(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 719 724 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.07.1996 Bulletin 1996/27

(51) Int. Cl.[6]: **B66B 11/00**

(21) Application number: **95120246.4**

(22) Date of filing: **21.12.1995**

(84) Designated Contracting States:
DE FR IT

(30) Priority: **28.12.1994 FI 946143**

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(54) Traction sheave elevator and machine space for a traction sheave elevator

(57) Traction sheave elevator comprising an elevator car (1) moving along elevator guide rails (10), a counterweight (2) moving along counterweight guide rails (11), and a set of hoisting ropes (3) on which the elevator car and counterweight are suspended. A drive machine unit (6) drives a traction sheave (7) acting on the hoisting ropes (3). The drive machine unit (6) is placed in a machine space (9) provided in the elevator shaft (17) and/or in a wall structure (15) of the elevator shaft and is substantially separated with a wall (14) from the rest of the shaft space.

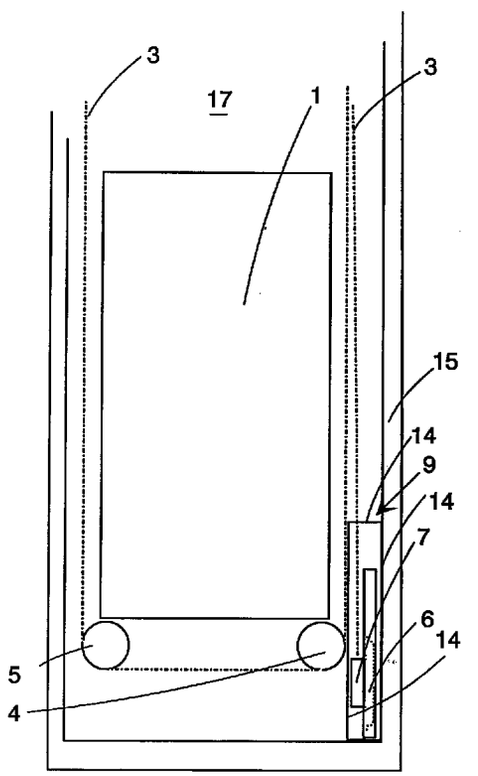

Fig. 2

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Description

The present invention relates to a traction sheave elevator as defined in the preamble of claim 1 and to a machine space for a traction sheave elevator as defined in the preamble of claim 7.

One of the objectives in elevator development work has been to achieve an economic and efficient use of building space. Aiming at efficient and economic systems, the applicant's previous Finnish patent applications no. 932975, 941719, 942062 present elevator solutions in which the machinery is placed in the shaft space or in a shaft wall without an external machine room or equivalent. However, for reasons of safety or other circumstances prevailing in the shaft, it is sometimes necessary to isolate the machine space from the elevator shaft. Especially in the case of fast elevators, it is necessary to prevent the propagation of noise generated by the hoisting machinery and traction sheave rope contact. The solutions presented in the applications mentioned above are advantageous in respect of elevator construction, but in themselves they are not always fully protected against dirt and dust that may be present in the shaft. Also, the question of preventing passage between the machine space and the rest of the shaft space has received little attention in them.

To meet the needs described above and to achieve a reliable elevator construction that is advantageous in respect of both economy and space utilization and whose space requirement in the building is substantially limited to the space required by the elevator car and counterweight on their paths, including safety distances, and by the passage of the hoisting ropes, a traction sheave elevator and a machine space for a traction sheave elevator are presented as an invention.

The traction sheave elevator of the invention is characterized by what is presented in the characterization part of claim 1. The machine space for a traction sheave elevator according to the invention is characterized by what is presented in the characterization part of claim 7. Other embodiments of the invention are characterized by what is presented in the other claims.

