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(54) **AN ASSEMBLING DEVICE AND A METHOD FOR ASSEMBLING ANCHOR BOLTS**

(57) The invention relates to an assembling device and a method for assembling anchor bolts in a concrete reinforcing mesh. Anchor bolts are commonly used fasteners for attaching structures, such as wall elements to a concrete foundation. Unfortunately, assembling anchor bolts in a concrete reinforcing mesh is very laborious and time consuming project. In the present invention, an as-

sembly device for an anchor bolt comprises a fastening part for fastening the assembly device in a concrete reinforcing mesh, and supporting part supporting an anchor bolt in the assembly device, wherein the fastening part and supporting part are connected together in a substantially perpendicular position.

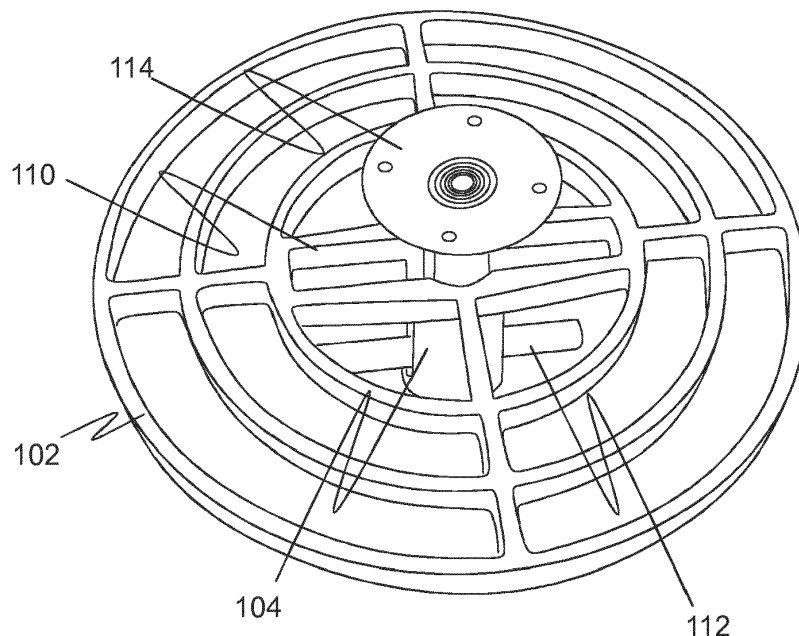


FIG. 3

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Description

Technical field

[0001] Generally, the invention relates to an assembling device and a method for assembling anchor bolts. More particularly, the invention relates an assembling device and a method for assembling anchor bolts in a concrete reinforcing mesh.

Background technology

[0002] Anchor bolts are commonly used fasteners for attaching structures, such as wall elements, for example, to a concrete foundation. Different types of anchor bolts are used, but typically all of them consist of a threaded end, to which a nut and washer can be attached for the external load.

[0003] A common apartment building comprises a lot of anchor bolts. For example, one store having a quite small area in a building may contain about 100 or more anchor bolts. Unfortunately, assembling anchor bolts in a concrete reinforcing mesh before casting concrete is very laborious and time consuming project. Usually, anchor bolts are assembled by welding or tying due to a lack of better assembly method. Welding or tying anchor bolts in a concrete reinforcing mesh are very slow procedures requiring lot of working hours, which naturally increases costs. Also, the outcome may not be satisfactory in many cases, but anchor bolts may come off or get into a wrong position during casting.

[0004] Welding anchor bolts is more reliable way comparing to tying to fasten anchor bolts in their place in a concrete reinforcing mesh, but underfloor heating pipes, for example, may cause troubles and increase costs. The underfloor heating pipes must be assembled in concrete reinforcing mesh before anchor bolts and welding anchor bolts can easily break these pipes. Replacing and/or repairing are laborious and time consuming project. Due to this many builders have given up assembling underfloor heating, which on the other hand may slow down and hinder drying of concrete. At the worst, this may cause damages to the building because of the moisture in structures.

[0005] The prior art knows some solutions for assembling anchor bolts, but unfortunately the assembling devices usually are difficult to use and expensive. For example, the document US 7,174,689 presents a concrete anchor float for facilitating the placement of anchor bolts in foundation, which anchor float comprises a base plate with a hole, and a cap extending from the base plate over the hole. Unfortunately, the base plate of the present solution is difficult to fasten and an anchor bolt placed in this device may easily move without any support.

Summary of the invention

[0006] It is an objective of the present invention to im-

plement such a solution, that the previously mentioned drawbacks of the prior art could be diminished. In particular, the invention is implied to solve how to provide an assembly device for reliably and fast assembling anchor bolts.

