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Remarks:

Amended claims in accordance with Rule 137(2) EPC.

(54) **CONTACT ASSEMBLY**

(57) A contact assembly for electrically connecting a first terminal (10) with a second terminal (20) that are rotatable relative to each other about a rotation axis (R) is disclosed. The assembly comprises: a plurality of conducting rings (110), each ring (110) of the plurality comprising a contact element (111) at its inner circle for contacting the first terminal (10); a plurality of isolating rings (120) alternatively stacked with the plurality of conducting rings (110) to form a stack of rings (110, 120), wherein the conducting rings (110) are electrically isolated from each other; a case (130) including a bearing (135, 136) for the stack of rings (110, 120), wherein the stack of rings (110, 120) is rotationally fixed relative to the first terminal (10); and a plurality of spring elements (140) electrically connected to the second terminal (20) and configured to provide multiple sliding electrical contacts to outer circles of the conducting rings (110) while rotating the first terminal (10) relative to the second terminal (20) about the rotational axis (R).

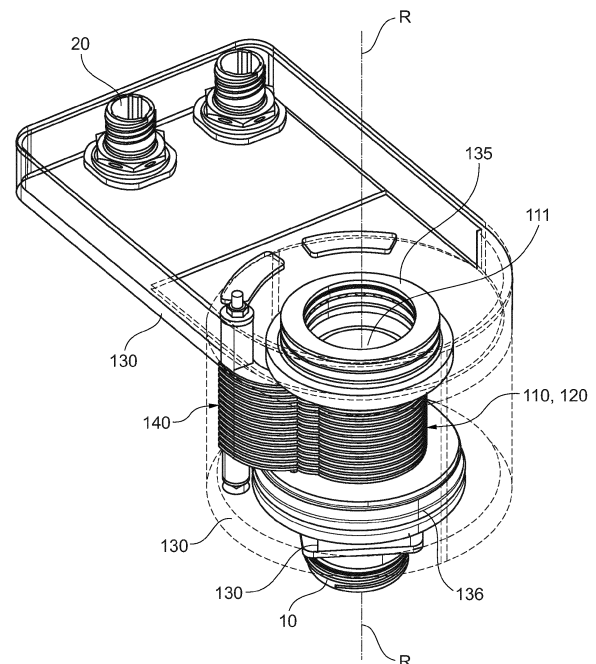


Fig. 1

Description

[0001] The present invention relates to a contact assembly and a radar system, and in particular, to a rotating electrical coupling.

BACKGROUND

[0002] Radar systems include, for example, a base unit and an antenna installation that is rotating relative to the base unit to scan a surveillance area. Since the antenna installation might be rotatable upon large angles or even continuously, there is a need to provide a reliable electrical contact between the antenna installation and the base unit while both components rotate relative to each other.

[0003] For a reliable operation it is important to maintain a solid electrical connection between the two separately rotating assemblies. Conventional solutions involve, for example, complex cabling systems or specialized external rotating assembly. The complex cabling systems are subject to problems with kinks, tangling and space constraints, whereas the external rotating devices are typically very expensive, very large and usually are limited in the number of cables that can be connected with each other.

[0004] Therefore, there is a need for a reliable rotatable contact, in particular if many electrical wires shall be connected (for example 20 or more wires). For this large number of wires there is a need for a contact assembly that can be realized in a compact way within a small available space.

SUMMARY OF THE INVENTION

[0005] At least some of the above-mentioned problems are solved by a contact assembly according to claim 1 and a radar system according to claim 11. The dependent claims refer to further advantageous realizations for the subject matters of the independent claims.

[0006] The present invention relates to a contact assembly for electrically connecting a first terminal with a second terminal that are rotatable relative to each other about a rotation axis. The assembly comprises a plurality of conducting rings, a plurality of isolating rings, a case, and a plurality of spring elements. Each ring of the plurality of conducting rings comprises a contact element at its inner circle for contacting the first terminal. The rings of the plurality of isolating rings are alternatively stacked with the plurality of conducting rings to form a stack of rings so that the conducting rings are electrically isolated from each other. The case includes a (pivot) bearing for the stack of rings, wherein the stack of rings is rotationally fixed relative to the first terminal. The spring elements of the plurality of spring elements are electrically connected to the second terminal and configured to provide multiple sliding electrical contacts to outer circles of the conducting rings while rotating the first terminal relative to the

second terminal about the rotational axis.

[0007] Optionally, the springs are finger-shaped and can be formed as leaf springs that are spring-loaded to provide a spring force. The sliding contact can be at an end portion of the finger-shaped springs or be made at an inner portion of the corresponding finger to allow rotations in both directions.

[0008] According to further embodiments, the case comprises a support for the plurality of spring elements, wherein the support is configured to hold the spring elements while each spring exerts a bias force on the outer circle of the respective conducting ring.

[0009] According to yet another embodiment, the bearing is configured to enable a relative rotation between the first terminal and the second terminal in one or both directions of more than 180° or more than 360° or to enable a continuous rotation about the rotation axis. It is understood that the possibility of rotations of more than 180° or more than 360° does not imply that it has to rotate about these angles. Instead, the contact assembly may rotate about any angle between 0° to a maximum angle, which may be more than 180° or 360°.

[0010] According to yet another embodiment, the contact of each of the conducting rings are formed along a helical path at the inner circles of the plurality of conducting rings so that adjacent conducting rings are contacted at their inner circles at different angular positions about the rotational axis.

[0011] According to yet another embodiment, the plurality of isolating rings extends radially further outwards than the plurality of conducting rings to provide grooves associated with each of the conducting rings, each groove guiding a corresponding spring element to prevent shorts between adjacent spring elements.

