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(54) HIGH VOLTAGE OUTLET STRUCTURE OF ULTRA-HIGH VOLTAGE SHUNT REACTOR

(57) A high voltage outlet structure of an ultra-high voltage shunt reactor comprises a voltage sharing pipe (1) and a voltage sharing ball (2) connected to the tail end of the voltage sharing pipe. The high voltage outlet structure of an ultra-high voltage shunt reactor further comprises an insulating paper cylinder (3) on the outer side of the voltage sharing ball, a Ω-type paperboard (4) on the outer side of the insulating paper cylinder, and a lead supporting structure (5). Three layers of insulating paper pulp (2a) and two layers of supporting strips (2b) are disposed on the outer side of the voltage sharing ball at intervals. The insulating paper cylinder is mounted below an ascending seat (8), and an opening (9) is provided below the insulating paper cylinder. Two ends of the Ω-type paperboard are fixed to a tank wall of an oil tank (12). The lead supporting structure clamps the voltage sharing pipe by arranging grooving paperboards (5a) in a staggered mode. A thick paperboard (5b) configured to fix the grooving paperboards is disposed below the grooving paperboards. The lower part of the thick paperboard is supported by an insulating conductor grip (5c). The high voltage outlet structure of an ultra-high voltage shunt reactor guarantees electrical strength and reliable insulation of outlet of 1100kilovolt, and also guarantees mounting of the outlet structure and a sleeve on an oil tank body, thereby avoiding shearing action of a high voltage ascending seat on the oil tank body, improving the shock resistance of the ultra-high voltage shunt reactor, and guaranteeing long-term safe running of the reactor.

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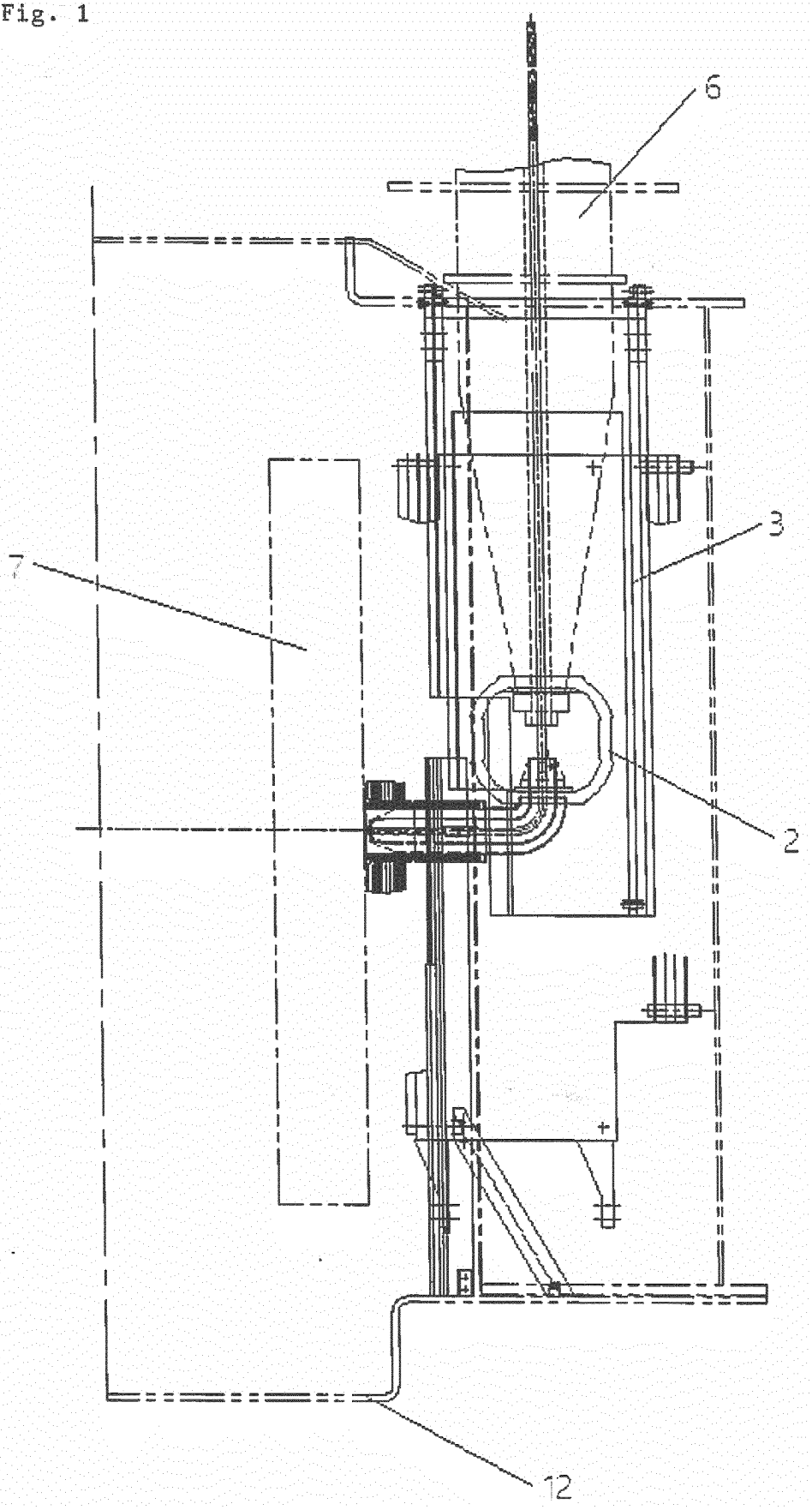
Fig. 1



Description

Technical field

[0001] The invention relates to an outlet structure of reactor, particularly a high voltage outlet structure of an ultra-high voltage shunt reactor.

