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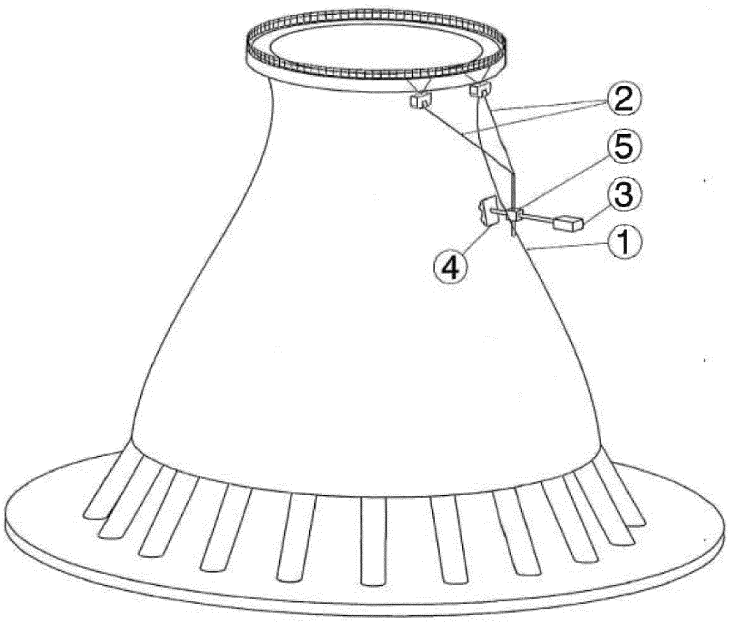
(54) A DEVICE FOR MOVING ACROSS VERTICAL CONSTRUCTION OBJECTS, PARTICULARLY COOLING TOWERS AND DAMS

(57) The device for moving on the vertical construction objects, particularly cooling towers and dams, is characterised in that it has a locomotion system, consisting of a bogie (4), a counterbalance (3) and a connecting element (5) suspended on a cable or cables (2) attached to the crown of the cooling tower (1) or the dam so that the attachment point of the cable or the cables (2) to the connecting element (5) is located above the line connecting centres of mass of the counterbalance (3) and the bogie (4).



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Description

[0001] The object of the invention is a device for moving on the vertical construction objects such as cooling towers and dams in order to transport other technical objects (e.g. diagnostic and monitoring modules, tools and power tools, measurement and executive systems) for conducting inspections, diagnosing cooling towers or dams and for carrying out maintenance and repair works. The main problems to be solved by the invention are enabling the movement of a diagnostic platform along the surface of the cooling tower or the dam and providing a contact of this platform in confined areas, e.g. in the narrowing area of the cooling tower. Sufficiently large contact force of the platform is required particularly during the contact tests of the outer surface of the cooling tower or the dam.

[0002] The patent no. 143400 presents a device for repairing the walls of cooling towers. The device is equipped with a catwalk designed for repair crew workers. The catwalk is suspended on two hoist cables attached to motor bogies moving along a guideway located at the crown of the cooling tower. Winding or unwinding of the hoist cables, and thereby controlling platform movement vertically, is carried out with another two motor units integrated with the catwalk. Additionally, the device is equipped with pressing cables mounted on one side to the guideway by passive bogies and on the other side manually clamped in clamps located on the catwalk. Moving the catwalk horizontally towards the axis of the cooling tower (in order to bring the catwalk closer to the surface of the cooling tower) is troublesome because it requires at least a few actions, i.e. releasing the clamps clamping the pressing cables, raising the platform on the hoist cables, clamping the clamps on the pressing cables and lowering the platform on the hoist cables. Lowering the catwalk in order to bring it closer to the cooling tower axis lasts until the resultant forces in pressing cables balance the forces occurring in the hoist cables. It does not always allow bringing the catwalk closer to the cooling tower axis so as to provide a contact of the catwalk with the platform surface. Then it is necessary to additionally shift the passive bogies on the guideway, which requires additional service.