[0007] The objective of the invention is met by the features disclosed in the independent patent claims.

[0008] An assembly device for anchor bolts according to the present invention is characterized by the features of claim 1.

[0009] According to an embodiment of the present invention, an assembly device for an anchor bolt comprises a fastening part for fastening the assembly device in a concrete reinforcing mesh, and supporting part supporting an anchor bolt in the assembly device, wherein the fastening part and supporting part are connected together in a substantially perpendicular position.

[0010] In an embodiment, the fastening part has a form of centric shapes for enabling easy fastening of the assembly device. Centric shapes, such as, but not limited to circles, ovals, squares, rectangles, stars or others shapes, may provide a firm structure to the assembly device for keeping it in right position during casting, but still leaving good space for the user to easily fasten the assembly device by hand or by using a fastening tool in concrete reinforcing mesh.

[0011] In an embodiment, the supporting part comprises at least one hanger part for supporting an anchor bolt in the device. In this way the anchor bolt may be firmly supported in the assembly device and it may better stay in its position during casting.

[0012] In another embodiment, the supporting part comprises means for adjusting the height of the assembly device. This embodiment can be advantageous for using one assembly device for different types of anchor bolts, especially when the height of the anchor bolt varies. In addition, this embodiment provides means for adjusting the depth that anchor bolt will sink in concrete in case the concrete reinforcing mesh or the concrete foundation level varies, for example.

[0013] Yet, in another embodiment, the assembly device comprises locking means for locking an anchor bolt in the assembly device. This embodiment may enable a user to prepare the assembly by inserting anchor bolts in the assembly devices beforehand and transfer them to an assembly location without a fear that the anchor bolts will detach from the devices, which could cause extra work. In addition, by locking the anchor bolts in the assembly device, it may provide more secure positioning for the anchor bolts during casting.

[0014] Yet, in another embodiment, the assembly device further comprises a removable protecting part for protecting threads of the anchor bolt during casting. This embodiment helps the casting process, when there is no fear of spoiling the anchor bolts with concrete.

[0015] In an embodiment, at least the protecting part has a high-visibility color for helping to locate anchor bolts in the concrete foundation after casting. Adding a high-

visibility color to the assembly device may also help workers on a foundation site to locate anchor bolts even in difficult circumstances, such as among snow, and not to accidentally step on them or kick them.

[0016] A method for assembling anchor bolt in concrete foundation according to the present invention is characterized by the features of claim 8.

[0017] According to an embodiment of the present invention, a method for assembling anchor bolt in a concrete foundation having an assembly device comprises at least following steps of:

- setting an anchor bolt in the assembly device,
- fastening the assembly device in a concrete reinforcing mesh,
- casting the concrete foundation.

[0018] Yet, in another embodiment, the method further comprising steps of:

- setting the protecting part on the anchor bolt before casting,
- removing the protecting part from the anchor bolt after casting.

[0019] Some preferable embodiments of the invention are described in the dependent claims.

[0020] Significant advantages can be achieved with the present invention when compared to prior art solutions. The assembly device according to the present invention may provide a fast, but reliable way to assemble anchor bolts in a concrete foundation. The assembly device according to the present invention can be manufactured from various kinds of materials, but preferably it is manufactured from plastic or metal, such as steel or aluminum. Especially, a plastic assembly device is cheap and fast to manufacture. In addition, a plastic assembly device can be durable keeping the anchor bolt in its place during casting, and it is easy to add a color to it during manufacturing.

[0021] The form of the assembly device may enable easy and fast fixing of the assembly device, which naturally cause savings in time and costs, and it may ensure a correct position of anchoring bolts, which may provide a better outcome of the assembly.

[0022] The assembly device according to the present invention can be fastened in a concrete reinforcing mesh either by hands or by using a suitable tool, such as a reinforcing bar wire tying tool, for example.

[0023] The usage of anchor bolts with the assembly device according to the present invention can be more various than only a fastener for attaching structures. The anchor bolts with the assembly device may be able to use as a fasteners for handrails, when assembling fall protections on a building site.

[0024] Furthermore, the assembly device according to the present invention may enable a usage of underfloor heating pipes in concrete foundation without a fear of damages caused by assembly of the anchor bolts. Using the underfloor heating provide itself many advantages, because it is used for drying concrete and as a method for drying concrete it is much more efficient than radiators with circulating hot water.

[0025] The expression "a number of" refers herein to any positive integer starting from one (1), e.g. to one, two, or three.

[0026] The terms "a" and "an", as used herein, are defined as one or more than one.

