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(54) **WIRE LOOP BOX**

(57) A wire loop box to be used in after-cast seams between concrete elements, featuring a housing (1) to be mounted in the seam, and a wire formed as a wire loop (2) and fastened to the housing, the wire is threaded through one or more holes on the bottom face (4) of the housing (1), and the ends of the wire are fastened together with an anchor piece (5). The same elongated housing (1) has three wire loops (2) arranged at different points in longitudinal direction of the housing.

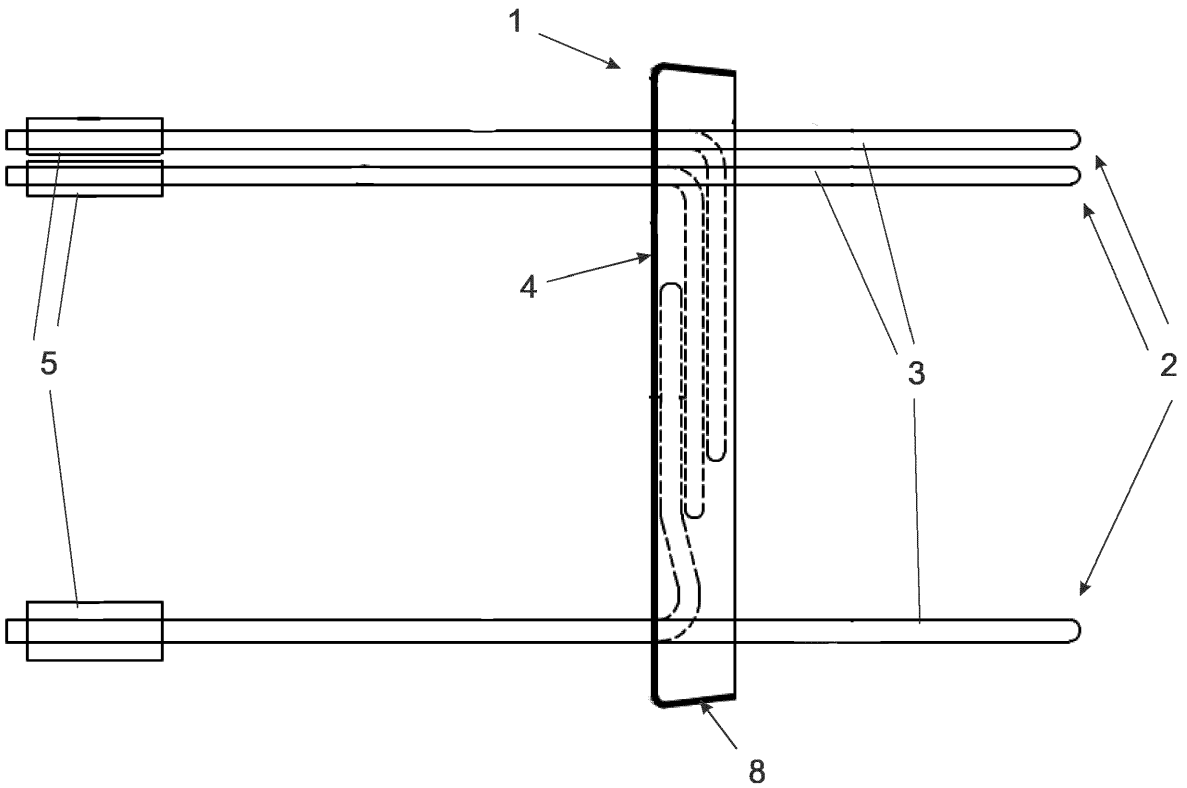

Figure 1

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Description

Technical field

[0001] The invention relates to a wire loop box used in after-cast seams between wall elements and between other reinforced concrete elements.

