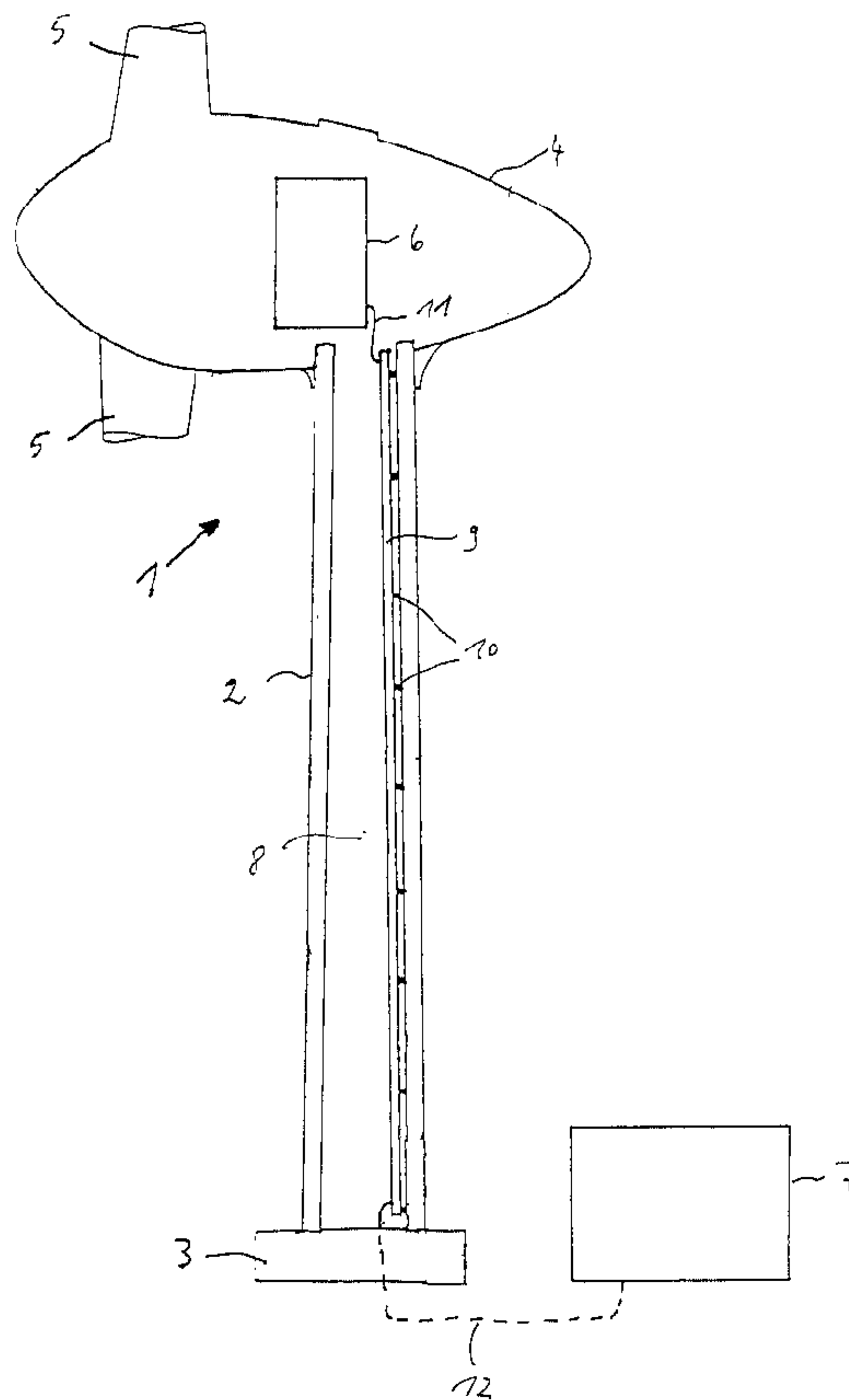




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 (72) Inventeur/Inventor:
 WOBGEN, ALOYS, DE
 (73) Propriétaire/Owner:
 WOBGEN, ALOYS, DE
 (74) Agent: OYEN WIGGS GREEN & MUTALA LLP

