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(71) Applicant: **MITSUBISHI DENKI KABUSHIKI KAISHA**
Chiyoda-ku
Tokyo 100-8310 (JP)

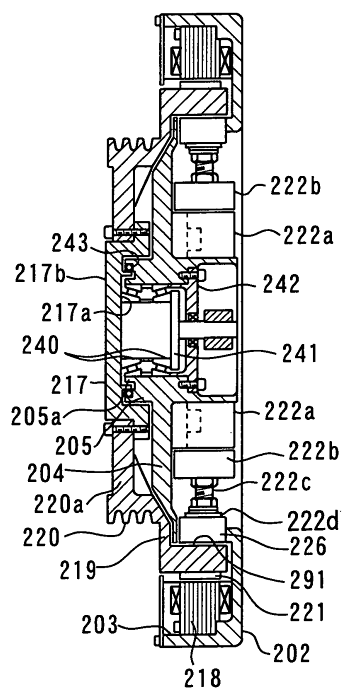
(72) Inventors:
- **HAMAGUCHI, Shuki**
  c/o MITSUBISHI DENKI K.K.
  Chiyoda-ku, Tokyo 100-8310 (JP)
- **INOUE, Kenji**
  c/o MITSUBISHI DENKI K.K.
  Chiyoda-ku, Tokyo 100-8310 (JP)

(74) Representative: **HOFFMANN EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(54) THIN HOIST FOR ELEVATOR

(57) There is provided a low-profile traction machine for an elevator, in which the number of component parts is reduced, and the thickness in the width direction is decreased, by which smaller thickness and lighter weight are achieved, the degree of freedom of installation location is improved, and the area of shaft in a horizontal cross section is decreased. The traction machine includes a basic body (202); a main shaft (217) provided on the basic body; a rotating body (219) supported on the main shaft; a drive sheave (220) formed on the rotating body; a stator (218) provided on the basic body; an armature (221) which is arranged at the outer periphery of the rotating body so as to be opposed to the stator and forms a motor together with the stator; a braking surface (291) formed on the rotating body having a diameter larger than the external shape of the drive sheave; and a brake (222) which is arranged so as to be opposed to the braking surface and is operated by being pressed on the braking surface. A bottom face (204) of the basic body, which is connected to a bearing support part (205) for supporting the main shaft of the rotating body, and the drive sheave are arranged close to each other, and the main shaft of the rotating body is supported by the bearing support part of the basic body in a cantilever form.

Fig. 2



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Description

Technical Field

[0001] The present invention relates to a low-profile traction machine used for an elevator without a machine room, and also relates to a low-profile traction machine for an elevator, in which the construction thereof is simplified, and smaller thickness and lighter weight are achieved.

Background Art

[0002] As a conventional low-profile traction machine used for an elevator without a machine room, for example, a low-profile traction machine disclosed in Japanese Patent Laid-Open No. 2000-289954 has been known. In this low-profile traction machine, a main rope is wound around a drive sheave. The drive sheave is rotated by a stator winding and an armature, and thus the main rope is driven by a frictional force, by which a car and a counter weight are moved vertically in the opposite direction to each other. When the car of the elevator arrives at a predetermined floor, an electromagnet is de-energized, and a spring force of brake spring is transmitted to a braking surface via a brake arm, a spherical washer, and a brake shoe, by which the traction machine is stopped.

[0003] The conventional low-profile traction machine thus configured requires many parts, and also is required to machine component parts with high accuracy and assemble them to reduce increased weight and manufacturing error due to the combination of component parts, which results in an increase in cost. Also, the thickness of the whole machine increases. An elevator without a machine room, in which a traction machine is provided between a shaft wall and a car has a problem in that the increase in thickness of the traction machine leads to an increase in the area of shaft in a horizontal cross section.

Disclosure of the Invention

[0004] The present invention has been made to solve the above problems, and accordingly an object thereof is to provide a low-profile traction machine for an elevator, in which the construction thereof is simplified and the number of component parts is reduced, and the thickness in the width direction is decreased, by which smaller thickness and lighter weight are achieved, the degree of freedom of installation location is improved, and the area of shaft in a horizontal cross section is decreased.

Brief Description of the Drawings

[0005]

Figure 1 is a front view of a low-profile traction machine for an elevator in accordance with the embodiment 1 of the present invention.