Background

[0002] Wire loop boxes form concrete wire loop box reinforcements and loop reinforcements in cast seams of concrete elements, that support the structure and increase the strength of the seams, thus making it possible to successfully mount the elements without breaking the concrete. Normally, a wire loop box comprises a housing and a wire loop fastened to the housing, so a grip loop is present on one side of the housing, and ends of the wire loop which are fastened together with an anchor piece are present on the other side of the housing.

[0003] It is known before to use two wire loop boxes in thicker elements. This in turn causes additional material costs and requires more time as more wire loop boxes are mounted in the elements.

[0004] An object of the invention is to improve the wire loop box so, that the aforementioned problem can be solved or mitigated. The object of the invention is reached by a wire loop box, that is characterized by what is said in the independent claim. Preferable embodiments of the inventions are objects of dependent claims.

Brief description

[0005] The invention is based on one housing having plurality of wire loops.

[0006] An advantage of the wire loop box according to the invention is better strength resistance, and therefore a lower amount of wire loop boxes is needed to achieve the same strength resistance compared to a wire loop box with only one wire loop.

Brief description of drawings

[0007] In the following the invention is further described by way of preferable embodiments with reference to the attached drawings, in which:

Figure 1 illustrates a certain embodiment of the wire loop box according to the invention viewed from a side face of the housing;
Figure 2 illustrates the embodiment of figure 1 viewed from an open side; and
Figure 3 illustrates the embodiment of figure 1 viewed from an end face of the housing.

Detailed description

[0008] Figures 1-3 illustrate an embodiment of a wire loop box according to the invention, which comprises an elongated housing 1, which has a bottom face 4, two side faces 7, and two end faces 8. Figure 1 illustrates the wire loop box viewed from a side face 7. Figure 2 illustrates the wire loop box viewed from the open side of the housing 1. Figure 3 illustrates the wire loop box viewed from the end face 8.

[0009] The wire loop box illustrated in figures 1-3 features a bent housing 1, which can be made of for example steel plate. The housing 1 can be made for example by cutting it mechanically and bending it into shape. The housing 1 can also be made by welding the sides together. The housing 1 can feature two side faces 7 and two end faces 8, which protrude from the bottom face 4 of the housing 1 at an angle less than 90 degrees leaving the side opposite of the bottom face 4 open. In some embodiments, the side faces 7 and end faces 8 can be formed at different angles relative to the bottom face 4.

[0010] Three wires made of high strength steel are threaded through the housing 1 through one or more holes on the bottom face 4 of the housing 1. The holes can be for example pairs of holes 6. The wire is formed as a wire loop 2, which is threaded through the pair of holes 6, so that the ends of the wire loop 2 are fastened together with an anchor piece 5. Therefore, a grip loop 3 is formed on the inside of the housing 1, leaving the fastened ends on the other side of the housing 1. Before mounting in the element, the grip loop 3 remains on the inside of the housing 1. The anchor piece can be any sort of object, which fastens the ends of the wire loop 2 together, for example a compression sleeve. The wire loop 2 can be set in the housing 1 so, that the grip loop 3 make up for example 30-50% of the length of the wire loop 2.

[0011] The one or more hole located in the bottom face 4 can be for example a pair of holes 6. The pairs of holes 6 are drilled or cut near the end faces 8 of the housing 1, so that two pairs of holes 6 are near one of the end faces 8 and one pair of holes 6 is near the opposite end face 8. This layout allows, that the grip loops 3 fit inside the housing 1, when they are bent for transportation from a factory to a construction site. The pair of holes 6 can be positioned for example 1 cm from the end face 8 of the housing 1. The second pair of holes can be positioned for example 1 cm from the first pair of holes 6. When viewed in the width direction of the housing 1, the holes of the pairs of holes 6 can be positioned for example 30-35% distance away from each side face 7, so that the distance between the holes of the pair of holes 6 is for example 30-40% of the width of the housing 1. The total length of the housing 1 can be for example 18 cm or 22 cm, and respectively the total width can be 5 cm and 8 cm.