Background technology

[0002] Generally, a high voltage outlet structure of an ultra-high voltage of 1100kilovolt shunt reactor adopts an indirect outlet structure, i.e. before connected to a terminal block of a sleeve, the high voltage outlet enters an outlet device consisting of an insulator, a copper pipe, a voltage sharing ball and so on. The outlet device and sleeve are mounted in a "trunk type" ascending seat on the outer side of the oil tank independently. The entire ascending seat is about 16 tons in weight. As the source of shock, the body of the reactor vibrates greatly; located independently on the outer side of the oil tank body, the high voltage "trunk type" ascending seat exerts huge shearing action on the oil tank. Under the vibration of the body of the reactor (frequency: 100Hz), the independent "trunk type" ascending seat poses tremendous potential safety hazard; meanwhile, since the weight difference between the reactor and ascending seat is not big, the body and the ascending seat are connected only by the flange and reinforced iron, featuring poor shock resistance.

Content of Invention

[0003] As for the aforesaid problems, the invention provides a high voltage outlet structure of an ultra-high voltage shunt reactor which guarantees electrical strength and reliable insulation of outlet of 1100kilovolt, and also guarantees mounting of the outlet structure and a sleeve on an oil tank body, thereby avoiding shearing action of a high voltage ascending seat on the oil tank body.

[0004] In order to solve the aforesaid problems, the present invention adopts the following technical solutions: a high voltage outlet structure of an ultra-high voltage shunt reactor comprises a voltage sharing pipe and a voltage sharing ball connected to the tail end of the voltage sharing pipe. The high voltage outlet structure of an ultra-high voltage shunt reactor further comprises an insulating paper cylinder on the outer side of the voltage sharing ball, a Ω-type paperboard on the outer side of the insulating paper cylinder, and a lead supporting structure. Three layers of insulating paper pulp and two layers of supporting strips are disposed on the outer side of the voltage sharing ball at intervals. The insulating paper cylinder is mounted below an ascending seat, and an opening is provided below the insulating paper cylinder. Two ends of the Ω-type paperboard are fixed to a tank wall of an oil tank. The lead supporting structure clamps the voltage sharing pipe by arranging grooving paperboards in a staggered mode. A thick paperboard configured to fix the grooving paperboards is disposed below the grooving paperboards. The lower part of the thick paperboard is supported by an insulating conductor grip. The outlet structure guarantees electrical strength of outlet of 1100kilovolt by the insulating paper cylinder and Ω-type paperboard on the outer side of the voltage sharing ball. To guarantee the stability of the voltage sharing pipe and voltage sharing ball, the voltage sharing pipe and voltage sharing ball are supported by the lead supporting structure outside the voltage sharing pipe. The opening below the insulating paper cylinder steers clear of the lead supporting structure. The lead supporting structure clamps the voltage sharing pipe by arranging three layers of grooving paperboards in a staggered mode; its lower part uses two thick paperboards to drag three grooving paperboards used for clamping the voltage sharing pipe. The lower part of the thick paperboards is supported by a formed insulating conductor grip to guarantee the stability of the outlet structure.

[0005] A sleeve is inserted in the upper part of the voltage sharing ball.

[0006] Preferably the voltage sharing pipe is L-type copper pipe, with its tail ends inserted in the voltage sharing ball. Led out from the middle of the high voltage winding, the high voltage lead penetrates from the head end of the L-type copper pipe and is crimped with the leader cable in the L-type copper pipe, then passing the voltage sharing ball and led out from the sleeve.

[0007] Preferably the L-type copper pipe is covered by paper pulp and insulating layer.

[0008] Preferably the insulating paper cylinder has four layers from inside to outside.

[0009] The Ω-type paperboard has four layers from inside to outside. The two ends of the four-layer Ω-type paperboard are fixed to the oil tank by the supporting strip and insulating screw, etc., and the middle of the four-layer Ω-type paperboard is fixed by the cushion block and insulating screw, etc..

[0010] The outer three layers of the insulating paper cylinder are fixed at the top, and the innermost layer is fixed at the bottom. The outer three layers of the insulating paper cylinder are fixed by the cushion block and insulating screw at the top, and the innermost layer is fixed at the bottom.

[0011] The invention provides a high voltage outlet structure of an ultra-high voltage shunt reactor which guarantees electrical strength and reliable insulation of outlet of 1100kilovolt, and also guarantees mounting of the outlet structure and a sleeve on an oil tank body, thereby avoiding shearing action of a high voltage ascending seat on the oil tank body, improving the shock resistance of the ultra-high voltage shunt reactor, and guaranteeing long-term safe running of the reactor.

Brief description of the figures

[0012]

Figure 1 is the front view of the invention;
Figure 2 is the left view of the invention;
Figure 3 is the vertical view of the invention;
Figure 4 is the schematic diagram of the connection between voltage sharing pipe and voltage sharing ball;
Figure 5 is the front view of insulating paper cylinder;
Figure 6 is the vertical view of insulating paper cylinder;
Figure 7 is the vertical view of Ω-type paperboard;
Figure 8 is the front view of the lead supporting structure;

[0013] Wherein, 1, Voltage sharing pipe, 2, Voltage sharing ball, 2a, Insulating paper pulp, 2b, Supporting strips, 3, Insulating paper cylinder, 4, Ω-type paperboard, 5, Lead supporting structure, 5a, Grooving paperboard, 5b, Thick paperboard, 5c, Insulating conductor grip, 6, Sleeve, 7, High voltage winding, 7a, Coil, 7b, Iron core, 8, Ascending seat, 9, Opening, 10, Cushion block, 11, Insulating screw, 12, Oil tank, 13, Magnetic shielding, 14, High voltage lead.

Specific embodiments

[0014] A high voltage outlet structure of an ultra-high voltage shunt reactor comprises a voltage sharing pipe 1, a voltage sharing ball 2 connected to the tail end of the voltage sharing pipe 1, an insulating paper cylinder 3 on the outer side of the voltage sharing ball 2, a Ω-type paperboard 4 on the outer side of the insulating paper cylinder 3, and a lead supporting structure 5; the sleeve 6 is inserted in the upper part of the voltage sharing ball 2, the voltage sharing pipe 1 is L-type copper pipe, the L-type copper pipe is covered by paper pulp and insulating layer, with its tail ends inserted in the voltage sharing ball 2; led out from the middle of the high voltage winding 7, the high voltage lead 14 penetrates from the head end of the L-type copper pipe and is crimped with the leader cable in the L-type copper pipe, then passing the voltage sharing ball 2 and led out from the sleeve 6. High voltage winding 7 includes coil 7a and iron core 7b; magnetic shielding 13 is disposed on top of high voltage winding 7.

