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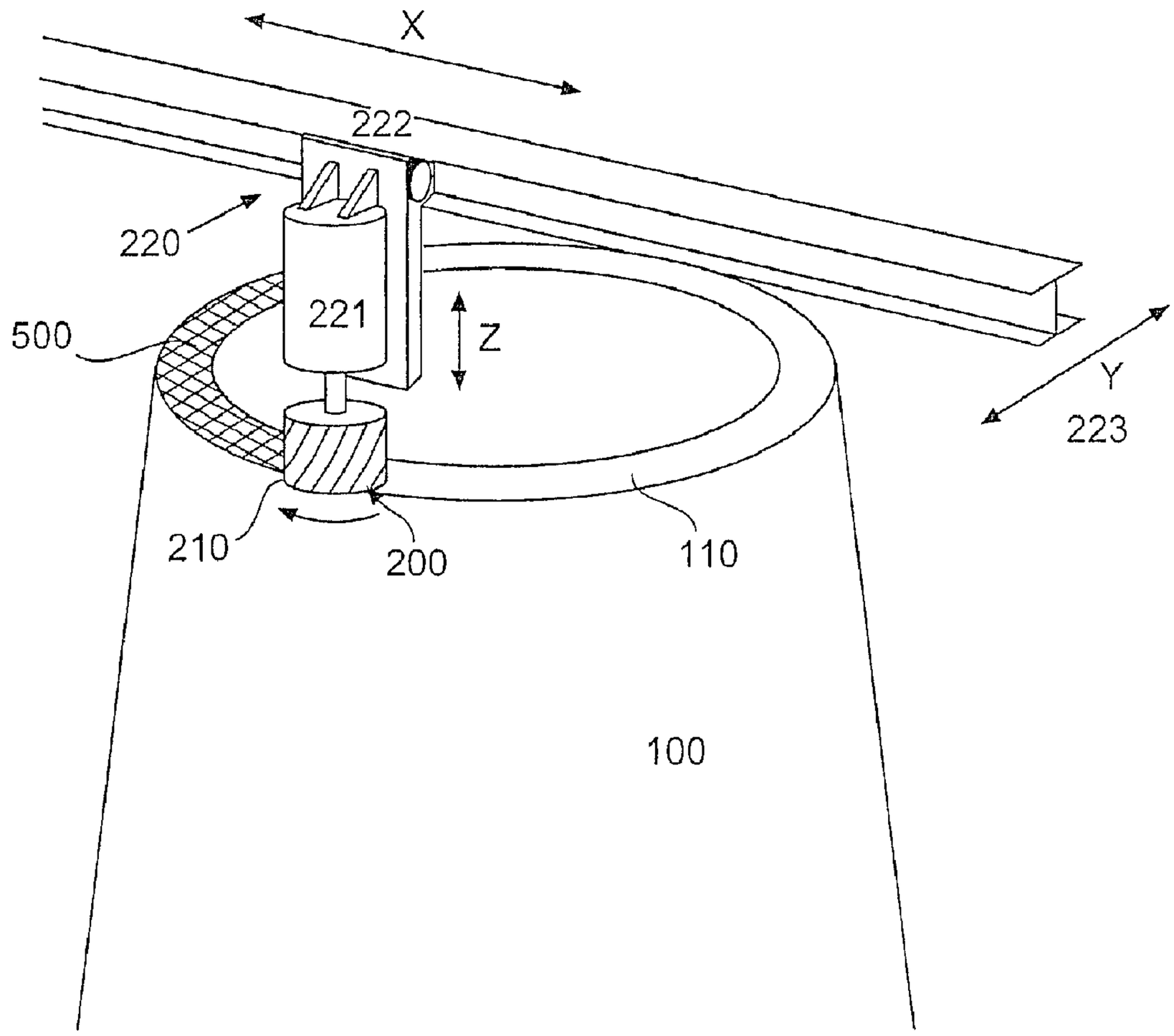
(54) **Titre : PROCEDE SERVANT A FABRIQUER DES ELEMENTS DE MONTAGE EN BETON**
(54) **Title: METHOD OF PRODUCING CONCRETE PREFINISHED PARTS**



(57) **Abrégé/Abstract:**
There is provided a process for producing precast concrete parts, in particular pylon segments. Concrete is poured into a casting mould with a planar bottom for producing a planar underside. After the concrete has reached a predetermined minimum strength

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(57) **Abrégé(suite)/Abstract(continued):**
an equalisation layer is applied to a join surface (110) of the precast concrete part (100), that is opposite to the underside. As soon as the equalisation layer has reached a predetermined minimum strength the precast concrete part (100) is placed on an exactly horizontally oriented surface and the equalisation layer on the top side is removed in plane-parallel relationship.

Abstract

There is provided a process for producing precast concrete parts, in particular pylon segments. Concrete is poured into a casting mould with a planar bottom for producing a planar underside. After the concrete has reached a predetermined minimum strength an equalisation layer is applied to a join surface (110) of the precast concrete part (100), that is opposite to the underside. As soon as the equalisation layer has reached a predetermined minimum strength the precast concrete part (100) is placed on an exactly horizontally oriented surface and the equalisation layer on the top side is removed in plane-parallel relationship.

(Figure 1)

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Method of producing concrete prefinished parts

The present invention concerns a process for producing precast concrete parts, a precast concrete part and a wind power installation.