Short description of the drawings

[0027] Next, the invention is described in more detail with reference to the appended drawings, in which

Fig. 1 depicts a top view of the assembly device according to an embodiment of the present invention,

Fig. 2 depicts a bottom perspective view of the assembly device according to an embodiment of the present invention,

Fig. 3 depicts a top perspective view of the assembly device according to an embodiment of the present invention with an anchor bolt,

Fig. 5 depicts a bottom perspective view of the assembly device according to an embodiment of the present invention with an anchor bolt,

Fig. 5 depicts a side view of a protecting part according to an embodiment of the present invention,

Fig. 6 depicts an exemplary assembly of the assembly device according to an embodiment of the present invention with an anchor bolt,

Fig. 7 is a flow chart illustrating a method of assembling an anchor bolt according to an embodiment of the present invention.

Detailed description of the embodiments

[0028] In the Figures herein, unique features receive unique reference numerals, while features that are the same in more than one drawing receive the same reference numerals throughout. Further, certain terms of orientation may be used, such as "upper," "lower," "top," "bottom," "left," "right," "inside," "outside," "interior," "exterior," "inner," and "outer." These terms are generally for convenience of reference, and should be so understood unless a particular embodiment requires otherwise.

[0029] The scope of the invention is not intended to be

limited by materials listed herein, but may be carried out using any materials that allow the construction and operation of the present invention. Materials and dimensions depend on the particular application. In general the materials of the components may be plastic or metal, as known by the person skilled in the art.

[0030] Fig. 1 depicts a top view and Fig. 2 a bottom perspective view of the assembly device according to an embodiment of the present invention. An assembly device 100 for an anchor bolt comprises a fastening part 102 for fastening the assembly device 100 in a concrete reinforcing mesh, and a supporting part 104 for supporting an anchor bolt.

[0031] As can be seen in Fig. 2, the fastening part 102 and the supporting part 104 are connected together in a substantially perpendicular position, so that the fastening part 102 is set substantially in the parallel with the forthcoming concrete foundation level and the supporting part 104 is protruding substantially downwards into the forthcoming concrete.

[0032] The size and form of the assembly device can vary depending on anchor bolts the assembly device is designed for. In an embodiment depicted in Figs. 1-2, the fastening part 102 of the assembly device 100 is circular and the supporting part 104 is a kind of tubular. The diameter of the fastening part is preferably 200 mm - 300 mm, more preferably 240 mm - 260 mm, in order to reach the best way between the reinforcing bars in the mesh. Typically, the space between reinforcing bars in a mesh is about 150 mm in both direction. The depth of the assembly device can also vary, but preferably the depth of the supporting part is 40 mm - 60 mm, and more preferably 45 mm - 50 mm for ensuring that the anchor bolt is sank deep enough in concrete, but it still has enough upper end above. The common depth of a concrete foundation is about 240 mm - 300 mm.

[0033] In an embodiment, the fastening part 102 has a form of centric shapes, and in an embodiment depicted in Figs. 1-2, the form of the fastening part is centric circles 106 for enabling easy fastening of the assembly device 100. The person skilled in the art will understand that the shapes in the centric form can also vary, i.e. inside of a circle can be a rectangle, or inside of a rectangle can be a star, for example. The number of the centric shapes can vary, but preferably the fastening part has 2-3 centric parts. Varying the centric shapes can enable connecting the centric shapes together, but still leaving enough space for fastening the assembly device.

[0034] In an embodiment, the fastening part 102 comprises at least one, preferably 3-4 connecting sections 108 for connecting the circles 106 in a centric form. The shape of the cross-section of connecting sections 108 can vary. It can be round, square or rectangular, for example. The space between the circles is preferably at least 40 mm for providing wide enough space between the circles so that user can easily fasten the assembly device in the concrete reinforcing mesh.

[0035] In an embodiment, the fastening part 102 further

comprises an opening part comprising partial circles 110a, 110b and a widening section 110c, which is arranged to widen between the partial circles 110a, 110b.

[0036] The length of the widening section 110c can vary depending on the anchor bolt type to be used, but preferably the length of the opening is 90 mm - 100 mm, and the width 14 mm - 16mm, for example. The diameter of the combined partial circles 110a, 110b is preferably 22 mm - 25 mm, but the person skilled in the art understands that the diameter can vary depending on the diameter of the shank of an anchor bolt intended to use.

[0037] Fig. 3 depicts a top perspective view of the assembly device according to an embodiment of the present invention with an anchor bolt. The opening part 110 arranged preferably in the middle of the fastening part for enabling anchors 112 of an anchor bolt 114 to enter into the supporting part 104 through the fastening part 102. The partial circles 110a, 110b are set to fit around the anchor bolt 114 for keeping it in a correct position.