[0015] Three layers of insulating paper pulp 2a and two layers of supporting strips 2b are disposed on the outer side of the voltage sharing ball 2 at intervals.

[0016] The insulating paper cylinder 3 with four layers from inside to outside is mounted below an ascending seat 8, and an opening 9 is provided below the insulating paper cylinder; the outer three layers of the insulating paper cylinder 3 are fixed by the cushion block 10 and insulating screw 11 at the top, and the innermost layer is fixed at the bottom.

[0017] The Ω-type paperboard has four layers from inside to outside, two ends of the Ω-type paperboard are fixed to a tank wall of an oil tank; the two ends of the four-layer Ω-type paperboard are fixed to the oil tank 12 by the supporting strip and insulating screw 11, and the middle of the four-layer Ω-type paperboard is fixed by the cushion block 10 and insulating screw 11.

[0018] The lead supporting structure 5 clamps the voltage sharing pipe 1 by arranging grooving paperboards 5a in a staggered mode. A thick paperboard 5b configured to fix the grooving paperboards 5a is disposed below the grooving paperboards 5a. The lower part of the thick paperboard 5b is supported by an insulating conductor grip 5c.

Claims

1. A high voltage outlet structure of an ultra-high voltage shunt reactor, comprises a voltage sharing pipe and a voltage sharing ball connected to the tail end of the voltage sharing pipe, **characterized in that** further comprises an insulating paper cylinder on the outer side of the voltage sharing ball, a Ω-type paperboard on the outer side of the insulating paper cylinder, and a lead supporting structure; three layers of insulating paper pulp and two layers of supporting strips are disposed on the outer side of the voltage sharing ball at intervals; the insulating paper cylinder is mounted below an ascending seat, and an opening is provided below the insulating paper cylinder; two ends of the Ω-type paperboard are fixed to a tank wall of an oil tank; the lead supporting structure clamps the voltage sharing pipe by arranging grooving paperboards in a staggered mode; a thick paperboard configured to fix the grooving paperboards is disposed below the grooving paperboards; the lower part of the thick paperboard is supported by an insulating conductor grip.

2. The high voltage outlet structure of an ultra-high voltage shunt reactor according to Claim 1, **characterized in that** wherein a sleeve is inserted in the upper part of the voltage sharing ball.

3. The high voltage outlet structure of an ultra-high voltage shunt reactor according to Claim 2, **characterized in that** wherein the voltage sharing pipe is L-type copper pipe, with its tail ends inserted in the voltage sharing ball; led out from the middle of the high voltage winding, the high voltage lead penetrates from the head end of the L-type copper pipe and is crimped with the leader cable in the L-type copper pipe, then passing the voltage sharing ball and led out from the sleeve.

4. The high voltage outlet structure of an ultra-high voltage shunt reactor according to Claim 3, **characterized in that** wherein the L-type copper pipe is covered by paper pulp and insulating layer.

5. The high voltage outlet structure of an ultra-high voltage shunt reactor according to Claim 1, **character-**

ized in that wherein the insulating paper cylinder has four layers from inside to outside.

6. The high voltage outlet structure of an ultra-high voltage shunt reactor according to Claim 1, **characterized in that** wherein the Ω-type paperboard has four layers from inside to outside.

7. The high voltage outlet structure of an ultra-high voltage shunt reactor according to Claim 1, **characterized in that** wherein the outer three layers of the insulating paper cylinder are fixed at the top, and the innermost layer is fixed at the bottom.