When constructing high towers or pylons based on prefabricated segment parts or precast concrete parts, it can happen, because of production tolerances, that precast concrete parts which have to be placed one upon the other do not fit together in the optimum fashion.

To avoid that problem typically an equalisation layer, for example mortar, is applied on the building site to a join surface or a flange of a precast concrete part, in which case that equalisation layer must then harden on the building site, that is to say it must attain a predetermined minimum strength. That requires inter alia compliance with minimum meteorological demands which are dependent on the material of the equalisation layer. If those minimum demands are not met or if the equalisation layer is incorrectly or negligently applied then there is the risk of flaws or inadequate setting and so forth.

DE 101 33 607 A1 discloses a process for the production of a precise precast concrete part.

Therefore an object of the present invention is to provide a process for producing precast concrete parts, which permits easier and faster erection of a pylon or tower from the precast concrete parts, with a quality that remains consistently high.

Thus there is provided a process for producing precast concrete parts. Concrete is cast in a casting mould with a planar floor to provide a planar underside. As soon as the concrete has reached a predetermined minimum strength and a precast concrete part of predetermined maximum strength is obtained an equalisation layer is applied to a join surface of a hardened precast concrete part, that is opposite to the underside. The

precast concrete part with its minimum strength is placed on a horizontal plane and the equalisation layer is removed in plane-parallel relationship.

The prefabricated concrete parts can be pylon segments or parts of pylon segments.

In an aspect of the invention the equalisation layer has synthetic resin.

In a further aspect of the invention removal of the equalisation layer is effected by a milling unit having a displacement unit for displacement of the milling unit in the X-, Y- and Z-directions.

In a further aspect of the invention a plurality of precast concrete parts which have hardened or which are of a minimum strength are arranged with an equalisation layer on their respective join surface opposite to the underside on a horizontal plane and the equalisation layers are machined in plane-parallel relationship by means of a milling unit.

The invention also concerns a precast concrete part which has been produced as described hereinbefore. The invention also concerns a pylon, in particular of a wind power installation, which has been erected with a plurality of the above-described precast concrete parts.

The present invention also concerns a wind power installation having an above-described pylon.

The invention concerns the notion of providing precast concrete parts which are previously produced in a factory. In that case the precast concrete parts are produced in plane-parallel configuration in the factory. For that purpose the casting mould of the precast concrete part is arranged (exactly) horizontally. In that situation the bottom of the casting mould is machined (exactly) flat so that in the casting operation an exactly flat underside is produced on the precast part, when for example concrete is introduced into the casting mould and remains in the mould until it has reached a predetermined minimum strength.

Then an equalisation layer for example in the form of a synthetic resin is applied to the side of the precast concrete part, that is opposite to the flat underside. As soon as the equalisation layer has in turn reached a predetermined minimum strength that equalisation layer is removed in

plane-parallel relationship so that that side of the precast concrete part is in plane-parallel relationship with the flat underside of the precast part. The precast concrete parts can then be transported to a building site.

As the precast concrete parts already leave the factory with plane-parallel join surfaces there is no need for post-treatment of the precast concrete parts on the building site. The precast concrete parts can thus be assembled to constitute a pylon without delay. In particular the step of applying an equalisation material is omitted, and as a result, besides eliminating possible sources of error, the operating procedure on the building site is also accelerated and to a large extent made independent of the weather. The process according to the invention can also ensures a uniform quality for the precast concrete parts as complete production takes place in the factory under controlled conditions with quality assurance. In particular construction of the precast concrete parts to form a pylon can take place more quickly as there is no longer any need for any post-treatment operation or application of an equalisation layer on the building site.

Embodiments by way of example and advantages of the invention are described more fully hereinafter with reference to the drawing.

Figure 1 shows a diagrammatic perspective view of a precast concrete part and a removal unit in a first embodiment,

Figure 2 shows a perspective view of a precast concrete part and a removal unit in the first embodiment,

Figure 3 shows a perspective detail view of Figure 2,

Figure 4 shows a further perspective view of precast concrete parts and the removal unit in accordance with the first embodiment,

Figure 5 shows a perspective view of a detail portion of Figure 4, and

Figure 6 shows a perspective view of a pylon in the construction phase in accordance with a second embodiment.

Figure 1 shows a perspective view of a precast concrete part and a removal unit in accordance with the first embodiment. The precast

concrete part 100 has a join surface or a flange 110, to which an equalisation layer 500 is applied. In the first embodiment the removal unit 200 is in the form of a milling unit having a milling head 210 and a displacement unit 220. The displacement unit 220 has a Z-displacement unit 221 for displacement in the Z-direction, an X-displacement unit 222 for displacement in the X-direction and a Y-displacement unit 223 for displacement in the Y-direction. The milling head 210 can be accurately controlled by the X-, Y- and Z-displacement units so that the milling head 210 can remove the equalisation layer 500 on the join surface or the flange 110 of the precast concrete part 100 in that way as soon as the equalisation layer has reached a minimum strength required for the mechanical processing operation so that the join surface or the flange 110 is (exactly) plane-parallel.