(54) Titre : EOLIENNE PRESENTANT UNE TOUR DANS LAQUELLE DES MOYENS CONDUCTEURS DE COURANT SONT PREASSEMBLES
 (54) Title: WIND TURBINE WITH CURRENT CONDUCTING MEANS, WHICH ARE PRE-ASSEMBLED IN THE TOWER THEREOF



(57) Abrégé/Abstract:

The present invention concerns a wind energy plant for generation of alternating current with a tower constructed of several tower segments, a generator arranged in the region of the top of the tower, a power module arranged in the region of the base of the

(57) **Abrégé(suite)/Abstract(continued):**

tower, and current carrying means for transferred current from the generator to the power module. In order to enable faster, easier and thereby cheaper erection of the wind energy plant, it is provided in accordance with the present invention that the current carrying means be premounted in the tower segments in segmented form.

Abstract of the Disclosure

The present invention concerns a wind energy plant for generation of alternating current with a tower constructed of several tower segments, a generator arranged in the region of the top of the tower, a power module arranged in the region of the base of the tower, and current carrying means for transferred current from the generator to the power module. In order to enable faster, easier and thereby cheaper erection of the wind energy plant, it is provided in accordance with the present invention that the current carrying means be premounted in the tower segments in segmented form.

**WIND TURBINE WITH CURRENT CONDUCTING MEANS,
WHICH ARE PRE-ASSEMBLED IN THE TOWER THEREOF**

5 The present invention concerns a wind energy plant with a
tower formed of a number of tower segments, with a generator
arranged in the region of the tower head, with a power module
arranged in the region of the tower base and with current carrying
means to transfer the current from the generator to the power
10 module.

 The electrical power module of a wind energy plant, which
includes electrical units such as transformers, control boxes,
optionally rectifiers, medium voltage plants, low voltage
distributions, etc., is arranged underneath the level of the
15 generator as in the case of the known wind energy plants and
commonly is in the region of the base of the tower of the wind
energy plant. Most often a separate small building outside the
wind energy plant is provided for this module or for some of these
components. Current carrying means, which most often run within
20 the tower and are designed as cables, are provided to carry the
electrical energy produced by a generator arranged in a gondola
at the top of the tower to the power module. These cables are
introduced into the tower after it has been built. This is a costly
process, since the cable has to be installed over the entire height
25 of the tower in a separate work cycle. In addition, this work cycle is
dependent on the prior erection of the tower.

This invention is based on the task of providing a wind energy plant that can be erected more easily and thus also cheaper and faster.

This task is solved in accordance with the present invention
5 by the fact that the current carrying means are premounted in segmented form in the tower segments.

The segments of the current carrying means are thus premade and are preferably installed on the tower segments before the tower is constructed from the individual tower
10 segments. It is thus no longer necessary to perform the laborious operation of pulling cable through the tower after the tower has been built in order to connect the generator and power module to each other electrically. Through the measures in accordance with the present invention, the entire construction time of the wind
15 energy plant can be reduced and the costs for construction reduced without a tradeoff of any kind of technical disadvantage.

Advantageous embodiments of the wind energy plant in accordance with the present invention are claimed in the dependent claims. It is preferable for the segments of the current
20 carrying means to be firmly attached to the pertinent tower segment only in one region, preferably in the region that is uppermost in the erected state. This attachment to the power segment preferably take place before the erection of the tower, so

that the tower segments, including the segments of the current
conducting means attached to them, are premade. Since the
segment of the current conducting means is firmly attached to the
tower at only one point, it is indeed attached, but it is movable
5 within certain limits at the inside wall of the tower segment and
thus can still be adjusted in order to connect it as easily and
reliably as possible to the next segment of the current conducting
means of the next tower segment.