[0012] The open part of the housing 1 can be covered with a detachable fastener (not shown in figures), which can be for example tape, and a spring like part (not shown in figures) is arranged on the grip loop (3), so that the fastener keeps the grip loop 3 bent inside the housing 1 and the spring like part straightens the grip loop 3, when the fastener is detached. The spring like part can be for

example a spring, or an elastic part in the wire loop 2, or connected to it, the spring like part is prestressed to straighten the grip loop 3. As an alternative, a plastic deformation of the material of the wire loop 2 keeps the grip loop 3 bent inside the housing 1, and the grip loop 3 straightens with manual assistance. In this context, the plastic deformation means that when a force is applied on the wire loop 2, it does not revert to its original shape, but stays in its new shape. In other words, when the wire loop 2 is straightened, it stays straightened without external forces.

[0013] In some embodiments, diameter of the at least one wire loop 2 threaded through the housing 1 is larger or smaller than the diameter of other wire loops 2 threaded through the same housing 1. For example, smaller i. e. 5-6 mm diameter wire loops 2 can be threaded through the two pairs of holes at one end face 8 of the housing 1 of the wire loop box, and a larger i.e. 7-8 mm diameter wire loop 2 can be threaded through the one pair of holes 6 at the opposite end face 8. Respectively, it is possible that only one wire loop 2, with a smaller diameter than the others, is threaded through the housing 1. In some cases, each of the wire loops 2 of the same housing 1 have different diameters, for example 5 mm, 7 mm, and 9 mm.

[0014] The wire loop box housing 1 is mounted vertically spaced in the element, so that two wire loop boxes of the opposite wall element are joined together through the grip loops 3 with a steel bar. The shear strength of the wire loop boxes perpendicular to the seam and the wall element is obtained with similar principle through diagonal compression and pulling force between the pair of the wire loop boxes. The values to be used for the pulling force of the pair of the wire loop boxes is obtained through the strengths in the direction of the seams. When a shear force in the direction of the seam is applied, the diagonal compression is in an approximately 45°-degree angle and so the horizontal force, meaning the anchoring force, applied to one loop is as large as the corresponding shear force for each wire loop box.

[0015] Thicker elements require using two wire loop boxes with one wire loop. The advantage of the wire loop box with three wire loops is that it can replace two wire loop boxes, as the strength of three wires is significantly better than of one or two wires. In the mounting stage, the wire loop box with three wires can be mounted in one element seam, so that the end with two pairs of holes 6 is high. Accordingly, the wire loop box with three wires can be mounted in the adjacent element seam, so that the end with two pairs of holes 6 is low. Doing so, the steel bar passes through three plus three grip loops 3 and produces better strength results compared to one plus one grip loops.

[0016] A solution according to the invention decreases the material costs and speeds up the mounting time when wanting to join thicker concrete elements together, because instead of using two wire loop boxes with one wire, by using one wire loop box with three wires, better strength is achieved with less work and better cost-efficiency.

Claims

1. A wire loop box to be used in after-cast seams between concrete elements, featuring a housing (1) to be mounted in the seam, and a wire formed as a wire loop (2) and fastened to the housing, the wire is threaded through one or more holes on the bottom face (4) of the housing (1), and the ends of the wire are fastened together with an anchor piece (5), **characterized in that** the same elongated housing (1) has three wire loops (2) arranged at different points in longitudinal direction of the housing (1).

2. A wire loop box according to claim 1, **characterized in that** the holes are pairs of holes (6), and two pairs of holes (6) are arranged at one end of the elongated housing (1) and one pair of holes (6) is arranged at the opposite end.

3. A wire loop box according to claim 1 or 2, **characterized in that** the housing (1) has a detachable fastener, and a spring like part is arranged on a grip loop (3), the spring like part is prestressed in order to straighten the grip loop (3), and that the fastener keeps the grip loop (3) bent inside the housing (1).

