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(54) Rotary electrical slip ring assembly

(57) The rotary electrical slip ring assembly (1) comprises a first electrical energy transmission unit (2) defined by a first rotor (3) slidably associated with a first stator (4). The slip ring assembly (1) also comprises a second electrical energy transmission unit (6) defined by a second rotor associated with a second stator. The second electrical energy transmission unit (6) is housed in a chamber of the first rotor (3).

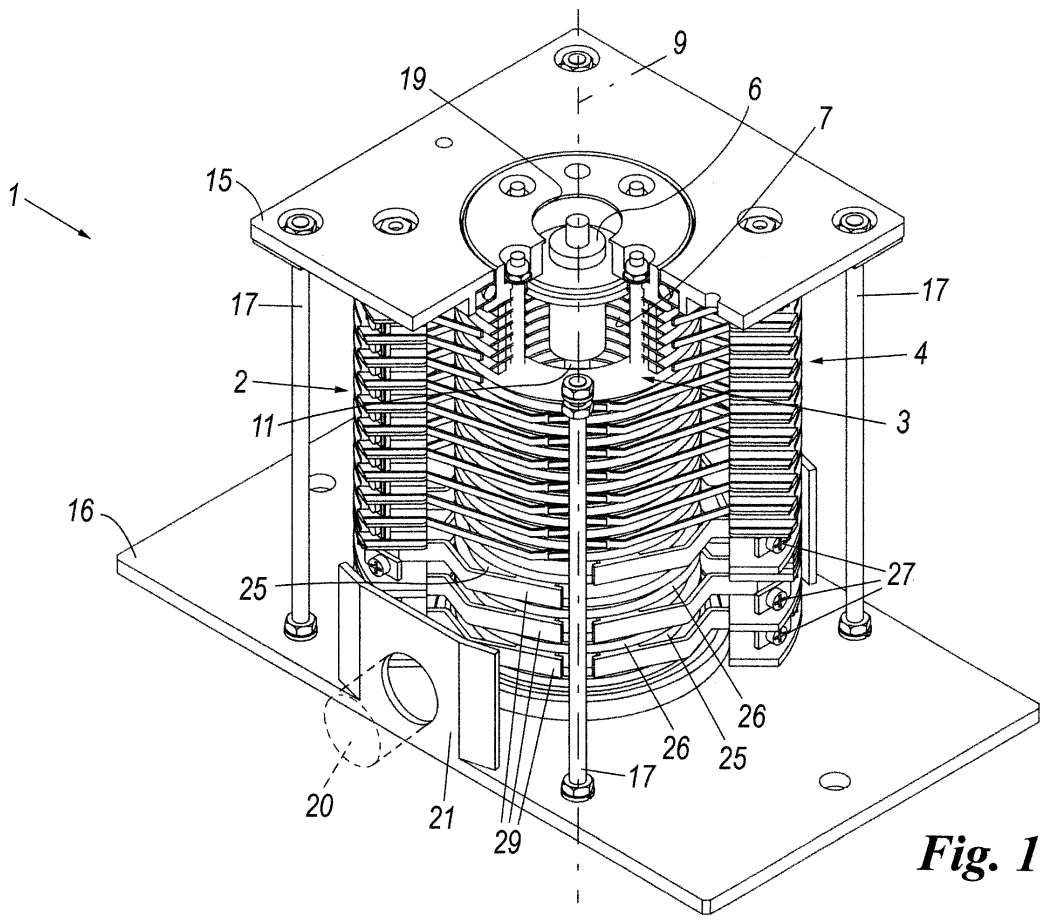

Fig. 1

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Description

[0001] The present invention relates to a rotary electrical slip ring assembly.

[0002] When energy has to be transmitted between a fixed source and a rotary electrical machine, it is known to use appropriate devices provided with a part (the stator) arranged for coupling to a fixed source, and a part (the rotor) arranged for coupling to the rotary electrical machine; the stator and rotor are coupled together by a plurality of sliding contacts.

[0003] A rotary electrical machine usually requires the transmission of very high currents (for example for powering the machine) and also of low intensity currents (for example for signals for controlling and verifying machine operation).

[0004] Consequently, traditional slip ring assemblies must be able to transmit numerous electrical currents and are consequently provided with numerous sliding contacts between the rotor and stator; the result is that the rotor and stator have very large dimensions (height) which, in certain cases, are incompatible with the required use.

[0005] The technical aim of the present invention is therefore to provide a rotary slip ring assembly by which the stated technical drawbacks of the known art are eliminated.

[0006] Within the scope of this technical aim, an object of the invention is to provide a rotary slip ring assembly of small dimensions (in particular along its axis of rotation or height).

[0007] The technical aim, together with this and other objects are attained according to the present invention by a rotary slip ring assembly in accordance with claim 1.

[0008] Other characteristics of the present invention are defined in the subsequent claims.

