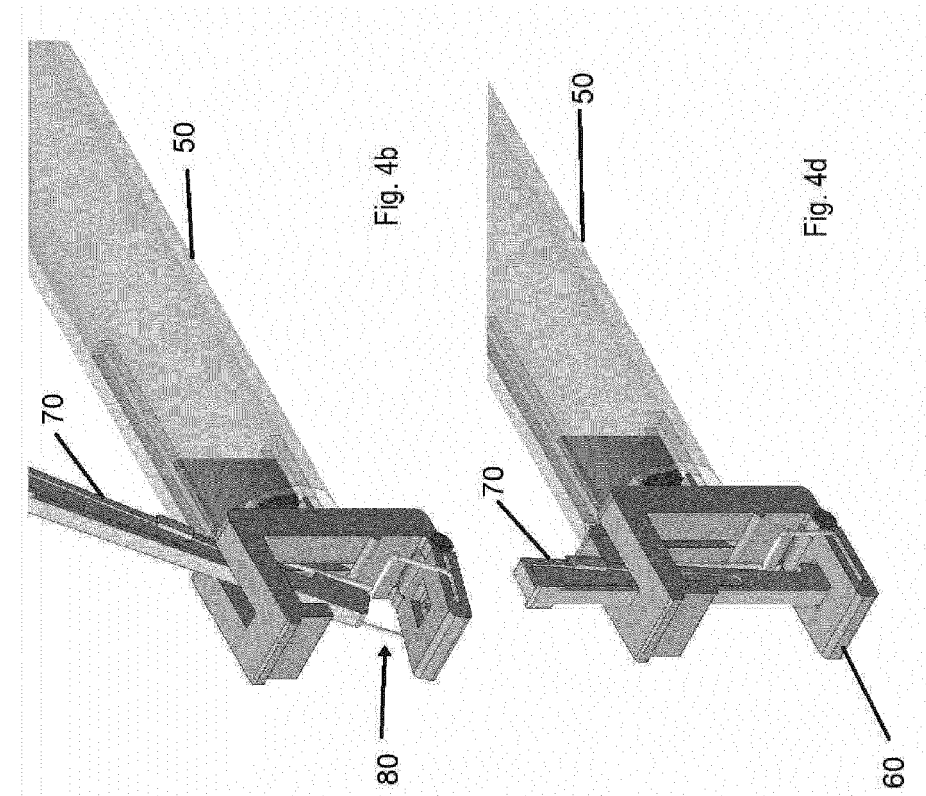

Fig. 4b

Fig. 4d

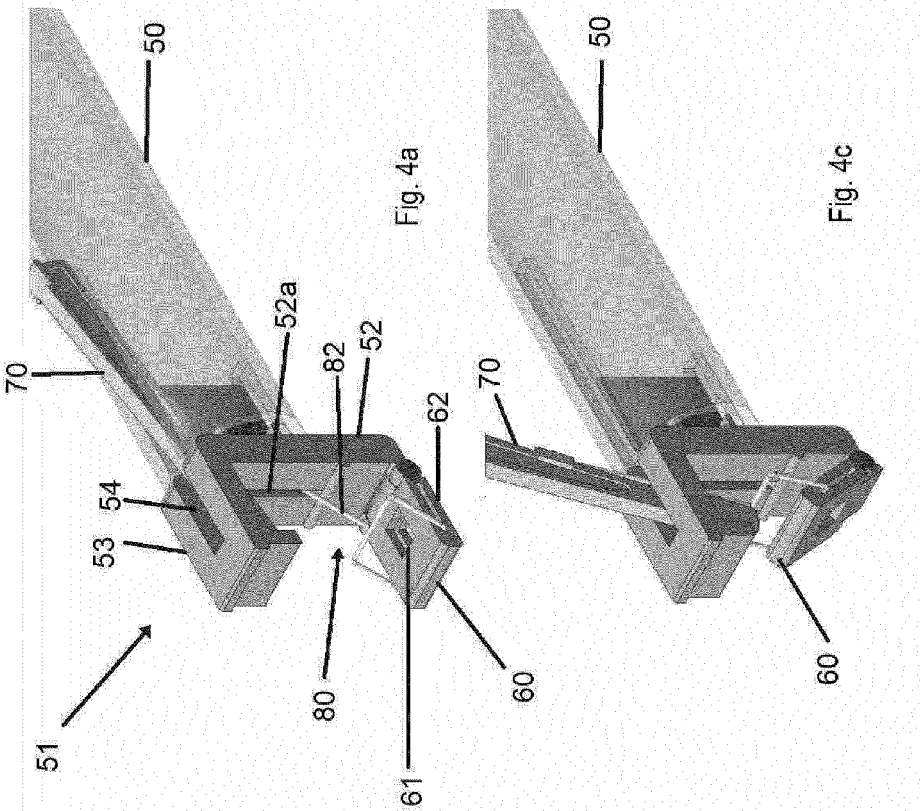

Fig. 4a

Fig. 4c

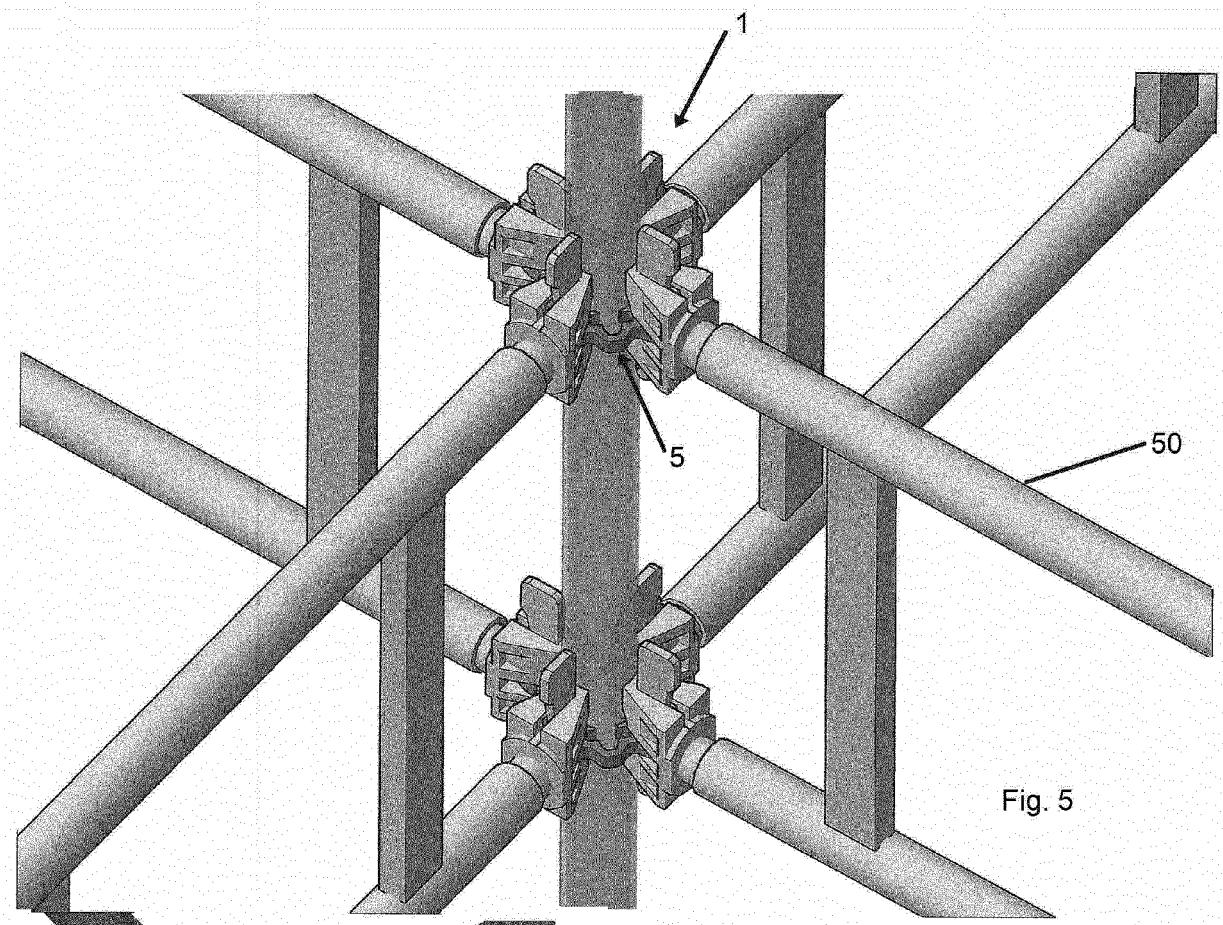

Fig. 5

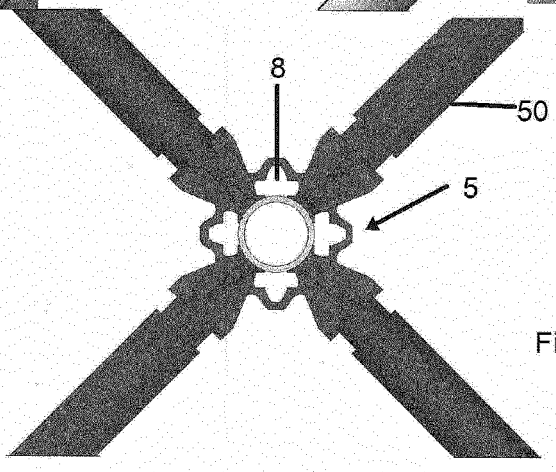

Fig. 6

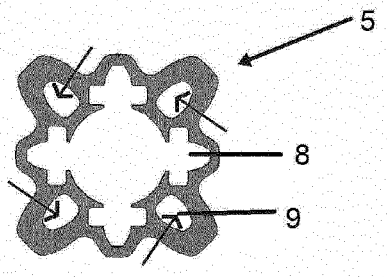

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 19 18 8828

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 3 315 691 A1 (AMADIO & C S P A [IT]) 2 May 2018 (2018-05-02) * paragraph [0037] - paragraph [0044]; figures 4,8,9 * * paragraph [0057] *	1-8	INV. E04G7/22 E04G7/30 E04G7/32
X	CA 2 297 148 A1 (PLETTAC AG [DE]) 7 January 1999 (1999-01-07) * page 2, line 13 - line 17; figure 1 * * page 3, line 7 - line 11 * * page 3, line 28 - page 4, line 20 *	1-8	
A	WO 85/01976 A1 (SZUCS ANDRAS) 9 May 1985 (1985-05-09) * figure 1 *	1-8	
A	DE 88 06 128 U1 (ROSE UDO) 28 July 1988 (1988-07-28) * paragraph [0045]; figure 4 *	1-8	
			TECHNICAL FIELDS SEARCHED (IPC) E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 January 2020	Manera, Marco

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82