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(54) **CROSSING ELEMENT, METHOD FOR MANUFACTURING A CONCRETE FLOOR AND CONCRETE FLOOR**

(57) Presented is a crossing element (1) configured to connect at least two movement joints (2) in a concrete floor together, wherein the concrete floor is supported on a sub-base (3). The crossing element (1) comprises a support member (4) configured to be supported on the sub-base (3), and a connection member (5) surrounding the support member (4) and configured to be attached to edge rails (6) of said at least two movement joints (2). The connection member (5) being in the form of a first hollow cylinder that is in the axial direction divided into at least two semi-cylindrical shell members (7). Presented is also a method for manufacturing a concrete floor and a concrete floor.

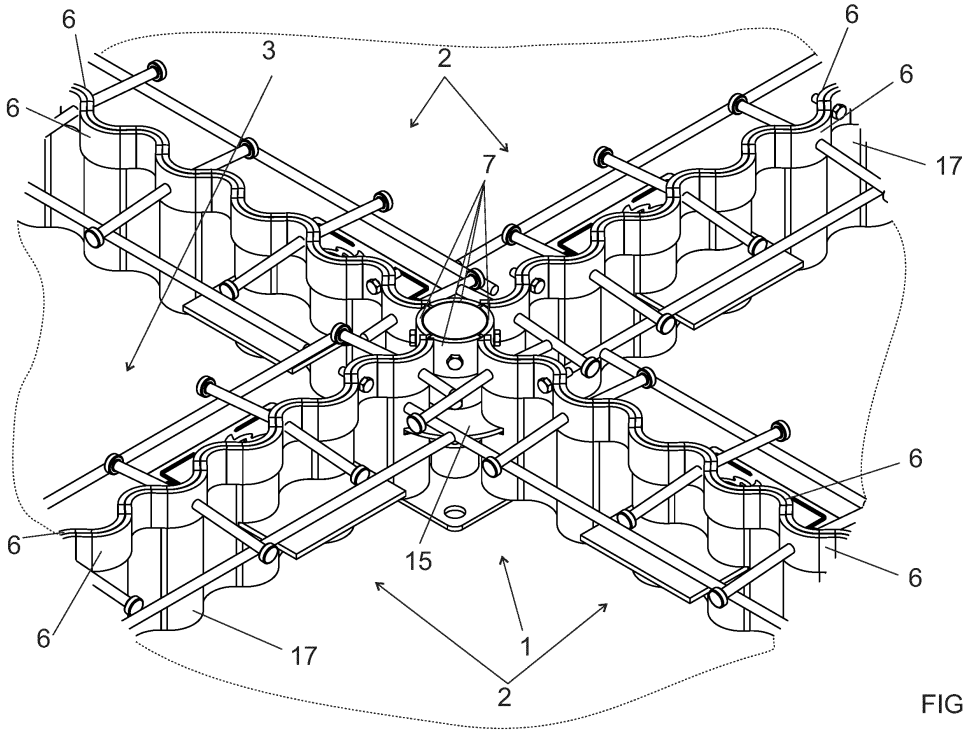

FIG 5

EP 4 450 706 A1

Description

Field

[0001] The invention relates to a crossing element configured to connect at least two movement joints in a concrete floor together, wherein the concrete floor is supported on a sub-base as defined in the preamble of independent claim 1.

[0002] Movement floor joint apparatuses are mainly used in connection with large concrete floors supported on a sub-base such as on a sand bed. Large concrete floors are structures formed of concrete slabs and cast directly in place for example on a sub-base such as on a sand bed on the construction site. Usually it is necessary to cover relatively large areas by means of concrete. Due to the shrinkage and thermal movements of concrete, large areas must be divided into smaller parts i.e. into concrete slabs with movement floor joint apparatuses. A movement floor joint apparatus must allow adjacent concrete slabs of the concrete floor to move horizontally relative to each other due to shrinkage and thermal movements. These movements mean here movements that are in the direction of the joint and perpendicular to the joint. In contrast, vertical movements perpendicular to the slab plane must be prevented, in other words the joint must be capable of transferring vertical load between the concrete slabs of a concrete floor.

[0003] Between ends of two movement floor joint apparatuses in a concrete floor or at junctions, where ends of several movement floor joint apparatuses meet in the concrete floor in a none-plane parallel manner, can special crossing elements be used to connect the ends of the movement floor joint apparatuses together in the concrete floor. One purpose of such special crossing elements is to divide the concrete floor properly into concrete slabs also at the ends of the movement floor joint apparatuses and so to ensure that the concrete slabs of the concrete floor can move horizontally relative to each other also at the ends of the movement floor joint apparatuses.

Objective

[0004] The object of the invention is to provide an improved crossing element configured to connect at least two movement joints in a concrete floor together.

Short description

[0005] The crossing element of the invention is characterized by the definitions of independent claim 1.

[0006] Preferred embodiments of the crossing element are defined in the dependent claims 2 to 10.

[0007] Presented is also a method for manufacturing a concrete floor as defined in claim 11.

[0008] Presented is also a concrete floor as defined in claim 12.

List of figures

[0009] In the following the invention will described in more detail by referring to the figures, of which

Figure 1 shows one embodiment of the crossing element,
Figure 2 shows the crossing element shown in figure 1 as seen from the side,
Figure 3 shows the crossing element shown in figure 1 as seen from above,
Figure 4 shows the crossing element shown in figure 1 in cross section as cut along line A-A in figure 3,
Figure 5 shows an arrangement where a crossing element as shown in figure 1 is installed on a sub-base and where four movement joints having a sine wave form have been connected to the crossing element,
Figure 6 shows the arrangement illustrated in figure 5 as shown from above,
Figure 7 shows another arrangement where a crossing element as shown in figure 1 is installed on a sub-base and where three movement joints having a sine wave form have been connected to the crossing element,
Figure 8 shows another arrangement where a crossing element as shown in figure 1 is installed on a sub-base and where two movement joints having a sine wave form and one movement joint having a linear form have been connected to the crossing element,
Figure 9 shows another arrangement where a crossing element as shown in figure 1 is installed on a sub-base and where one movement joints having a sine wave form and two movement joints having a linear form have been connected to the crossing element,
Figure 10 shows another embodiment of the crossing element, and
Figure 11 shows the crossing element shown in figure 10 as seen from the side.

