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(54) **SWITCH DEVICE FOR AN OVERHEAD CONVEYOR**

(57) Switch device (1) for an overhead conveyor, comprising rail segments (2a, 2b), an intermediate piece (3) with an opening (5) and connecting grooves (4), suspension elements (6) for connecting the rail segments (2a, 2b) to the intermediate piece (3), wherein the suspension elements (6) comprise attachment means (7) which are fittable in the respective connecting grooves (4) for connecting the suspension elements (6) to the intermediate piece (3), and wherein the suspension elements (6) are configured to extend through said opening (5), wherein the connecting grooves (4) extend along a first direction which, in use, is upright, and wherein these connecting grooves (4) lead out on one side so that the attachment means (7) are fittable in the respective connecting grooves (4) along the first direction.

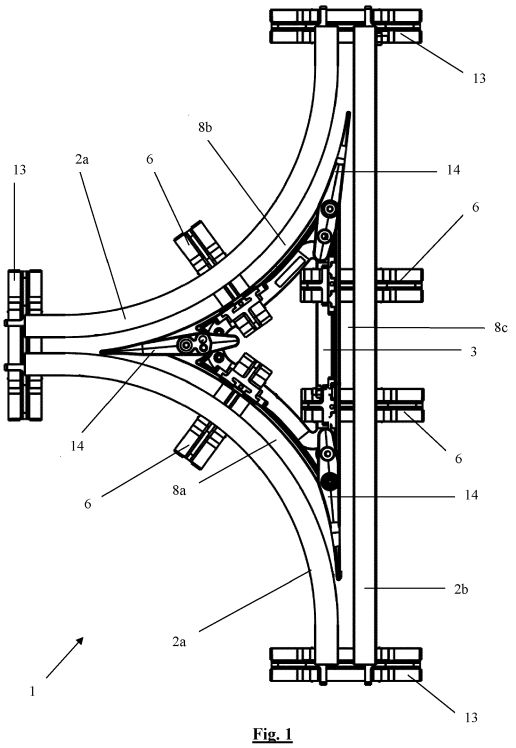

Fig. 1

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Description

[0001] The present invention relates to a switch device for an overhead conveyor, wherein this overhead conveyor comprises several rail tracks along which a load-bearing element is displaceable and holding elements for suspending these rail tracks, wherein each rail track is formed by two rails which are positioned a distance apart and suspended by means of said holding elements, wherein the switch device is connectable to three or several rail tracks for forming a switch between these rail tracks and wherein the switch device comprises the following:

- three or several rail segments,
- an intermediate piece comprising a base which surrounds an interior space and comprises connecting grooves which are arranged in the interior space, wherein the base comprises an opening at the top, so that the interior space is at least accessible through this opening,
- suspension elements for connecting the three or several rail segments to the intermediate piece in such a way that the three or several rail segments surround the intermediate piece and thus, together with the intermediate piece, form three or several tracks along which a load-bearing element is displaceable, wherein the suspension elements comprise attachment means which are fittable in the respective connecting grooves to connect the suspension elements to the intermediate piece, and wherein the suspension elements are configured to extend through said opening of the base when the intermediate piece is connected to the three or several rail segments.

[0002] The present invention also relates to an overhead conveyor comprising several rail tracks along which a load-bearing element is displaceable and holding elements for suspending these rail tracks, wherein each rail track comprises two rails which are positioned and suspended a distance apart and wherein the overhead conveyor comprises one or several switch devices for forming switches between these rail tracks.

[0003] Overhead conveyors comprising several rail tracks along which load-bearing elements are displaceable and comprising holding elements for suspending these rail tracks, wherein each rail track comprises two rails which are positioned and suspended at a distance apart by means of said holding elements, are frequently used to move meat, such as cattle carcasses. Thus, these overhead conveyors are used in slaughterhouses, butcheries, etc. However, these overhead conveyors may also be used in other industries, such as for example paint shops, laundries, etc.

[0004] Such overhead conveyors are also referred to by the terms bi-rail conveying device or twin-rail conveying device. By means of the holding elements, the rails are attached to a ceiling or the like and in the desired position. In order to be able to move a load-bearing element between different rail tracks, these overhead conveyors comprise switch devices by means of which it is possible to switch between the different rail tracks.

[0005] Such an existing switch device is illustrated in GB 2147863. This switch device comprises an intermediate piece and rail segments, wherein this intermediate piece and the rail segments are connectable to each other, positionable with respect to each other and suspendable from, for example, a ceiling by means of suspension elements. This intermediate piece is often referred to by the term 'chair'. When the intermediate piece and the rail segments are connected to each other, the switch device comprises tracks which are then connectable to rail tracks, so that it is possible to move a load-bearing element from one rail track to another desired rail track by means of this switch device. The problem with this existing switch device is that mounting the switch device in situ is laborious. With the switch device described in GB 2147863, the suspension elements comprise bolts which are fitted through upright passages of the intermediate piece. It requires considerable time and some expertise to fit this switch device. In this case, it is also necessary to provide separate suspension elements in order to be able to attach the intermediate piece to the rail segments. Switch devices in which the intermediate piece and the rail segments are attachable to one another by suspension elements which are identical to the holding elements of the rail tracks already exist. Here, the intermediate piece is then formed by attaching pieces of rails to each other, for example by welding these pieces together. By working with rails to form the intermediate piece, it is possible to ensure that suspension elements may be used which are virtually identical to the holding elements for the rail tracks. In this case, the rails of the intermediate piece comprise grooves which extend in the longitudinal direction, wherein the suspension elements are then provided with bolts which are fittable in these grooves. However, some expertise is necessary in order to be able to connect the suspension elements to this intermediate piece, since several suspension elements have to be connected to the intermediate piece and it is difficult to fit and attach all bolts of the suspension elements correctly and quickly in their respective grooves. An additional drawback is the fact that welding the components of the intermediate piece to each other may result in impeding weld seams which may impede the displacement of the load-bearing element at the location of the switch device. When fitting an overhead conveyor, fitting the switch devices is often the most time-consuming aspect. Also, when a switch device or parts of a switch device have to be replaced, this also takes up a lot of time.