[0009] Advantageously, the rotary slip ring assembly of the present invention also has a lesser weight than a traditional slip ring assembly with the same number of sliding contacts.

[0010] Further characteristics and advantages of the invention will be more evident from the description of a preferred but non-exclusive embodiment of the rotary slip ring assembly according to the invention, illustrated by way of non-limiting example in the accompanying drawing, in which:

the single figure represents a partially sectional view of a slip ring assembly according to the invention.

[0011] With reference to said figure, this shows a rotary slip ring assembly indicated overall by the reference numeral 1.

[0012] The electrical slip ring assembly 1 comprises a first electrical energy transmission unit 2 defined by a first rotor 3 slidably associated with a first stator 4.

[0013] The slip ring assembly 1 comprises a second electrical energy transmission unit 6 having a structure similar to that of the first unit 2 and hence defined by a second rotor associated with a second stator.

[0014] As shown in the figure, the second electrical energy transmission unit 6 is housed in a chamber 7 within the first rotor 3.

[0015] The chamber 7 of the first rotor 3 is formed on the same axis 9 as the first rotor 3 and is symmetrical about this axis 9.

[0016] The first rotor 3, the second rotor and the chamber 7 are all mutually coaxial (about the axis 9), the first rotor 3 and the second rotor being fixed to the same shaft 11.

[0017] The slip ring assembly 1 presents a frame composed of a first and a second plate 15, 16 which oppose each other and are joined together by ties 17, the first stator 4 being fixed between the first and second plate 15, 16.

[0018] The first plate 15 presents a hole 19 on the axis 9 of the first and second rotor, the conductor cables (not shown) connected to the second stator (of the transmission unit 6) passing through this hole 19.

[0019] Then all the cables (hence both said cables of the second stator and the cables of the first stator) pass through and are retained by a nozzle 20 passing through a lug 21 extending from the second plate 16.

[0020] The second electrical energy transmission unit 6 is positioned at the hole 19 and is fixed to the first plate 15.

[0021] The first rotor 3 is defined by first electrically conducting rings 25 electrically insulated from each other by rings of insulating material (typically plastic material) 26.

[0022] The first stator 4 comprises first electrical contacts 27 each connected to first brushes 29 slidable on the first conducting rings 25.

[0023] The second rotor (although not shown in detail) presents a structure identical to that of the first rotor 3 and is defined by second electrically conducting rings insulated electrically from each other; in the same manner the second stator presents a structure similar to that of the first stator 4 and comprises second electrical contacts each connected to second brushes slidable on the second conducting rings.

[0024] The chamber 7 is defined within the first conducting rings 25 (in a position corresponding with the first plate 15 and the hole 19).

[0025] The operation of the slip ring assembly according to the invention is apparent from that described and illustrated and is substantially the following.

[0026] The electric cables (not shown) are firstly connected to achieve the correct electrical connections between the various parts of the electrical machine.

[0027] In this respect, it will be noted that the first transmission unit 2 is able to transmit greater current intensities than the second transmission unit 6 because of the greater dimensions of the first and second brushes and of the first and second rings.

[0028] Consequently, power for the electrical machine

and the high-power signals is preferably provided via the first transmission unit 2, while power for the control and verification signals is preferably provided via the second transmission unit 6.

[0029] Operation is similar to that of a rotary slip ring assembly of traditional type.

[0030] Modifications and variants, in addition to those already described, are evidently possible, for example the number of transmission units inserted one into the other can be greater than two; for example in the case of groups of electrical signals of mutually different intensity, a slip ring assembly provided with numerous transmission units could be provided, each within another and each suitable for transferring a predetermined current intensity.

[0031] It has been found in practice that the rotary slip ring assembly of the invention is particularly advantageous, being of particularly small dimensions.

[0032] In practice the materials used and the dimensions can be chosen at will according to requirements and to the state of the art.

[0033] In a further embodiment, for example the plates 15 and 16 can be of circular shape (simplifying its construction) and can be of plastic material.

Claims

1. A rotary electrical slip ring assembly (1) comprising a first electrical energy transmission unit (2) defined by a first rotor (3) slidably associated with a first stator (4), **characterised by** comprising at least a second electrical energy transmission unit (6) defined by a second rotor associated with a second stator, the second electrical energy transmission unit (6) being housed in a chamber (7) of the first rotor (3).

2. A slip ring assembly (1) as claimed in claim 1, **characterised in that** the chamber (7) of the first rotor (3) is provided on the axis (9) of the first rotor (3) and is symmetrical about that axis (9).

3. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised in that** the first rotor (3), the second rotor and the chamber (7) are coaxial.

4. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised in that** the first rotor (3) and the second rotor are fixed to one and the same shaft (11).

5. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised by** presenting a frame composed of a first and a second plate (15, 16) which oppose each other and are joined together by ties (17), said first stator (4) being fixed between said first and second plate (15, 16).

6. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised in that** at least said first plate (15) presents a hole (19) on the axis (9) of said first and second rotor, the conductor cables connected to said second stator passing through said hole (19).

7. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised in that** said second electrical energy transmission unit (6) is located in a position corresponding with said hole (19).

8. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised in that** the second electrical energy transmission unit (6) is fixed to said first plate (15).

9. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised in that** the first rotor (3) is defined by first electrical conducting rings (25) electrically insulated from each other, the first stator (4) comprising first electrical contacts (27) each connected to first brushes (29) slidable on said first conducting rings (25), the second rotor being defined by second conducting rings electrically insulated from each other, the second stator comprising second electrical contacts each connected to second brushes slidable on said second conducting rings.

10. A slip ring assembly (1) as claimed in one or more of the preceding claims, **characterised in that** said chamber (7) is defined within said first conducting rings (25).

11. A slip ring assembly (1) as claimed in claim 1, **characterised in that** said chamber (7) lies within said first rotor (4).

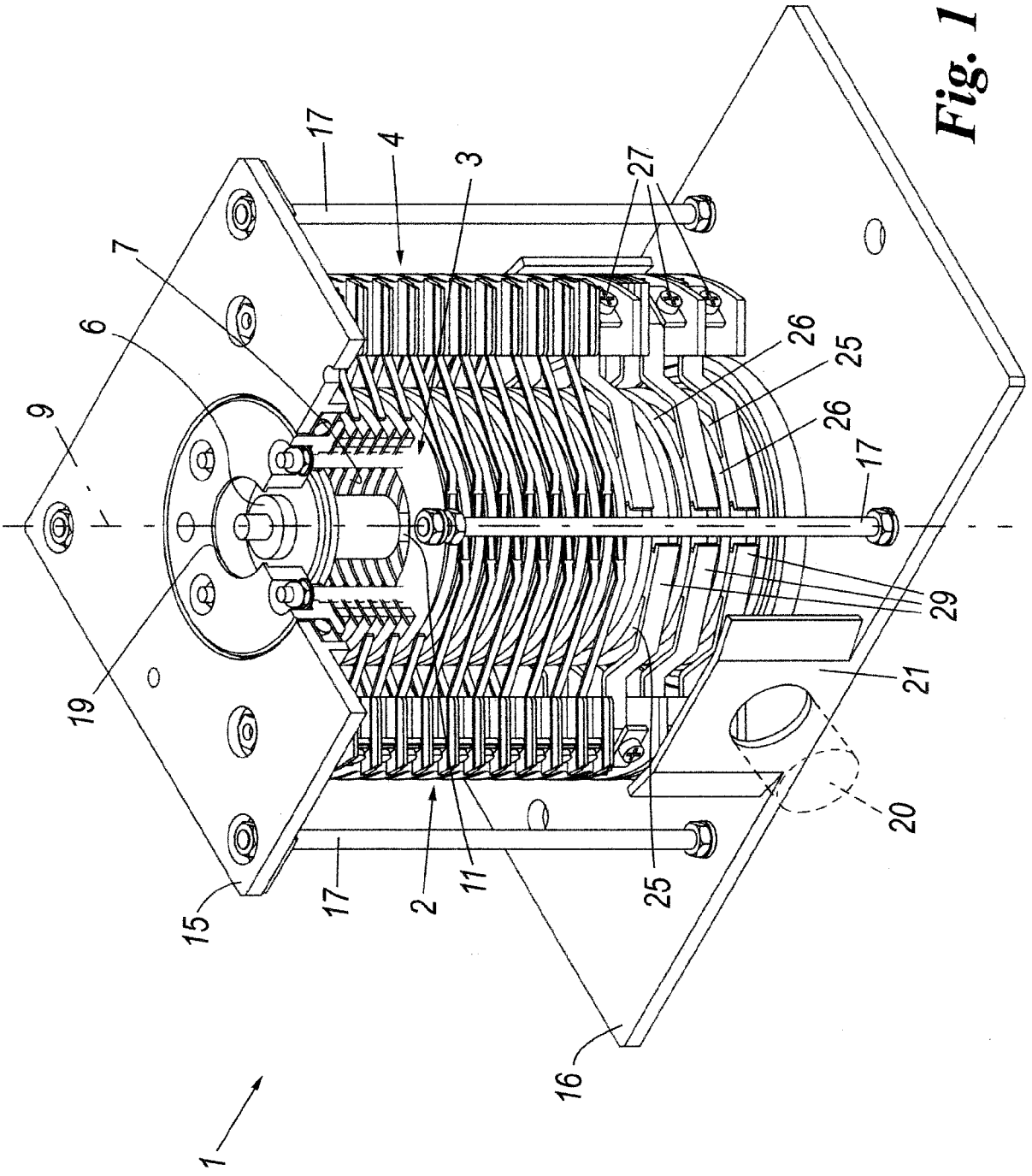

Fig. 1