[0038] In an embodiment depicted in Fig. 3, the supporting part 104 has a tubular form having one opening or two openings on both sides for the anchor or anchors 112 of the anchor bolt 114 depending on the anchor bolt type. In this embodiment, the supporting part 104 is arranged to support the bottom of the shank of an anchor bolt 104 and the anchor or anchors 112 of the anchor bolt is/are arranged to protrude from the opening(s).

[0039] Fig. 4 depicts a bottom perspective view of the assembly device according to an embodiment of the present invention with the anchor bolt 114. In an embodiment, the supporting part 104 comprises at least one hanger part for supporting an anchor bolt in the device. In an embodiment depicted in Fig. 4, the supporting part 104 comprises two hanger parts 116 for anchors 112 of the anchor bolt 114. The hanger parts 116 preferably are arranged under the widening section 110 in order the anchors of the anchor bolt 114 to be set on them.

[0040] In an embodiment, the supporting part comprises means for adjusting the height of the assembly device according to the anchor bolt to be assembled. In an embodiment, the supporting part is formed of at least two telescopic parts, which can be locked to different levels in order to adjust the height. In another embodiment, the supporting part is formed of at least two parts having threads for adjusting the height.

[0041] Yet, in another embodiment, the assembly device comprises locking means for locking an anchor bolt in the assembly device. The locking means can be arranged in the assembly device in many ways. In an embodiment, the locking means comprises a snap lock or quick release lock having parts for locking the anchor bolt, when pressed to the device. In another embodiment, the locking means comprises a latch for locking the anchor bolt. Yet, in another embodiment, the locking means comprises threads and the anchor bolt is locked in its place by twisting it.

[0042] The locking means can be arranged in the assembly device in many ways. In an embodiment, the locking means is arranged in connection with the fastening part, especially in the widening section. In another embodiment, locking means is arranged in connection with the supporting part. Yet, in another embodiment, the locking means is arranged in connection with one or both of the hanger parts, and yet in another embodiment, the locking means is a separate part to be added to the assembly device.

[0043] Fig. 5 depicts a side view of a protecting part according to an embodiment of the present invention. In an embodiment, the assembly device further comprises a removable protecting part 116 for protecting threads of the anchor bolt in the assembly device during casting. The protecting part according to an embodiment depicted in Fig. 5 has a form of a socket cap comprising a thread section 116a for fastening in the threads of the anchor bolt, , and a cap section 116b for providing a form to fasten the protecting part 116 to the anchor bolt and remove it after casting. In an embodiment, the protecting part comprises a smooth section 116c for preventing concrete to attach to the protecting part.

[0044] In another embodiment, the protecting part comprises a threaded rod, which enables the assembly device to be set in such way that the depth of the assembly device in concrete does not have to be precise. In the present embodiment, a big part of the threaded rod protrudes above the concrete level, which may enable a temporary support of a concrete element by using the threaded rod. Also in the embodiment in question, the threads of the threaded rod can be protected totally or at least partly for casting.

[0045] In an embodiment, the protecting part 116 has a high-visibility color for helping to locate anchor bolts in a concrete foundation. The color is added at least to the cap section 116b, but also the other sections of the protecting part can have the color. Typically, a high-visibility color, such as, but not limited to, fluorescent yellow, orange and/or yellow-green, is used.

[0046] Fig. 6 depicts an exemplary assembly of the assembly device according to an embodiment of the present invention with an anchor bolt. As can be seen in Fig. 6, the assembly device 100 according to the present invention has been arranged on a concrete reinforcing mesh 118, so that at least the outermost centric circle 106 reaches between parallel reinforcing bars. The assembly device according to the present invention can be arranged very near of tubes, such as underfloor heating tubes 120, without causing any harm to the tubes. The assembly device 100 is fastened to the concrete reinforcing mesh 118 at least one, but preferably at least two or three points 122.

[0047] Fig. 7 is a flow chart illustrating a method of assembling an anchor bolt according to an embodiment of the present invention. In an embodiment, a method for assembling anchor bolt in a concrete foundation having an assembly device according to any of claim 1-6, com-

prises at least following steps:

At step 802, an anchor bolt is set in the assembly device. Depending on embodiment, this at this step also the assembly device is adjusted to desired height and/or the anchor bolt is locked to the assembly device.

At step 804, the assembly device is fastened in a concrete reinforcing mesh. The fastening can be performed in many ways, such as tying either by hands or by using a reinforcing bar wire tying tool, for example.

At step 806, a concrete foundation is casted.