[0006] It is therefore an object of the invention to produce a switch device which is easier to install.

[0007] This object is achieved by providing a switch device as described in the first paragraph of this description, in which the connecting grooves extend along a first direction, which, in use, is upright and in which these

connecting grooves lead out on one side so that the attachment means are fittable in the respective connecting grooves along the first direction.

[0008] In use, the rail tracks of an overhead conveyor for example extend virtually horizontally or at least extend in a plane which makes an angle of less than 60° with a horizontal plane. The first direction is an upright direction in use and thus extends from the bottom towards the top. Thus, the first direction is for example virtually the vertical direction or, in use, this first direction makes an angle of more than 60° with a horizontal plane. This means that it is readily possible in this case to connect the intermediate piece to the suspension elements, namely by moving the suspension elements and/or the intermediate piece along the first direction. Said opening which extends at the top, ensures that it is readily possible to fit the suspension elements through the intermediate piece in order thus to connect the intermediate piece to a respective suspension element in an easy manner. In this case, it is easy to fit the intermediate piece between the rail segments and along virtually the first direction and to then also connect the intermediate piece to the suspension elements along this first direction. It is thus possible to position the intermediate piece as desired with respect to the suspension elements and rail segments by means of only one movement and this in a way where all the attachment means together assume the desired position in the connecting grooves. As a result thereof, installation of the switch device may be carried out very quickly and is not very laborious either. Thus, this switch device may be installed twice as quickly of even three times as quickly than the existing switch devices. In this case, it is for example possible simultaneously to insert the attachment means in the respective connecting grooves of the intermediate piece and/or to slide the intermediate piece onto the attachment means and this along the first direction. Preferably, the attachment means comprise bolts and the suspension elements comprise corresponding nuts. It is simple to connect the suspension elements to the intermediate piece and the respective rail segments by means of connecting grooves, bolts and nuts. When use is made of bolts and nuts, the design of the connecting grooves is preferably such that the head of a bolt is fittable in said connecting groove via the first direction, but cannot move out of the connecting groove along a plane at right angles to this first direction. The suspension element is then preferably provided with a bolt-receiving component having a respective opening or hole through which the bolt can extend, so that the suspension element can then be connected to the intermediate piece by means of a nut. However, the suspension elements may also be provided with one or several protruding parts which form the attachment means, in which case these protruding parts are then slidable into the respective connecting grooves.

[0009] In a preferred embodiment, in use, the tracks of the switch device make an angle of at most 60°, preferably at most 45°, with a horizontal plane. Still more preferably, the tracks are configured to extend virtually horizontally in use.

[0010] Preferably, the tracks of the switch device in use extend in the same plane and the first direction extends substantially perpendicular to this plane.

[0011] In use, the connecting grooves preferably lead out at the bottom. It is then easily possible to move the intermediate piece downwards in order to connect the intermediate piece to the suspension elements.

[0012] Furthermore preferably, the connecting grooves only lead out at the bottom and the connecting grooves are bounded at the top. In this way, the intermediate piece can rest on the suspension elements in use. The intermediate piece is thus reliably held in place, which benefits the stability of the switch device. If the attachment means comprise, for example, bolts and nuts, the design of the base and the suspension elements is preferably such that the intermediate piece rests on the bolts and/or rests on other components of the suspension elements.

[0013] Furthermore, still more preferably, the base comprises a top part which comprises said opening and the connecting grooves are bounded at the top by the top part. Therefore, the switch device is extremely stable.

[0014] Furthermore, still more preferably, the top part is a panel-shaped top wall which centrally comprises said opening and the base comprises upright side walls which adjoin the top wall, wherein the side walls and the top wall together bound said interior space and wherein the intermediate piece comprises protruding elements at the location of the inwardly facing surfaces of the side walls which, together with the side walls, form said connecting grooves. Still more preferably, the connecting grooves are situated at a distance from the opening, viewed along a plane perpendicular to the first direction. In this embodiment, the top part can then reliably rest on the suspension elements in use, as a result of which a very stable combination is obtained and the switch device does not have any negative effect on the stability of the overhead conveyor. The protruding parts may have, for example, an L-shaped and/or a T-shaped cross section in order to form connecting grooves into which a head of a bolt is slidable in the first direction. Preferably, the number of side walls corresponds to the number of rail segments, wherein each of the rail segments then extends opposite a respective side wall, so that each track of the switch device extends between a rail segment and a side wall. If the intermediate piece comprises one or several pairs of said connecting grooves, wherein each pair is configured to be connected to one suspension element, the protruding elements then comprise, for each pair, for example a T-shaped protrusion which extends centrally and two outer L-shaped protrusions which face the T-shaped protrusion, in such a way that then two T-shaped grooves are present for each said pair of connecting grooves.