[0012] According to yet another embodiment, the spring elements of the plurality of spring elements are spaced, parallel to the rotational axis, from one another by a plurality of spacers arranged between adjacent spring elements to prevent electrical contacts between adjacent spring elements.

[0013] According to yet another embodiment, the support of the plurality of spring elements is a bolt attached to the case, each spring element of the plurality of spring elements may comprise a further contact element and all of them may be formed as a staircase about the bolt (e.g. neighboring spring elements are shifted in an angular direction relative to each other).

[0014] Embodiments allows a large number of electrical contacts at the first terminal and at the second terminals, e.g. are more than 5 or more than 10 or more than 20 can be electrically connected to one another. According to yet another embodiment, a first plurality of wires is arranged between the first terminal and the plurality of contacts elements at the inner circles of the conducting rings. Likewise, a second plurality of wires is arranged between the second terminal and the further contact elements at the spring elements.

[0015] According to yet another embodiment, the as-

sembly is configured to connect a rotating equipment to a fixed installation, wherein the case may comprise:

- a first case portion for supporting the first terminal and the stack of rings to provide an electrical connection to the rotating equipment; and
- a second case portion for supporting the second terminal to provide an electrical connection to the fixed equipment.

[0016] According to yet another embodiment, the second case portion includes a plate part extending at least partially perpendicular to the rotational axis for securing it to the fixed equipment, wherein the stack of rings forms a cylinder about the rotational axis. For example, the case can have a tube-like portion along the rotational axis and, along a cross-sectional plane thereto, a holding portion enabling a secure mounting of the contact assembly during rotation.

[0017] According to yet another embodiment some or all rings of the plurality of conducting rings are made of electrically conducting material in one or more angular sections (only). Each angular section may include a contact element at its inner circle. The angular sections can be isolated from each other so that the rings are electrically conductive only the in angular sections.

[0018] Optionally, each ring of the plurality of conducting rings are made of electrically conducting material in multiple angular sections. For example, the rings may include electrically isolating portions every 90°, 120° or 180° (i.e. there may be four, three or two angular sections that are isolated from each other). Similarly, at least some spring elements of the plurality of spring elements are arranged to contact multiple angular sections of one or more conducting rings simultaneously. For example, there may be multiple supports of the spring elements to contact the rings in the angular sections, i.e. at different angular positions.

[0019] Thus, embodiments may utilize half rings (or three- or four-part rings) allowing for at least twice as many wires in the same length but with a reduction in movement allowance to under 180°.

[0020] According to yet another embodiment, the assembly comprises a switching circuitry that is configured to compensate a switching performed by the spring elements when moving from one angular section to a next angular section upon rotation about the rotation axis. As a result, a signal path (or all signal paths) between lines of the first terminal and second terminal remains intact. For example, during the rotation, a given line of the first terminal remains in an electrical contact with the same line of the second terminal (no switching of lines caused by the rotation).

[0021] Embodiments relate also to a radar system with: a base unit, an antenna installation, and an assembly as defined before to electrically contact the antenna installation with the base unit. The base unit may be connected to the second terminal and may define a fixed assembly

(e.g. not subject to any centrifugal force during normal operation), whereas the antenna installation may be connected to the first terminal and may define a rotating assembly (e.g. subject to a centrifugal force during normal operation).

[0022] Embodiments overcome the problems of conventional systems by using a series of rings which are alternating between conductive and isolating rings and using spring-loaded contact elements to establish the electric contact between two relative rotating assemblies.

[0023] Advantages of embodiments relate in particular to the compact design, because the rotating electrical connection can be maintained in a very small package with this design. The only restraint on the number of cables being carried is the available axial length of the assembly. Therefore, this contact assembly can be scaled to a large amount of lines that can be contacted with each other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] Various embodiments of the present invention will be described in the following by way of examples only, and with respect to the accompanying drawings, in which:

- Fig. 1 depicts an overview of a contact assembly according to an embodiment of the present invention.
- Fig. 2 depicts a cross-sectional view through the stack of conducting rings and isolating rings.
- Fig. 3 illustrates the line routing inside the contact assembly.
- Fig. 4 depicts the fixation of the stack of rings between bearings by an exemplary screw connection.

DETAILED DESCRIPTION

[0025] Various examples will now be described more fully with reference to the accompanying drawings in which some examples are illustrated. Accordingly, while examples are capable of various modifications and alternative forms, the illustrative examples in the figures and will herein be described in detail. It should be understood, however, that there is no intent to limit examples to the particular forms disclosed, but on the contrary, examples are to cover all modifications, equivalents, and alternatives falling within the scope of the disclosure. Like numbers refer to like or similar elements throughout the description of the figures.

[0026] It will be understood that when an element is referred to as being "connected" or "coupled" to another element, it can be directly connected or coupled to the other element or intervening elements may be present. In contrast, when an element is referred to as being "directly connected" or "directly coupled" to another element, there are no intervening elements present. Other words used to describe the relationship between ele-

ments should be interpreted in a like fashion (e.g., "between" versus "directly between," "adjacent" versus "directly adjacent," etc.).

[0027] The terminology used herein is for the purpose of describing illustrative examples only and is not intended to be limiting. As used herein, the singular forms "a," "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises," "comprising," "includes" and/or "including," when used herein, specify the presence of stated features, steps, operations, elements and/or components, but do not preclude the presence or addition of one or more other features, steps, operations, elements, components and/or groups thereof.

