(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 November 2004 (25.11.2004)

PCT

(10) International Publication Number
WO 2004/101420 A1

(51) International Patent Classification[7]: B66B 9/04

(21) International Application Number:
PCT/GR2004/000021

(22) International Filing Date: 6 April 2004 (06.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
20030100217 13 May 2003 (13.05.2003) GR

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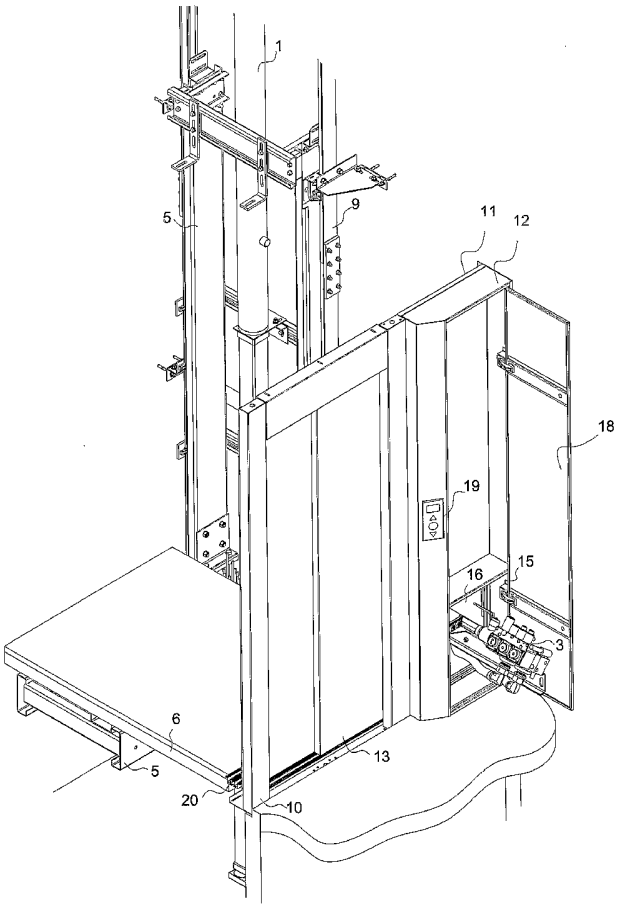
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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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(54) Title: HYDRAULIC LIFT WITH MOVABLE HYDRAULIC VALVE BLOCK



(57) Abstract: Hydraulic lift, with the car (6) moving inside the well (14) on guide rails (9), comprising a hydraulic piston (1) and a power unit (2), which comprises a mineral oil container. The container houses the motor, the pump and a valve block (3), mounted on a driving mechanism (4) (by rolling or sliding), allowing the valve block (3) to move from its initial position inside the well (14) to the maintenance, inspection and emergency release position outside the well (14), through a suitable outlet (16) on the frame of one of the lift doors or on a supplementary panel (11) placed next to the doorframe (10) forming an extension.

WO 2004/101420 A1

Published:
— *with international search report*
— *with amended claims*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

HYDRAULIC LIFT WITH MOVABLE HYDRAULIC VALVE BLOCK

This invention concerns a Hydraulic Lift.

Hydraulic lifts are fitted with a hydraulic mechanism, which ensures the vertical movement of the car, driven on guide rails within a preset travel. A well electrical device comprising controls, an electronic control panel and safety devices ensures safe driving by the operator through the appropriate controls. More specifically, the hydraulic mechanism controlling the vertical motion of the car consists of a single action hydraulic piston and the power unit. The power unit comprises a metal mineral oil container containing the pump, the motor and the valve block that controls the amount of oil going to the hydraulic piston during the upward movement and from the hydraulic piston to the container during the downward movement. The valve block is situated either inside or above the container either at a fixed position, or with the ability to move. Both the upward and downward movement of the piston take place within the car sling to which the car is fixedly attached, with the sling either directly suspended from the hydraulic piston, or indirectly, by way of wire ropes, the one end of which is attached to a fixed point at a special base in the pit and the other end lifting the car sling by way of a horizontal suspension beam, which forms part of the car sling, passing through a deviation pulley located at the top of the piston, creating a suspension ratio 2:1.