[0015] Also furthermore preferably, the base comprises an opening at the bottom through which the connecting grooves are accessible along the first direction. Here, the

connecting grooves are then easily accessible from below, as a result of which this switch device may be installed very quickly. This opening may be formed by said side walls.

[0016] In a preferred embodiment, each rail segment comprises a groove which extends along the longitudinal direction of the rail segment, wherein this groove forms a connecting groove of the rail segment in which a said suspension element can engage in order to attach the suspension element to the rail segment. Connecting elements such as bolts can easily be fitted in such a groove. Since the rails of an overhead conveyor often also comprise such grooves, it is then possible in this case to provide suspension elements which are similar to the holding elements, as a result of which the installation and construction of an overhead conveyor is very simple. Thus, only one type of such an element has to be provided for the overhead conveyor which can then serve as both a said holding element or as a said suspension element.

[0017] Preferably, the cross section of a rail segment virtually corresponds to the cross section of a rail of the overhead conveyor. Here, suspension elements may then be provided which are similar to the holding elements.

[0018] In a highly preferred embodiment, the intermediate piece comprises one or several pairs of said connecting grooves, wherein each pair is configured to be connected to one suspension element. In this way, it is possible to anchor the intermediate piece securely to the suspension elements in order thus to achieve an extremely strong unit. Thus, the suspension elements may then be provided with two bolts which are fittable in a said pair of connecting grooves.

[0019] Furthermore preferably, the suspension elements comprise a holding part which is configured to extend through said opening in use, wherein this holding part comprises two attachment means, being two bolts, and a bolt-receiving component through which the bolts are configured to extend along a direction which extends substantially perpendicular to the first direction. Here, it is easily possible to move the intermediate piece and/or the suspension elements along the first direction in order to fit the bolts in the respective connecting grooves. The bolt-receiving component may, for example, comprise two holes which, in use, are accessible along a direction which is in a plane at right angles to the first direction and in which said bolts are respectively fittable along this direction. Thus, this bolt-receiving component may be a panel-shaped element in which the holes are provided, so that the securing components then extend through this bolt-receiving component at the location of the holes.

[0020] A said suspension element preferably furthermore comprises two said holding parts wherein the one holding part is then configured to be connected to the intermediate piece and the other holding part is then configured to be connected to a respective rail segment or vice versa. Still more preferably, the holding parts of the suspension elements are virtually each other's mirror image. Here, the suspension elements may be symmetrical, as a result of which it is very easy to connect the suspension elements to the rail segments and the intermediate piece.

[0021] In a highly preferred embodiment, the intermediate piece is formed as a single piece, preferably by means of die-casting. In this case, the intermediate piece does not have any seams or the like, as a result of which a load-bearing element can easily move at the location of the switch device. Since it is formed as one piece, the intermediate piece also contributes to the stability of the switch device in this case.

[0022] In a specific embodiment, the switch device is configured to serve as a switch for three rail tracks and to this end the switch device comprises three rail segments. If the intermediate piece comprises said top wall and side walls, it then comprises three side walls in this case, each side wall, in use, extending opposite a rail segment.

[0023] Preferably, the switch device comprises connecting elements for connecting the switch device to rail tracks of an overhead conveyor. Still more preferably, the connecting elements and the suspension elements are of a virtually identical design. This is possible, for example, with an embodiment in which the suspension elements are each provided with 2 pairs of bolts, being 2 bolts which are connectable to the connecting grooves of the intermediate piece and two bolts which are connectable to the groove of a said rail segment. Such suspension elements are therefore also useful to connect the switch device to rail tracks, since with each pair of two bolts, the one bolt is attachable to the rail of a rail track and the other bolt is attachable to the rail segment. In a preferred embodiment, the switch device comprises one or several flip elements, which are configured to be displaceably connected to the intermediate piece to determine the track of the switch device to be followed.

[0024] The object of the invention is also achieved by providing an overhead conveyor comprising several rail tracks along which a load-bearing element is displaceable and holding elements to suspend these rail tracks, wherein each rail track comprises two rails which are positioned and suspended a distance apart by means of said holding elements and wherein the overhead conveyor comprises one or several switch devices for forming switches between these rail tracks, wherein the switch devices are switch devices as described above.

[0025] Preferably, the holding elements and the suspension elements are of a virtually identical design.

[0026] The present invention will now be explained in more detail by means of the following detailed description of a preferred embodiment of a switch device and an overhead conveyor according to the present invention. The sole aim of this description is to give illustrative examples and to indicate further advantages and features and may therefore by no means be interpreted as a limitation of the area of application of the invention or of the patent rights defined in the claims.

[0027] In this detailed description, reference numerals are used to refer to the attached drawings, in which:

- ***Fig. 1*** shows a bottom view of a switch device according to the invention;
- ***Fig. 2*** shows a perspective view of the switch device illustrated in Fig. 1, in which one connecting element is not shown;
- ***Fig. 3*** shows a detail view of Fig. 1, at the location of one suspension element;
- ***Fig. 4*** shows a top view of the intermediate piece of the switch device illustrated in Fig. 1;
- ***Fig. 5*** shows a bottom view of the intermediate piece illustrated in Fig. 4.