For further attachment of the segments of the current
10 conducting means within the tower segment, one can in any case
also provide additional fastening elements on the inside wall of the
tower, with which the segments of the current carrying means are
firmly held before or after erection of the tower in order to affix said
means as well as possible.

15 If the current conducting means are designed as a cable, the
lengths of the cable sections in the tower segments can, in order
to bridge over flanges or parts that project from the inside wall of
the tower, be measured so that bridging these regions is possible
without any problem.

20 If current buses are used as current carrying means, flexible
connecting buses can preferably be provided in order to bridge
over parts that project from the inside wall of the tower and/or to
connect current bus segments. These flexible buses are used

after erection of the tower to connect the current bus segments, if such segments do not meet each other directly or if gaps or other hindrances between the current bus segments, for example a flange on the tower bus segment, have to be bridged.

5 In order to protect maintenance personnel against contact with the current buses as they climb the tower through its internal space and to ensure electrical insulation on the one hand and to protect the current carrying means against damage on the other, a protective sheathing, in particular a guard plate, which is firmly
10 attached to the inside wall of the tower and which completely protects the current carrying means against contact is provided in another embodiment. This protective sheathing can also be divided into individual segments, which are likewise premounted on the tower segments, like the segments of the current carrying
15 means. A further reduction of time and simplification of erection of the wind energy plant is achieved through this.

The present invention is illustrated in more detail before by means of the drawings.*

Here:

20 Figure 1 shows a wind energy plant in accordance with the present invention,

Figure 2 shows a section through such a wind energy plant

with two tower segments and

Figure 3 shows a perspective drawing of current buses provided in accordance with the present invention.

The wind energy plant 1 in accordance with the present invention that is shown schematically in Figure 1 has a tower 2 with foundation 3, a gondola 4 that is positioned with the possibility of rotation in the region of the top of the tower and a power module 7 arranged in the region of the base of the tower, for example in a separate housing. A rotor with several rotor blades 5, which can rotate about a horizontal axis, and an electrical generator 6 are arranged within the gondola 4. Wind forces acting on the rotor blades 5 set the rotor in motion and drive generator 6 to produce electrical energy.

To transfer the energy produced by generator 6 to the power module 7, which has numerous electrical units, such as a transformer or optionally a rectifier for processing the electrical current, before it is sent to the power network or to a user, there are provided current buses, preferably two current buses, in the inside space 8 of tower 2 at the wall by means of fastening elements 10. These buses are electrically conducting and are electrically connected via a cable 11 to the generator and via a connecting line 12, which preferably goes through the foundation 3 and underground to power module 7.

The current buses 9 are made rigid and preferably consist of individual current bus segments, as, for example, is shown in more detail in Figure 2. Two tower segments 21 and 22, of which the tower 2 is preferably constructed, are shown there. Such tower segments 21 and 22 can consist, for example, of steel or even of concrete.

These tower segments 21 and 22 are premade and are assembled into the tower at the site of the wind energy plant. In order to reduce the setup time even further and to simplify the work and thus reduce the costs of the overall wind energy plant, the current bus segments 91 and 92 are preferably firmly attached to the appropriate sites of the individual tower segments 21 and 22 before the erection of tower 2. Preferably, the attachment of the current bus segments 91 and 92 takes place only in the upper region of the relevant tower segment 21 and 22 by means of a fastening element 10, while the remaining part of the current bus segments 91 and 92 remains moveable to a certain extent, in order to simplify the connection with the subsequent bus segments. Through this construction relative movement between the tower 2 and current buses 91 and 92, for example as a consequence of different coefficients of expansion, can also be compensated. However, it can also be provided for the use of other fastening elements 14 that guide the current bus segments

91 and 92 over the entire length. For this the cross-section of the opening for current bus segments 91 and 92 in the fastening elements 14 can be designed to be greater than the cross-section of the current bus segments 91 and 92 itself. Relative movement of the current bus segments 91 and 92 in fastening elements 14 is enabled in this way and at the same time the current buses 91 and 92 are guided and restricted in their ability to move.