[0028] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which examples belong. It will be further understood that terms, e.g., those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0029] Fig. 1 depicts a contact assembly according to an embodiment of the present invention. This contact assembly is configured for an electrical contact of a first electrical terminal 10 with a second electrical terminal 20 which are rotatable relative to each other about a rotational axis R. The assembly comprises a plurality of conducting rings 110, each ring 110 comprising a contact element 111 at its inner circle for contacting the first terminal 10. The assembly further comprises a plurality of isolating rings 120 alternatively stacked with the plurality of conducting rings 110 so that the conducting rings 110 are electrically isolated from each other and form together with isolating rings 120 a stack of rings 110, 120 that form a cylinder about the rotational axis R. The assembly comprises further a case 130 with pivot bearings 135, 136 for the stack of rings 110, 120, wherein the stack of rings 110, 120 is rotationally fixed relative to the first terminal 10. The case 130 may not only provide a housing, but also a support structure or frame for the components like the bearings 135, 136 and the stack of rings 110, 120.

[0030] To implement the electrical contact, the contact assembly includes a plurality of springs elements 140 configured to provide multiple sliding electrical contacts between the second terminal 20 and outer circles of rings 110 of the plurality of conducting rings 110 while rotating the first terminal 10 relative to the second terminal 20 about the rotational axis R. The spring elements 140 may be held by a bolt 134 (or any other support) and are spring loaded to exert a bias force on an outer surface of the conducting rings 110 to maintain a reliable electric contact during rotation.

[0031] When assembling the assembly this bolt construction 134 may be rotated so that the spring elements

140 are separated from the conducting rings 110 or vice-versa and the stack of rings 110, 120 may be placed between the bearings 135, 136. Finally, the spring elements 140 can be pressed on the conducting rings 110.

[0032] It is understood that the form of the spring elements 140 can be different from the depicted finger-form that are contacted at their end portions. For example, if rotations in both directions shall be allowed for the contact assembly, the spring elements 140 can contact the conducting rings 110 at inner portions of the finger-shaped spring elements 140.

[0033] Fig. 2 depicts a cross-sectional view along the rotational axis R through the stack of conducting rings 110 and isolating rings 120 that define the cylinder about the rotational axis R. This view depicts further details of the first terminal 10 that is formed as a plug connector into which a first cable with multiples lines can be inserted, wherein the connections wires to the conductive rings 110 are not shown in Fig. 2. This first cable may be connected to a rotating assembly whereas a second cable connected to the second terminal 20 may be connected to a stationary assembly.

[0034] To secure the first cable at the first terminal 10, the case 130 may comprise a first case portion 131 which is rotationally fixed to first terminal 10. The first case portion 131 may provide support for the stack of rings 110, 120 to hold them as rotatable about the axis R. Moreover, the case 130 may include a second case portion 132 that holds the second terminal 20, the spring elements 140, and the bearings 135, 136. In the depicted embodiment, the second terminal 20 is formed at the second case portion 132 that extends in the direction perpendicular to the rotational axis R to mount the case 130 to the exemplary stationary assembly (not shown).

[0035] Each of the conducting rings 110 comprises the contact element 111 that provides a contact for the lines from the first terminal to an inner circle of the respective conducting ring 110. These contact elements 111 are shifted with respect to each other to simplify the wire arrangement inside the stack of rings 110, 120. The contact elements 111 may be arranged in a helical shape on an inner surface of the stack of rings 110, 120 (like a spiral stairway). The step depth (angular offset) between neighboring contact elements 111 can be adjusted freely. In particular, enough spacing can be provided to prevent electrical shorts. For example, the contact elements 111 can be arranged such that, when viewed along the axis R, neighboring contact elements 111 do not overlap.

[0036] In a similar or same way, the spring elements 140 may include further contact elements (not shown) on their sides which remain exposed after stacking the individual spring elements 140. These further contact elements, too, can be arranged in a helical or staircase shape (e.g. around a support bolt 134 that holds the spring elements) in order to allow wires to contact separately one of the spring elements 140 without risking any shorts.

[0037] According to embodiments, the spring elements

140 are stacked onto each other, wherein each adjacent spring elements 140 may be separated by an isolating element arranged between each two adjacent spring elements 140 to maintain a reliable electrical isolation. Likewise, the bolt support 134 may be formed by an isolated material or is coated therewith to maintain the electrical isolation.

[0038] According to yet another embodiment, each of the isolating rings 120 may extend radially further outward than the neighboring conducting rings 110. As a result, the outer circles of the conducting rings 110 and the isolating rings 120 form a groove structure, in which respective spring elements 140 are guided by side walls formed by outer portions of the isolating rings 120. This has advantage of further preventing short contacts between adjacent spring elements 140.

[0039] Fig. 3 depicts another cross-sectional view along the axial direction of the cylindrical stack of rings 110, 120 that illustrate the line routing of the wires to the terminals 10, 20. According to this embodiment the first terminal 10 includes multiples lines connected with respective first wires 12. Likewise, the second terminal 20 includes multiple lines, each being connected with respective second wires 22 that provide electrical paths to further contact elements on the individual spring elements 140.

[0040] These further contact elements, too, can be formed as stairway around the support 134 of the spring elements 140. The (spiral) stairway formed by the contact elements 111 and by the further contact elements on the spring elements 140 provide the advantage that the thereby spaced cable routing of the wires 12, 22 (ideally) circumvent any direct contact of the wires 12, 22. Since the signals through these wires may have a high frequency, this separation improves the (e.g. inductive) decoupling of the respective signal paths.