Figure 2 is a sectional view of the low-profile traction machine for an elevator in accordance with the embodiment 1 of the present invention.

Figure 3 is an enlarged sectional view of a bearing portion shown in Figure 2.

Best Mode for Carrying Out the Invention

[0006] To explain the present invention in more detail, an embodiment 1 will be described with reference to the accompanying drawings.

[0007] Figure 1 is a front view of a low-profile traction machine for an elevator in accordance with the embodiment 1 of the present invention, Figure 2 is a sectional view of the low-profile traction machine for an elevator in accordance with the embodiment 1 of the present invention, and Figure 3 is an enlarged sectional view of a bearing portion shown in Figure 2.

[0008] In the figures, a basic body 202 formed so as to be thin in the axial direction houses a part of a rotating body 219, described later, at the outer periphery. The basic body 202 also has an opening fringe part 203 forming a space for housing a stator 218, and has a bottom face 204 substantially flush with the tip end of the opening fringe part 203. In the central portion of the basic body 202, a bearing support part 205 for a bearing 240 is provided to rotatably support a main shaft 217. That is to say, the bearing support part 205 for supporting the main shaft 217 is connected to the bottom face 204 of the basic body 202. On the inside of the opening fringe part 203 at the outer periphery of the basic body 202, the stator 218 is provided together with a stator winding. The cup-shaped rotating body 219 is arranged so that a part thereof is fitted in the basic body 202, by which the thickness of the whole of traction machine is decreased. The rotating body 219 is formed integrally with a drive sheave 220 on the outer peripheral face on the opposite side of the bottom face 204 of the basic body 202, and is fittingly connected to the outside of a flange part 217a of the main shaft 217. That is to say, the traction machine is formed by the bearing support part 205 formed in a cantilever form from the basic body 202 and the rotating body 219 integrated with the drive sheave 220 supported by the bearing 240 mounted in the bearing support part 205, and the rotating body 219 and the basic body 202 are installed so as to be close to each other. Therefore, a traction machine constructed in a thin shape in the axial direction can be obtained. Also, since an attachment face of the main shaft 217 is interposed between the rotating body 219 and the basic body 202, the connecting portion between the rotating body 219 and the main shaft 217 is configured so that the rotating body 219 can be attached and detached from the left-hand side in FIG. 2, so that the rotating body 219 can be assembled or replaced easily by merely installing or removing fastening screws. A portion that is formed integrally with the drive sheave 220 on the opening fringe part side of the rotating body 219 and has a larger diameter than the outside diameter of the drive sheave is housed in the opening fringe part 203 of the basic body 202, and a rotor 221 is provided on the outer peripheral face of the larger-diameter portion. This rotor 221 is arranged so as to be opposed to the stator 218. The main shaft 217 is supported by a bearing support part 205 integrally formed in the central portion of the bottom face 204 of the basic body 202, which is arranged close to and in parallel with a rib face 220a of the rotating body 219. In an end portion of the bearing support part 205, a bearing stopper 205a is provided to determine the position of the outer race of the bearing 240. The main shaft 217 is provided with a bearing inner race stopper 217a for determining the position of the inner race of the bearing 240. The bearing 240 is provided with a bearing nut 241 for fixing the inner race of the bearing 240 to the main shaft 217 and a bearing holder 242 for fixing the outer race of the bearing 240 to the bearing support part 205, so that the positional relationship between the main shaft 217 and the basic body 202 is set by the fixing of the bearing nut 241 and the bearing holder 242. The inner and outer races of the bearing 240 must be fixed. When the traction machine is assembled, the bearing 240 is inserted between the main shaft 217 and the inside diameter portion of the bearing support part 205, and the inner race side and the outer race side of the bearing 240 are fixed by the bearing nut 241 and the bearing holder 242, respectively. Both of the assembling operations can be performed from the side opposite to the sheave without reversing the traction machine each time the screws are tightened, so that the assembling time can be shortened. An electromagnetic brake 222 is configured so that fields 222a of electromagnet arranged at the right and left are integral. The electromagnetic brake 222 includes an electromagnet armature 222b, a threaded rod 222c which is fixed to the armature 222b and has a spherical face at the tip end, and a spherical washer 222d which is in spherical contact with the spherical face of the threaded rod 222c. A brake shoe 226 which comes into contact with a braking surface 291 of the rotating body 219 when the brake is applied is configured so as to be held in contact with the threaded rod 222c by a plate spring 222e installed to the brake shoe 226. A cutout part 202a is provided at a position of the basic body 202 corresponding to the position at which the brake shoe 226 of the rotating body 219 is arranged. The cutout part 202a plays a role of a stopper for holding a load applied to the brake shoe 226 when the brake is applied. Specifically, the brake shoe 226 is pressed on the braking surface 291 by a brake spring 225, which produces brake torque. At this time, on the brake shoe 226, a force is generated in the tangential direction of the braking surface 291, and this force is borne by the cutout part 202a of the basic body 202. A construction in which, when the electromagnet for braking is de-energized, the armature 222b and the brake shoe 226 are moved linearly by the brake spring 225 with the cutout part 202a of the basic body 202 being a guide is called a direct-acting type. The features of this direct-acting type are simple construction, low cost, and high reliability. Also, this type has an advantage that even when only one of the right and left brakes is operated, the brake torque value is not changed by the direction of rotation. Between the bearing support part 205 and the main shaft 217, an oil seal 243 is provided so that the oil supplied to the bearing 240 is prevented from intruding onto the braking surface 219 of the brake. A main rope 212 is wound around the drive sheave 220, and though the illustration is omitted, a car and a counter weight are connected to both ends of the main rope 212. In the low-profile traction machine for an elevator, which is constructed as described above, the bearing support part 205 and the bottom face 204 of the basic body 202 for supporting the bearing support part 205 are arranged close to the drive sheave 220 subjected to a high load, by which the load applied to the bearing support part 205 is reduced though the main shaft 217 is supported in a cantilever form. Also, the bearing support part 205 is arranged within (on the inside of) the drive sheave 220. Therefore, the function and configuration are the same as those of the conventional traction machine. Specifically, the main rope 212 suspending the car and counter weight is driven by a motor consisting of the stator and the rotor in a state of being wound around the drive sheave 220 with friction, by which the car and the counter weight are moved vertically in the direction opposite to each other. Also, the electromagnet field 222a for paired right and left brakes, which presses the braking surface 291 formed on the inner peripheral surface of the larger-diameter portion on the opening fringe part side of the rotating body 219 by the brake shoes 226, is integrally fixed to the bottom face 204 of the basic body 202, and the load applied to the brake shoe 226 when the brake is applied is borne by the cutout part 202a of the basic body 202, so that the number of parts can be reduced. Also, the reduction in the number of parts can decrease the manufacturing manpower, simplify the maintenance, and further decrease the thickness of traction machine.