In order to connect the current bus segments 91 and 92 and in doing so to bridge parts that may be present projecting into the inside space, such as flanges 211 and 212 that are present at the lower and upper edge of the tower segments 21 and 22, insulated flexible connecting buses 13 are used, the shape of which can be changed by hand as they are attached to the two current bus segments 91 and 92. Also, material expansions or contractions, for example due to temperature variations, can be compensated for by these connecting buses 13.

Figure 3 shows a perspective drawing of two parallel current bus segments 911 and 912. These are firmly screwed to the fastening elements 14 by screws 15. In this case insulating means can be provided in order to insulate the current bus segments 911 and 912 from the fastening elements 14. Alternatively, of course, the fastening elements 14 themselves can also be made of an insulating material. The fastening elements 14 themselves are

firmly screwed to the inside wall of the tower segment.

For protection against contact with current buses 911 and 912 in the operation of the wind energy plant, there is additionally provided a guard plate 16, which, just like the current bus
5 segments 911 and 912, can already be built into the individual tower segments before the erection of the tower 2. By means of a guide rail 17 which can consist, for example, of solid rubber, this protective sheathing can, on the one hand, be secured and, on the other hand, be insulated from the tower segment. However, still
10 other means that are not shown here can also be provided to fasten the guard plate 16.

Furthermore, in and/or on these guard plates that are provided as protective sheathing 16, it is also possible to position other devices, such as electrical receptacles, lights, etc., so that
15 these can likewise be preassembled in a simple way. In addition, the incorporation of these devices into the protective sheathing 16 in particular avoids exposed installation on the inside wall of the tower and thus leads to reduced danger of damage, for example by falling objects during and after the erection of the tower.

20

Summary of Invention

The present invention concerns a wind energy plant for generation of alternating current with a tower constructed of

several tower segments, a generator arranged in the region of the top of the tower, a power module arranged in the region of the base of the tower, and current carrying means for transferred current from the generator to the power module. In order to enable
5 faster, easier and thereby cheaper erection of the wind energy plant, it is provided in accordance with the present invention that the current carrying means be premounted in the tower segments in segmented form.

WHAT IS CLAIMED IS:

1. A wind energy plant with a tower formed of several tower segments, a generator arranged in the region of the top of the tower, a power module arranged in a region of the base of the tower and current carrying means to conduct the generated current from the top of the tower, which is characterized by the fact that the current carrying means are premounted in segmented form in the tower segments.
5
2. A wind energy plant as in claim 1, which is characterized by the fact that the current carrying means are fastened to the tower segments with fastening elements.
10
3. A wind energy plant as in any one of claims 1 or 2 which is characterized by the fact that the current carrying means are protected against contact by a cover, in particular a cover plate.
15
4. A wind energy plant as in any one of claims 1-3, which is characterized by the fact that the segments of the current carrying means are firmly connected to a pertinent power segment only in one region, preferably in the region that is uppermost in the erected state.
20
5. A wind energy plant as in any one of claims 1-4, which is characterized by the fact that the current carrying means are built as cable.

6. A wind energy plant as in any one of Claims 1 to 4, which is characterized by the fact that the current carrying means are built as buses.
7. A wind energy plant as in Claim 6, which is characterized by the fact that flexible connecting buses are provided to bridge over parts that project from the inside wall of the tower and/or to connect current buses segments.
8. A wind energy plant as in any one of claims 1-7, which is characterized by a power module wherein the current carrying means are provided to carry the current from the generator to the power module.
9. A wind energy plant as in Claim 8, which is characterized by the fact that the power module is arranged in the region of the base of the tower.
10. A tower segment for a tower of a wind energy plant formed from several tower segments, which has a generator for generating current in the region of the top of the tower which is characterized by the fact that a current carrying means segment conducting the generating current from the top of the tower is preinstalled in the tower segment.
11. A wind energy plant as in claim 4, wherein the segments of the current carrying means are firmly connected to the tower segment in the region that is uppermost in the erected state.