The equalisation layer is preferably synthetic resin such as for example epoxy resin and is applied to the join surface 110 of the precast concrete part 100. After the equalisation layer has reached a predetermined minimum strength it is then removed in plane-parallel relationship by means of the milling unit 200. Those working steps are preferably effected in a factory under precisely defined conditions. That can thus ensure precise reproducibility of the desired quality.

After the conclusion of the removal operation the equalisation layer can be of a layer thickness of 1 to 5 millimetres.

Figure 2 shows a perspective view of a precast concrete part and a removal unit in accordance with the first embodiment. In this case the precast concrete part 100 is standing on a floor 300 which is oriented exactly horizontal. The removal unit or the milling unit 200 has an X-displacement unit 222, a Y-displacement unit 223 and a Z-displacement unit 221. The Y-displacement unit 223 has two rails, along which a carriage of the milling unit 200 is movable. The X-displacement unit 222 has a rail which extends between the rails of the Y-displacement unit 223 and along which the milling head 210 is movable. The milling head 210 is coupled to the Z-displacement unit 221, by which the milling cutter can be adjusted in the Z-direction, that is to say vertically.

Figure 3 shows a perspective view of a detail portion of Figure 2. This Figure shows the X-displacement unit 222, the Z-displacement unit 221 and the milling head 210. In this case the milling head 210 removes an equalisation layer 500 to a predetermined amount. As the precast part segment is standing on a flat floor, removal of the equalisation material by the milling head 210, with the Z-setting remaining the same with respect to the floor, results in a plane-parallel flange or a plane-parallel join surface which is to be found on the top side 110 of the precast concrete part 100.

Figure 4 shows a further perspective view of a plurality of precast concrete parts and a removal unit. Figure 4 shows a plurality of precast concrete parts which have been placed in part one within the other. That allows a rational and fast removal operation. The precast concrete parts can represent complete segments or segment portions. All precast parts are processed in plane-parallel relationship at the same time by virtue of the (exactly) horizontally oriented flat plane 300.

Figure 5 shows a perspective view of a detail in Figure 4.

In accordance with the first embodiment of the invention plane-parallel removal of the equalisation layer is already effected in the factory. The casting mould in which for example the concrete is cast makes it possible to ensure that the underside is of a precisely planar configuration. That is a preferred prerequisite for plane-parallel processing of the oppositely disposed join surface or the oppositely disposed flange.

Figure 6 shows a perspective view of a structure of a pylon comprising segments in accordance with the second embodiment. Figure 6 shows a crane 400 which places a pylon storey portion comprising a plurality of precast concrete parts 100 on two pylon storey portions which have already been set in place and which have already been set up. In this case the precast concrete parts 100 in accordance with the second embodiment correspond to the precast concrete parts of the first embodiment.

It is thus possible to ensure that there is a uniformly high quality for the precast concrete parts, wherein the bottom and the join surface or the flange of the precast concrete parts are in plane-parallel relationship with

each other so that no further equalisation layer has to be provided on the building site between two precast concrete parts, but the parts can be placed in exactly mutually fitting relationship in mutually superposed relationship.

In a further embodiment of the invention the precast parts can be lowered into the ground. For that purpose there can be provided for example a lifting platform which can be moved downwardly or which can be lowered into the ground. That is particularly advantageous because in that case no complicated and expensive X-, Y- and Z-displacement unit has to be used. In that way the displacement unit and the milling unit can be smaller. Optionally the displacement units and the milling unit can be adapted to be displaceable so that the precast parts which are to be milled or which have been milled can be placed on and removed from the lifting platform.

CLAIMS

1. A process for erecting a wind energy installation pylon, comprising the steps of

producing precast concrete wind energy installation pylon segments for a wind power installation pylon having a first and second end comprising the steps:

casting concrete into a casting mould having a planar floor for producing a concrete pylon segment having a planar underside first end,

hardening the concrete to a predetermined minimum strength to obtain a precast concrete part of predetermined minimum strength,

applying an equalisation layer to a join surface of the second end, that is opposite to the underside, of the precast concrete part pylon segment of predetermined minimum strength,

placing the precast concrete part pylon segment of predetermined minimum strength on a horizontal plane, and

removing the equalisation layer in plane-parallel relationship on the second end of the concrete pylon segment until the second end of the concrete pylon segment is plane-parallel to the first end so that the first and second ends of the concrete pylon segment are plane-parallel to each other, and

arranging a plurality of the produced precast concrete parts on top of each other in a horizontal plane.

2. A process according to claim 1 wherein the equalisation layer has synthetic resin.

3. A process according to claim 1 or claim 2 wherein removal of the equalisation layer is effected by a milling unit having a displacement unit for displacement of the milling unit in the X-, Y- and Z-directions.