Detailed description

[0010] Next the crossing element 1 and some embodiments and variants of the crossing element 1 will be presented in greater detail.

[0011] The crossing element 1 is configured to connect at least two movement joints 2 in a concrete floor (not illustrated) together, wherein the concrete floor is supported on a sub-base 3 such as on a sand bed.

[0012] The crossing element 1 comprises a support member 4 configured to be supported on the sub-base 3.

[0013] The crossing element 1 comprises a connection member 5 surrounding the support member 4 and configured to be attached to edge rails 6 of said at least two movement joints 2.

[0014] The connection member 5 is in the form of a

first hollow cylinder (not marked with a reference numeral) that is in the axial direction divided into at least two semi-cylindrical shell members 7, or alternatively, that is in the axial direction configured to be divided into at least two semi-cylindrical shell members 7.

[0015] Because the connection member 5 is in the form of a first hollow cylinder that is in the axial direction divided, or because the connection member 5 is in the axial direction configured to be divided, into at least two semi-cylindrical shell members 7, it is possible to attach by welding several movement joints 2 to the crossing elements 1 in various angles with respect to each other, not only in 90 ° or in 180 ° with respect to each other.

[0016] In the concrete floor, edge rails 6 of different movement joints 2, which will partly horizontally limit the same concrete slab in the finished concrete floor and which ends meet at a crossing element 1, are, as illustrated in figures 5 and 6, attached by welding to the same semi-cylindrical shell member 7 of the first hollow cylinder of the crossing element 1. In this way, one semi-cylindrical shell member 7 together with the edge rails 6 of different movement joints 2, which partly horizontally limit the same concrete slab in the finished concrete floor and which ends meet at a crossing element 1, will form an entity in the finished concrete floor allowing proper horizontal relative movement of the concrete slabs of the concrete floor.

[0017] Figures 5 to 7 shows connecting of movement joints 2 having a sine wave form by using the crossing element 1. The crossing element 1 can however also be used for connecting at least one movement joint 2 having a sine wave form with at least one movement joint 2 having a linear form, as illustrated in figures 8 and 9, or for connecting several movement joints 2 having a linear form.

[0018] The central angle of at least one semi-cylindrical shell member 7 of the semi-cylindrical shell members 7 can for example be one of 90°, 120°, 180° and 270°.

[0019] If the crossing element 1 is configured to connect two movement joints 2 in a concrete floor together so that said two movement joints 2 will be disposed in a line in the concrete floor, i.e. to form an I-shaped structure in the concrete floor, the first hollow cylinder can be divided into two semi-cylindrical shell members 7 each having a central angle of 180°.

[0020] If the crossing element 1 is configured to connect two movement joints 2 in a concrete floor together so that said two movement joints 2 will be disposed in a 90° angle with respect to each other in the concrete floor, i.e. to form a L-shaped structure in the concrete floor, the first hollow cylinder can be divided into two semi-cylindrical shell members 7 so that a first of the semi-cylindrical shell members 7 has a central angle of 90° and so that a second of the semi-cylindrical shell members 7 has a central angle of 270°.

[0021] If the crossing element 1 is configured to connect three movement joints 2 in a concrete floor together so that said three movement joints 2 will be disposed to form a T-shaped structure in the concrete floor, the first hollow cylinder can be divided into three semi-cylindrical shell members 7 so that a first and a second of the semi-cylindrical shell members 7 has a central angle of 90° and so that a third of the semi-cylindrical shell members 7 has a central angle of 180°.

[0022] If the crossing element 1 is configured to connect three movement joints 2 in a concrete floor together so that said three movement joints 2 will be disposed to form a Y-shaped structure in the concrete floor, the first hollow cylinder can be divided into three semi-cylindrical shell members 7 each having a central angle of 120°.

[0023] If the crossing element 1 is configured to connect four movement joints 2 in a concrete floor together so that said four movement joints 2 will be disposed to form a X-shaped structure in the concrete floor, the first hollow cylinder can be divided into four semi-cylindrical shell members 7 each having a central angle of 90°.

[0024] The support member 4 of the connection element 1 comprises preferably, but not necessarily, a ground engaging plate 8.

[0025] The support member 4 of the connection element 1 comprises preferably, but not necessarily, a second hollow cylinder 9 projecting from the ground engaging plate 8.

[0026] The support member 4 of the connection element 1 comprises preferably, but not necessarily, a third hollow cylinder 10, wherein the second hollow cylinder 9 and the third hollow cylinder 10 are telescopically displaceable one within the other, and wherein a screw arrangement 11 is functionally engaged with both the second hollow cylinder 9 and the third hollow cylinder 10 to fix the position of the second hollow cylinder 9 with respect to the third hollow cylinder 10. The purpose of this is to adjust the length/height of the support member 4 of the connection element 1 for example in accordance with the thickness of the concrete floor. The screw arrangement 11 can for example comprise threaded through holes 12 in one of the second hollow cylinder 9 and the third hollow cylinder 10 and bolts 13 arranged in the threaded holes and configured to press against the other one of the second hollow cylinder 9 and the third hollow cylinder 10 to fix the position of the second hollow cylinder 9 with respect to the third hollow cylinder 10. In the embodiment of the crossing element 1 illustrated in the figures, the screw arrangement 11 comprising threaded through holes 12 in the third hollow cylinder 10 and bolts 13 arranged in the threaded holes and configured to press against the second hollow cylinder 9 to fix the position of the second hollow cylinder 9 with respect to the third hollow cylinder 10.

[0027] If the support member 4 of the connection element 1 comprises a third hollow cylinder 10, a cover plate 14 can be received at the end of the third hollow cylinder 10 to close the end of the third hollow cylinder 10.

[0028] If the support member 4 of the connection element 1 comprises a third hollow cylinder 10, the third hollow cylinder 10 can comprise a flange collar 15 sur-

rounding the third hollow cylinder 10. The flange collar 15 can comprise at least two cuts (not illustrated in the figures) each configured to receive one divider plate of one of said at least two movement joints 2. In the arrangements presented in figures 5 and 6, the flange collar 15 does not have such cuts, but the divider plate of the movement joints 2 are provided with cuts (not marked with a reference numeral) configured to receive the flange collar 15.