Fig. 1

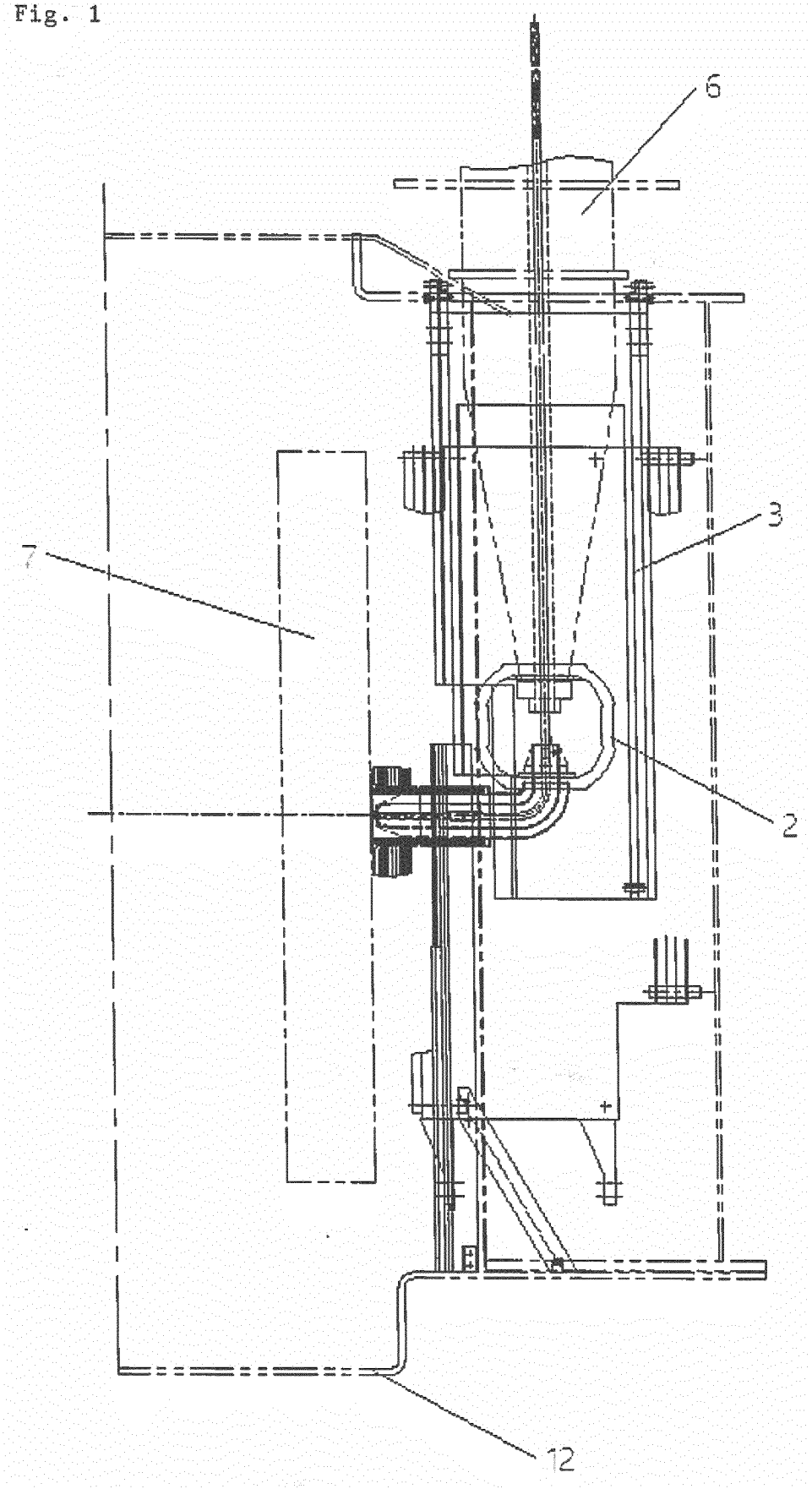
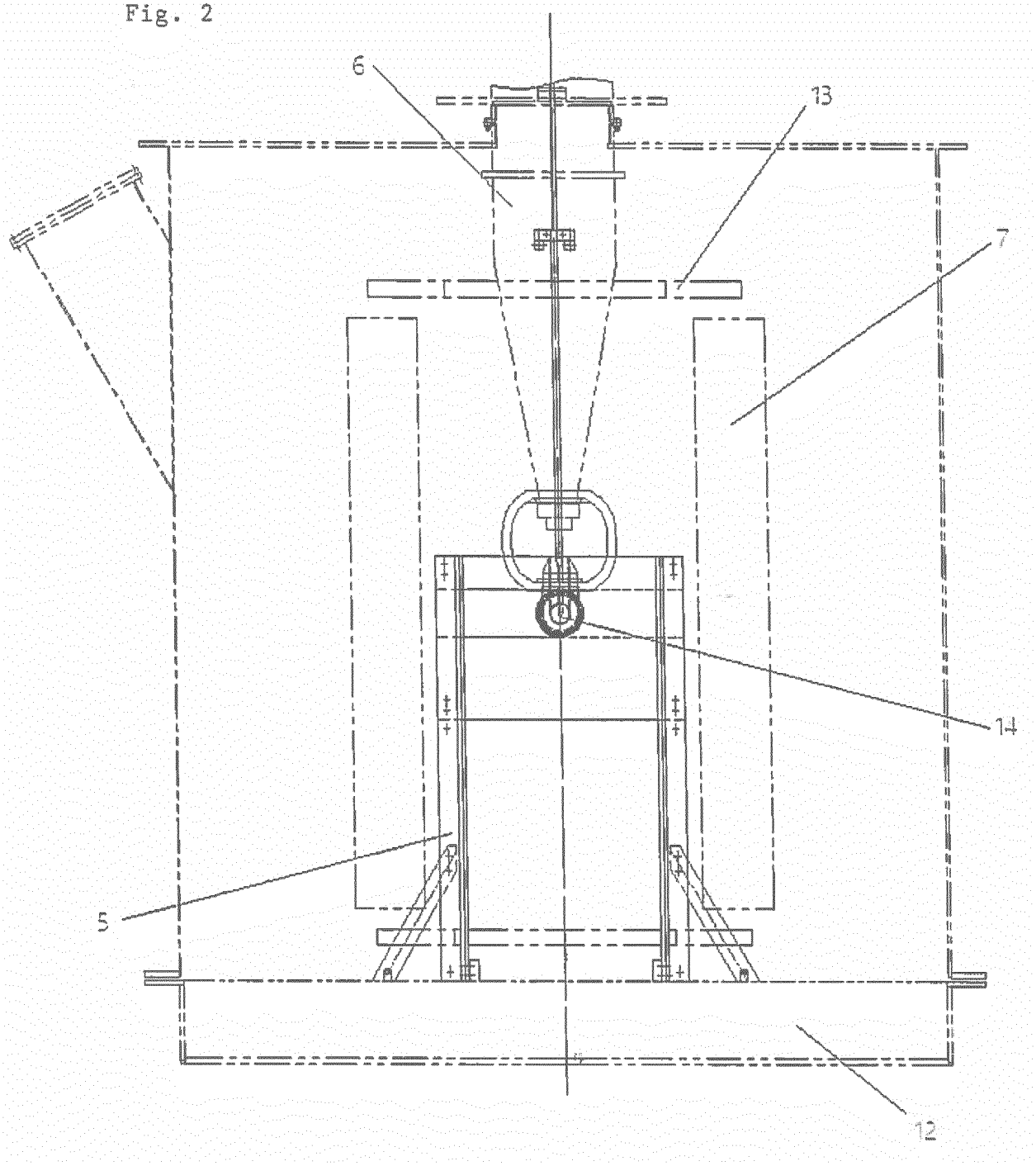