The power unit and the control panel are located either in a specially designed area outside the well (machine room) that can be situated at any part of the building, or inside the lift well. The oil reaches the piston through hydraulic piping.

Although the machine room can be located at any part of the building, it should cover a certain area, providing an enclosed and protected area for the above-mentioned parts.

This requires:

a) the occupation of a certain building area for the machine room that will increase the total construction costs and minimize the available useful areas in the building.

b) the maintenance of the lift becomes more time-consuming and complicated due to the distance between the well and the machine room.

c) the distance between the machine room and the well necessitates long piping for the movement of the oil to and from the piston, something that will raise the installation and maintenance costs, increasing the risk of pollution due to a possible failure in the hose, in the area outside the machine room and the well.

d) the machine room is often located near the flats, creating noise pollution problems.

e) the maintenance staff will not have an overview of the lift during inspection works. Very often the maintenance staff fails to warn the users of the lift while carrying out maintenance work, creating safety problems.

On the other hand, placing the driving mechanism inside the well will result in the following inconveniences:

a) adjustment of the valve block must be done from inside the well, making the inspection and maintenance works difficult. At the same time, the manual emergency release procedure from inside the well becomes complicated and unsafe for the users.

b) the use of valve block or power units, whether movable or fixed, arranged in such a way inside the well as to be accessible from the outside, requires large openings on the walls of the well, on the basis of a specific design that is not always possible in static terms, and a more sizeable well compared with a typical hydraulic lift.

c) the engineer constructs the wells usually on the basis of a standard design that does not provide for further openings on the wall, apart from those necessary for the lift doors on each floor, and as a result it is impossible to make further openings at a later stage.

The present invention solves all the above problems.

This invention is about a hydraulic lift with the car moving inside the well on guide rails, comprising a hydraulic piston and a power unit tha consists of a container. The container houses the motor, the pump and a valve block, and is placed on a driving mechanism (by rolling or sliding), allowing it to move by the action of a force, from its initial position inside the well, to the maintenance, inspection and emergency release position outside the well, through a suitable outlet on the frame of a lift door or on a supplementary panel placed next to the lift doorframe forming an extension.

As a result, placing the power unit inside the well would free the building area kept for the machine room. The power unit can be placed at the pit and the valve driving mechanism can be attached to the guides of the lift, ensuring that the height reached by the valve will allow the valve to move and pass through the said outlet reaching the outside of the well. Only a small part of the opening (which is always provided for in the architectural design and construction for the lift doors) will be used as an outlet for the exit of the valve from the well, without requiring any other intervention or modification in the construction by the architect.

The various electrical parts and controls can be placed in a cabinet. The cabinet can be suitably palced at a stop of the lift in front of a doorframe of the lift or a supplementary panel placed next to the lift doorframe forming an extension, so that the technician can have access to the control panel and the valve block for regular inspection and maintenance without needing to enter into the well, and the user can operate the manual emergency release outside the well with safety.

Due to a special application of this hydraulic lift, the various electrical parts and controls can be placed at an area located above the outlet, enabling the exit of the valve from the well.

Another application allows the door leafs to fold towards the side of the valve block driving mechanism when the door opens. The width of the mechanism projected onto the horizontal plane is shorter than the width of the valve block projected onto the horizontal plane. This allows the valve block to move and exit the well through the above-mentioned outlet when the lift door is closed, without been obstructed by the door leafs. In the final driving positions of the valve block in or outside the well, where the lift is allowed to operate, the lift door leafs (in the open position) can be in front or behind the valve block projected onto the vertical plane. The above-mentioned arrangement minimizes the required dimensions of the well and saves room in the building, allowing at the same time the use of doors with a larger opening for the specific well dimensions.

In accordance with the attached designs an application of the invention will be further developed. Figure 1 illustrates the hydraulic lift in accordance with the application of the invention.