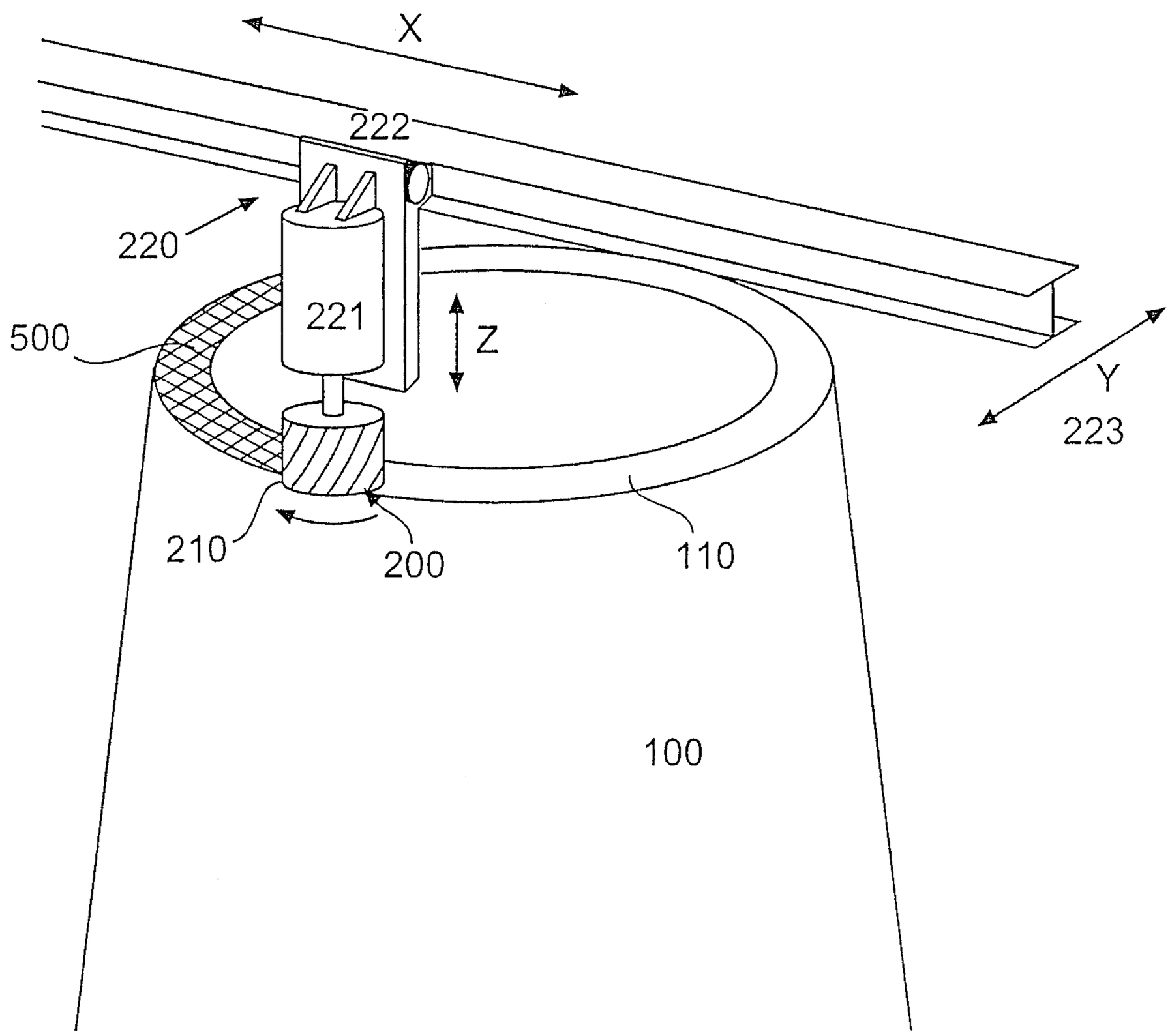


Fig. 1

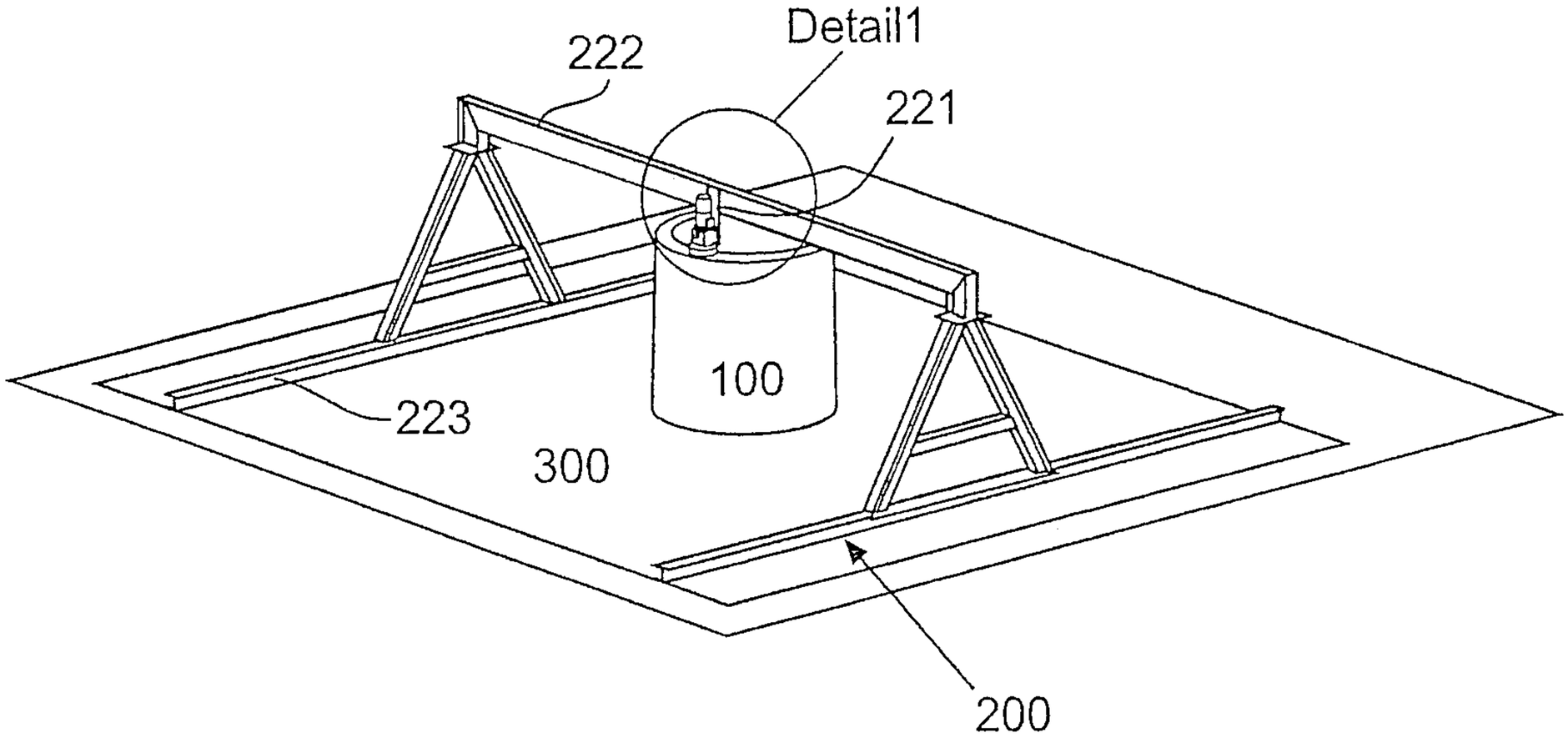

Detail1
222
221
