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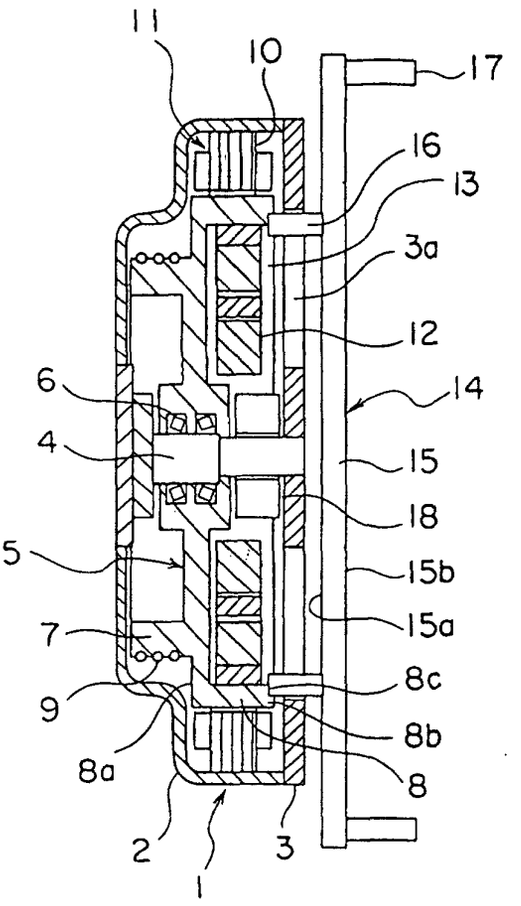
(54) ELEVATOR HOISTING MACHINE

(57) In an elevator hoisting machine, a rotary portion having a drive sheave rotates about a main shaft. The drive sheave and a brake drum are provided integrally in the rotary portion. A plurality of rotary portion side engaging portions with intervals therebetween are formed in a circumferential direction in an end portion of the brake drum. A plurality of handle side engaging portions that engage the rotary portion side engaging portions are provided in a manual-operation handle to rotate the rotary portion manually.

FIG. 2



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Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator hoisting machine having a drive sheave around which a main rope is wrapped. A car that is suspended from the main rope ascends and descends by means of rotation of the drive sheave.

BACKGROUND ART

[0002] A conventional elevator hoisting machine is disclosed in JP 2000-351548 A, for example. An engaging portion for engaging a manual-operation handle is provided in an end portion of a rotary shaft in this example. When a car is moved during elevator installation or during a power outage, the manual-operation handle is engaged with the engaging portion, a brake device of the hoisting machine is released, and the rotary shaft is rotated manually by using the manual-operation handle. The drive sheave of the hoisting machine thus rotates, and the car can ascend and descend.

[0003] However, in recent years the number of hoisting machines having a speed detecting unit mounted in the end portion of the rotary shaft has increased due to the spread of inverter control. If the engaging portion is provided in the end portion of the rotary shaft with this type of hoisting machine, the manual-operation handle cannot engage the engaging portion until after the speed detector is removed, and this is burdensome.

[0004] Further, if the speed detector is provided in one end portion of the rotary shaft and the engaging portion is provided in the other end portion, it is necessary to secure a space for maintenance and replacement of the speed detector in the periphery of the one end portion, and it is necessary to secure a work space in the periphery of the other end portion for the manual-operation handle. In particular, it is difficult to secure a large space in the periphery of the hoisting machine in a case of a machine-room-less elevator in which the hoisting machine is disposed within a hoistway.

[0005] In addition, with a hoisting machine of a type where the main shaft, which is positioned in the center of rotation, is fixed to a fixing portion, the drive sheave cannot be rotated even if the engaging portion is provided in the end portion of the main shaft.

DISCLOSURE OF THE INVENTION

[0006] The present invention has been made with a view toward solving the problems described above. It is an object of the present invention to obtain an elevator hoisting machine in which a maintenance space can be made smaller, and in which manual rotation operation of a drive sheave can be performed easily.

[0007] To this end, according to one aspect of the present invention, there is provided an elevator hoisting machine comprising: a main shaft; a rotary portion having a drive sheave around which an elevator main rope is wrapped, the rotary portion rotating about the main shaft; a motor that causes the rotary portion to rotate; and a brake device for braking the drive sheave, wherein the rotary portion has a plurality of rotary portion side engaging portions with intervals therebetween in a circumferential direction, and the elevator hoisting machine further comprises a manual-operation handle for manually rotating the rotary portion, the manual-operation handle having a plurality of handle side engaging portions that engage the rotary portion side engaging portions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

Fig. 1 is a rear view that shows a state during manual rotation operation of an elevator hoisting machine is conducted according to an embodiment mode of the invention;
Fig. 2 is a cross sectionalviewof the elevator hoistingmachine of Fig. 1;
Fig. 3 is a front view that shows another example of a rotary portion side engaging portion; and
Fig. 4 is a front view that shows still another example of a rotary portion side engaging portion.

BEST MODE FOR CARRYING OUT THE INVENTION

[0009] Preferred embodiment modes of the present invention are explained below with reference to the drawings.

[0010] Fig. 1 is a rear view that shows a state during manual rotation operation of an elevator hoisting machine (gearless hoisting machine) is conducted according to an embodiment mode of the present invention and Fig. 2 is a cross sectional view of the elevator hoisting machine of Fig. 1.