Figure 2 illustrates the vertical section of the well of the said lift.

Figure 3 illustrates a horizontal section of the well of the said lift.

The above-mentioned figures illustrate a hydraulic lift which comprises the guide rails (9), allowing the vertical movement of the car within a specific travel, the piston (1), which is placed on the hollow beam supporting the piston (15) and the suspension base (16), and the power unit (2), placed inside the well (14).

The movement of the car (6) is achieved through a transmission ratio 2:1, which is carried out by suspending the car sling (5) on which the car (6) is mounted, by way or wire ropes (7), the other end of which is firmly attached to the suspension base (16), passing through a pulley (8) placed at the top of the piston (1).

In the ascending movement of the car, the power unit (2) sends the appropriate amount of mineral oil to the piston (1) through the

valve block (3), in order to allow the vertical suspension of the car (6) between the stops of the well (14) within a travel restricted by the guide rails (9). The mineral oil reaches the piston through the high-pressure hose (17). The car (6) descends when the mineral oil returns to the power unit (2) through hydraulic hoses by the action of the valve blocks (3).

The valve block is driven by a mechanism (4) at a horizontal or inclined level, allowing the valve block (3) to move from the normal operation position of the lift, which is inside the well (Fig. 2), to the inspection, maintenance and emergency release position (Fig. 1) outside the well. More specifically, the valve block passes through the outlet (16), located on a supplementary panel (11) placed next to the lift doorframe (10) forming an extension (Fig. 1). This outlet is covered by a sliding cap (15) ensuring the fire protection of the whole panel (11) along with the lift door.

Figure 1 illustrates the cabinet (12) in which the electronic control panel of the lift can be placed. The cabinet (12) is placed at a stop of the well, in front of the supplementary panel (11) placed next to the doorframe (10), forming an extension. Access to the cover (17), and though it to the outlet (16) that allows the movement of the valve block (3) by remote control but also from the control panel, is achieved through a locking door (18) that prevents unauthorized access.

The control panel is placed at the upper part of the cabinet (12) above the outlet (16) through which the valve block (3) passes. This allows to separate the control panel area from the inspection and valve (3) maintenance area, and also to divide the panel in various subunits that could be placed in the same or different cabinets anywhere in the well (14).

During normal operation of the lift, the users may register calls by way of the car or well stop (19) controls, which are registered and evaluated by the control panel.

Then the panel activates the power unit pump (2) and the valve block (3) coils at the upward movement or just the valve block (3) coils at the downward movement, through the suitable sequence, and ensures that all locking systems operate properly.

During inspection, maintenance and repair works, the technician has access to the control panel and the valve block (3) by unlocking the door of the cabinet (18). By applying remote action through the outlet, after the cap covering the said outlet has been opened, the valve block (3) reaches the area outside the well (14).

After completion of inspection and maintenance the reverse order of actions can be followed in order to return the valve block (3) to the initial position, releasing the operation of the lift controls (19).

Figure 3 illustrates the two end positions of the valve block motion, the initial, inside the well, and the final, outside the well. According to Fig. 1 and Fig. 3, the leafs (13) of the lift door that slide on the sliding guides (20) are retracted when the door opens, to the side of the valve block (3) driving mechanism (4), where the leafs (13) of the door can be placed either in front or behind the valve block (3) projected onto the vertical plane. In this invention, the used driving mechanism (4) has been designed to have a width projected onto the horizontal plane that is shorter than the width of the valve block (3) projected onto the horizontal level. This means that the valve block (3) can move and exit the well (14) through the said outlet (16) if the leafs of the lift doors (13) are in front of or behind the vertical projection of the valve block (3) when the doors are closed and is not obstructed by the leafs (13) of the lift doors, provided that the horizontal distance between the leafs (13) when they are retracted to the side of the driving mechanism (4) (open door) and the well walls (14) is bigger than the width of the driving mechanism (4) when projected onto the horizontal level.