Fig. 2



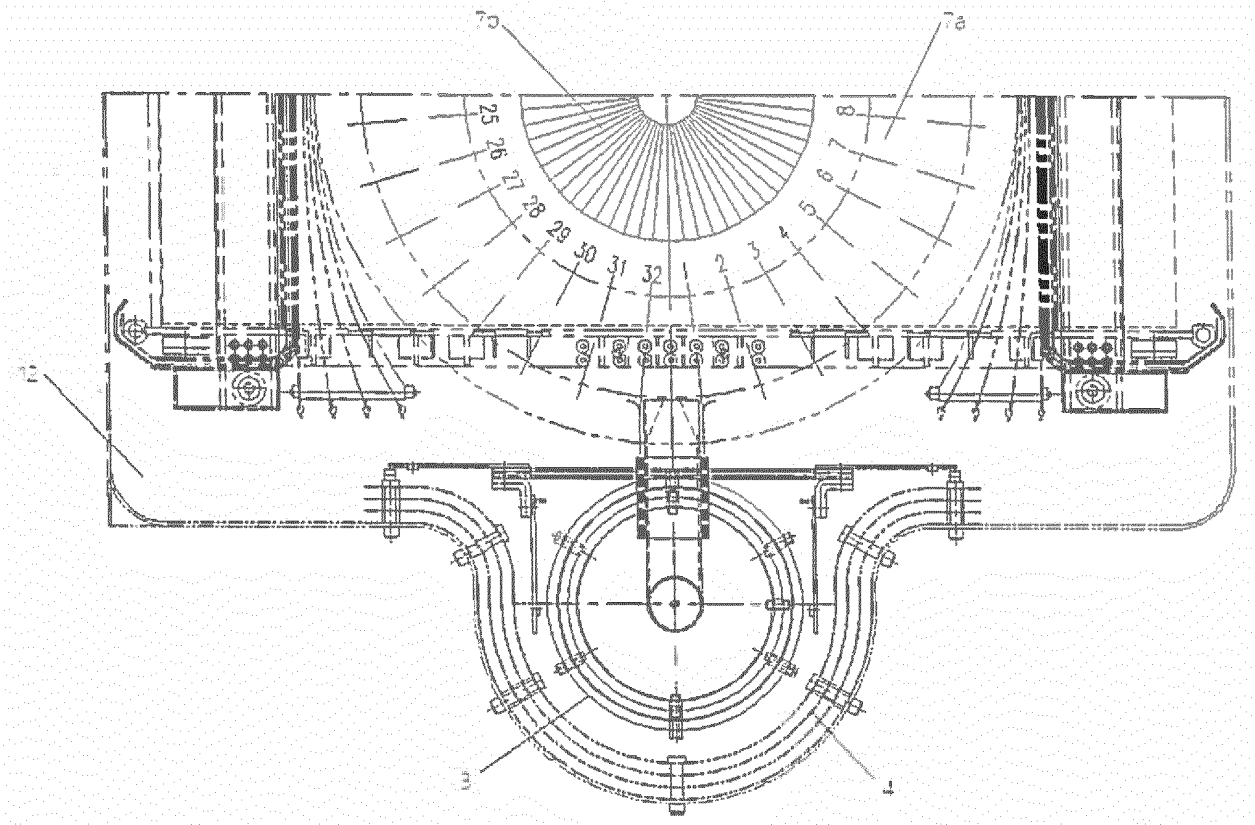


Fig. 3

Fig. 4