The advantages provided by the invention include the following:

- The hoisting machinery and associated equipment, placed in the shaft, are protected against any dirt and dust that may be present in the shaft space.
- Illicit access to the hoisting machinery and associated equipment from the shaft is prevented. Likewise, access from the machine space to the rest of the shaft can be prevented.
- The traction sheave elevator of the invention allows an obvious space saving in the building as no separate machine room outside the shaft is needed.
- The elevator is advantageous to install as the machine space and its equipment can be largely assembled and tested beforehand in factory.
- Being separated from the shaft space, the machine space damps noise proceeding from the hoisting machinery.
- Practical application of the invention does not require any big changes in the design and manufacture of the elevator.
- The machinery and instrument panel can be easily accessed, so that, as regards maintenance and rescuing, accessing the machinery is not substantially different from conventional elevators.

In the following, the invention is described by the aid of an application example by referring to the attached drawings, in which

Fig. 1 presents a diagram representing a machine space as applied in the invention,
Fig. 2 presents an elevator with machinery below, implemented according to the invention,
Fig. 3 presents the layout of the main components of an elevator with machinery below, implemented according to the invention, projected in the cross-section of the elevator shaft, and
Fig. 4 presents an elevator with machinery above, implemented according to the invention.

The diagram in Fig. 1 represents a cabinet type machine space 9 of a traction sheave elevator as provided by the invention. This figure shows the hoisting unit of a traction sheave elevator with machinery below, placed in a machine space 9, with hoisting ropes 3 going up from the traction sheave 7 of the hoisting machine 6. The hoisting machine 6 is mounted on the frame 20 of the machine space, which also forms the frame of the hoisting unit. Mounted on the frame 20 is also an instrument panel 8, which contains the elevator control equipment and the equipment required for the control of and supply of power to the electromotor comprised in the hoisting machine 6. The hoisting machine 6 is discoidal in shape and, in relation to its diameter, rather flat in the axial direction of the traction sheave. The traction sheave protrudes from discoidal hoisting machine 6. This type of elevator machinery does not require a large machine space, so it can easily be placed in an opening in a wall of the elevator shaft or in a recess in a shaft wall facing to the shaft, or in the elevator shaft between a shaft wall and the space required by the elevator car or an extension of said space. The machine space 9 may be assembled in advance, and it can contain a hoisting machine and/or other equipment installed in factory. It is also possible to assemble the machine space in the shaft on site. At least part of the wall of the cabinet-like machine space is preferably made of transparent material, making it possible to visually observe the operation of the machinery e.g. during servicing without opening a door or hatch leading to the machine space.

Fig. 2 presents a diagrammatic view of an elevator with machinery below, implemented according to the invention, with a cabinet type machine space 9 placed

at one of the side walls in the bottom part of the elevator shaft, between the elevator car 1 and the wall 15 of the shaft 17. The walls 14 of the machine space 9 are made of metal sheet or net, gypsum board or other suitable material. The cabinet sides facing to different directions may be made of different materials. For example, the ceiling and floor of the machine space may consist of metal sheet and the walls of a net structure. The walls are provided with lead-through holes for the ropes 3, electric conductors etc. The machine space is provided with a door or hatch (not shown in the figure).

Fig. 3 illustrates the layout of the main parts of an elevator with machinery below, projected in the cross-section of the elevator shaft 17. The elevator car 1 moves along elevator guide rails 10 and the counterweight 2 moves along counterweight guide rails 11. The hoisting machine 6 with a control panel 8 is placed at a wall 15 of the elevator shaft 17. The traction sheave 7 protrudes from the hoisting machine 6. The passage of the hoisting ropes is guided by diverting pulleys 12 placed in the upper part of the shaft. One diverting pulley 12 guides the hoisting ropes from the traction sheave 7 to a diverting pulley 13 by means of which the counterweight 2 is suspended and from which the hoisting ropes go further to a fixed anchorage in the upper part of the shaft. Another diverting pulley 12 guides the hoisting ropes from the traction sheave 7 to diverting pulleys 4 and 5 mounted on the elevator car 1 and supporting the elevator car 1 on the ropes. From here, the hoisting ropes go to a fixed anchorage in the upper part of the shaft. In the figure, the hoisting ropes are indicated by their cross-sections on the traction sheave and diverting pulleys, but otherwise they are not shown. At each landing, the wall 17 of the elevator shaft is provided with an opening 18 for the landing door. The elevator car has a corresponding door opening 19. In elevators provided with a car door, the door opening 19 is closed with a car door.