CLAIMS

1. Hydraulic lift, with a driving mechanism that comprises a piston (1) and the power unit (2), and is placed inside the well (14) with the valve block (3) mounted on a mechanism (4) that has been designed to move the valve block (3) at a horizontal or inclined level and reach the inside of the lift well (14), with the extra feature that the outlet (16) through which the valve block (3) reaches the inside of the well (14) is on the frame (10) of a lift door or a supplementary panel (11) placed next to the lift doorframe (10), forming an extension.

2. Hydraulic lift as in claim 1, where the outlet (10) through which the valve block (3) passes, is fitted with a cover (15) ensuring fire protection of the whole device.

3. Hydraulic lift in accordance with claim 1, where the width of the driving mechanism (4) when projected onto the horizontal plane is shorter than the width of the valve block (3) when projected onto horizontal plane.

4. Hydraulic lift in accordance with claim 1 and 3, where the leafs (13) of the lift doors retract to the side of the driving mechanism (4) of the valve block (3) when opening.

5. Hydraulic lift in accordance with any of the above claims, where the driving mechanism (4) support is mounted on a guide of the lift (9).

6. Hydraulic lift in accordance with any of the above claims, where the force driving the valve block (3) is applied outside the well (14) through the outlet (16), which is located on the frame (10) of a lift door or a supplementary panel (11) placed next to the doorframe forming an extension.

7. Hydraulic lift in accordance with any of the above claims, where the power unit (2) containing the pump and the mineral oil motro is located at any point outside the well (14).

8. Hydraulic lift in accordance with any of the above claims, where the control panel is placed in a cabinet (12), located in front of the frame (10) of a lift door or in front of a supplementary panel (11) placed next to the doorframe forming an extension.

9. Hydraulic lift in accordance with claim 8, where the controls are placed above the outlet (16) allowing the exit of the valve block (3) from the well (14).

10. Hydraulic lift in accordance with all the above claims, where the various parts of the control panel can be separated in various subunits and placed in different positions inside or outside the well (14).

AMENDED CLAIMS
received by the International Bureau on 20 September 2004 : claims 1-10 replaced by claims 1-5.

CLAIMS

1. Hydraulic lift, with a driving mechanism that comprises a piston (1) and the power unit (2), and is placed inside the well (14) with the valve block (3) mounted on a mechanism (4) that has been designed to move the valve block (3) at a horizontal or inclined level and reach the outside of the lift well (14), where the outlet (16) through which the valve block (3) reaches the outside of the well (14) is on the frame (10) of a lift door or a supplementary panel (11) placed next to the lift doorframe (10), forming an extension, characterized that the width of the driving mechanism (4) when projected onto the horizontal plane is shorter than the width of the valve block (3) when projected onto horizontal plane.

2. Hydraulic lift in accordance with claim 1, where the leafs (13) of the lift doors retract to the side of the driving mechanism (4) of the valve block (3) when opening.

3. Hydraulic lift in accordance with any of the above claims, where the driving mechanism (4) support is mounted on a guide of the lift (9).

4. Hydraulic lift in accordance with any of the above claims, where the control panel is placed in a cabinet (12), located in front of the frame (10) of a lift door or in front of a supplementary panel (11) placed next to the doorframe forming an extension.

5. Hydraulic lift in accordance with claim 4, where the controls are placed above the outlet (16) allowing the exit of the valve block (3) from the well (14).