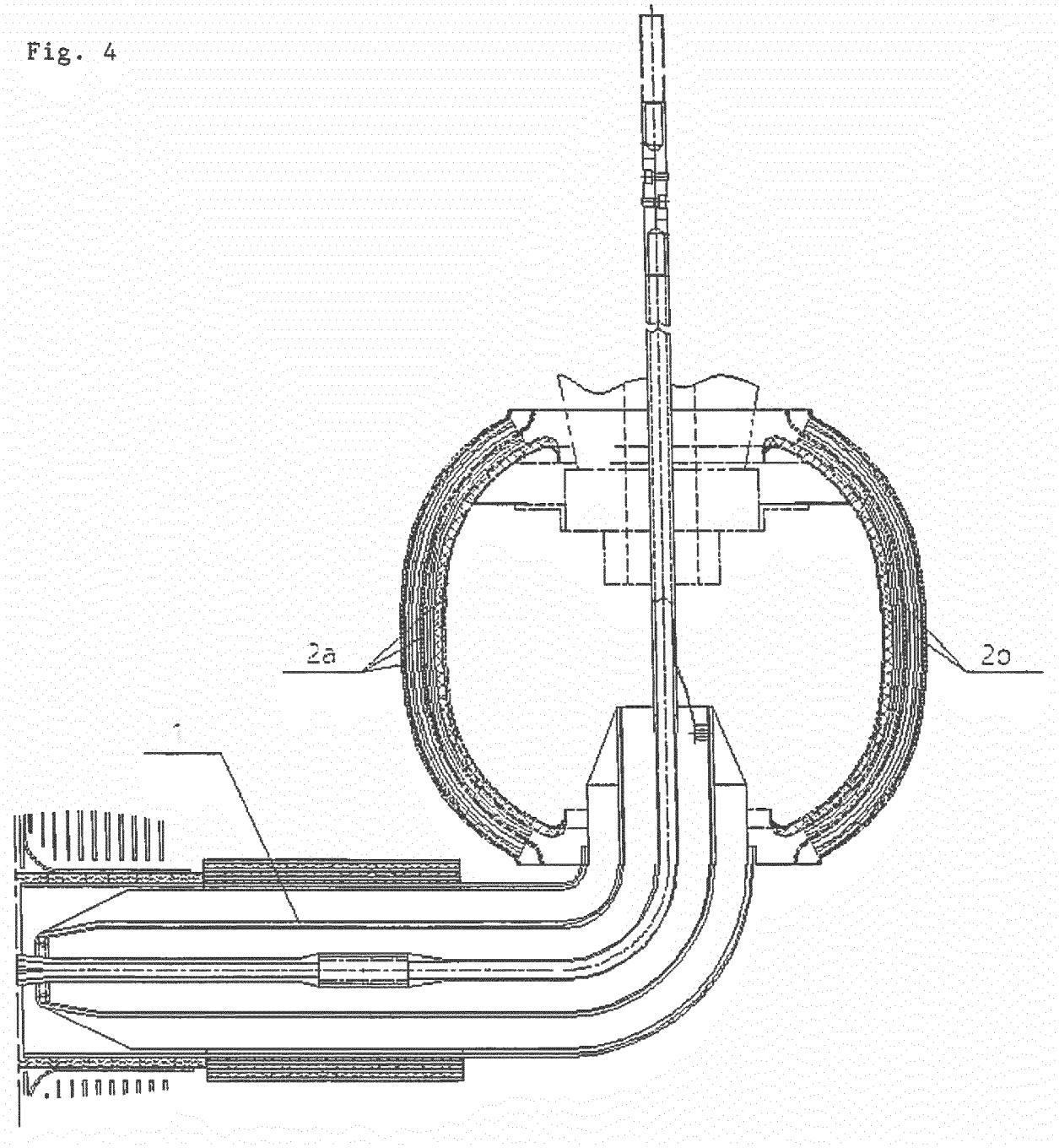
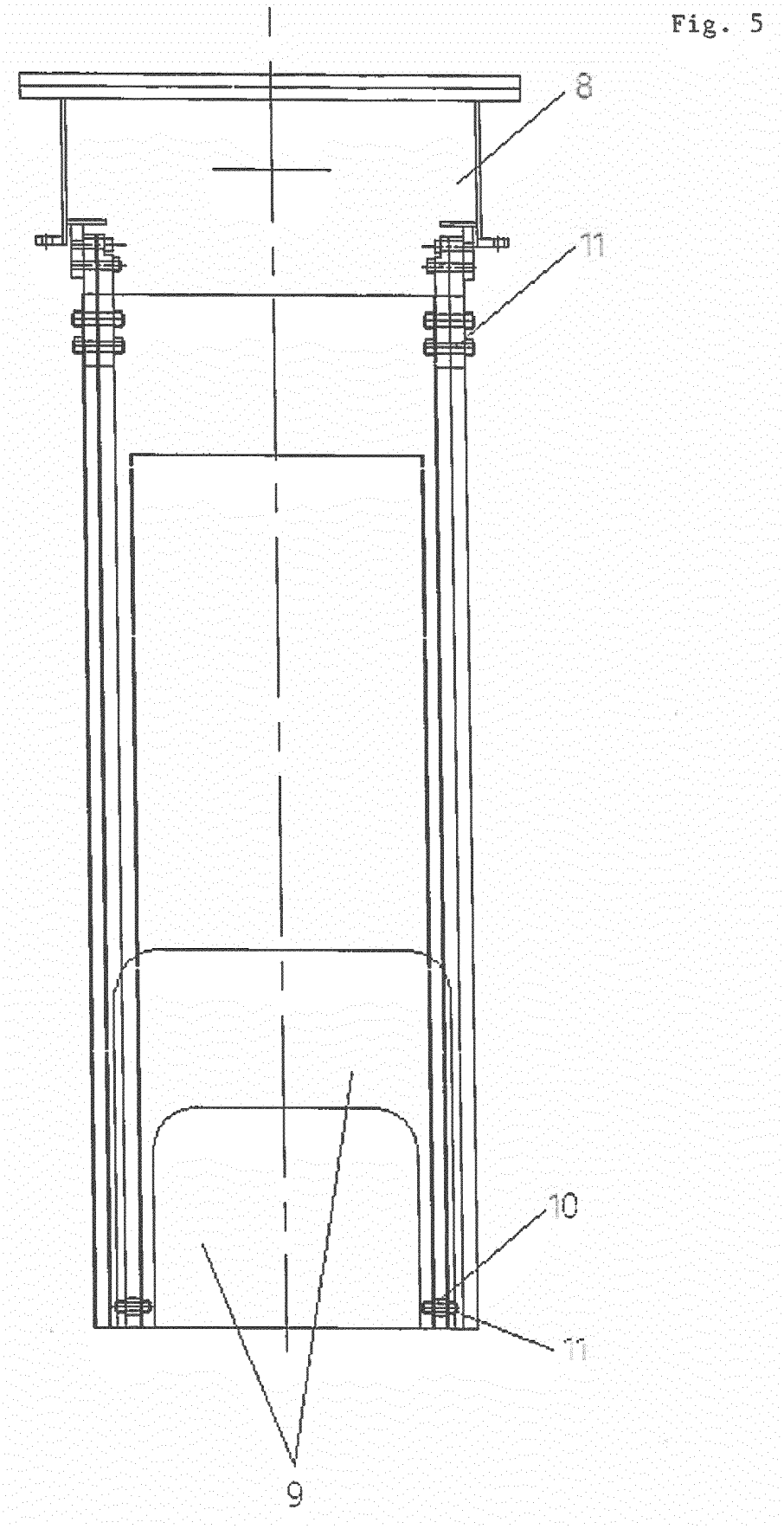