[0048] Furthermore, according to an embodiment, the method for assembling anchor bolt in a concrete foundation further comprises a step 801 of setting a protecting part on the anchor bolt before casting, and a step 808 removing the protecting part from the anchor bolt after casting. The step 801 of setting the protecting part can be performed in any phase before step 806.

[0049] The scope of the invention is determined by the attached claims together with the equivalents thereof. The skilled persons will again appreciate the fact that the explicitly disclosed embodiments were constructed for illustrative purposes only, and the scope will cover further embodiments, embodiment combinations, manufacturing processes, and equivalents that better suit each particular use case of the invention.

Claims

1. An assembly device for an anchor bolt comprising
 - a fastening part for fastening said assembly device in a concrete reinforcing mesh, and
 - a supporting part for supporting an anchor bolt in said assembly device,

wherein said fastening part and said supporting part are connected together in a substantially perpendicular position.

2. An assembly device according to Claim 1, wherein said fastening part has a form of centric shapes, such as circles, for enabling easy fastening of said assembly device.
3. An assembly device according to any preceding claim, wherein said supporting part comprises at least one hanger for supporting an anchor bolt in said assembly device.
4. An assembly device according to any preceding claim, wherein said supporting part further compris-

es means for adjusting the height of said assembly device.

5. An assembly device according to any preceding claim, wherein said assembly device further comprises locking means for locking an anchor bolt in said assembly device. 5

6. An assembly device according any preceding claim, wherein said assembly device further comprises a removable protecting part for protecting threads of the anchor bolt in said assembly device during casting. 10

7. An assembly device according to Claim 6, wherein at least said protecting part has a high-visibility color for helping to locate anchor bolts in a concrete foundation. 15

8. A method for assembling anchor bolt in a concrete foundation having an assembly device according to any of claim 1-6, comprising at least following steps: 20
 - setting an anchor bolt in said assembly device,
 - fastening said assembly device in a concrete reinforcing mesh, 25
 - casting a concrete foundation.

9. A method according to a Claim 8 further comprising steps of 30
 - setting said protecting part on the anchor bolt before casting,
 - removing said protecting part from the anchor bolt after casting. 35

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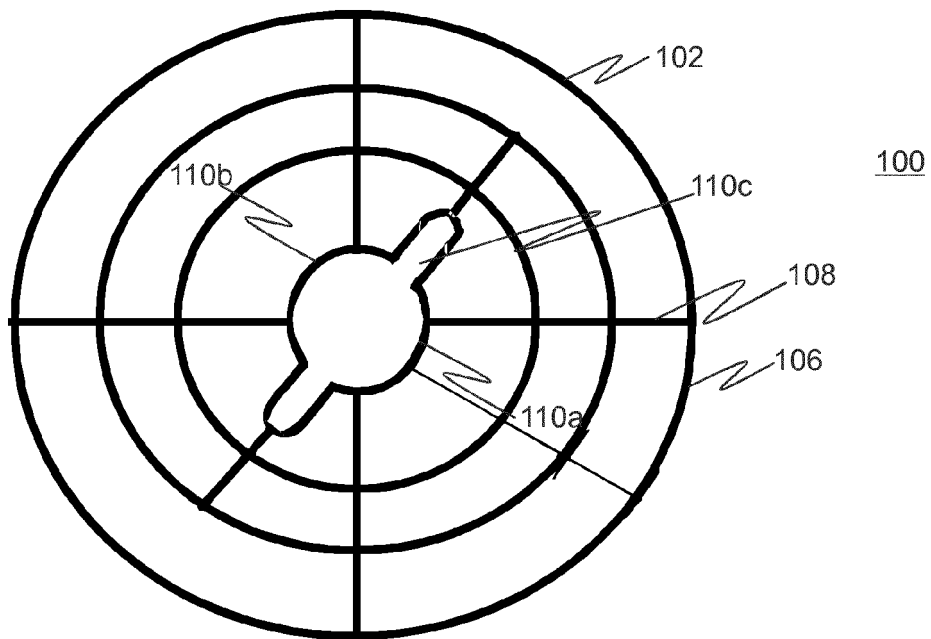