[0029] If the support member 4 of the connection element 1 comprises a third hollow cylinder 10, said at least two semi-cylindrical shell members 7 are preferably, but not necessarily, fastened to the third hollow cylinder 10 by means of screws 16 made of polymer or the like such as of nylon. The purpose of the material choice for the screws 16 is to ensure that the semi-cylindrical shell members 7 stays in position when the crossing element is installed and to ensure that the screws 16 can yield or break as a result of relative movements between the concrete slabs of the concrete floor.

[0030] If the support member 4 of the connection element 1 comprises a third hollow cylinder 10, the third hollow cylinder 10 can comprise, as illustrated in figures 10 and 11, a support flange 18 attached to the third hollow cylinder 10 and surrounding the third hollow cylinder 10 below said at least two semi-cylindrical shell members 7. Such support flange 18 allows supporting of the edge rails 6 of said at least two movement joints 2 during installation and fastening of the edge rails 6 of said at least two movement joints 2.

[0031] Next the method for manufacturing a concrete floor supported on a sub-base 3 such as by a sand bed will be described in greater detail.

[0032] The method comprises providing a crossing element 1 according to any embodiment or variant presented herein.

[0033] The method comprises supporting the crossing element 1 on the sub-base 3.

[0034] The method comprises providing at least two movement joints 2 each having a divider plate 17 and two edge rails 6.

[0035] The method comprises attaching by welding the two edge rails 6 of each of said at least two movement joints 2 to different semi-cylindrical shell members 7 of said at least two semi-cylindrical shell members 7.

[0036] In the concrete floor, edge rails 6 of different movement joints 2, which will partly horizontally limit the same concrete slab in the finished concrete floor and which ends meet at a crossing element 1, are, as illustrated in figures 5 and 6, attached by welding to the same semi-cylindrical shell member 7 of the first hollow cylinder of the crossing element 1. In this way, one semi-cylindrical shell member 7 together with the edge rails 6 of different movement joints 2, which partly horizontally limit the same concrete slab in the finished concrete floor and which ends meet at a crossing element 1, will form an entity in the finished concrete floor allowing proper horizontal relative movement of the concrete slabs of the concrete floor.

[0037] Next the concrete floor supported on a sub-base 3 such as by a sand bed.

[0038] The concrete floor comprises a crossing element 1 according to any embodiment or variant presented herein supported on the sub-base 3 and at least two movement joints 2 each having a divider plate and two edge rails 6.

[0039] In the concrete floor the two edge rails 6 of each of said at least two movement joints 2 are attached by welding to different semi-cylindrical shell members 7 of said at least two semi-cylindrical shell members 7.

[0040] In the concrete floor, edge rails 6 of different movement joints 2, which will partly horizontally limit the same concrete slab in the finished concrete floor and which ends meet at a crossing element 1, are, as illustrated in figures 5 and 6, attached by welding to the same semi-cylindrical shell member 7 of the first hollow cylinder of the crossing element 1. In this way, one semi-cylindrical shell member 7 together with the edge rails 6 of different movement joints 2, which partly horizontally limit the same concrete slab in the finished concrete floor and which ends meet at a crossing element 1, will form an entity in the finished concrete floor allowing proper horizontal relative movement of the concrete slabs of the concrete floor.

[0041] It is apparent to a person skilled in the art that as technology advances, the basic idea of the invention can be implemented in various ways. The invention and its embodiments are therefore not restricted to the above examples, but they may vary within the scope of the claims.

Claims

1. A crossing element (1) configured to connect at least two movement joints (2) in a concrete floor together, wherein the concrete floor is supported on a sub-base (3) and wherein the crossing element (1) comprising

   a support member (4) configured to be supported on the sub-base (3), and
   a connection member (5) surrounding the support member (4) and configured to be attached to edge rails (6) of said at least two movement joints (2),
   characterized
   by the connection member (5) being in the form of a first hollow cylinder that is in the axial direction divided into at least two semi-cylindrical shell members (7).

2. The crossing element (1) according to claim 1, **characterized**
   by the support member (4) comprising a ground engaging plate (8).

3. The crossing element (1) according to claim 2, **characterized**
by the support member (4) comprising a second hollow cylinder (9) projecting from the ground engaging plate (8).

4. The crossing element (1) according to claim 3, **characterized**

by the support member (4) comprising a third hollow cylinder (10),
by the second hollow cylinder (9) and the third hollow cylinder (10) are telescopically displaceable one within the other, and
by a screw arrangement (11) functionally engaged with both the second hollow cylinder (9) and the third hollow cylinder (10) to fix the position of the second hollow cylinder (9) with respect to the third hollow cylinder (10).

5. The crossing element (1) according to claim 4, **characterized**
by the screw arrangement (11) comprising threaded through holes (12) in one of the second hollow cylinder (9) and the third hollow cylinder (10) and bolts (13) arranged in the threaded holes and configured to press against the other one of the second hollow cylinder (9) and the third hollow cylinder (10) to fix the position of the second hollow cylinder (9) with respect to the third hollow cylinder (10).

6. The crossing element (1) according to claim 4 or 5, **characterized**
by a cover plate (14) received at the end of the third hollow cylinder (10).

7. The crossing element (1) according to any of the claims 4 to 6, **characterized**
by the third hollow cylinder (10) comprising a flange collar (15) surrounding the third hollow cylinder (10).

8. The crossing element (1) according to claim 7, **characterized**
by the flange collar (15) comprising at least two cuts each configured to receive one divider plate of one of said at least two movement joints (2).

9. The crossing element (1) according to any of the claims 4 to 8, **characterized**
by said at least two semi-cylindrical shell members (7) being fastened to the third hollow cylinder (10) by means of screws (16) made of polymer or the like.

10. The crossing element (1) according to any of the claims 1 to 9, **characterized**
by the central angle of at least one semi-cylindrical shell member (7) of the semi-cylindrical shell members (7) being one of 90°, 120°, 180° and 270°.

11. A method for manufacturing a concrete floor supported on a sub-base (3) such as by a sand bed, wherein the method comprises

providing a crossing element (1) according to any of the claims 1 to 10,
supporting the crossing element (1) on the sub-base (3),
providing at least two movement joints (2) each having a divider plate and two edge rails (6), and
attaching by welding the two edge rails (6) of each of said at least two movement joints (2) to different semi-cylindrical shell members (7) of said at least two semi-cylindrical shell members (7).