Industrial Applicability

[0009] As described above, in the low-profile traction machine for an elevator in accordance with the present invention, the number of parts constituting the traction machine can be reduced, and hence the cost can be decreased. Also, additionally, smaller thickness and lighter weight can be achieved, so that the degree of freedom of installation location can be increased, and the space in a shaft in a horizontal cross section can be decreased.

Claims

1. A low-profile traction machine for an elevator comprising:

a basic body; a main shaft provided on said basic body; a rotating body rotating by being supported on said main shaft; a drive sheave formed on said rotating body; a stator provided on said basic body; a rotor which is arranged at the outer periphery of said rotating body so as to be opposed to said stator and forms a motor together with said stator; a braking surface formed on said rotating body having a diameter larger than the external shape of said drive sheave; and a brake which is arranged so as to be opposed to said braking surface and is operated by being pressed on said braking surface, wherein a bottom face of said basic body, which is connected to a bearing support part for supporting the main shaft of said rotating body, and said drive sheave are arranged close to each other, and the main shaft of said rotating body is supported by the bearing support part of said basic body in a cantilever form.

2. The low-profile traction machine for an elevator according to claim 1, wherein said bearing support part is arranged within said drive sheave.

3. The low-profile traction machine for an elevator according to claim 1, wherein a bearing for supporting said main shaft is positioned by bearing positioning stoppers provided on end faces of the bearing support part of said basic body and said main shaft respectively, and a bearing nut and a bearing holder are arranged on the side opposite to said bearing, thereby enabling said bearing to be assembled from the basic body side.

4. The low-profile traction machine for an elevator according to claim 3, wherein the brake is housed in the basic body, an electromagnet for braking is fixed to the bearing support part of said basic body, and a cutout part for housing a brake shoe is provided along the inner periphery of the rotating body of said basic body so as to be used as a stopper for said brake shoe when the brake is applied.