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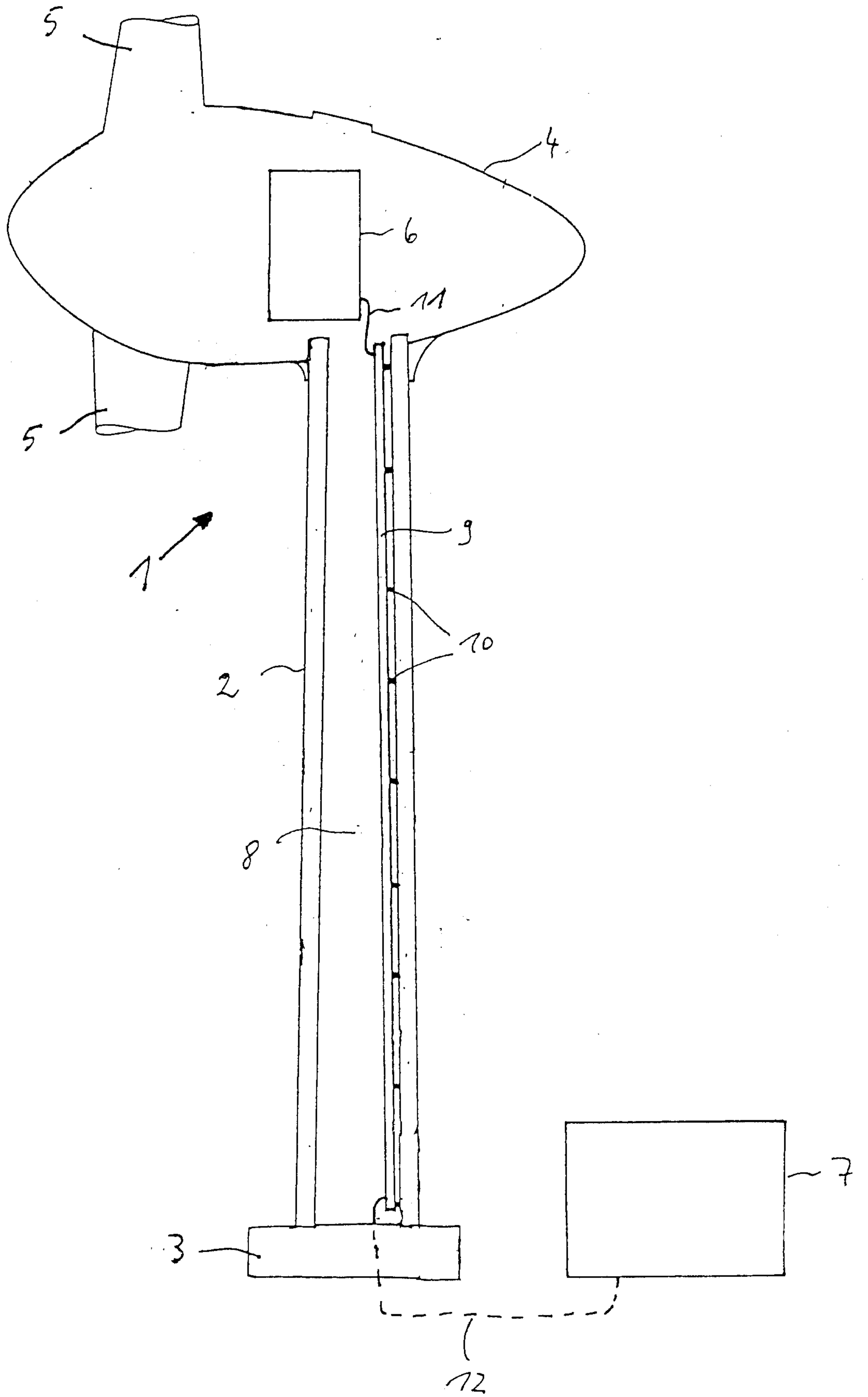