[0041] Fig. 4 depicts another cross-sectional view along the axial direction of the cylindrical stack of rings 110, 120 in another angular plane when compared to Fig. 3. This view illustrates the support of the stack of rings 110, 120 by the first case portion 131 between a first bearing 135 and a second bearing 136. For example, the stack of rings 110, 120 may be held on both sides in the axial direction between a first plate 131a and a second plates 131b, both being attached to each other by a connection element 137 (e.g. a screw connection) that presses the stack of rings 110, 120 onto each other. This provides the needed mechanical support so that the stack rings 110, 120 are rigid to rotate together as a bloc during the operation.

[0042] According to another embodiment, conductive half rings or multiple-part rings are utilized. For example, the conducting half rings 110 in Fig. 4 can be electrically isolated along the depicted cross-section and attached to each other, e.g. with an isolating strip in between the two halves. Or, the exemplary conductive half rings are formed and supported by the isolating rings and an air gap is formed between the half rings.

[0043] Thus, conductive semi circles (or more than two angular sections) replacing a single complete conductive ring 110 shall fall within the scope of the present invention.

5 **[0044]** This would allow at least twice as many lines to be carried in the same space as the other embodiment. In this embodiment, the rotations may be limited to movements under 180°. However, it is also possible to utilized an electronic switching circuitry that connects automatically the lines as desired (e.g. reverses the switching performed by the spring element when moving from one angular section to the next). It is further understood, that it would also be possible to use other multiples - cutting the ring into 3 (with movement reduced to under 120°) or 4 (reduced to under 90°), etc.

10 **[0045]** Advantageous aspects of embodiments can be summarized as follows:

The contact assembly may be a rotating coupling of at least one cable coupled to the top portion (second terminal(s) 20) to another cable at the lower portion (first terminal 10). The top portion may be fixed to a stationary external assembly. The individual cables or lines from the cable(s) at the second terminal 20 may be separated and passed through the coupling structure to the spring-loaded contact elements at the interface with the rotating coupling. The lower half of the rotating coupling may be fixed to a second external assembly which may be referred to as the rotating assembly.

20 **[0046]** The lower half of the rotating coupling includes the series of rings 110, 120, alternatively conducting and isolating, and a housing (case 130). A cable from the rotating assembly (or multiple cables) can pass into the lower half via the first terminal of the rotating coupling and may again be separated into individual lines and passed inside the structure to conducting rings 110. The sliding contact between the conducting rings 110 and the spring-loaded contacts 140 provide the electrical connection between the fixed assembly and the rotating assembly. The contact is maintained throughout the rotation due to the spring-loaded contact mechanism.

30 **[0047]** Embodiments provide the particular advantage that the contact assembly allows to electrically connect a large number of lines with each other. Only the axial length has to be increased in accordance with the number of lines to be contacted with each other. Therefore, the assembly can be scaled to any particular number of lines that shall be connected with each other. For example, with this design it is possible to connect 10 or 20 or even more electrical lines with each other. In addition, the risk of shorts can be effectively avoided by the contact elements 111 being formed as a spiral stairway.

35 **[0048]** The description and drawings merely illustrate the principles of the disclosure. It will thus be appreciated that those skilled in the art will be able to devise various arrangements that, although not explicitly described or shown herein, embody the principles of the disclosure and are included within its scope.

40 **[0049]** Furthermore, while each embodiment may

stand on its own as a separate example, it is to be noted that in other embodiments the defined features can be combined differently, i.e. a particular feature described in one embodiment may also be realized in other embodiments. Such combinations are covered by the disclosure herein unless it is stated that a specific combination is not intended.

List of reference signs

[0050]

10	first (electrical) terminal	
12	first wires for contacting the first terminal	
20	second (electrical) terminal	
22	second wires for contacting the second terminal	
110	conducting ring(s)	
111	contact elements of respective conducting rings	
120	isolating ring(s)	
130	case	
131	first case portion (e.g. rotatable)	
132	second case portion (e.g. fixed; stationary)	
134	support (e.g. a bolt) for the spring elements	
135,136	pivot bearing(s)	
140	spring elements	
R	rotation axis	

Claims

1. A contact assembly for electrically connecting a first terminal (10) with a second terminal (20) that are rotatable relative to each other about a rotation axis (R), the assembly comprising:

a plurality of conducting rings (110), each ring (110) of the plurality comprising a contact element (111) at its inner circle for electrically contacting the first terminal (10);

a plurality of isolating rings (120) alternatively stacked with the plurality of conducting rings (110) to form a stack of rings (110, 120), wherein the conducting rings (110) are electrically isolated from each other;

a case (130) including a bearing (135, 136) for the stack of rings (110, 120), wherein the stack of rings (110, 120) is rotationally fixed relative to the first terminal (10); and

a plurality of spring elements (140) electrically connected to the second terminal (20) and configured to provide multiple sliding electrical contacts to outer circles of the conducting rings (110) while rotating the first terminal (10) relative to the second terminal (20) about the rotational axis (R).

2. The assembly according to claim 1, the case (130) comprising a support (134) for the plurality of spring elements (140), wherein the support (134) is configured to hold the spring elements (140) while each spring (140) exerts a bias force on the outer circle of the respective conducting ring (110).

3. The assembly according to claim 1 or claim 2, wherein the bearing (135, 136) is configured to enable a relative rotation between the first terminal (10) and the second terminal (20) in one or both directions of more than 180° or more than 360° or to enable a continuous rotation about the rotation axis (R).

4. The assembly according to one of the preceding claims, wherein the contact elements (111) of each of the conducting rings (110) are formed along a helical path at the inner circles of the plurality of conducting rings (110) so that adjacent conducting rings (110) are contacted at their inner circles at different angular positions about the rotational axis (R).

5. The assembly according to one of the preceding claims, wherein the plurality of isolating rings (120) extends radially further outwards than the plurality of conducting rings (110) to provide grooves associated with each of the conducting rings (110), each groove guiding a corresponding spring element (140) to prevent shorts between adjacent spring elements (140).