[0028] The switch device (1) illustrated in the figures is configured to serve as a switch in an overhead conveyor. This overhead conveyor comprises several rail tracks along which a load-bearing element is displaceable and holding elements for suspending these rail tracks from a ceiling or the like. Each rail track comprises two rails which are positioned and suspended a distance apart by means of said holding elements. The switch device (1) is used as a switch for three rail tracks and is to this end connectable to these three rail tracks. By means of this switch device (1), it is possible to choose to which of the other two rail tracks, a load-bearing element which is situated on one rail track, will be moved.

[0029] The switch device (1) comprises three rail segments (2a, 2b), being two curved rail segments (2a) and one straight rail segment (2b). The switch device (1) also comprises an intermediate piece (3) which is illustrated separately in Figs. 4 and 5. Furthermore, the switch device (1) comprises four suspension elements (6) for connecting the three rail segments (2a, 2b) to the intermediate piece (3) in such a way that the three rail segments (2a, 2b) surround the intermediate piece (3) and thus, together with the intermediate piece (3), form three tracks (8a, 8b, 8c) along which a load-bearing element is displaceable. These three tracks (8a, 8b, 8c) extend in one plane. The switch device (1) also comprises three connecting elements (13) which are identical to the suspension elements (6), wherein these connecting elements (13) are used to attach the switch device (1) to three rail tracks. Lastly, the switch device (1) also comprises three flip elements (14) which are configured to be rotatably connected to the intermediate piece (3) along axes which extend at right angles to the plane in which the tracks (8a, 8b, 8c) extend, so that it is possible to choose to which rail track the load-bearing element is moved by the choice of the position of the flip elements (14).

[0030] The intermediate piece (3) comprises a base which is composed of a top wall (9) which comprises a top surface which extends along a plane which is configured to extend virtually horizontally in use, or at least forms an angle of less than 45° with a horizontal plane. This aforementioned plane extends parallel to the plane in which the tracks (8a, 8b, 8c) extend. The top wall (9) comprises an opening (5) at the centre and, in addition, the base comprises three side walls (10) which adjoin the top wall (9) in such a way that the base surrounds an interior space. In this interior space, at the location of the inwardly facing surfaces of the side walls (10), groups of protruding elements (11a, 11b) are arranged which each together form two connecting grooves (4) with the base. Thus, there are 4 pairs (40) of two connecting grooves (4) present. Each group of protruding elements (11a, 11b) comprises a T-shaped protruding element (11a) and two outer L-shaped protruding elements (11b) so that each group of protruding elements (11a, 11b) forms two T-shaped connecting grooves (4), together with the side walls (10). These connecting grooves (4) extend along a first direction which extends virtually at right angles to the plane in which the top surface of the top wall (9) extends. These connecting grooves (4) lead out at the bottom and are bounded at the top by the top wall (9). In addition, the connecting grooves (4) are situated at a distance from the opening (5), viewed along the aforementioned plane, and are accessible via the bottom side of the intermediate piece (3), since the bottom side comprises an opening which is formed by the side walls (10).

[0031] Each suspension element (6) comprises two holding parts, one of which is configured to be connected to a rail segment (2a, 2b) and the other of which is configured to be connected to the intermediate piece (3) or vice versa. To this end, each holding part comprises a panel-shaped bolt-receiving component (12) with two holes, two bolts (7), in which the bolts (7) are fittable along a second direction which, in use, extends at right angles to the first direction, in the respective holes and nuts (15). In use, the bolts (7) extend through the bolt-receiving component (12) along the second direction. This is clearly visible in Fig. 3, in which only one bolt (7) per holding part is illustrated for the sake of clarity. In use, the holding part which is connected to the intermediate piece (3), extends through the opening (5) and the bolts (7) are fitted along the first direction in their respective connecting grooves (4) for the purpose of connection. The design of the connecting grooves (4) is such that the head of a said bolt (7) is fittable in the respective connecting groove (4) along the first direction, but the bolt (7) cannot be removed from the connecting groove (4) along a direction which extends in a plane which extends at right angles to the first direction once the head has been fitted in the respective connecting groove (4). By means of nuts (15) and said bolts (7), the suspension elements (6) are then connected to the intermediate piece (3) at a fixed position.

[0032] The rail segments (2a, 2b) comprise grooves which extend along their longitudinal direction, with these grooves serving as connecting grooves. The bolts (7) of the respective holding parts are then in this case fittable in these grooves along said longitudinal directions for the purpose of connecting the suspension elements (6) to the rail segments (2a, 2b).