Fig. 4 shows a diagram representing an elevator with machinery above, implemented according to the invention. The machine space 109 is located in the upper part of the elevator shaft 117, extending partly into the shaft wall in the form of a cut-out 110. The elevator machinery 106 is placed partly in the cut-out 110 in the wall 115 of the elevator shaft 117. The cut-out is open on the side facing to the shaft, but closed with a door 116 from the outside of the shaft. Protruding from the hoisting machine 106 into the shaft 117 is a traction sheave 107, which drives the hoisting ropes 103 (represented by dotted dashed lines). The figure shows the portion of the hoisting ropes that goes round the diverting pulleys 104,105 under the elevator car 101 and the portion going from the traction sheave towards the counterweight. The machine space 109 is separated from the shaft 117 by a wall 114 that covers the cut-out 110 on the side facing to the shaft. The wall is provided with an opening for the traction sheave 107, leading from the machine space 109 into the rest of the shaft space. Placed in the machine space is also an instrument panel 108. The instrument panel is preferably placed in its own cabinet or otherwise separated from the rest of the machine space. To damp the noise generated by the machinery, it is advantageous to line the machine space with noise absorbing material, e.g. felt board or the like.

It is obvious to a person skilled in the art that different embodiments of the invention are not restricted to the examples presented above, but that they may instead be varied in the scope of the following claims. For instance, the wall separating the machine space from the rest of the shaft can be provided with other openings besides those needed to provide access to the machine space and lead-throughs for parts of the elevator system. It is also obvious to the skilled person that in a clean elevator shaft the machine space need only protect persons and/or prevent passage between the machine space and the rest of the shaft space, in which case a machine space formed by a railing or the like and having no top cover may be sufficient to achieve the desired effect. It is further obvious to the skilled person that an elevator with machinery above and an elevator with machinery below can equally well be implemented using a machine space placed in a cut-out in a shaft wall, and that it is likewise possible to use a cabinet type machine space in the case of an elevator with machinery above as well as an elevator with machinery below.

It is also obvious to the skilled person that it must preferably be possible to access the inside of the machine space without hindrance from the counterweight or elevator car in any position on their paths. In cases where passage or access to a machine space placed inside the building space required by the shaft space and shaft wall structures together is not effected via a separate opening in a shaft wall leading out of the shaft or e.g. via a hatch provided beside the door, it will be preferable to make such arrangements regarding placement of the parts, opening direction of the aperture for passage or access etc. that the machinery and associated equipment can always be accessed by service personnel.

Claims

1. Traction sheave elevator comprising an elevator car (1,101) moving along elevator guide rails (10), a counterweight (2) moving along counterweight guide rails (11), a set of hoisting ropes (3,103) on which the elevator car and counterweight are suspended in the elevator shaft (17,117) and a drive machine unit (6,106) driving a traction sheave (7,107) connected to the drive machine unit (6,106) and acting on the hoisting ropes (3,103), **characterized** in that the drive machine unit (6,106) is placed in a machine space (9,109) provided in the elevator shaft (17,117) and/or in a wall structure (15,115) of the elevator shaft, said machine space being substantially separated with a wall (14,114) from the rest of the shaft space.

2. Traction sheave elevator according to claim 1, **characterized** in that the machine space (9,109) is completely within the elevator shaft (17,117).

3. Traction sheave elevator according to claim 1 or 2, **characterized** in that the machine space (9,109) in the elevator shaft (17,117) is contiguous with a wall (15,115) of the elevator shaft.