100
223
300
200

Fig. 2

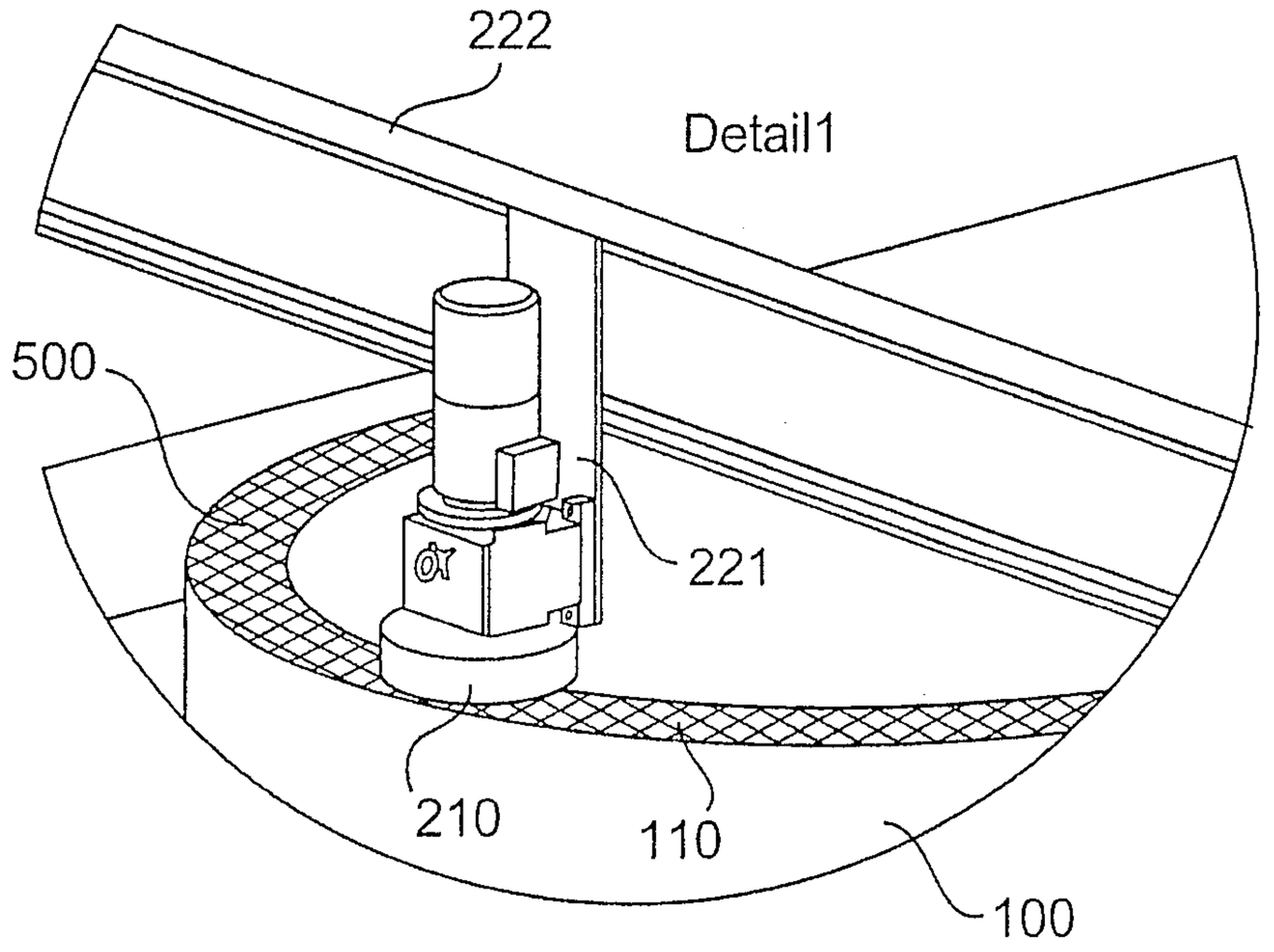

222
Detail1
500
221
210
110
100

Fig. 3