Fig. 5



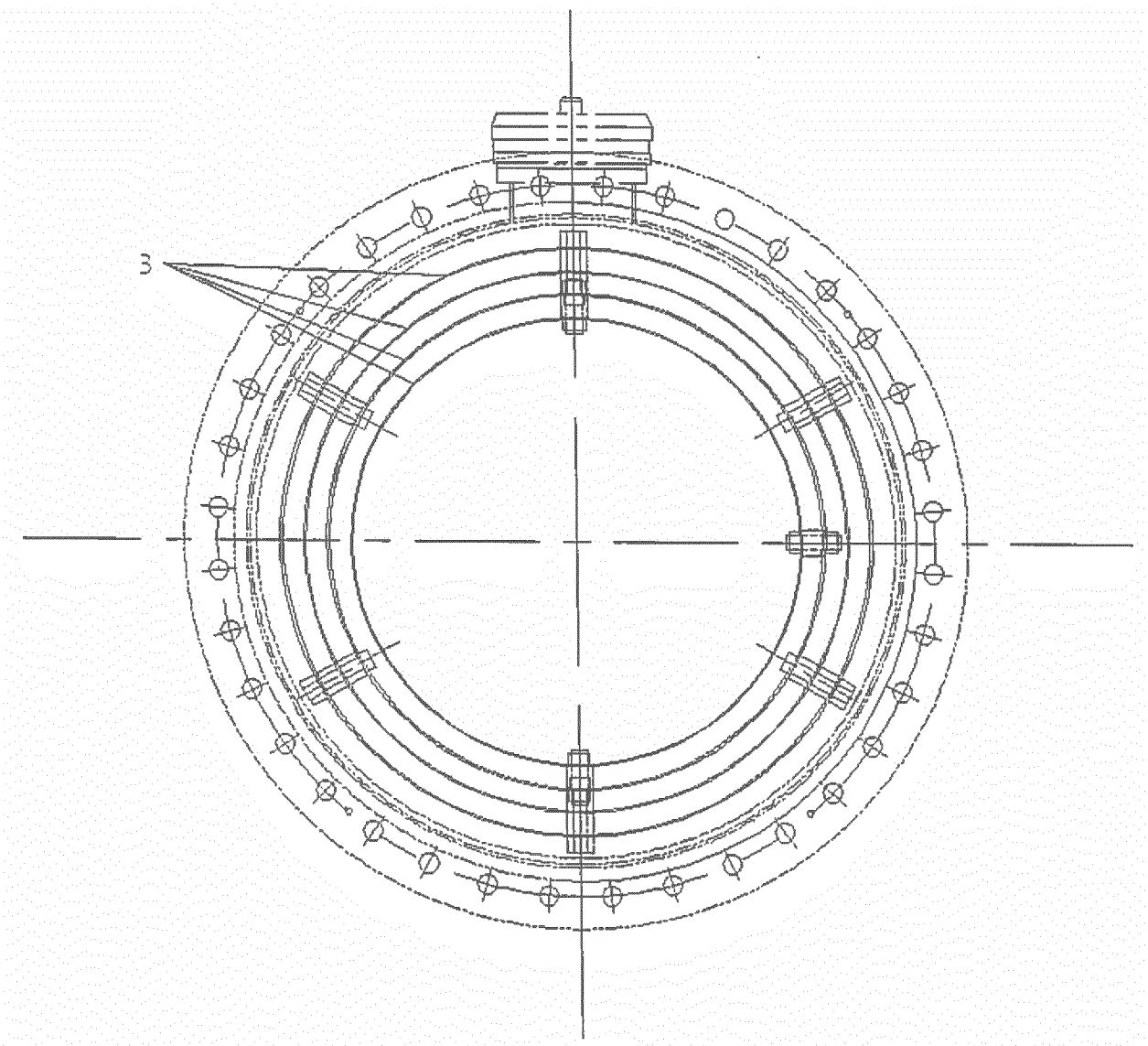


Fig. 6

Fig. 7

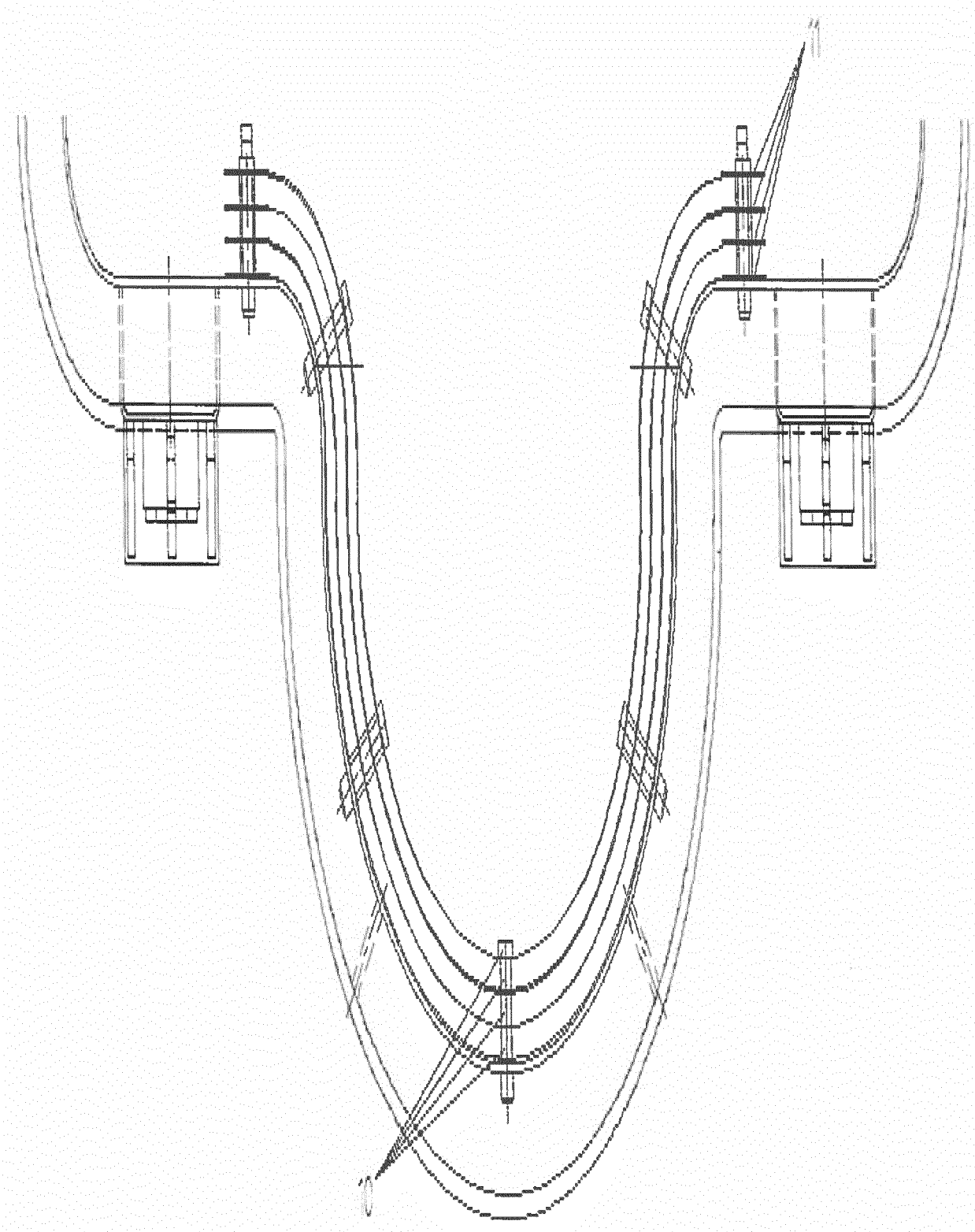
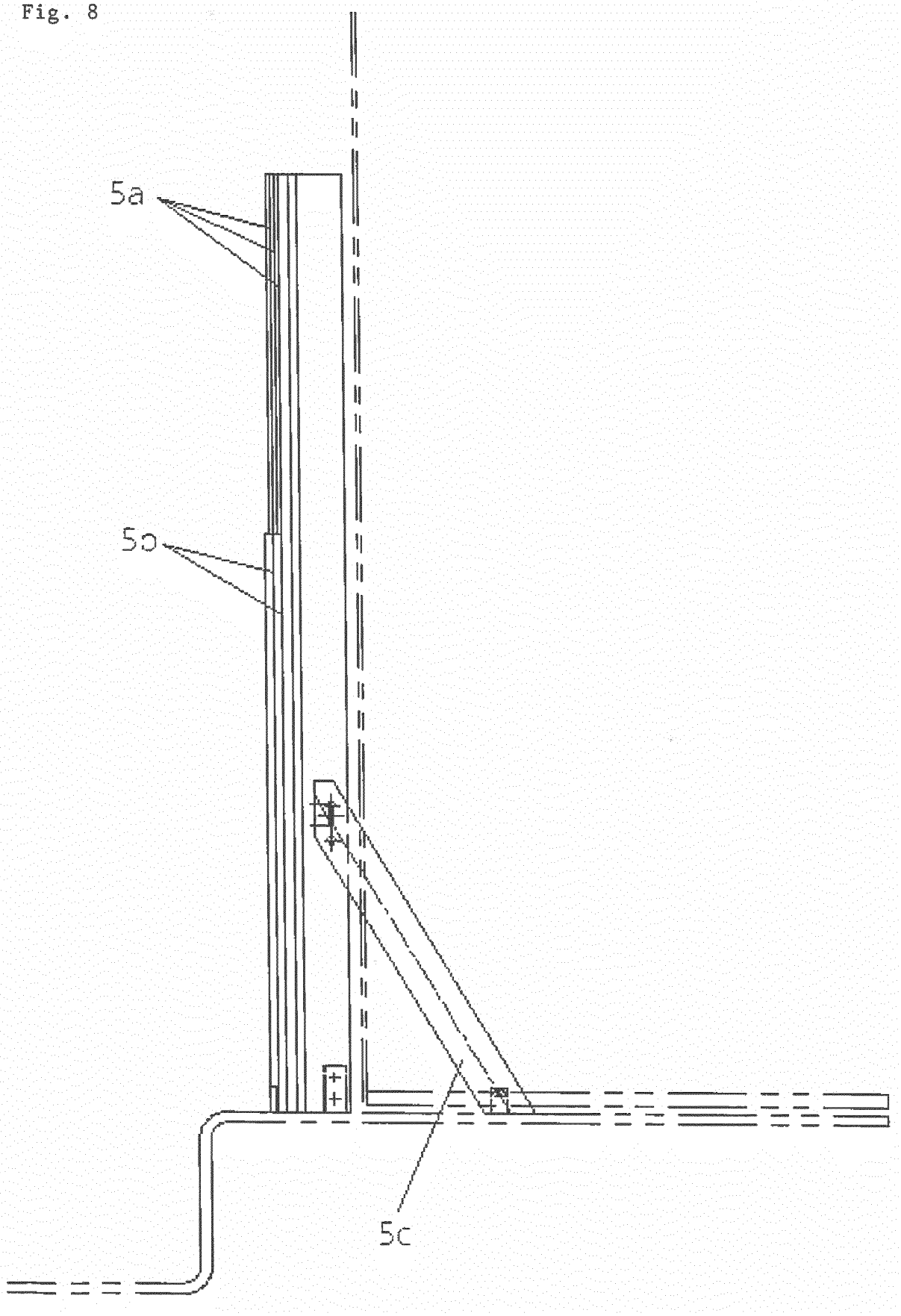


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/071448

A. CLASSIFICATION OF SUBJECT MATTER

H01F 27/32 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, EPODOC, WPI, CNKI: extra-high voltage, lead wire, pressure equalizing line, pressure equalizing ball, paper tube, oil tank, paperboard, gagger, transformer, inductor, reactor, pressure, ball, tube, insulat+, paper, tank, support, outlet, sleeve

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 204695942 U (SHANDONG POWER EQUIPMENT CO., LTD.), 07 October 2015 (07.10.2015), claims 1-7	1-7
A	CN 101694807 A (CHINA XD ELECTRIC CO., LTD.), 14 April 2010 (14.04.2010), the whole document	1-7
A	CN 103227039 A (SHANDONG POWER EQUIPMENT CO., LTD.), 31 July 2013 (31.07.2013), the whole document	1-7
A	CN 101640114 A (BAODING TIANWEI BAOBIAN ELECTRIC CO., LTD. et al.), 03 February 2010 (03.02.2010), the whole document	1-7
A	CN 102331551 A (CHINA ELECTRIC POWER RESEARCH INSTITUTE), 25 January 2012 (25.01.2012), the whole document	1-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
22 March 2016 (22.03.2016)	**21 April 2016 (21.04.2016)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **BAI, Qian** Telephone No.: (86-10) **62089536**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/071448

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 204695942 U	07 October 2015	None	
CN 101694807 A	14 April 2010	CN 101694807 B	15 June 2011
CN 103227039 A	31 July 2013	None	
CN 101640114 A	03 February 2010	CN 101640114 B	22 June 2011
CN 102331551 A	25 January 2012	CN 102331551 B	27 August 2014

Form PCT/ISA/210 (patent family annex) (July 2009)