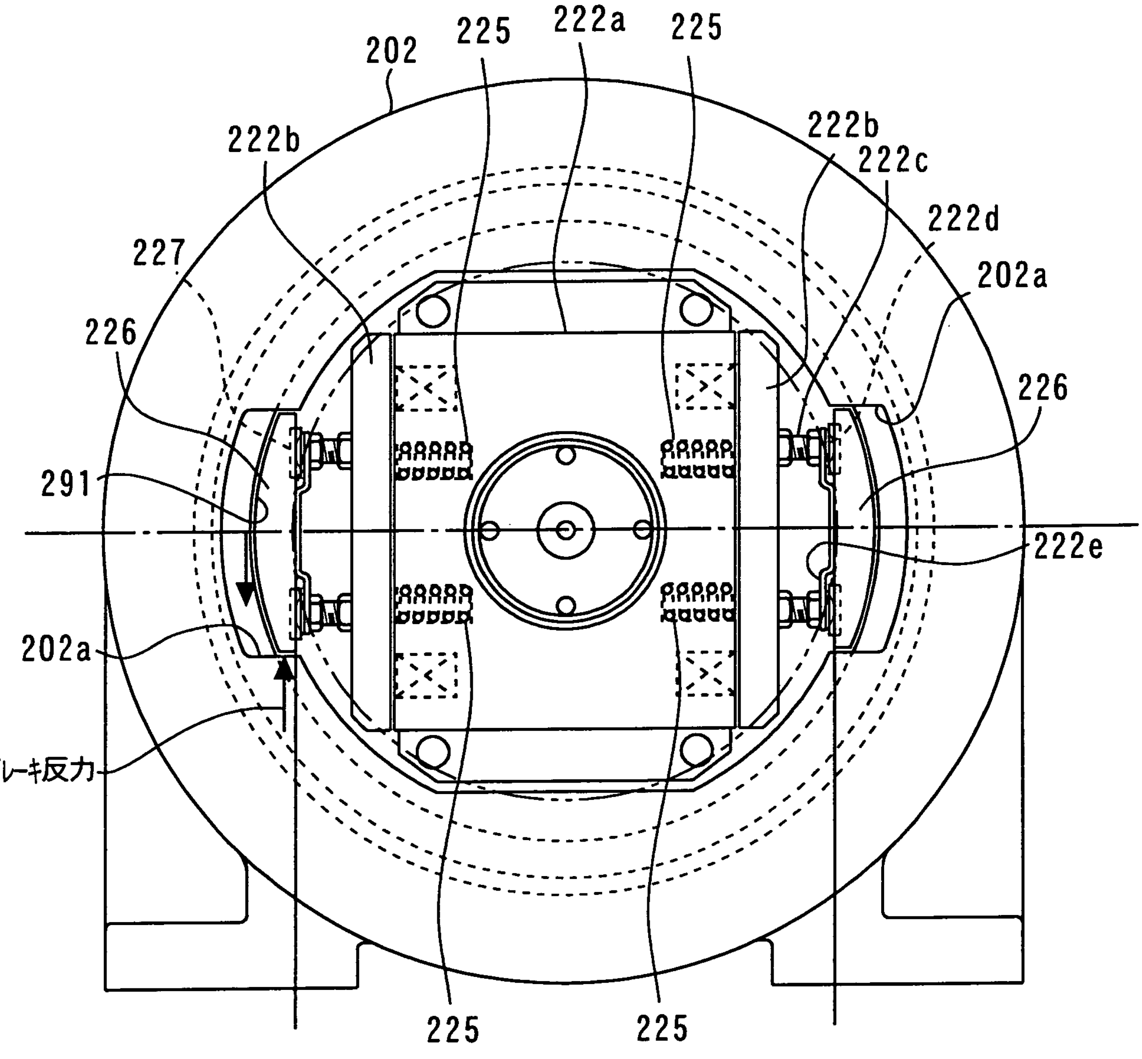
5. The low-profile traction machine for an elevator according to claim 4, wherein fields for the right and left electromagnets for brake are integrally formed.

6. The low-profile traction machine for an elevator according to claim 5, wherein the right and left brakes each have a construction of a direct-acting type.

7. The low-profile traction machine for an elevator according to any one of claims 1 to 5, wherein a connecting portion between said rotating body and said main shaft is arranged on the outside of a flange part of said main shaft.