FIG. 1

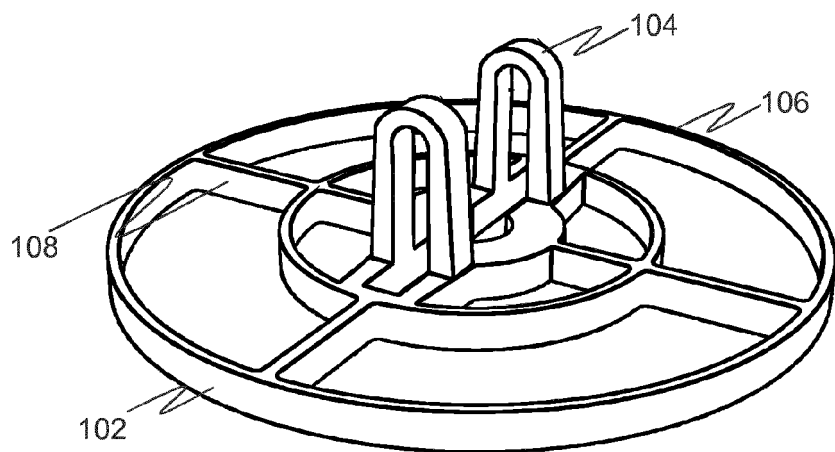


FIG. 2

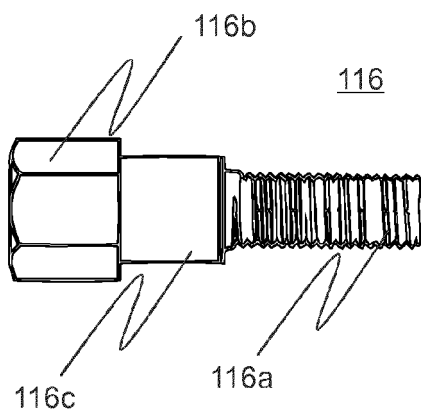


FIG. 5

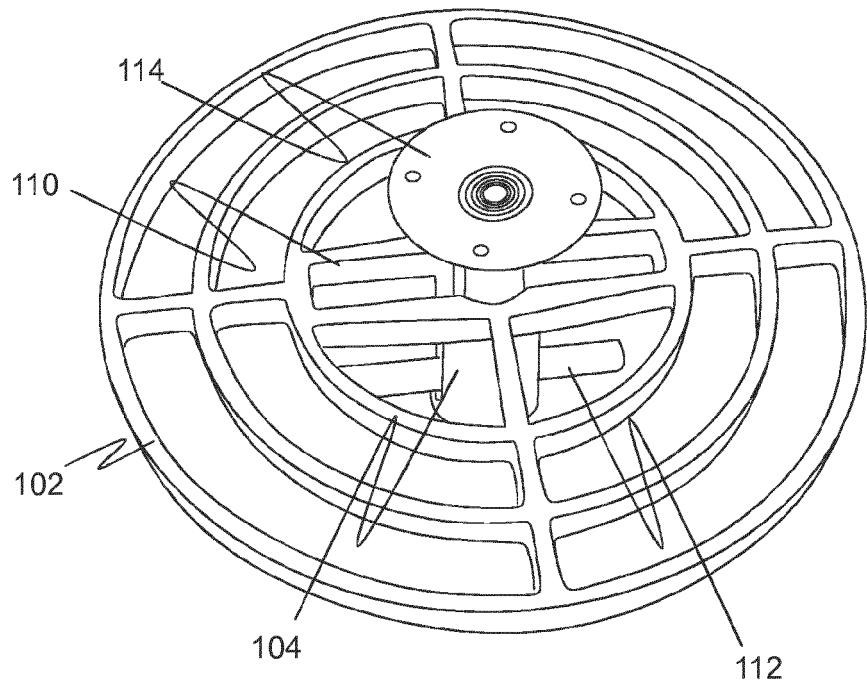


FIG. 3

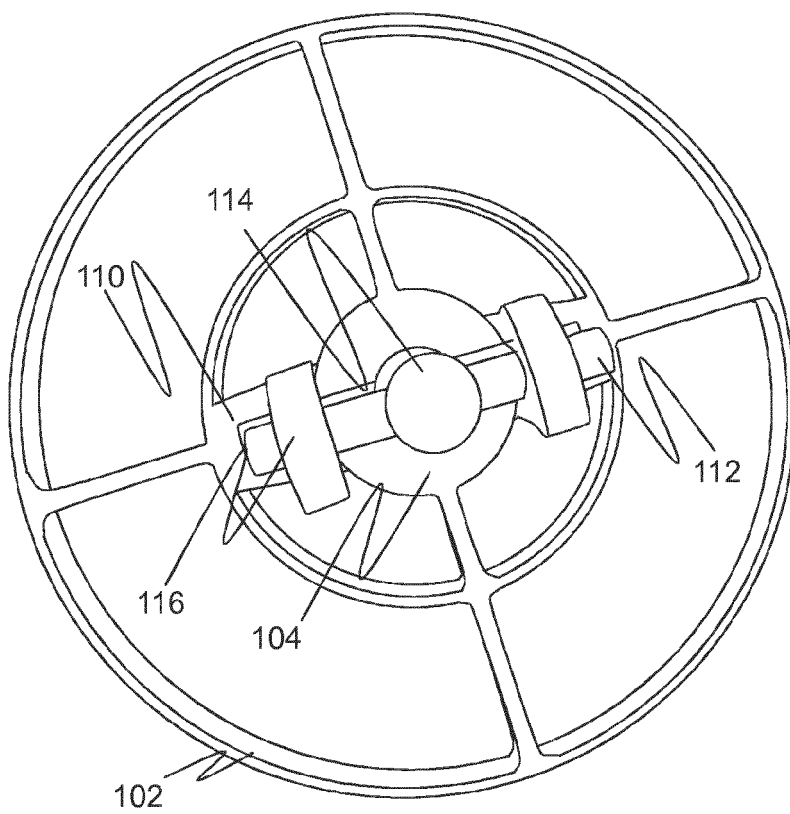


FIG. 4

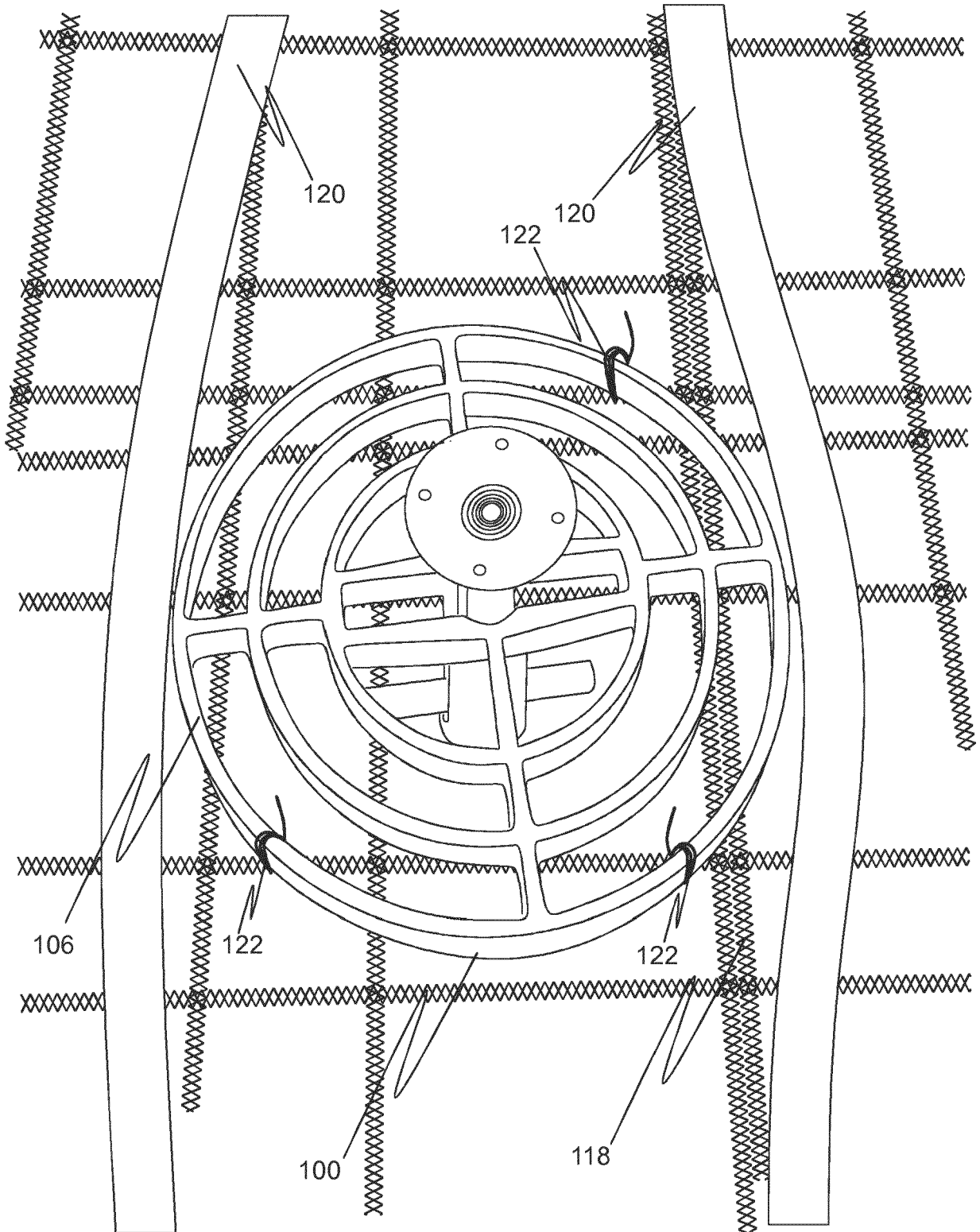


FIG. 6

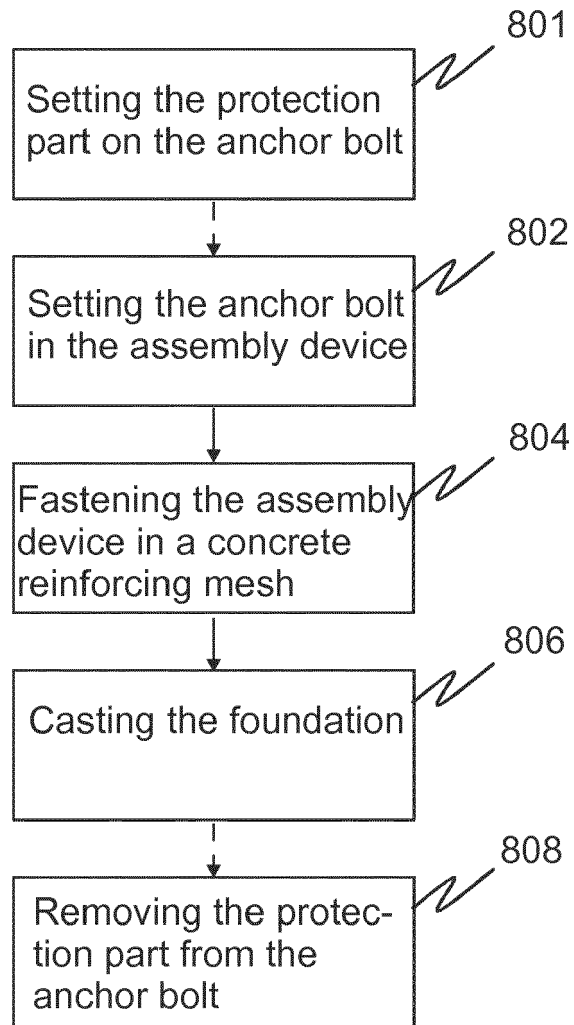


FIG. 7



EUROPEAN SEARCH REPORT

 Application Number
 EP 18 17 1461

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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	WO 2010/090748 A1 (ESPINOSA THOMAS M [US]) 12 August 2010 (2010-08-12) * pages 18-23; figures 22-28 * -----	1-9	INV. E04G21/18 E04C5/20 E04B1/41
X	WO 2010/151623 A1 (ILLINOIS TOOL WORKS [US]; SAYEGH BELLAL [AU]) 29 December 2010 (2010-12-29) * the whole document * -----	1,3,6-9	
X	US 2004/010984 A1 (WRIGHT WILLIAM JAMES [AU]) 22 January 2004 (2004-01-22) * the whole document * -----	1-3,5,8	