6. The assembly according to one of the preceding claims, wherein the plurality of spring elements (140) are spaced from one another, in a direction parallel to the rotational axis (R), by a plurality of spacers arranged between adjacent spring elements to prevent electrical contacts between adjacent spring elements (140).

7. The assembly according to one of the preceding claims, wherein the support (134) of the plurality of spring elements (140) is a bolt (134) attached to the case (130), each spring element (140) of the plurality of spring elements (140) comprising a further contact element and all further contact elements form a staircase about the bolt (134).

8. The assembly according to claim 7, further comprising:

a first plurality of wires (12) arranged between the first terminal (10) and the plurality of contact elements (111) at the inner circles of the conducting rings (110); and a second plurality of wires (22) arranged between the second terminal (20) and the further contact elements.

9. The assembly according to one of the preceding claims, wherein the assembly is configured to connect a rotating equipment to a fixed installation, the case (130) comprising:

a first case portion (131) for supporting the first terminal (10) and the stack of rings (110, 120) to provide an electrical connection to the rotating equipment; and
a second case portion (132) for supporting the second terminal (20) to provide an electrical connection to the fixed equipment.

10. The assembly according to claim 9, wherein the second case portion (132) includes a plate part extending at least partially perpendicular to the rotational axis (R) for securing it to the fixed equipment, and wherein the stack of rings (110, 120) forms a cylinder about the rotational axis (R).

11. The assembly according to one of the preceding claims, wherein some or all rings of the plurality of conducting rings (110) are made of electrically conducting material only in one or more angular sections each of which including a contact element (111) at its inner circle.

12. The assembly according to claim 11, wherein each ring of the plurality of conducting rings (110) are made of electrically conducting material in multiple angular sections, and wherein the multiple angular sections of one or more conducting rings (110) are contacted simultaneously by some spring elements of the plurality of spring elements (140).

13. The assembly according to claim 11 or claim 12, further comprising a switching circuitry configured to compensate a switching performed by the spring elements (140) when moving from one angular section to a next angular section upon rotation about the rotation axis (R) so that a signal path between lines of the first terminal (10) and second terminal (20) remains intact.

14. A radar system with:

a base unit;
an antenna installation; and
an assembly according to one of the preceding claims to electrically contact the antenna installation with the base unit.

Amended claims in accordance with Rule 137(2) EPC.

1. A contact assembly for electrically connecting a first terminal (10) with a second terminal (20) that are rotatable relative to each other about a rotation axis (R), the assembly comprising:

a plurality of conducting rings (110), each ring (110) of the plurality comprising a contact element (111) at its inner circle for electrically contacting the first terminal (10);
a plurality of isolating rings (120) alternatively stacked with the plurality of conducting rings (110) to form a stack of rings (110, 120), wherein the conducting rings (110) are electrically isolated from each other;
a case (130) including a bearing (135, 136) for the stack of rings (110, 120), wherein the stack of rings (110, 120) is rotationally fixed relative to the first terminal (10);

characterized by

a plurality of finger-shaped spring elements (140) electrically connected to the second terminal (20) and configured to provide multiple sliding electrical contacts to outer circles of the conducting rings (110) while rotating the first terminal (10) relative to the second terminal (20) about the rotational axis (R).

2. The assembly according to claim 1, the case (130) comprising a support (134) for the plurality of spring elements (140), wherein the support (134) is configured to hold the spring elements (140) while each spring (140) exerts a bias force on the outer circle of the respective conducting ring (110).

3. The assembly according to claim 1 or claim 2, wherein the bearing (135, 136) is configured to enable a relative rotation between the first terminal (10) and the second terminal (20) in one or both directions of more than 180° or more than 360° or to enable a continuous rotation about the rotation axis (R).

4. The assembly according to one of the preceding claims, wherein the contact elements (111) of each of the conducting rings (110) are formed along a helical path at the inner circles of the plurality of conducting rings (110) so that adjacent conducting rings (110) are contacted at their inner circles at different angular positions about the rotational axis (R).

5. The assembly according to one of the preceding claims, wherein the plurality of isolating rings (120) extends radially further outwards than the plurality of conducting rings (110) to provide grooves associated with each of the conducting rings (110), each

groove guiding a corresponding spring element (140) to prevent shorts between adjacent spring elements (140).

6. The assembly according to one of the preceding claims, wherein the plurality of spring elements (140) are spaced from one another, in a direction parallel to the rotational axis (R), by a plurality of spacers arranged between adjacent spring elements to prevent electrical contacts between adjacent spring elements (140). 5
7. The assembly according to one of the preceding claims, wherein the support (134) of the plurality of spring elements (140) is a bolt (134) attached to the case (130), each spring element (140) of the plurality of spring elements (140) comprising a further contact element and all further contact elements form a staircase about the bolt (134). 10 15
8. The assembly according to claim 7, further comprising:
a first plurality of wires (12) arranged between the first terminal (10) and the plurality of contact elements (111) at the inner circles of the conducting rings (110); and 25
a second plurality of wires (22) arranged between the second terminal (20) and the further contact elements. 30
9. The assembly according to one of the preceding claims, wherein the assembly is configured to connect a rotating equipment to a fixed installation, the case (130) comprising: 35
a first case portion (131) for supporting the first terminal (10) and the stack of rings (110, 120) to provide an electrical connection to the rotating equipment; and 40
a second case portion (132) for supporting the second terminal (20) to provide an electrical connection to the fixed equipment.
10. The assembly according to claim 9, 45
wherein the second case portion (132) includes a plate part extending at least partially perpendicular to the rotational axis (R) for securing it to the fixed equipment,
and wherein the stack of rings (110, 120) forms a cylinder about the rotational axis (R). 50
11. The assembly according to one of the preceding claims, 55
wherein some or all rings of the plurality of conducting rings (110) are made of electrically conducting material only in one or more angular sections each of which including a contact element (111) at its inner

circle.