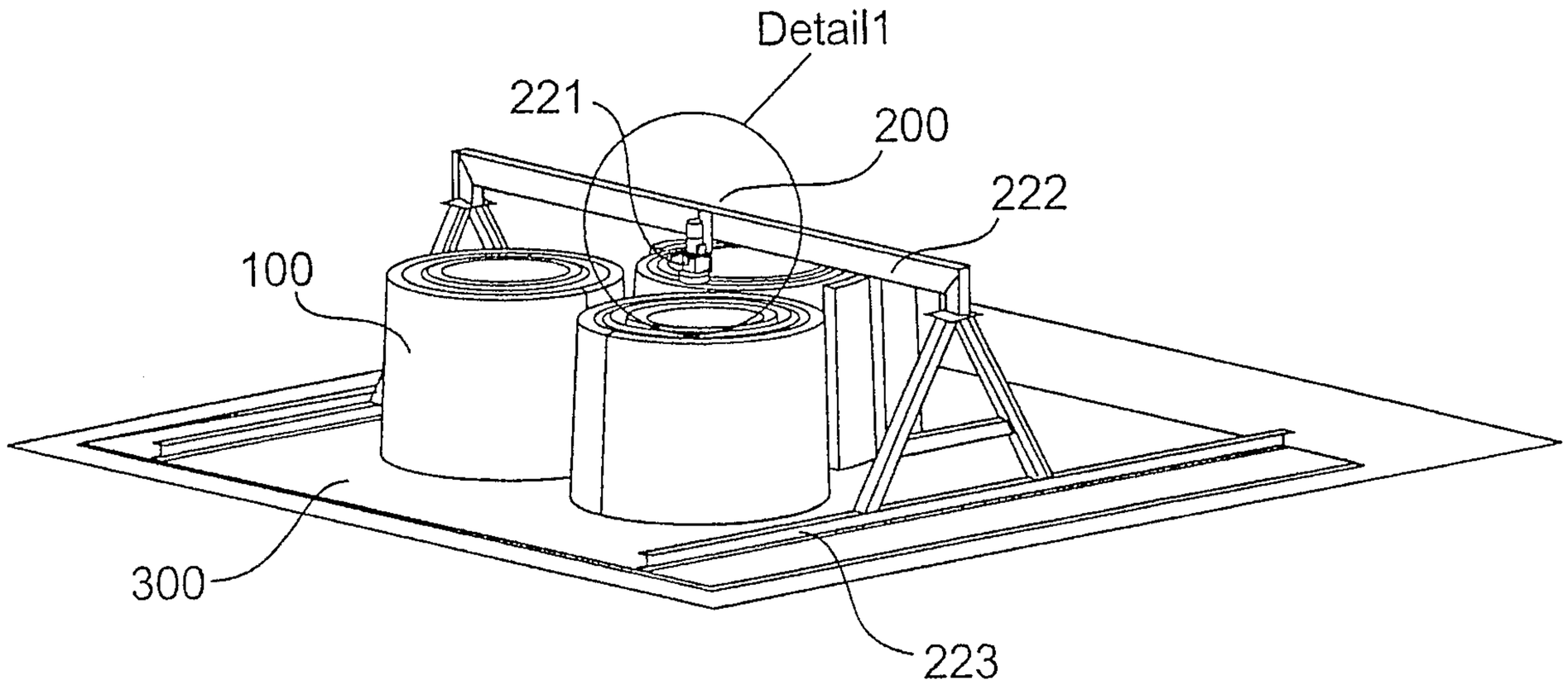

Detail1
221
200
222
100
300
223

Fig. 4

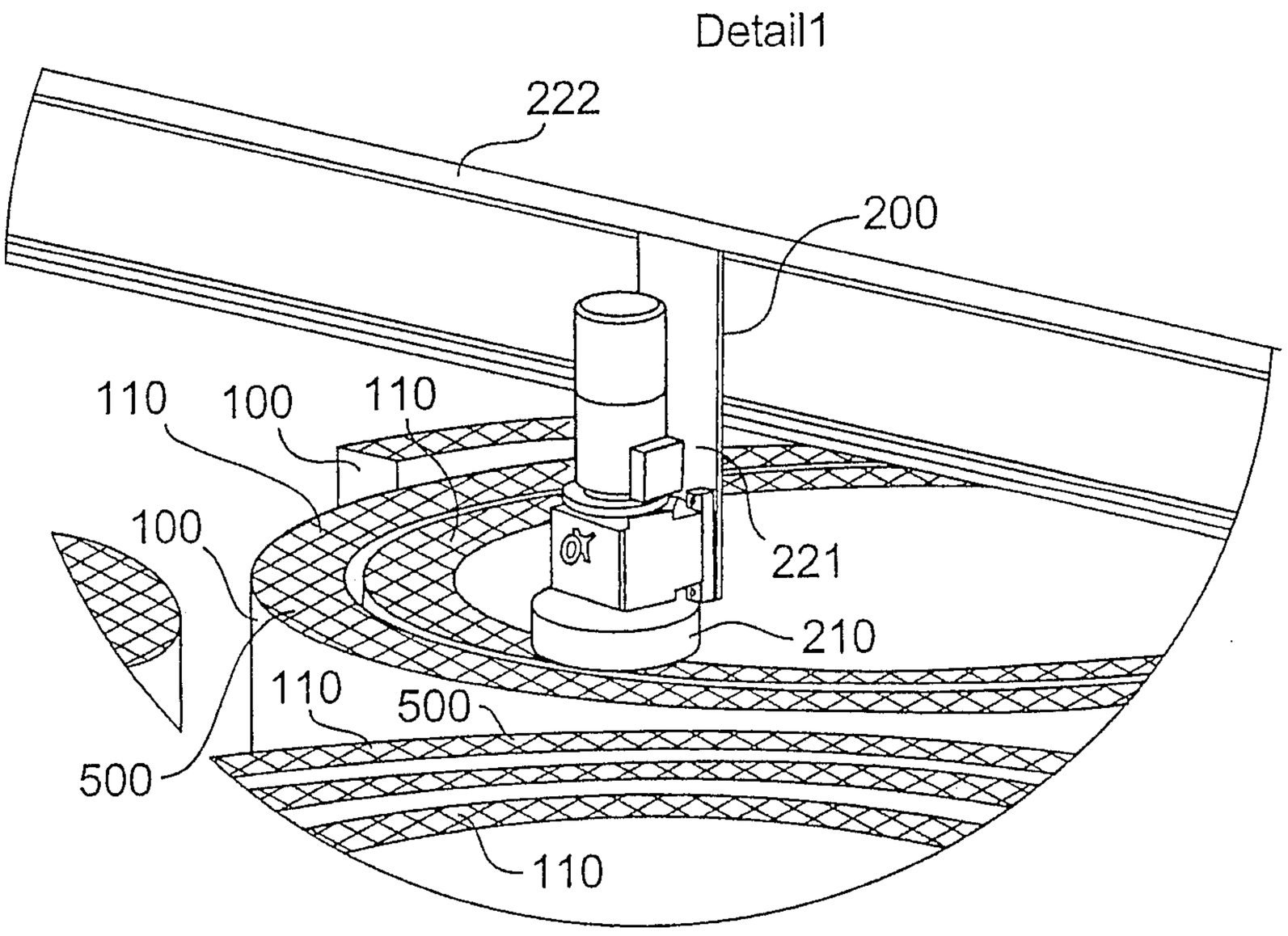