Claims

1. Switch device (1) for an overhead conveyor, wherein this overhead conveyor comprises several rail tracks along which a load-bearing element is displaceable and holding elements for suspending these rail tracks, wherein each rail track is formed by two rails which are positioned a distance apart and suspended by means of said holding elements, wherein the switch device (1) is connectable to three or several rail tracks for forming a switch between these rail tracks and wherein the switch device (1) comprises the following:

    • three or several rail segments (2a, 2b),
    • an intermediate piece (3) comprising a base which surrounds an interior space and comprises connecting grooves (4) which are arranged in the interior space, wherein the base comprises an opening (5) at the top, so that the interior space is at least accessible through this opening (5),
    • suspension elements (6) for connecting the three or several rail segments (2a, 2b) to the intermediate piece (3) in such a way that the three or several rail segments (2a, 2b) surround the intermediate piece (3) and thus, together with the intermediate piece (3), form three or several tracks (8a, 8b, 8c) along which a load-bearing element is displaceable, wherein the suspension elements (6) comprise attachment means (7) which are fittable in the respective connecting grooves (4) to connect the suspension elements (6) to the intermediate piece (3), and wherein the suspension elements (6) are configured to extend through said opening (5) of the base when the intermediate piece (3) is connected to the three or several rail segments (2a, 2b).

    characterized in that the connecting grooves (4) extend along a first direction which, in use, is upright and in which these connecting grooves (4) lead out on one side so that the attachment means (7) are fittable in the respective connecting grooves (4) along the first direction.

2. Switch device (1) according to Claim 1, **characterized in that**, in use, said tracks (8a, 8b, 8c) of the switch device (1) extend in the same plane and the first direction extends substantially perpendicular to this plane.

3. Switch device (1) according to Claim 1 or 2, **characterized in that** the connecting grooves (4), in use, lead out at the bottom.

4. Switch device (1) according to Claim 3, **characterized in that** the base comprises a top part (9) which comprises said opening (5), and **in that** the connecting grooves (4) of the intermediate piece (3) are bounded at the top by the top part (9).

5. Switch device (1) according to Claim 4, **characterized in that** the top part (9) is a panel-shaped top wall (9) which centrally comprises said opening (5), and **in that** the base comprises upright side walls (10) which adjoin the top wall (9), wherein the side walls (10) and the top wall (9) together bound said interior space, and wherein the intermediate piece (3) comprises protruding elements (11a, 11b) at the location of the inwardly facing surfaces of the side walls (10) which, together with the side walls (10), form said connecting grooves (4).

6. Switch device (1) according to Claim 5, **characterized in that** the connecting grooves (4) are situated at a distance from the opening (5), viewed along a plane perpendicular to the first direction.

7. Switch device (1) according to Claim 5 or 6, **characterized in that** the base comprises an opening at the bottom through which the connecting grooves (4) are accessible along the first direction.

8. Switch device (1) according to one of the preceding claims, **characterized in that** the intermediate piece (3) comprises one or several pairs (40) of two said connecting grooves (4), wherein each pair (40) is configured to be connected to one suspension element (6).

9. Switch device (1) according to Claim 8, **characterized in that** the suspension elements (6) comprise a holding part which is configured to extend through said opening (5) in use, wherein this holding part comprises two attachment means (7), being two bolts (7), and a bolt-receiving component (12) through which the bolts (7) are configured to extend along a direction which extends substantially perpendicular to the first direction.

10. Switch device (1) according to Claim 9, **characterized in that** a said suspension element (6) comprises two said holding parts wherein the one holding part is then configured to be connected to the intermediate piece (3) and the other holding part is then configured to be connected to a respective rail segment (2a, 2b) or vice versa.

11. Switch device (1) according to one of the preceding claims, **characterized in that** the switch device (1) comprises connecting elements (13) for connecting the switch device (1) to rail tracks of an overhead conveyor.

12. Switch device (1) according to Claim 11, **characterized in that** the connecting elements (13) and the suspension elements (6) are of a virtually identical design.

13. Switch device (1) according to one of the preceding claims, **characterized in that** the switch device (1) comprises one or several flip elements (14) which are configured to be displaceably connected to the intermediate piece (3) to determine the track (8a, 8b, 8c) of the switch device (1) to be followed.

14. Overhead conveyor comprising several rail tracks along which a load-bearing element is displaceable and holding elements for suspending these rail tracks, wherein each rail track comprises two rails which are positioned and suspended a distance apart by means of said holding elements, and wherein the overhead conveyor comprises one or several switch devices (1) for forming switches between these rail tracks, **characterized in that** the switch devices (1) are switch devices (1) according to one or several of Claims 1 to 13.

15. Overhead conveyor according to Claim 14, **characterized in that** the holding elements and the suspension elements (6) are of a virtually identical design.