Fig. 1

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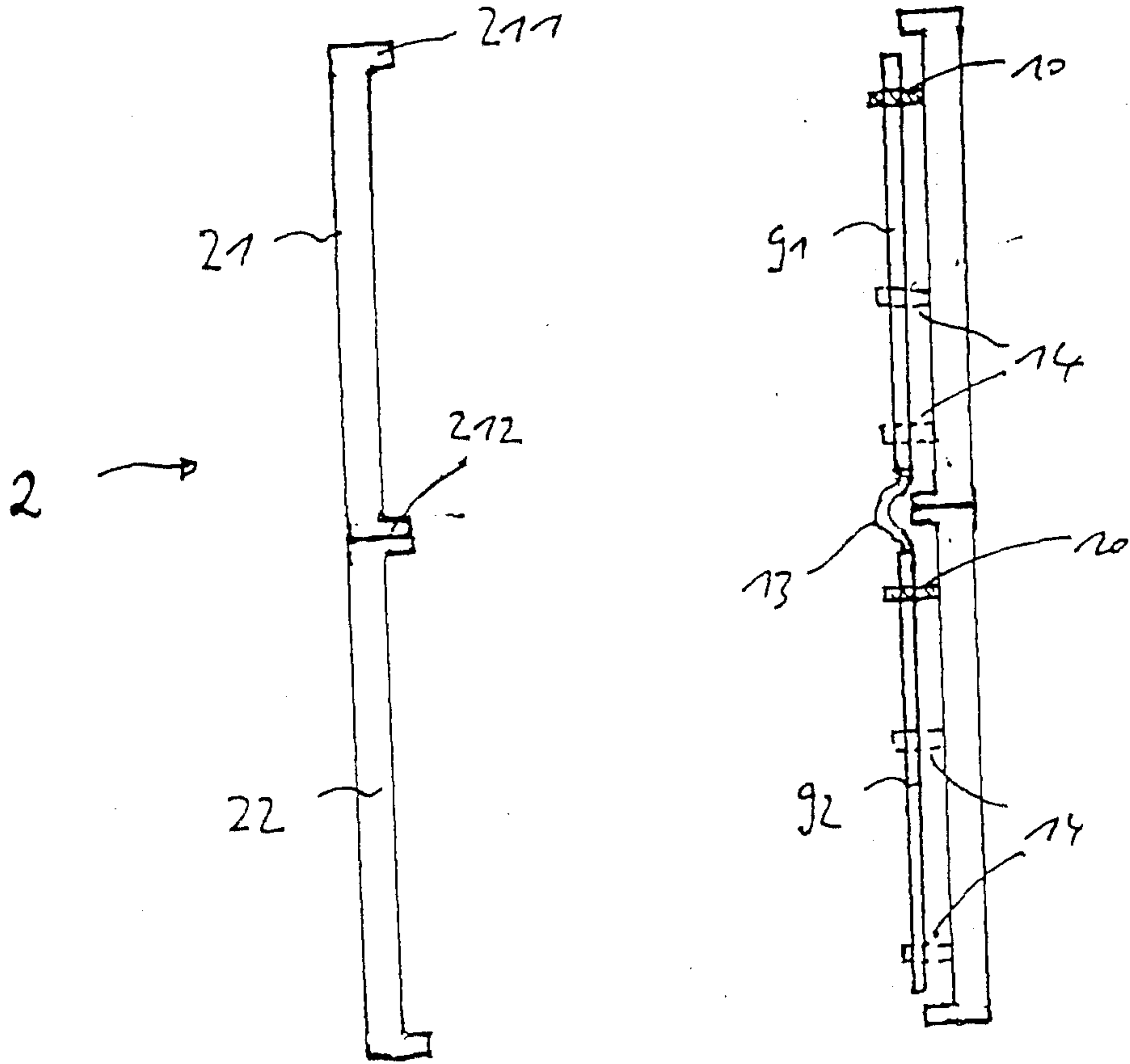