Detail1
222
200
110
100
110
100
221
210
110
500
500
110

Fig. 5

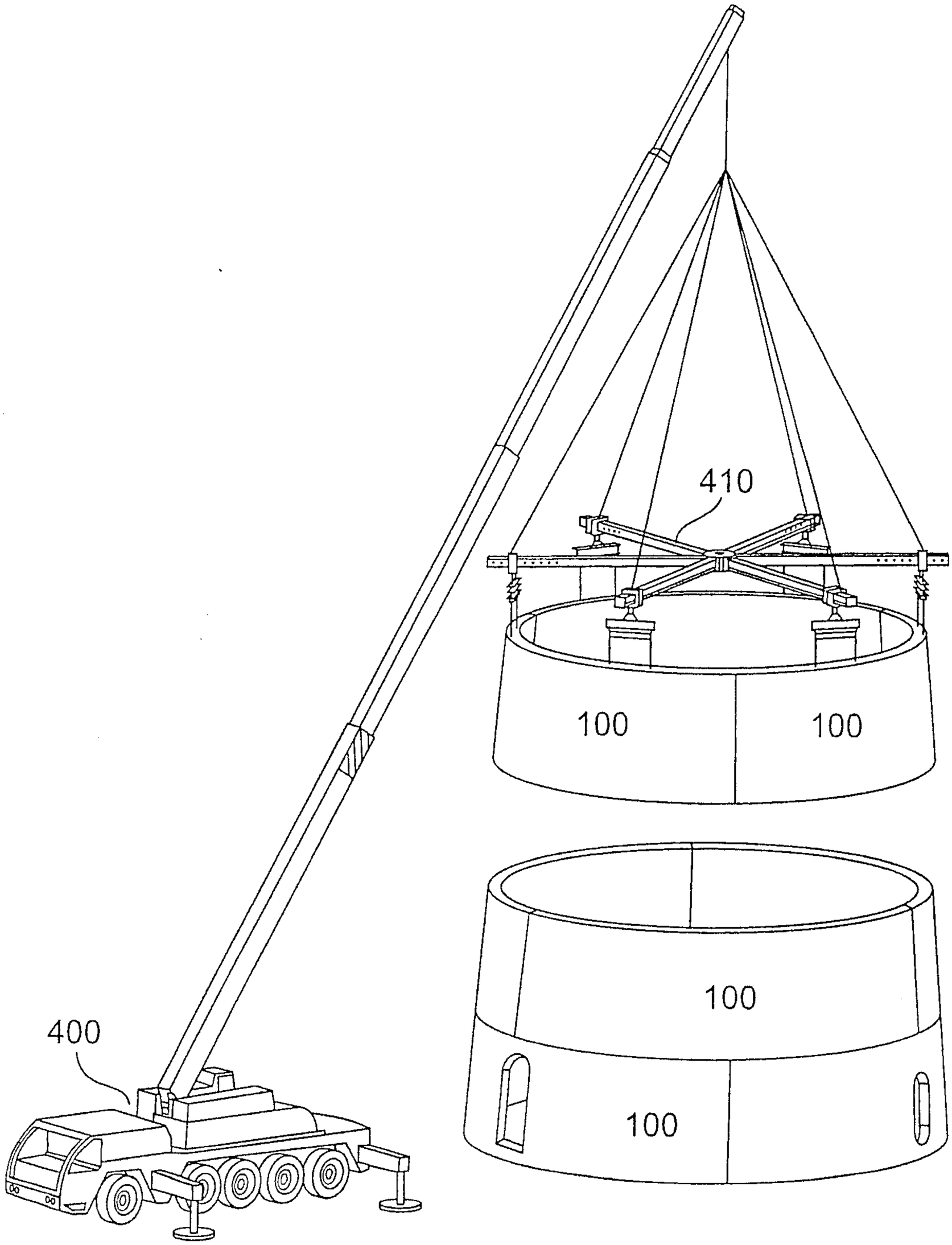