[0003] The patent no. 170511 also presents a device for renovating the walls of cooling towers. This solution eliminates (compared to the solution from the patent no. 143400) the need for using pressing cables, which allow bringing the device closer to the axis. Instead, it proposes manually retractable working platform, on which work people performing maintenance of the outer surface of the cooling tower. The drawback of such a solution is the inability to provide sufficient contact of the platform to the surface of the cooling tower, which is necessary when performing contact tests of that surface.

[0004] The aim of the present invention is to improve moving across the vertical surfaces of construction objects and to enable the implementation of transportation, diagnostics and operation tasks.

[0005] The device according to the invention is characterised in that it has a locomotion system, consisting of a bogie, a counterbalance and an element connecting them suspended on a cable or cables attached to the crown of the cooling tower or the dam so that the attachment point of the cable or the cables to the connecting element is located above the line connecting centres of mass of the counterbalance and the bogie.

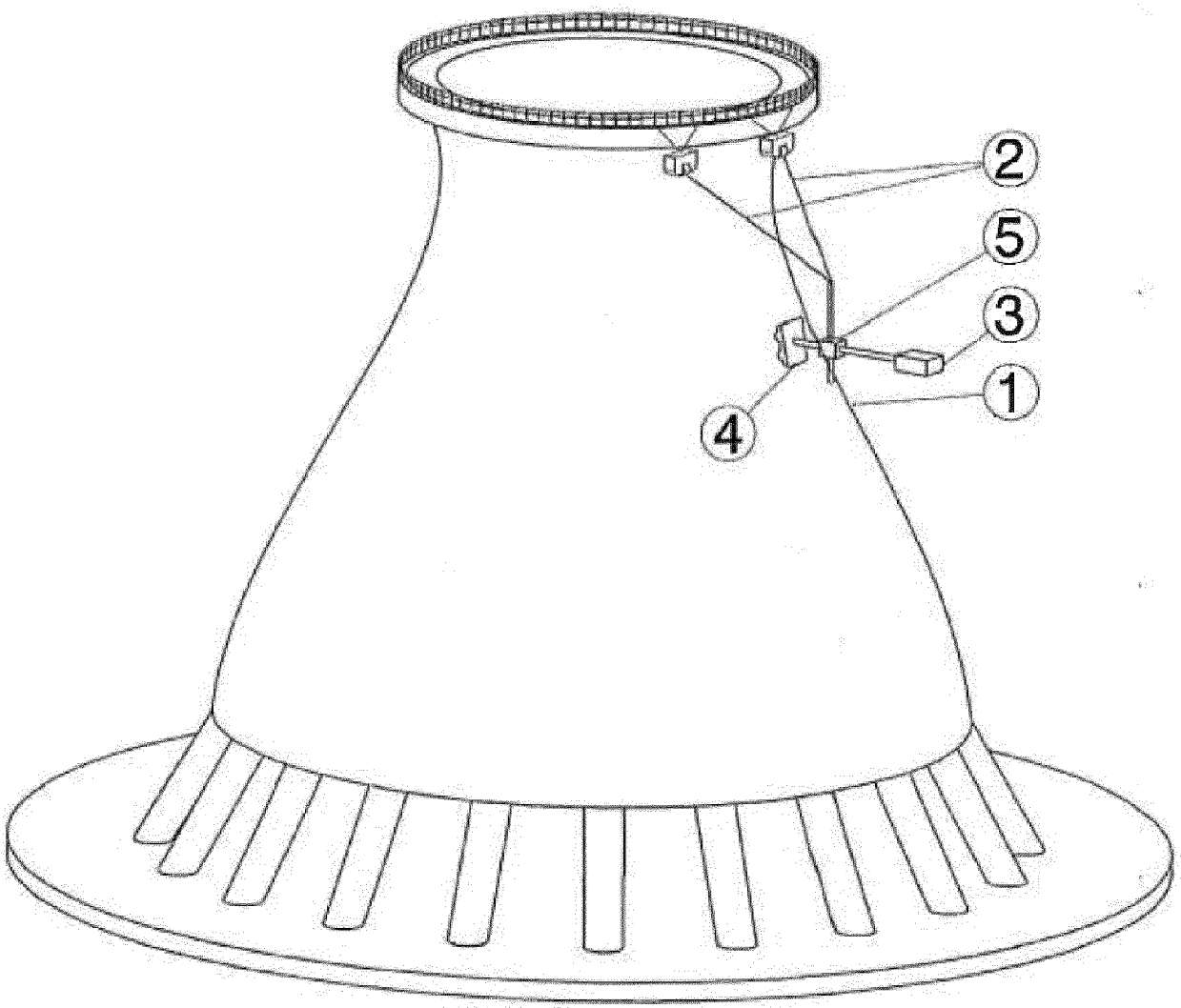
[0006] The greatest advantage of the proposed solution according to the invention is the ability to obtain adequate pressing force of the bogie to the object on which it is moving, which allows performing contact tests of concrete objects (especially cooling towers). An important advantage is also the device operation safety, i.e. the system is not vulnerable to break away from the wall and fall to the ground. In addition, the cables can be unwinded / winded with self-locking winches, so there is no need to continuously supply them with energy in order to maintain the position of the device.