12. A concrete floor supported on a sub-base (3) such as by a sand bed, wherein the concrete floor comprises

a crossing element (1) according to any of the claims 1 to 10 supported on the sub-base (3), and
at least two movement joints (2) each having a divider plate and two edge rails (6),
wherein the two edge rails (6) of each of said at least two movement joints (2) being attached by welding to different semi-cylindrical shell members (7) of said at least two semi-cylindrical shell members (7).

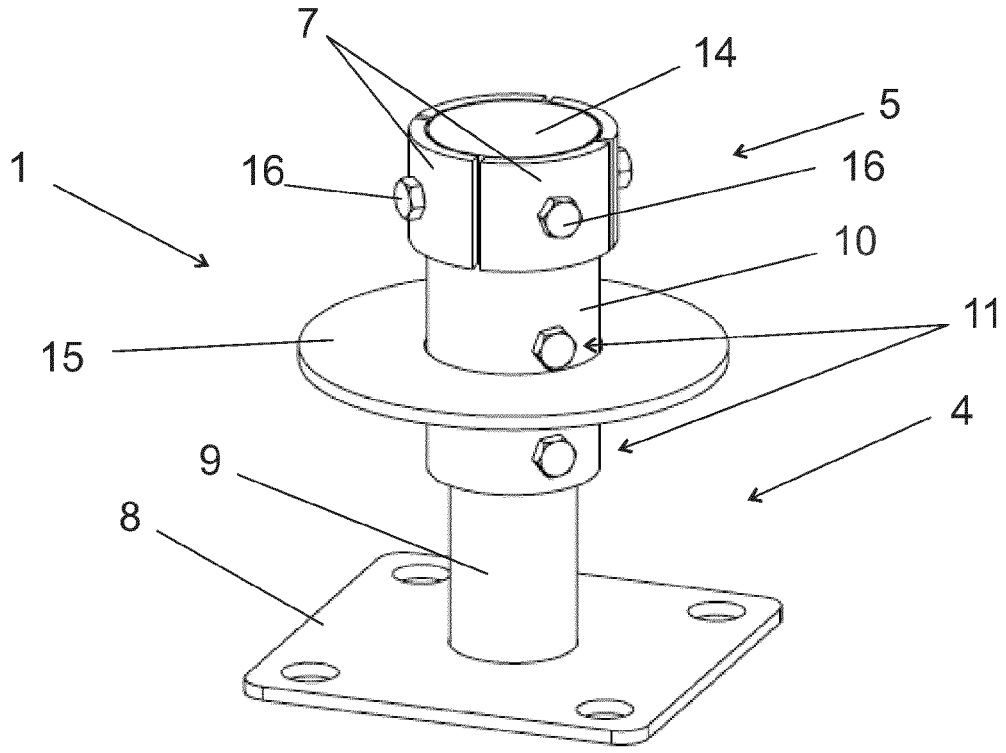

FIG 1

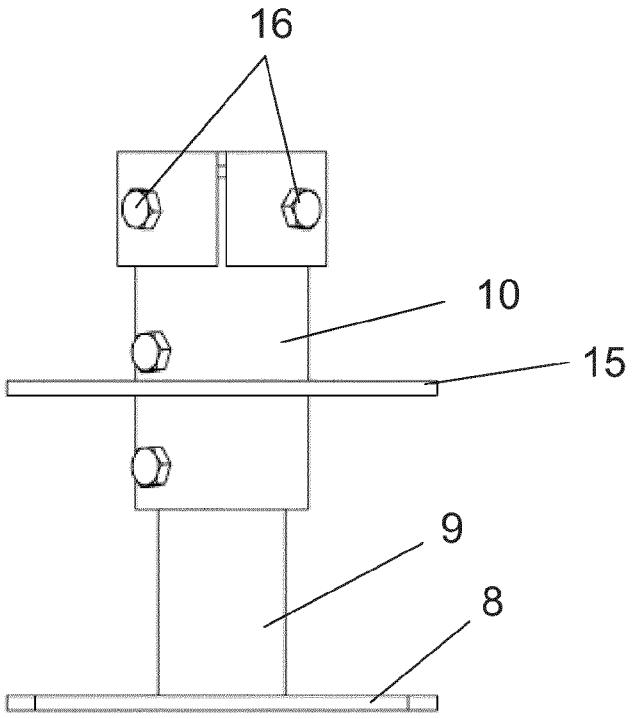

FIG 2

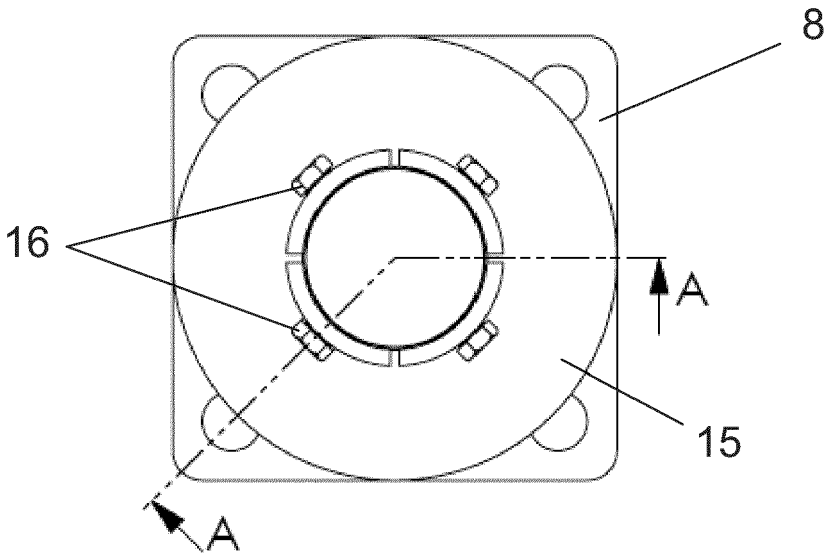

FIG 3

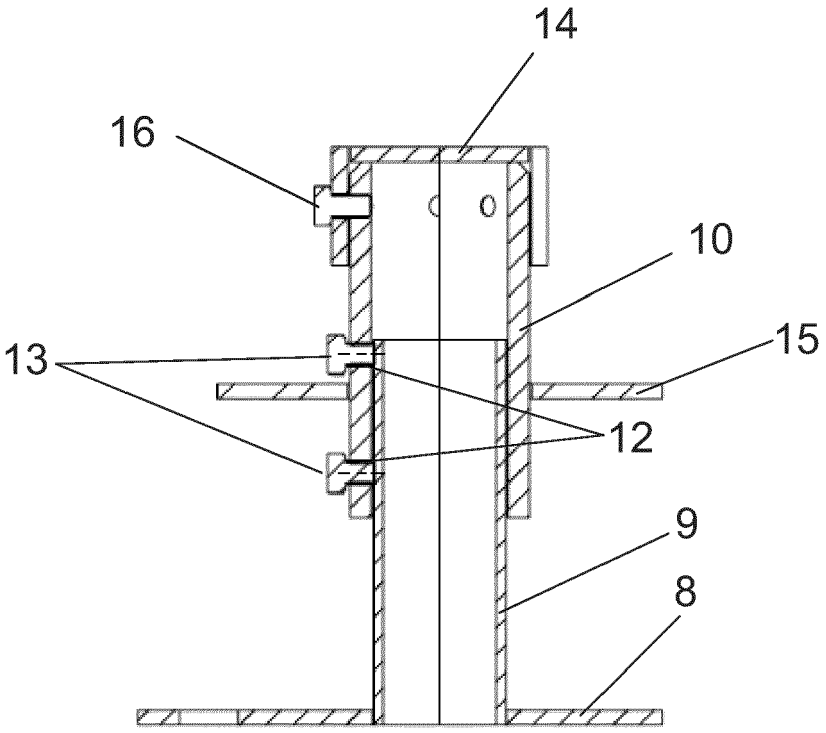

FIG 4

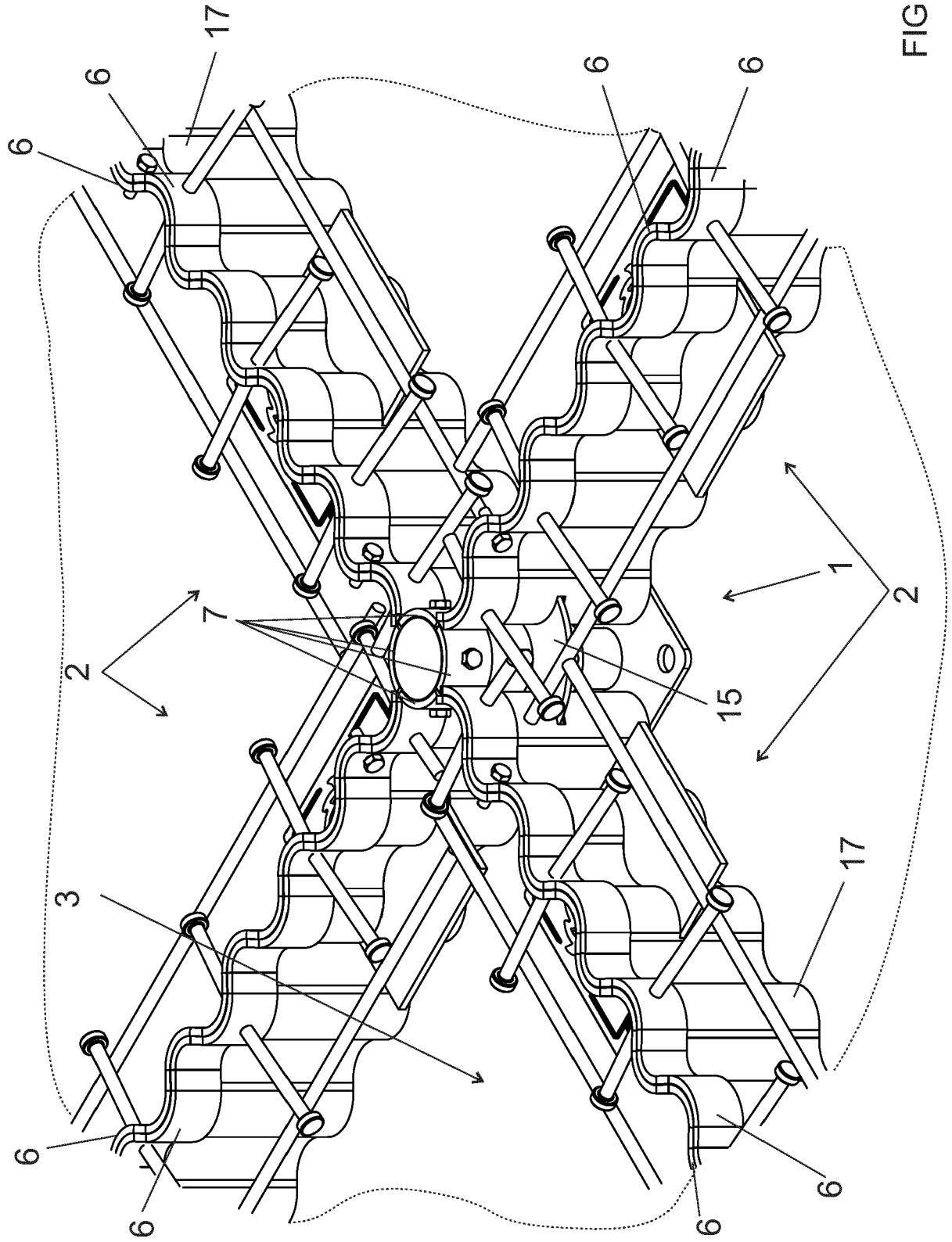

FIG 5