4. A wire loop box according to claim 1 or 2, **characterized in that** a plastic deformation of the material of the grip loop (3) keeps the grip loop bent inside the housing (1).

5. A wire loop box according to any of the claims 1-4, **characterized in that** the housing has side faces that protrude from the bottom face at an angle less than 90 degrees.

6. A wire loop box according to any of the claims 1-5, **characterized in that** the diameter of at least one wire loop (2) is different from the diameters of the other wire loops (2) threaded in the same housing (1).

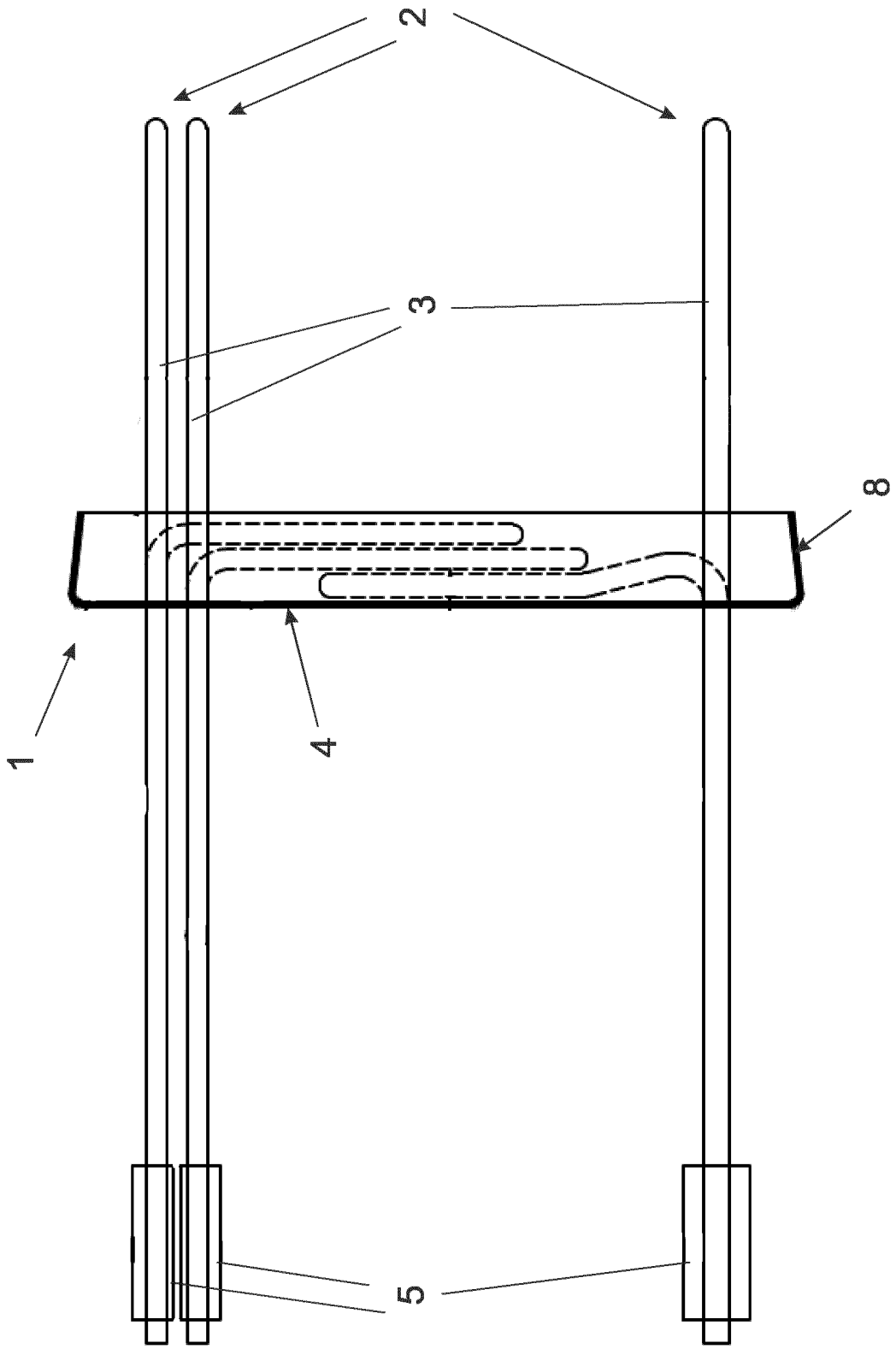

Figure 1

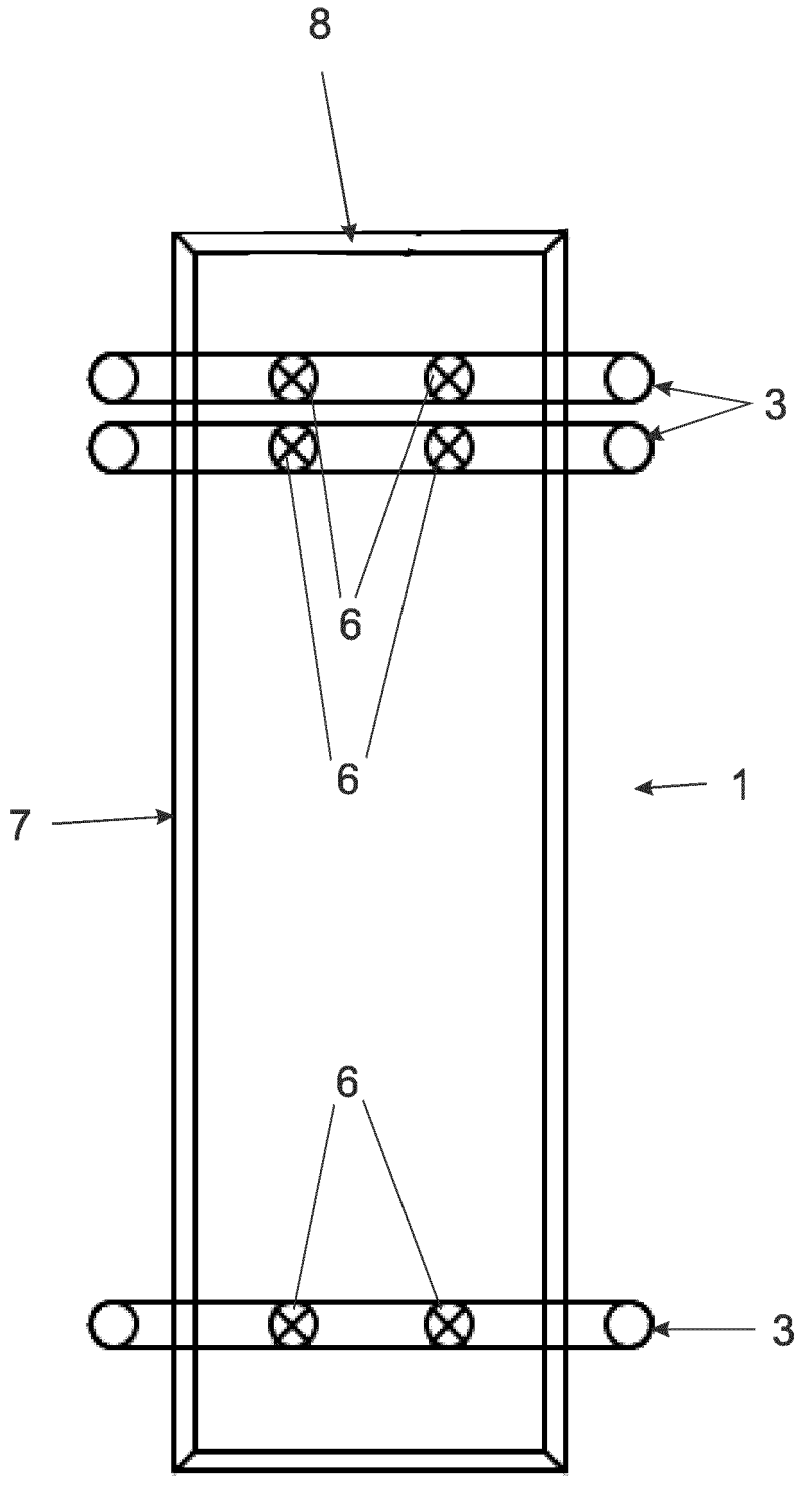

Figure 2

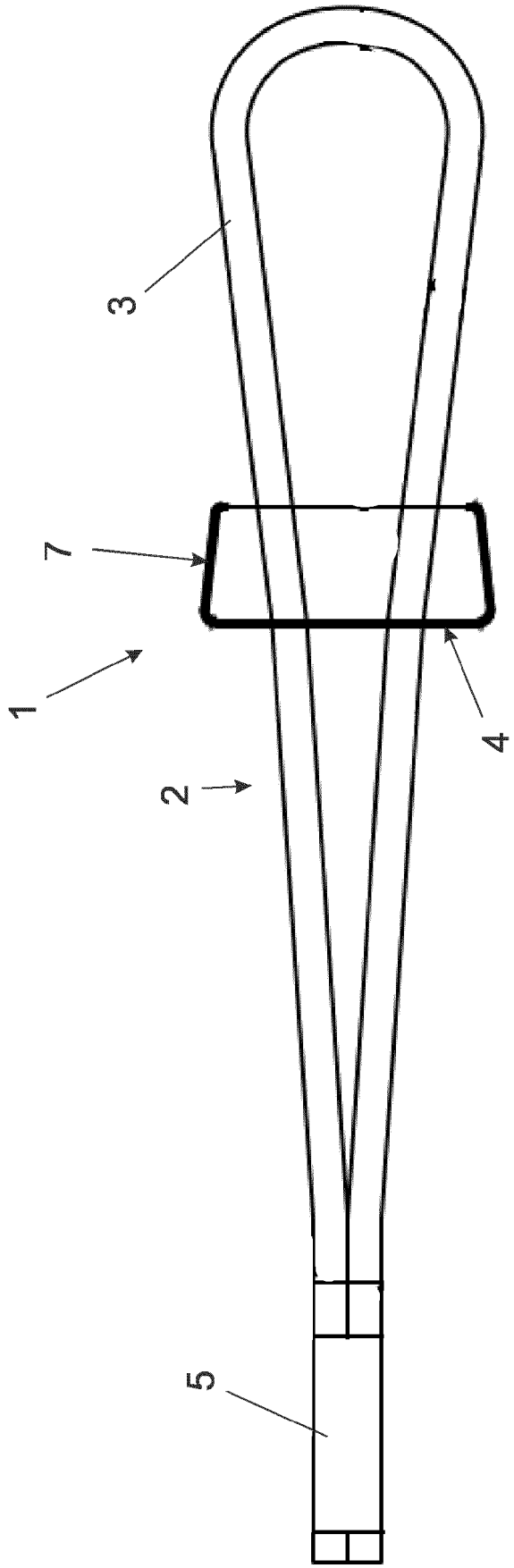

Figure 3

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 7311

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	WO 2009/012827 A1 (PHILIPP GMBH [DE]; PHILIPP MARTIN [DE]) 29 January 2009 (2009-01-29) * page 10, line 31 - page 11, line 17; figures 1,2,5 * * page 12, line 17 - line 26 *	1-6	
X	DE 203 05 662 U1 (PFEIFER HOLDING GMBH & CO KG [DE]) 19 August 2004 (2004-08-19) * paragraph [0037] - paragraph [0038]; figures 3-4 *	1-6	

TECHNICAL FIELDS SEARCHED (IPC)

E04G
B28B
E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 July 2021	Manera, Marco

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 15 7311

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-07-2021

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