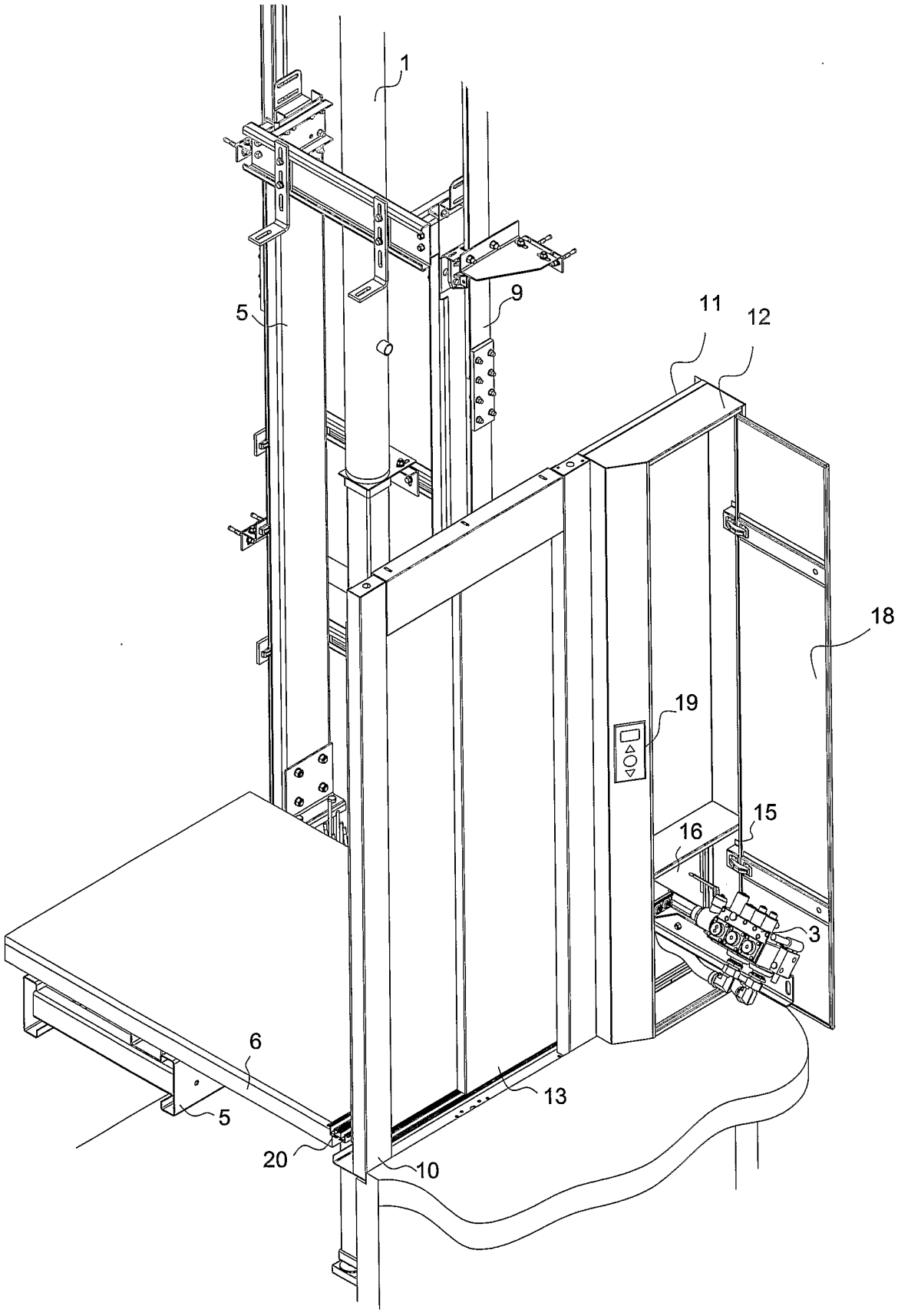


Figure 1

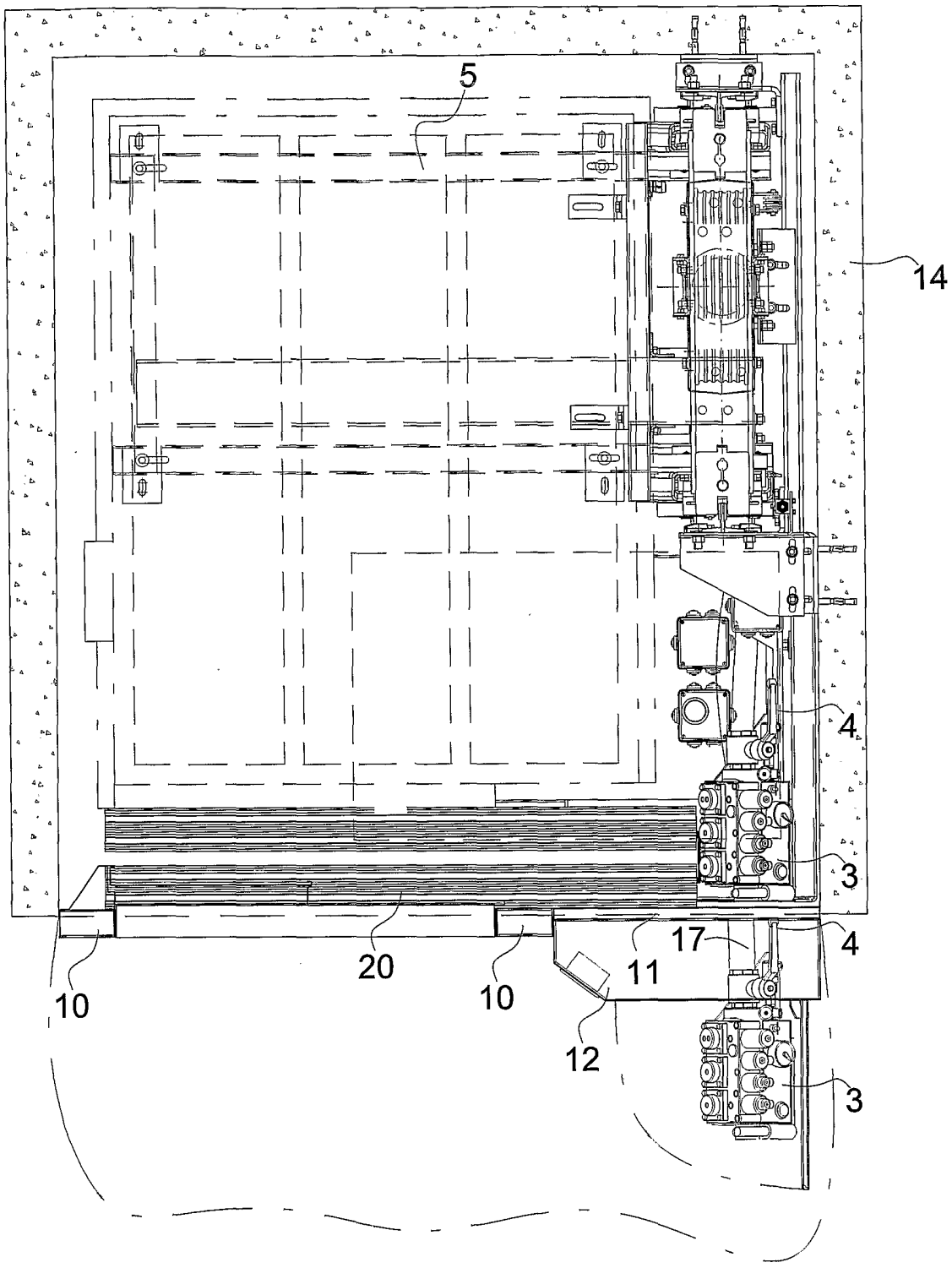


Figure 2

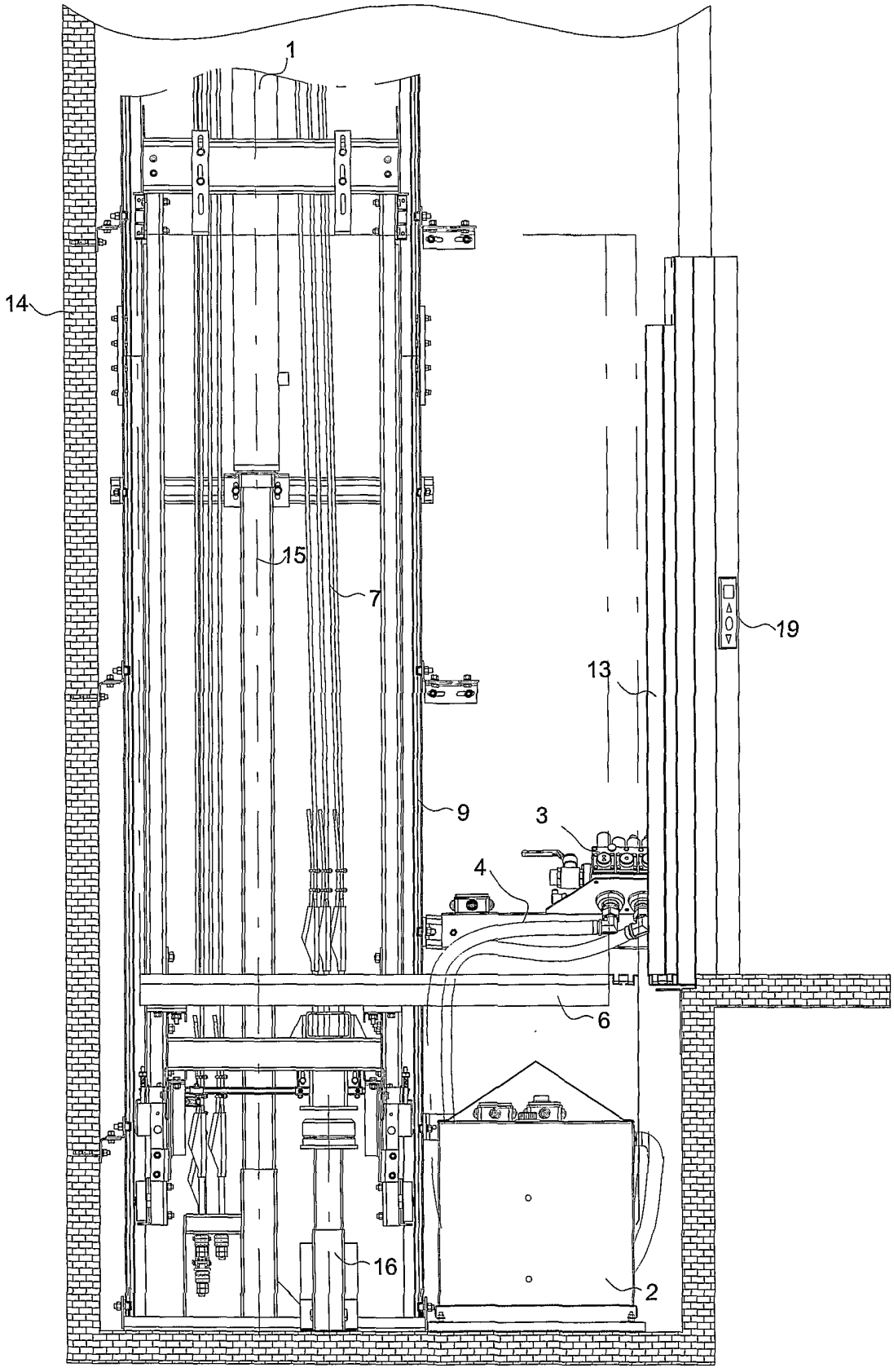


Figure 3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GR2004/000021

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B66B9/04

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)
IPC 7 B66B

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 practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	WO 03/013996 A (ASVESTOPOULOS LAZAROS ; MAVROMATIDIS ATHANASIOS (GR); KLEEMANN HELLAS) 20 February 2003 (2003-02-20) the whole document	1,2,6,7, 10 4,5,8,9 3
Y A	WO 02/081353 A (I G V S P A ; VOLPE GIUSEPPE (IT)) 17 October 2002 (2002-10-17) page 6, lines 3-5; figures 1-8	4,5,8,9 1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
13 July 2004	26/07/2004

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GR2004/000021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03013996 A	20-02-2003	GR 1004019 B1	10-10-2002
		WO 03013996 A1	20-02-2003
WO 02081353 A	17-10-2002	IT MI20010728 A1	07-10-2002
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