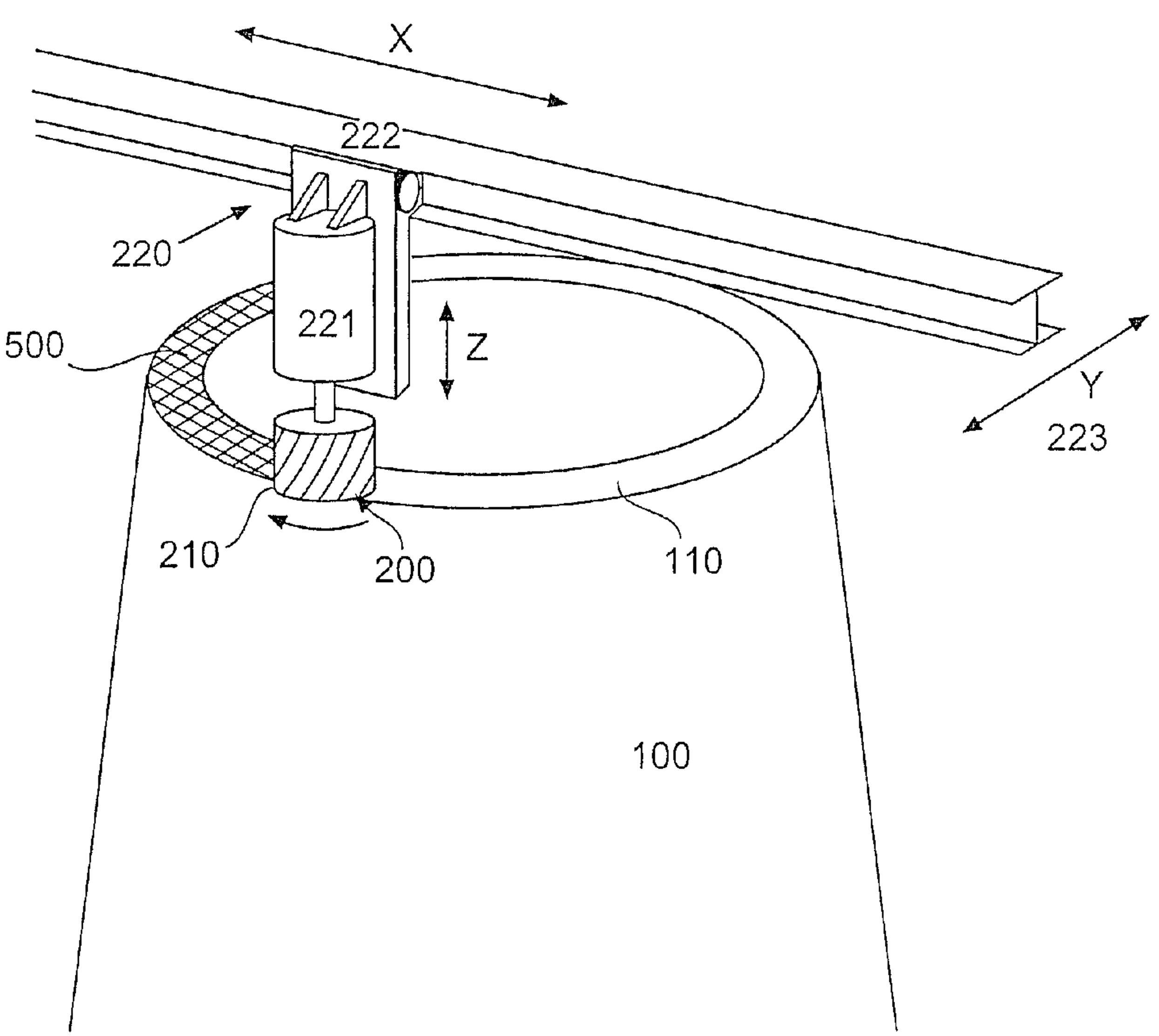


Fig. 6


X
222
220
221
500
Z
Y
223
210
200
110
100