[0007] The subject of the invention is presented in an embodiment in a drawing, which shows a view of the device mounted on a cooling tower.

[0008] The device has a locomotion system consisting of the bogie (4), the counterbalance (3) and the connecting element (5) suspended on a cable or cables (2) attached to the crown of the cooling tower (1) or the dam so that the attachment point of the cable or the cables (2) to the connecting element (5) is located above the line connecting centres of mass of the counterbalance (3) and the bogie (4). Position of the bogie (including a diagnostic and monitoring module) is dependent on the length of unwinded cables. Controlling the movement of the bogie in the vertical direction (up-down) is done by even winding / unwinding of the cables. Controlling the movement of the bogie (4) in the horizontal direction (left-right) is done by changing the cable attachment points on the crown of the cooling tower and differentiating the lengths of unwinded cables. The torque resulting from the action of gravity force of the counterbalance (3), causing rotation of the locomotion system in the vertical plane passing through the axis of the cooling tower, is balanced by the torque resulting from the force pressing the bogie (4) to the surface of the cooling tower

Claims

1. The device for moving on the vertical construction objects, particularly cooling towers and dams, **characterised in that** it has a locomotion system, consisting of a bogie (4), a counterbalance (3) and a connecting element (5) suspended on a cable or cables (2) attached to the crown of the cooling tower (1) or the dam so that the attachment point of the cable or the cables (2) to the connecting element (5) is located above the line connecting centres of mass of the counterbalance (3) and the bogie (4).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EUROPEAN SEARCH REPORT

Application Number
EP 15 20 1391

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 257 491 A (PRESNALL JR HOMER H ET AL) 24 March 1981 (1981-03-24) * column 3, line 51 - column 4, line 24; figure 1 *	1	INV. E04G3/32 E04G3/30 E04G3/28
X	EP 2 677 095 A2 (GESTA STAHLROHRGERUESTE [DE]) 25 December 2013 (2013-12-25) * paragraph [0018] - paragraph [0026]; figures 4,7-9 *	1	

TECHNICAL FIELDS SEARCHED (IPC)
E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 April 2016	Melhem, Charbel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 20 1391

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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14-04-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4257491 A	24-03-1981	NONE	
EP 2677095 A2	25-12-2013	DE 102012105417 A1	24-12-2013
		DE 202013005412 U1	23-09-2013
		EP 2677095 A2	25-12-2013

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 143400 A **[0002] [0003]**
- WO 170511 A **[0003]**