4. Traction sheave elevator according to any one of the preceding claims, **characterized** in that the machine space (9,109) is located in the lower part of the elevator shaft (17,117).

5. Traction sheave elevator according to any one of claims 1, 2 or 3, **characterized** in that the machine space (9,109) is located in the upper part of the elevator shaft (17,117).

6. Traction sheave elevator according to any one of the preceding claims, **characterized** in that the machine space (9,109) is located between a wall (15,115) of the elevator shaft and the space required by the elevator car (1,101) on its path or an extension of this space.

7. Machine space for a traction sheave elevator, **characterized** in that the machine space (9,109) is located in the elevator shaft (17,117) and/or in a wall structure (15,115) of the elevator shaft, lies completely on the same side of the elevator shaft wall surface facing outwards from the elevator shaft as the elevator shaft itself and is substantially separated with a wall (14,114) from the rest of the shaft space.

8. Machine space according to claim 7, **characterized** in that the machine space (9,109) is a cabinet type structure.

9. Machine space according to claim 7 or 8, **characterized** in that the machine space (9,109) contains a space required for the instrument panel (8,108) of the elevator, separated from the space needed for the drive machine (6,106).

10. Machine space according to claim 7, 8 or 9, **characterized** in that the machine space (9,109) is lined with noise absorbing material.