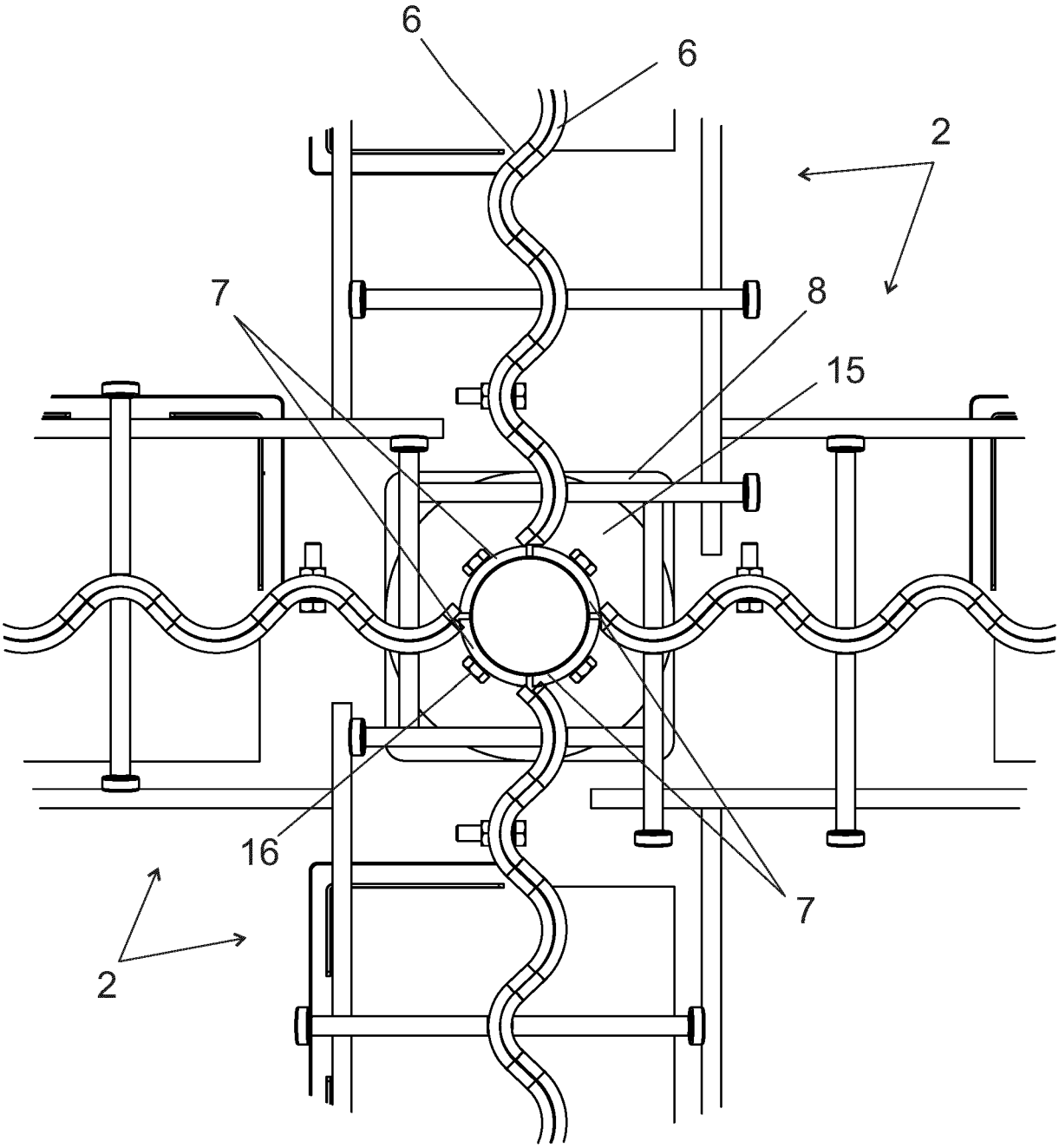

FIG 6

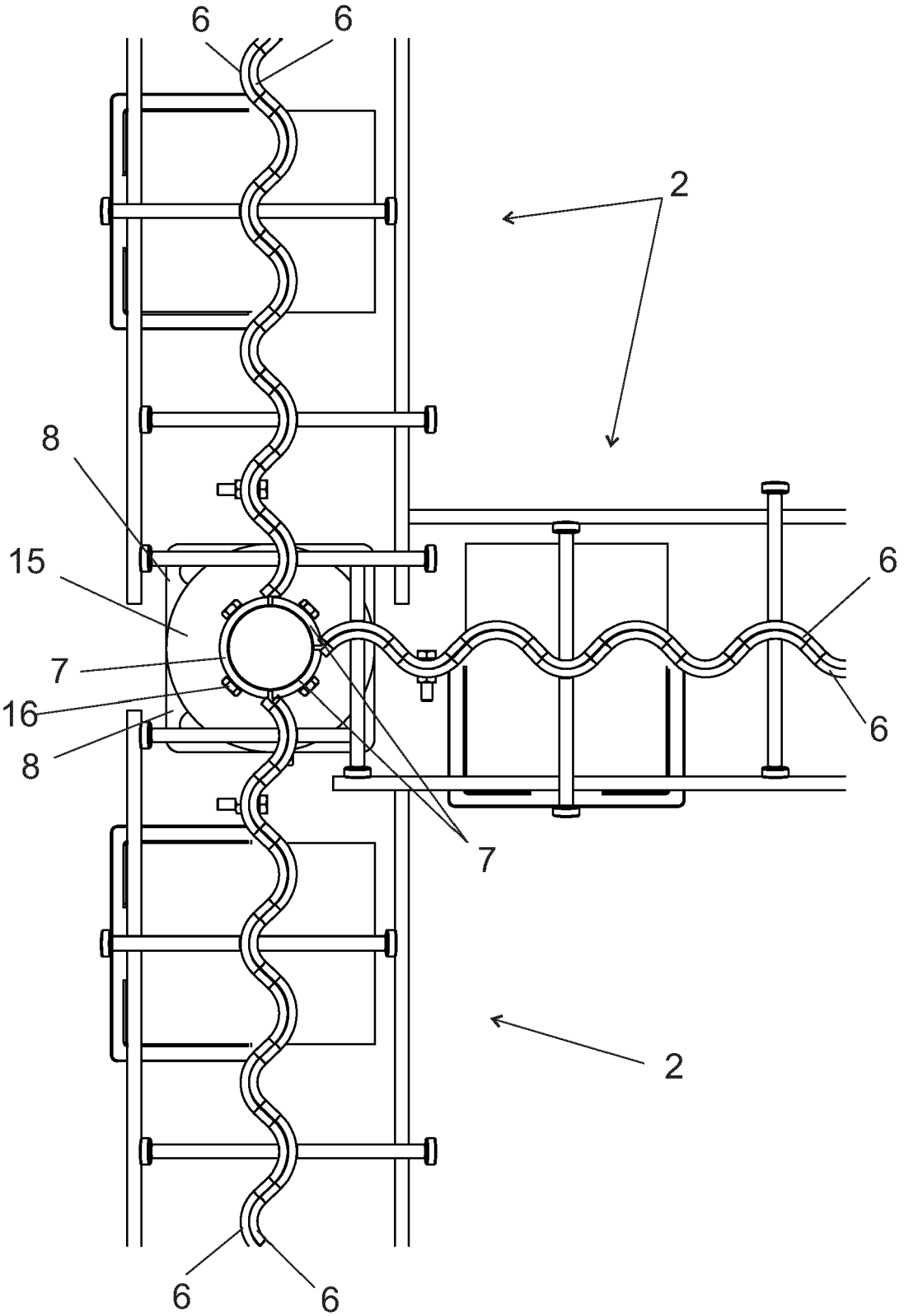

FIG 7

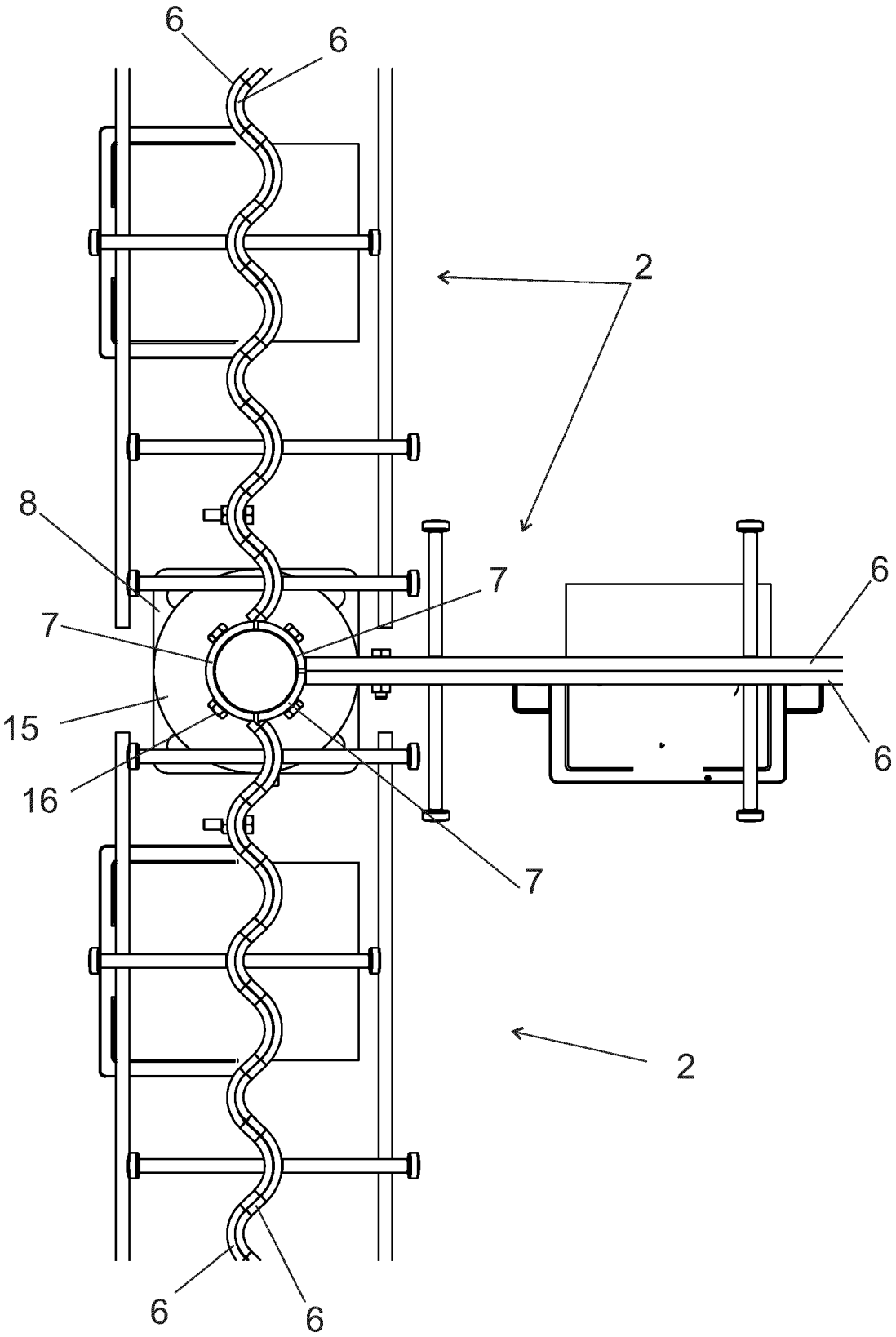

FIG 8

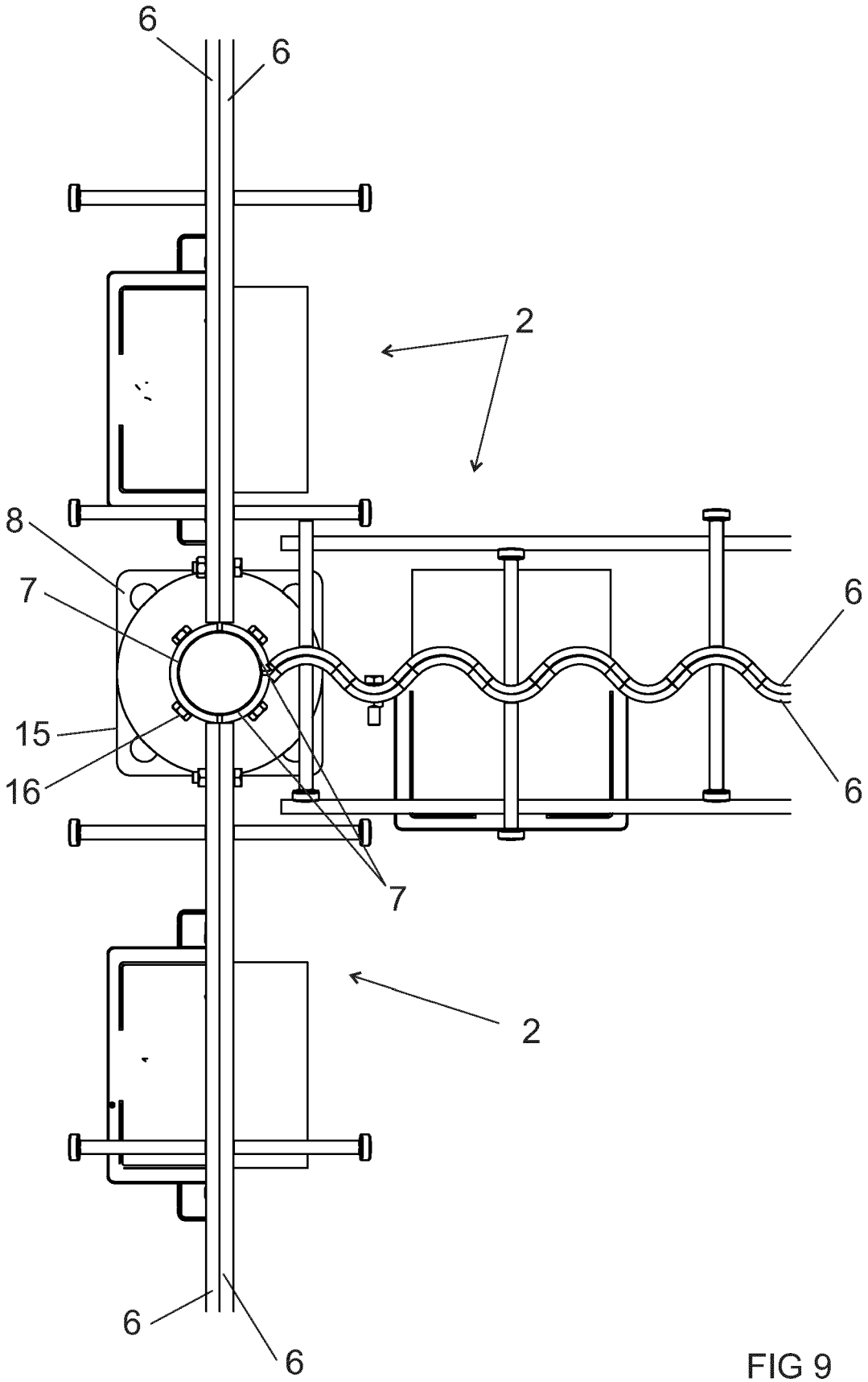

FIG 9

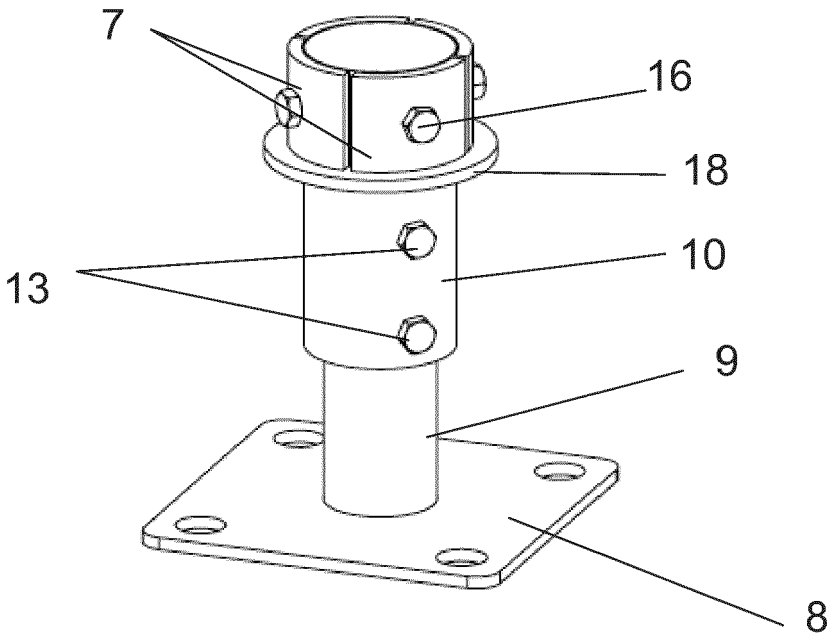

FIG 10

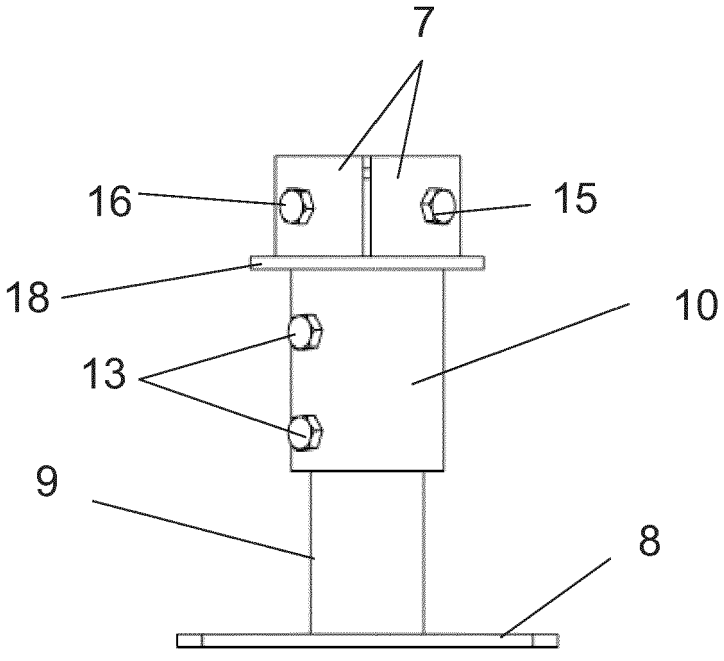

FIG 11

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EUROPEAN SEARCH REPORT

Application Number
EP 24 17 0516

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	FR 3 029 949 A1 (SIFLOOR [FR]) 17 June 2016 (2016-06-17)	1-12	INV. E01C11/14
Y	* page 1, paragraph 1 * * page 5, paragraph 5 * * page 7, paragraph 1 * * page 10, paragraph 1 - page 11, paragraph 5 * * figures 1-6 *	4,5,7,8	E01C11/08 E04B1/48 E04B1/68 E04F15/14
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Y	US 8 347 574 B2 (PLAKABETON SA [BE]; MICHIELS PIERRE [BE]) 8 January 2013 (2013-01-08) * column 4, lines 13-17 * * figure 7 *	7,8	
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TECHNICAL FIELDS SEARCHED (IPC)

E01C
E04B
E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 September 2024	Kerouach, May

CATEGORY OF CITED DOCUMENTS

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