12. The assembly according to claim 11, wherein each ring of the plurality of conducting rings (no) are made of electrically conducting material in multiple angular sections, and wherein the multiple angular sections of one or more conducting rings (110) are contacted simultaneously by some spring elements of the plurality of spring elements (140).
13. The assembly according to claim 11 or claim 12, further comprising a switching circuitry configured to compensate a switching performed by the spring elements (140) when moving from one angular section to a next angular section upon rotation about the rotation axis (R) so that a signal path between lines of the first terminal (10) and second terminal (20) remains intact.
14. A radar system with:
a base unit;
an antenna installation; and
an assembly according to one of the preceding claims to electrically contact the antenna installation with the base unit.

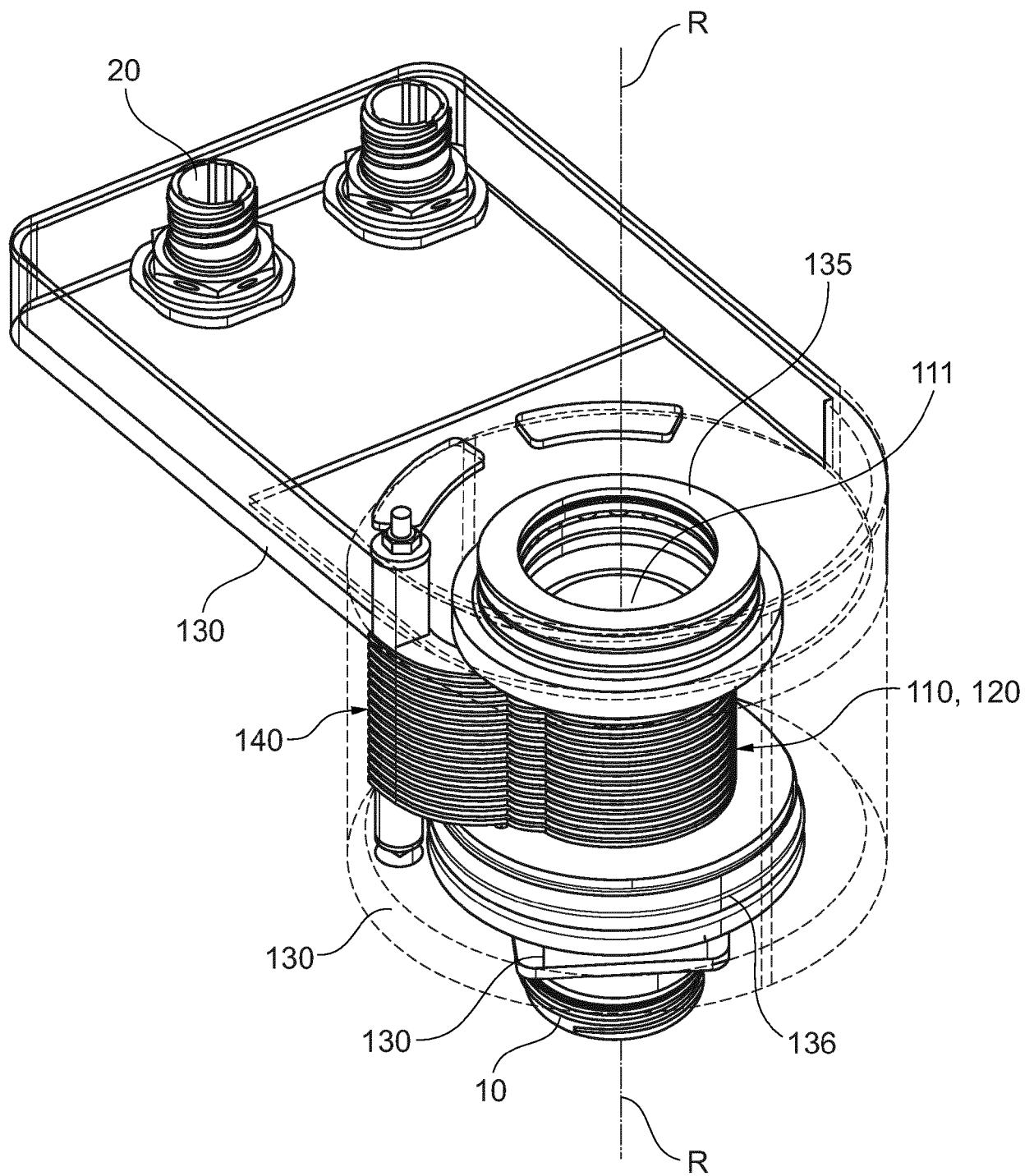


Fig. 1

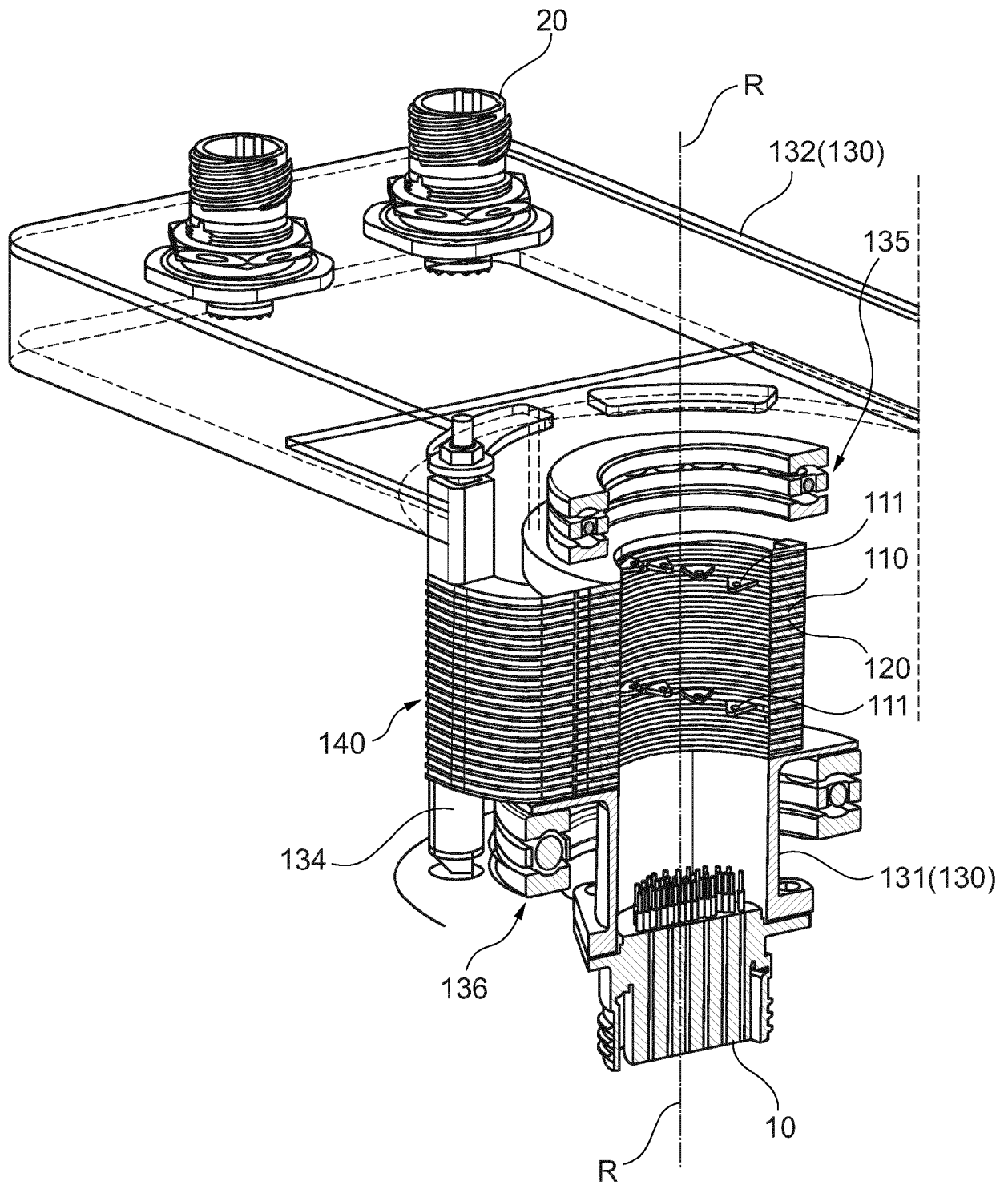


Fig. 2

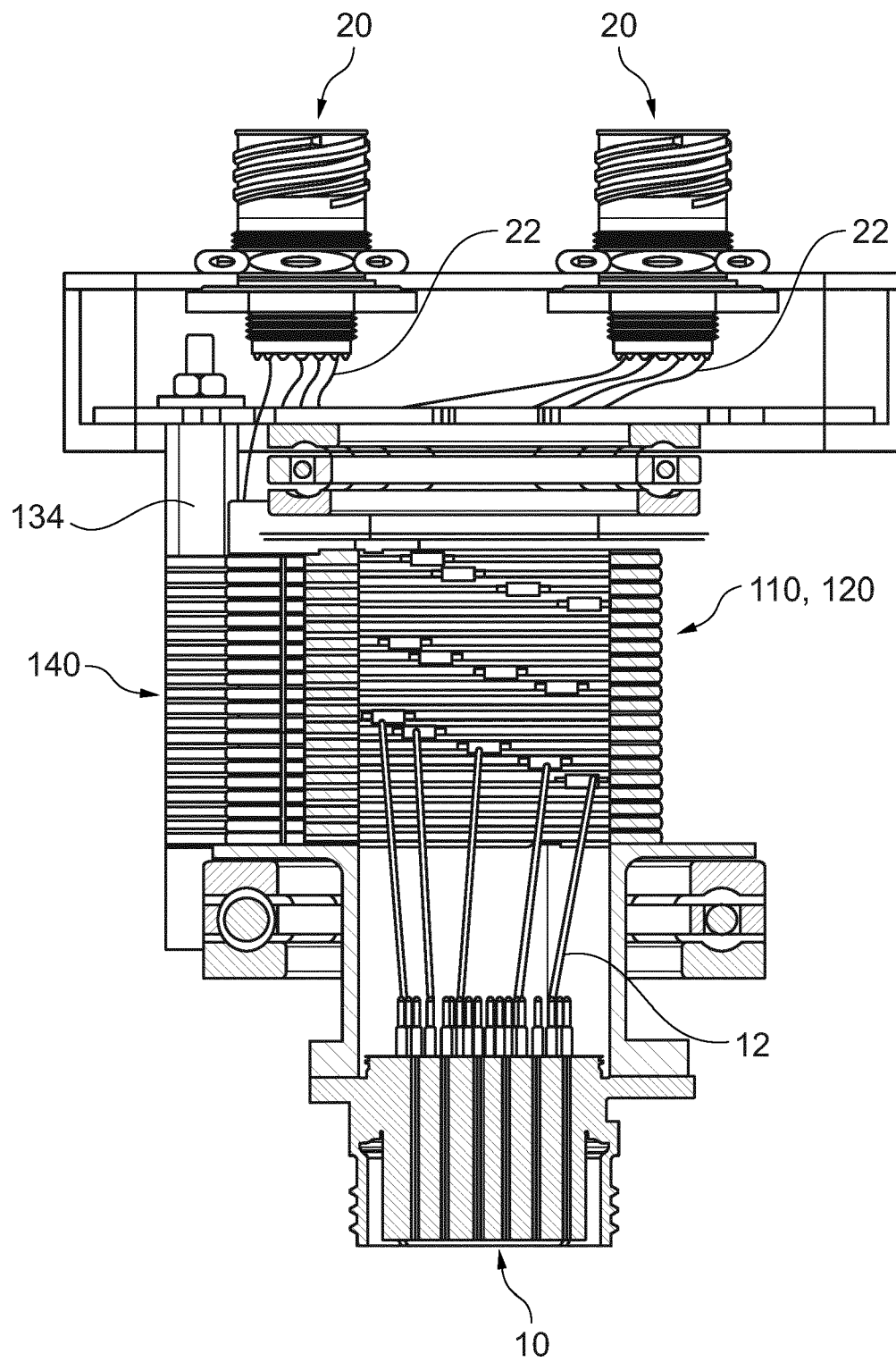


Fig. 3

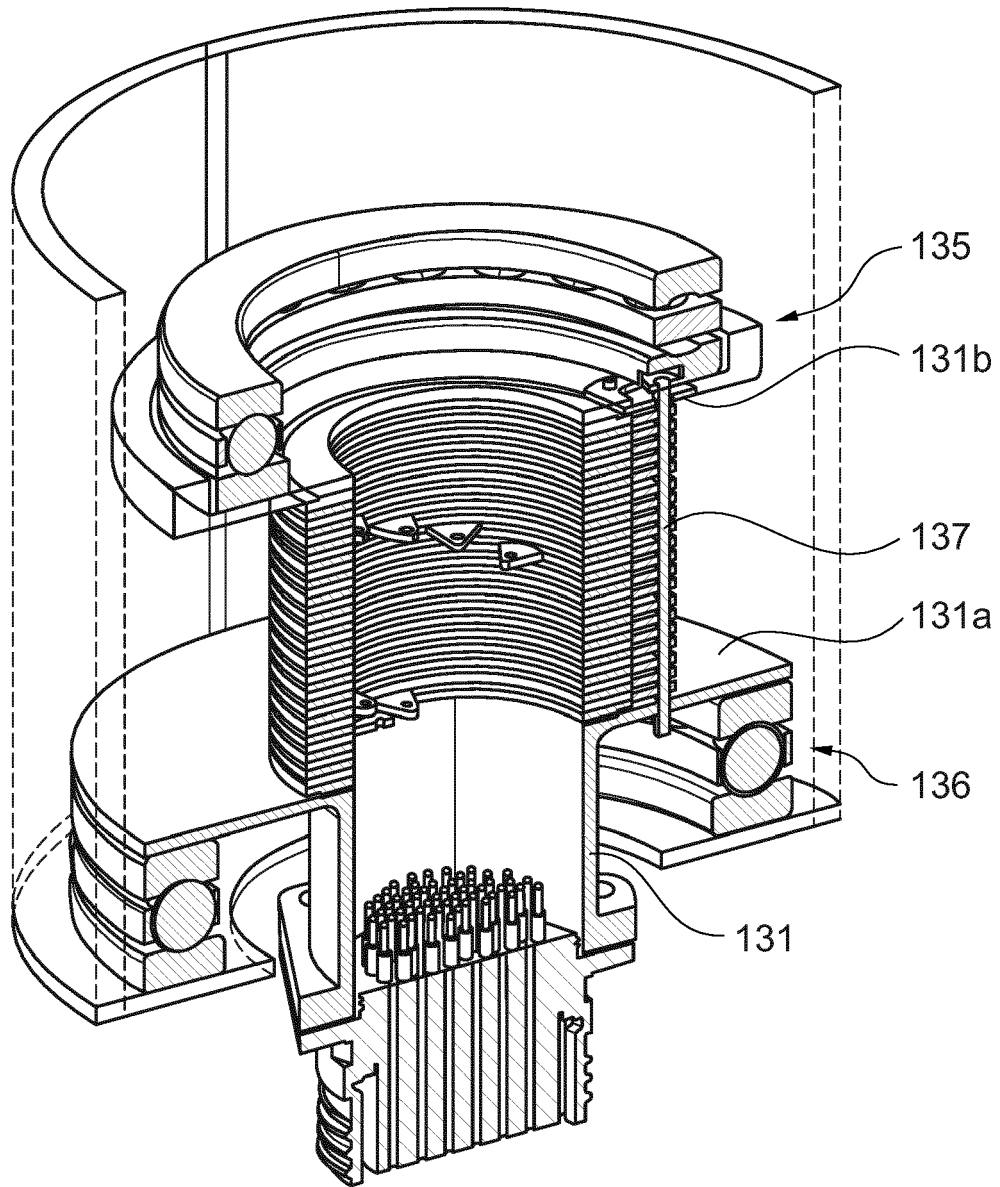


Fig. 4



EUROPEAN SEARCH REPORT

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Place of search The Hague		Date of completion of the search 3 March 2020	Examiner Kandyla, Maria
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