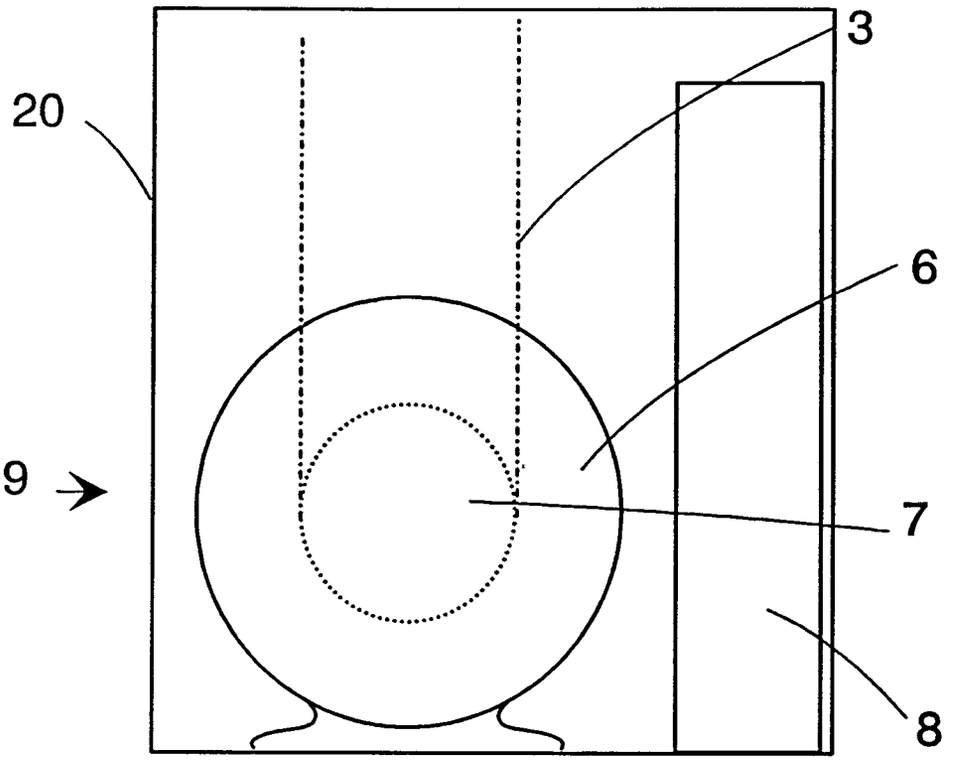

Fig. 1

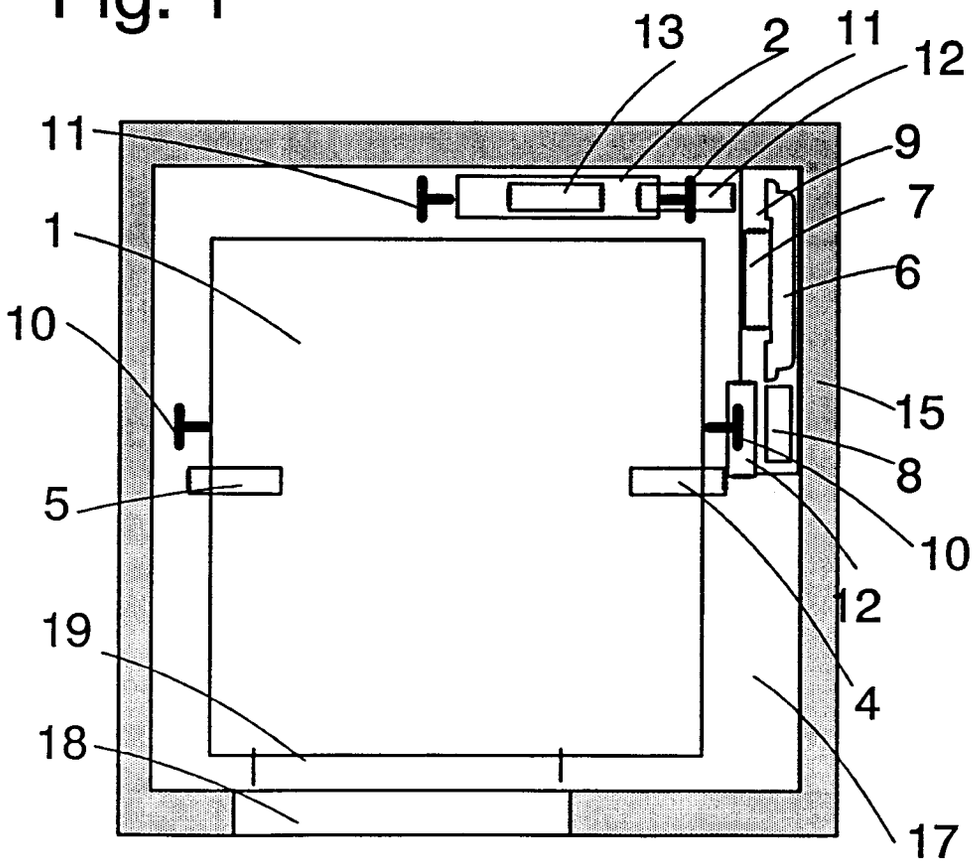

Fig. 3

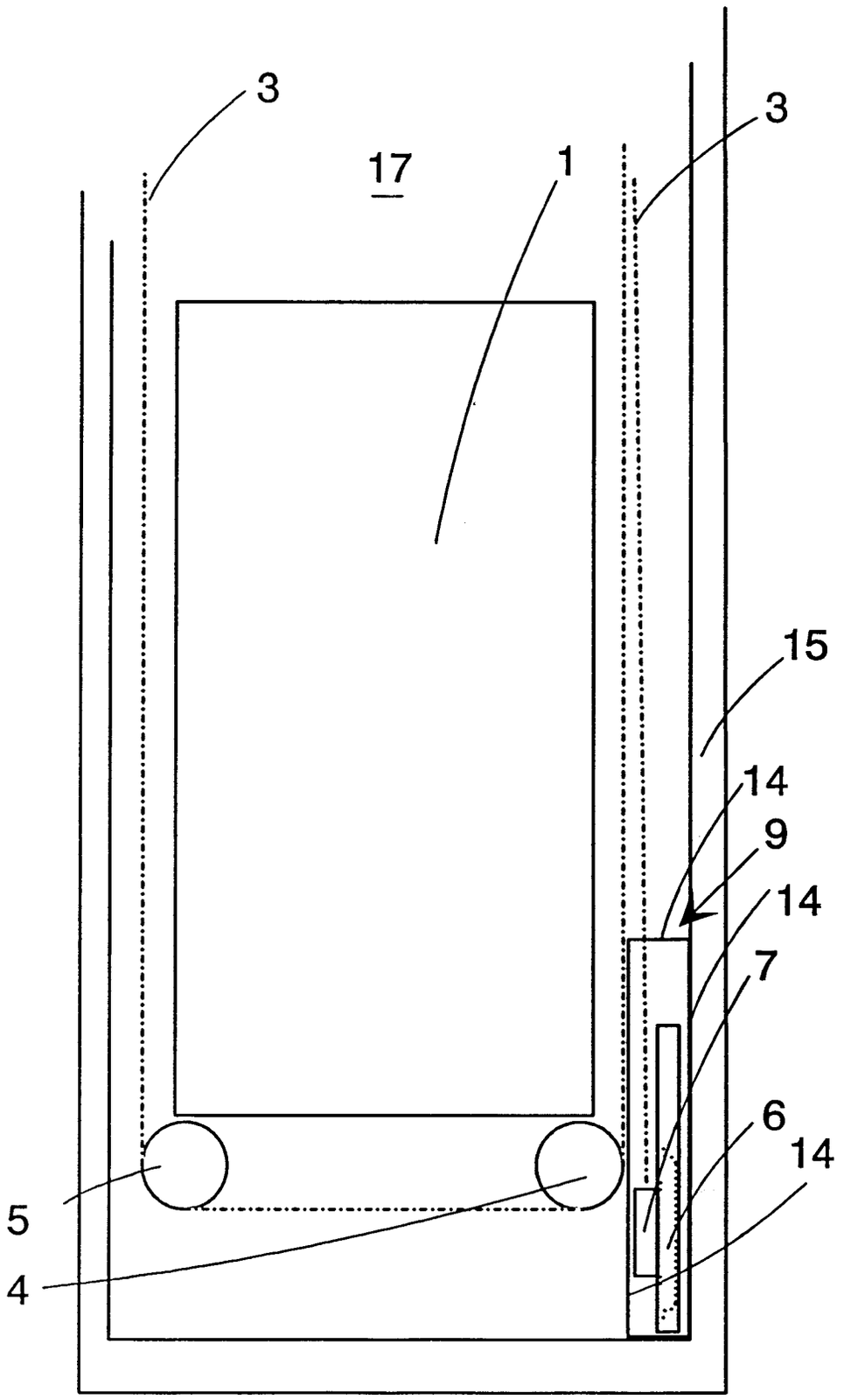

Fig. 2

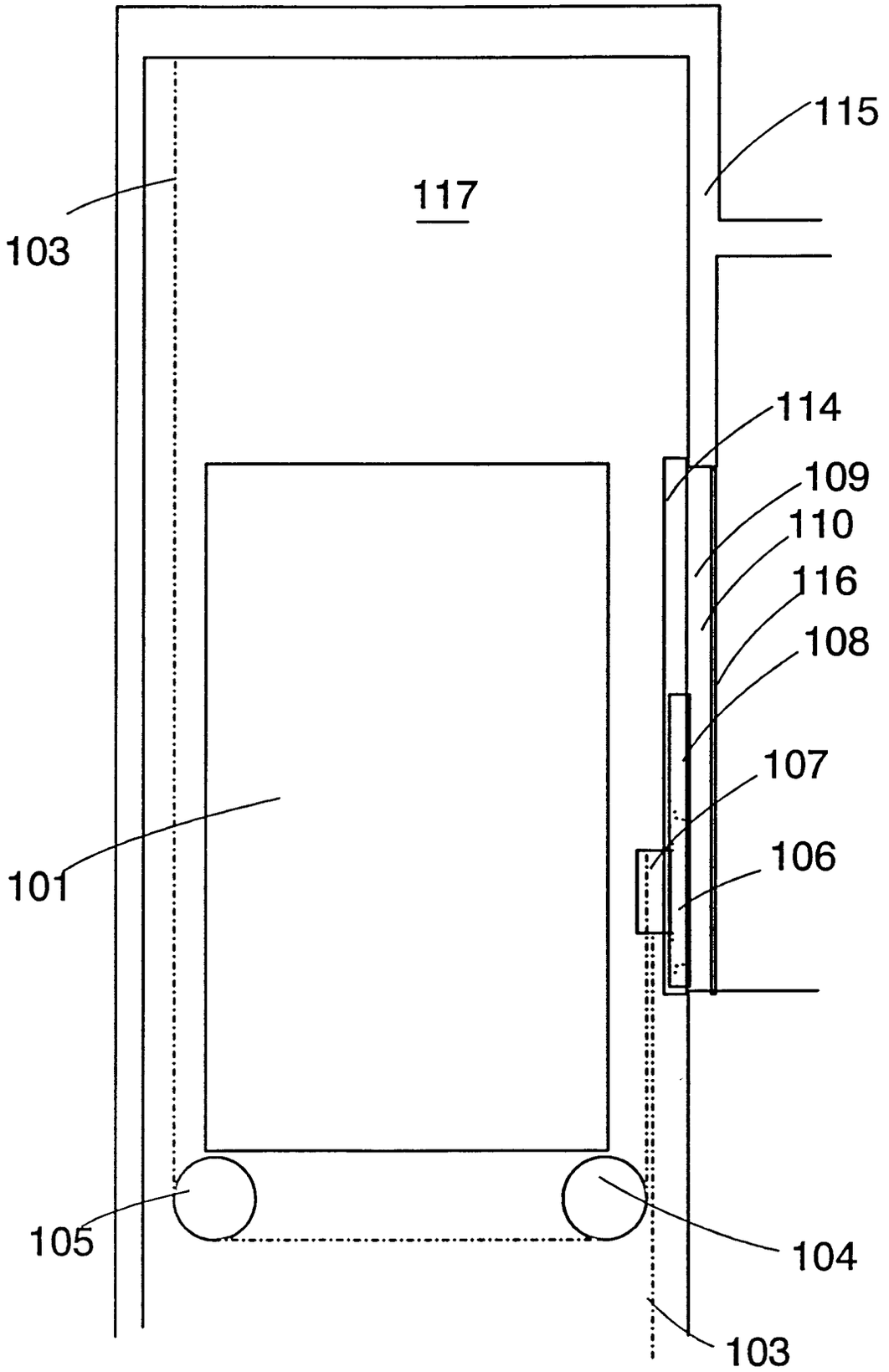

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 95 12 0246

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE-B-10 32 496 (JOSEPH TEPPER MASCHINENFABRICK) 19 June 1958 * the whole document *	1-10	B66B11/00
X	DE-U-7 395 (JOSEPH TEPPER MASCHINENFABRIK) 16 September 1954 * page 2, paragraph 1 - paragraph 2; figures 1,2 *	1-10	
X	FR-A-2 609 974 (OTIS ELEVATOR CO) 29 July 1988 * the whole document *	1-10	
X	PATENT ABSTRACTS OF JAPAN vol. 015 no. 171 (M-1108) ,30 April 1991 & JP-A-03 036184 (TOSHIBA CORP) 15 February 1991, * abstract *	1,7	
X,P	EP-A-0 631 968 (KONE OY) 4 January 1995 * the whole document *	1-10	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
X,P	EP-A-0 631 967 (KONE OY) 4 January 1995 * the whole document *	1-10	B66B
X,P	PATENT ABSTRACTS OF JAPAN vol. 950 no. 005 & JP-A-07 117957 (MITSUBISHI ELECTRIC CORP) 9 May 1995, * abstract *	1	
A	US-A-2 835 345 (BECK) 20 May 1958 * column 3, line 10 - line 13; figure 2 *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 March 1996	Sozzi, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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