Fig. 2

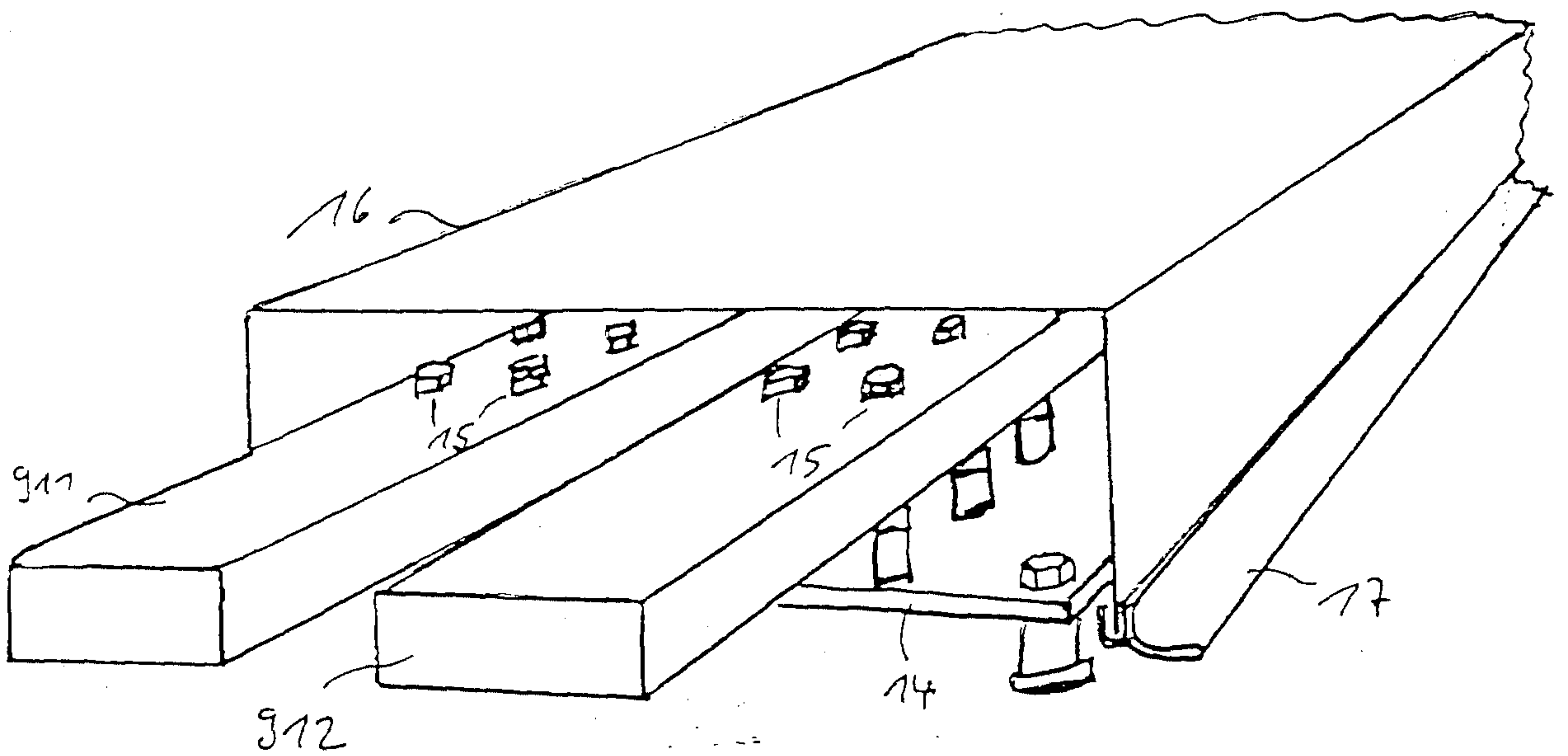


Fig. 3