X	WO 2017/075332 A1 (A L PATTERSON INC [US]) 4 May 2017 (2017-05-04) * pages 9-20; figures 2-6,18-22 * -----	1,3,5-9	
A	US 2006/016140 A1 (SMITH JAMES R [US]) 26 January 2006 (2006-01-26) * paragraphs [0060] - [0066]; figures 6,16-20 * -----	6,7,9	
A	JP H03 69770 A (MIRAI IND) 26 March 1991 (1991-03-26) * the whole document * -----	1-7	TECHNICAL FIELDS SEARCHED (IPC) E04G E04B E04C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 October 2018	Examiner Garmendia Irizar, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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ON EUROPEAN PATENT APPLICATION NO.**

EP 18 17 1461

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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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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010090748 A1	12-08-2010	CA 2788877 A1	12-08-2011
		CN 102341546 A	01-02-2012
		EP 2393994 A1	14-12-2011
		US 2011041449 A1	24-02-2011
		US 2015197931 A1	16-07-2015
		US 2017101771 A1	13-04-2017
		WO 2010090748 A1	12-08-2010

WO 2010151623 A1	29-12-2010	AU 2009202552 A1	20-01-2011
		AU 2010264434 A1	12-01-2012
		NZ 596926 A	30-05-2014
		WO 2010151623 A1	29-12-2010

US 2004010984 A1	22-01-2004	NZ 520149 A	31-01-2003
		US 2004010984 A1	22-01-2004

WO 2017075332 A1	04-05-2017	CA 3003657 A1	04-05-2017
		US 2017121963 A1	04-05-2017
		WO 2017075332 A1	04-05-2017

US 2006016140 A1	26-01-2006	NONE	

JP H0369770 A	26-03-1991	JP H0369770 A	26-03-1991
		JP H0639844 B2	25-05-1994

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 7174689 B [0005]