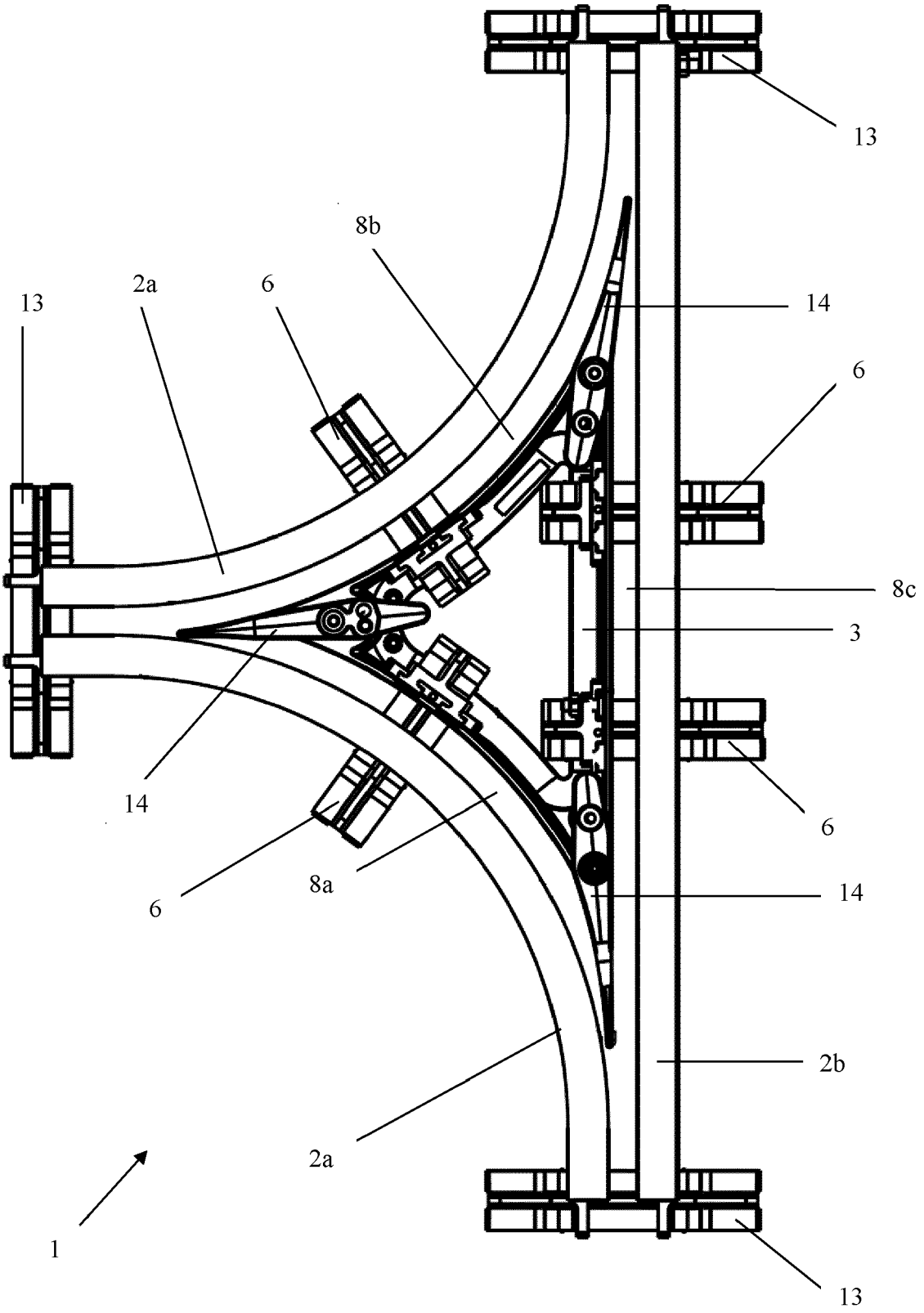

Fig. 1

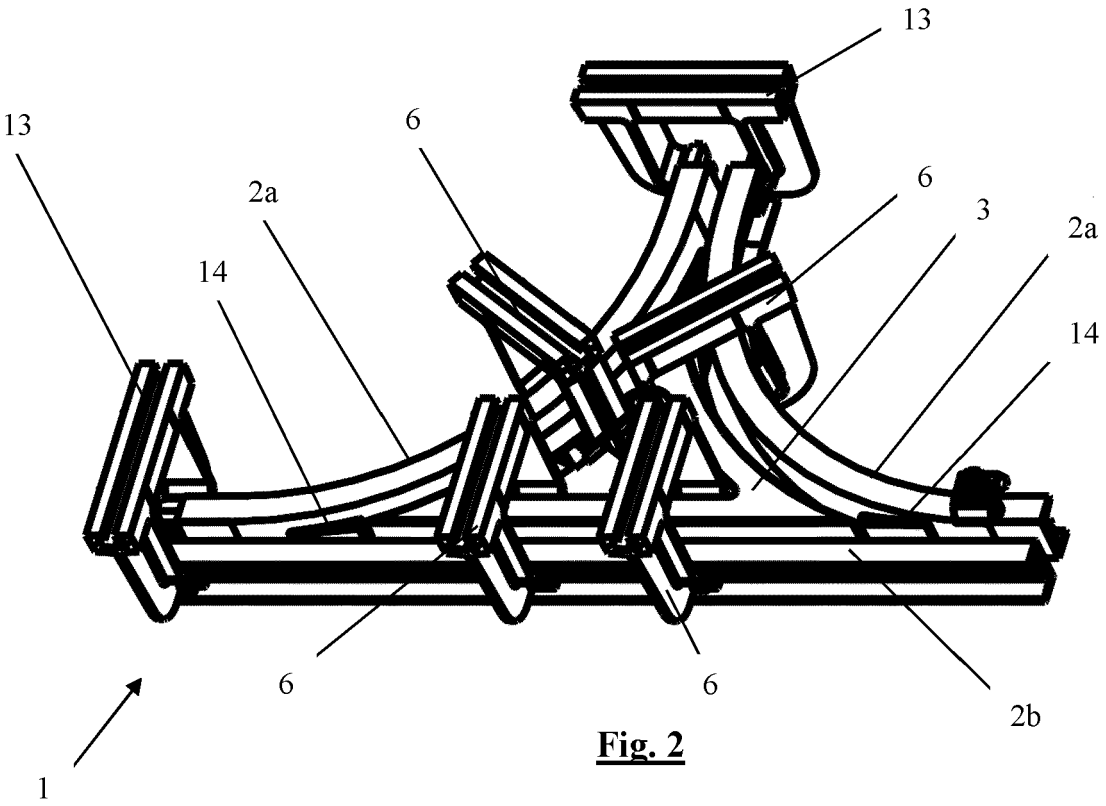

Fig. 2

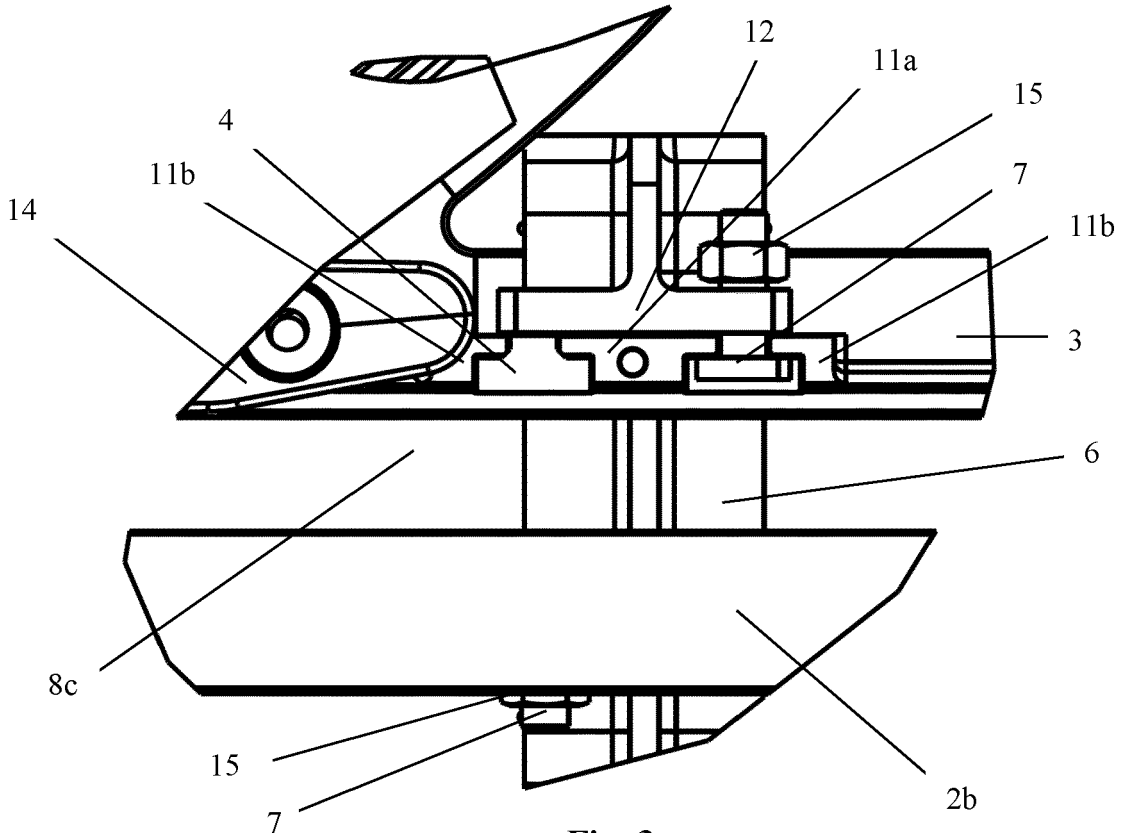

Fig. 3

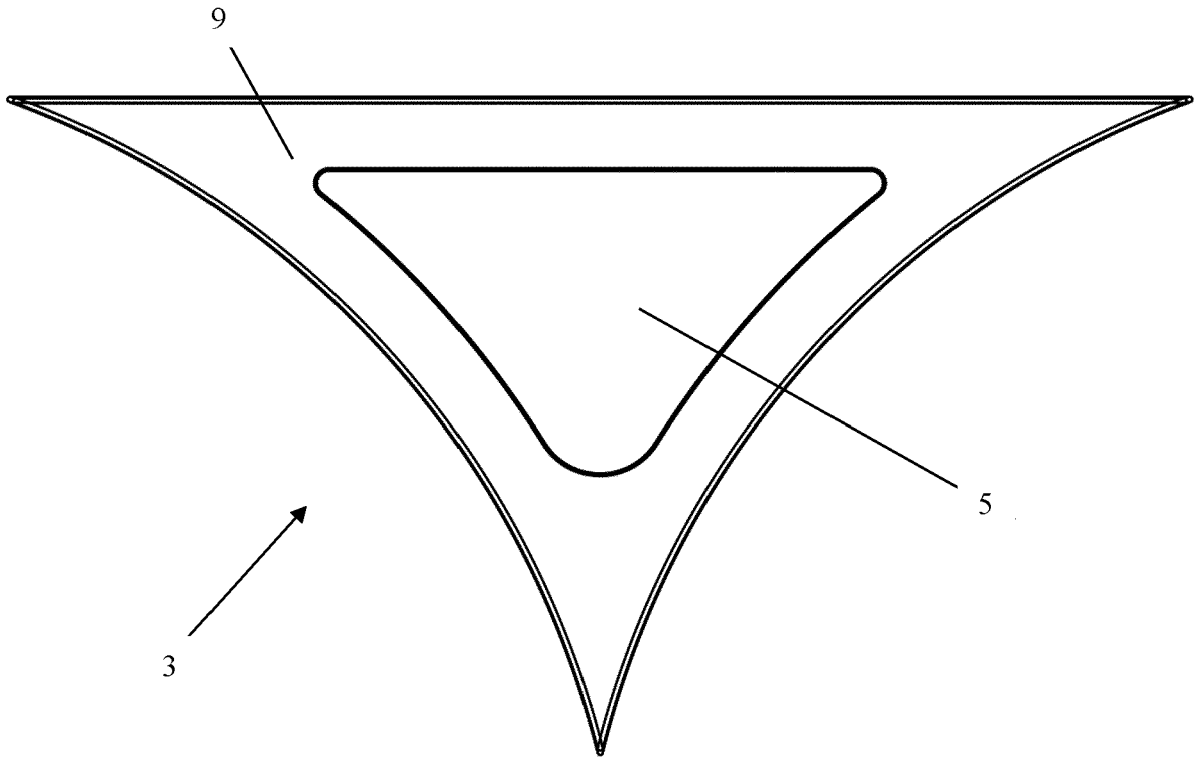

Fig. 4

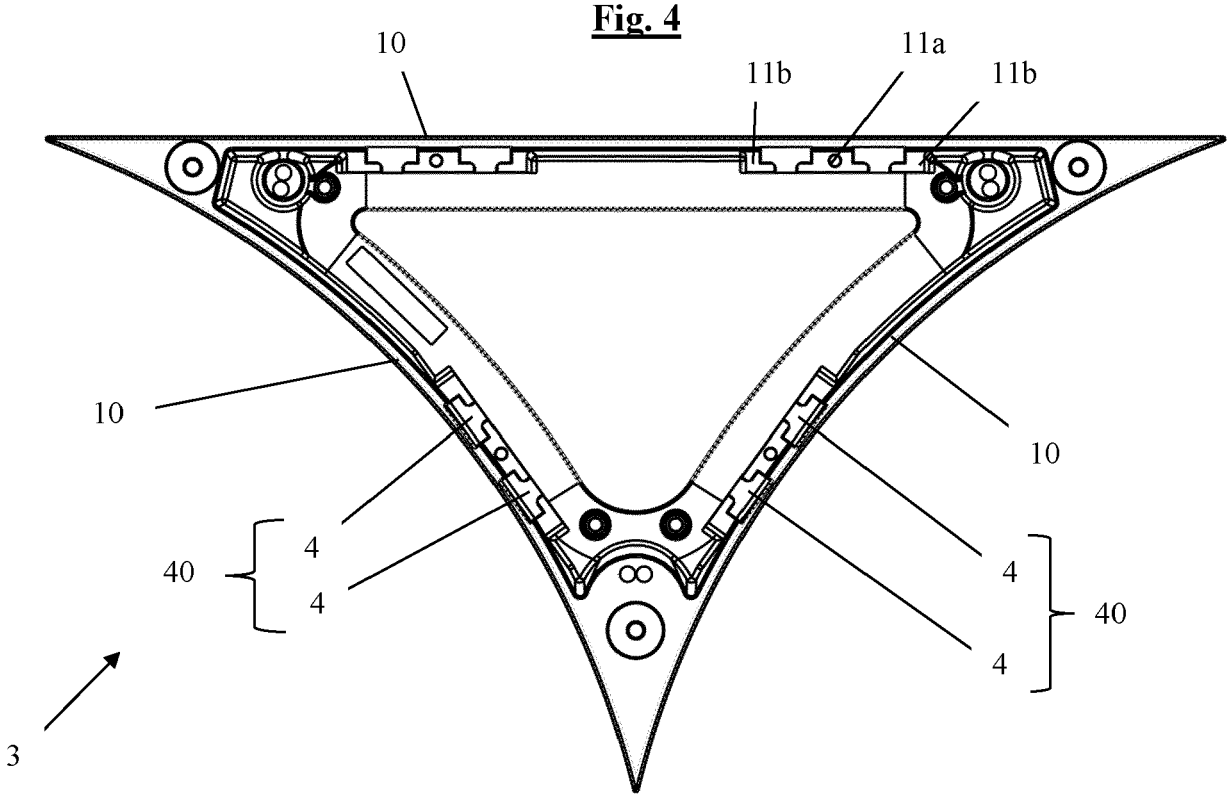

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 20 20 2944

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	GB 2 147 863 A (COUEDIC MADORE SARL) 22 May 1985 (1985-05-22) * the whole document *	1-15	INV. E01B25/26
A	FR 2 144 090 A5 (SUCMANU) 9 February 1973 (1973-02-09) * claims; figures *	1,15	
A	FR 2 126 554 A5 (LUCHAIRE SA) 6 October 1972 (1972-10-06) * claims; figures *	1,15	

TECHNICAL FIELDS SEARCHED (IPC)

E01B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 January 2021	Movadat, Robin

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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