8. The low-profile traction machine for an elevator according to claim 7, wherein an oil seal for preventing oil from intruding onto the braking surface is provided between the outer periphery of the bearing support part of said basic body and a part of said main shaft.

Fig. 1


202
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222a
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Fig. 2

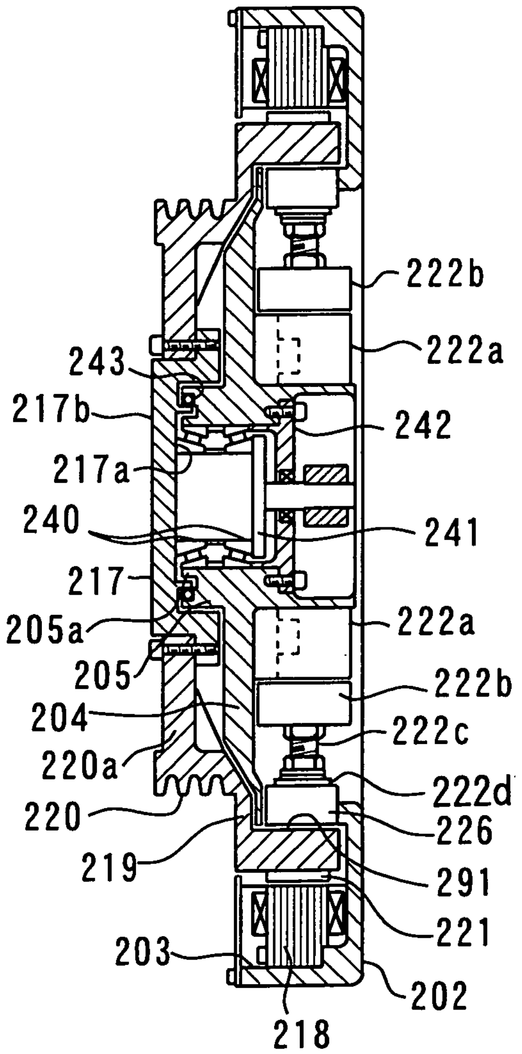
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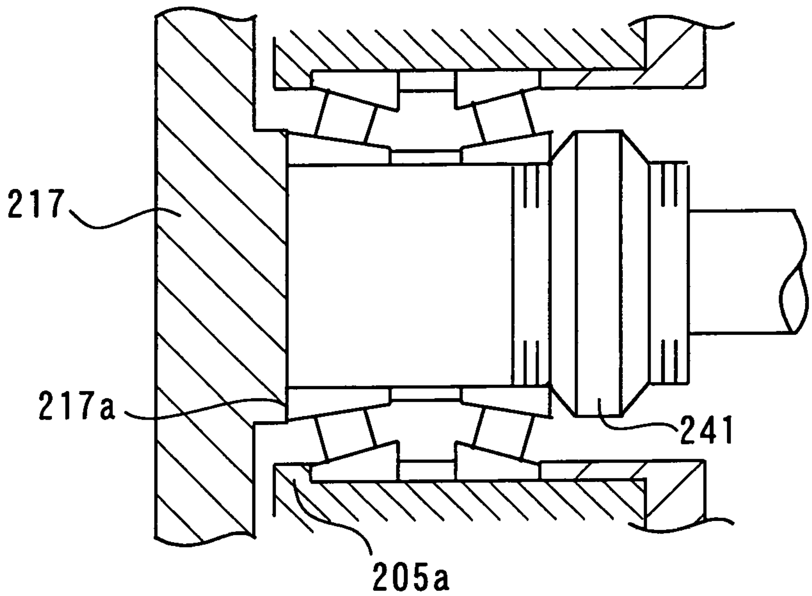
Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/10553

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B11/08

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)
Int.Cl[7] B66B11/00-11/08, F16D49/00-71/04, H02K7/10, 7/102

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2004
Kokai Jitsuyo Shinan Koho	1971-2004	Toroku Jitsuyo Shinan Koho	1994-2004

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	JP 2003-104666 A (Meidensha Corp.), 09 April, 2003 (09.04.03), & EP 1298084 A2 & CN 1410338 A & US 2003/0070881 A1	1-3,7-8
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[x] 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 20 April, 2004 (20.04.04)	Date of mailing of the international search report 11 May, 2004 (11.05.04)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/10553

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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