[0011] In those drawings, a case 1 has a case main body 2 that is fixed to a fixing portion, and a disk shape back plate 3 that is attached to the case main body 2. A main shaft 4 is fixed to the center of the case main body 2. A rotary portion 5 that rotates about the main shaft 4 is attached to the main shaft 4 through a bearing 6.

[0012] The rotary portion 5 has a cylindrical drive sheave 7, and a cylindrical brake drum 8 as a brake rotary body. The drive sheave 7 and the brake drum 8 are provided integrally in the rotary portion 5. A plurality of elevator main ropes 9 are wrapped around the drive sheave 7. The main ropes 9 are each inserted within one of a plurality of rope grooves formed in an outer circumferential portion.

[0013] The brake drum 8 has a first end portion 8a in which the drive sheave 7 is provided, and a second end portion 8b that is positioned on a side opposite to the first end portion 8a. A plurality of notches 8c as rotary

portion side engaging portions are formed in the second end portion 8b. The notches 8c are disposed in a circumferential direction with intervals therebetween. Further, the notches 8c are disposed symmetrically, with respect to the main shaft 4. Four of the notches 8c are formed in this example, at intervals of 90 degrees.

[0014] The brake drum 8 also functions as a motor rotor. A motor stator 10 is fixed to an inner circumferential surface of the case main body 2 so as to be opposite to an outer circumferential surface of the brake drum 8. A motor 11 that causes the rotary portion 5 to rotate has the brake drum 8 and the motor stator 10.

[0015] A brake device main body 12 for braking the brake drum 8 is disposed inside the brake drum 8. The brake device main body 12 is supportedly mounted to the back plate 3. It should be noted that a support structure for the brake device main body 12 is not shown. A brake device (electromagnetic brake) 13 that puts brake on the drive sheave 7 has the brake drum 8 and the brake device main body 12.

[0016] A plurality of apertures 3a are formed in the rear plate 3 in order to perform maintenance of the brake device main body 12 from outside of the case 1. The apertures 3a are closed by a lid (not shown) during normal operation. As described above, the rear plate 3 supports the brake device main body 12, and therefore the aperture cannot be given a round shape. The aperture is thus divided into the plurality of apertures 3a.

[0017] Accordingly, when the apertures 3a are open, a portion of an end surface of the second end portion 8b of the brake drum 8 is always hidden by the rear plate 3. However, at least two of the notches 8c are exposed from the apertures 3a when the apertures 3a are open, regardless of the rotation angle of the brake drum 8.

[0018] A manual-operation handle 14 for rotating the rotary portion 5 manually has: a flat plate shape handle main body 15 that possesses opposing first and second surfaces 15a and 15b; a plurality of (a pair of) projections 16 that are used as handle side engaging portions that engages the notches 8c; and a grip 17 that is provided in the second surface 15b. The handle main body 15 has a length that is greater than the diameter of the case 1. It should be noted that the handle main body 15 may also be made smaller than the case 1, but operation can be performed more easily by using a smaller force on the handle 15 as the grip 17 is positioned farther away from the main shaft 4 while making the handle main body 15 larger.

[0019] The manual-operation handle 14 is mounted to the rotary portion 5 by simply inserting the projections 16 into the notches 8c, and consequently it is easy to attach the manual-operation handle 14 to, and remove the manual-operation handle 14 f rom, the rotary portion 5. Further, the manual-operation handle 14 is only mounted to the rotary portion 5 when necessary, and is removed from the rotary portion 5 during normal operation and stored in a predetermined storage location.

[0020] A speed detector 18 is provided in an end portion of the rear plate 3 side of the main shaft 4. The speed detector 18 surrounds the end portion of the main shaft 4.

[0021] Operation is explained next. When the elevator is operating normally, the manual-operation handle 14 is removed from the rotary portion 5, and the apertures 3a of the rear plate 3 are covered by the lid. Further, the lid is removed, exposing the apertures 3a, during maintenance checks of the brake device 13. In addition, the rear plate 3 is removed from the case main body 2 when performing maintenance on, or replacement of, the speed detector 18.

[0022] Furthermore, when a failure such as no electric current flowing in the motor stator 10 develops due to some type of abnormality, and a car carrying a passenger stops between floors, the drive sheave 7 is rotated manually and the car is made to travel to the nearest floor. In this case, the apertures 3a are exposed. For example, the manual-operation handle 14 is mounted to the rotary portion 5 (brake drum 8) as shown in Fig. 1. The manual-operation handle 14 is then operated while the brake device 13 is released, and the rotary portion 5 rotates.

[0023] The projections 16 interfere with the rear plate 3 at this point, and therefore the manual-operation handle 14 cannot be rotated continuously. Accordingly, once the manual-operation handle 14 has been rotated from a solid line position to a double dashed line position in Fig. 1, the brake device 13 is engaged, and the manual-operation handle 14 is removed from the rotary portion 5. The manual-operation handle 14 is next reattached at the solid line position, and the manual-operation handle 14 is rotated while the brake device 13 is released. By repeatedly performing this type of operation, the drive sheave 7 turns gradually, and the car is made to travel to the nearest floor.

[0024] The notches 8c that engage the manual-operation handle 14 are not formed in the main shaft 4 with this type of elevator hoisting machine, but instead are formed in the rotary portion 5. Therefore the manual-operation handle 14 can be mounted from the same side as the speed detector 18, even for cases where the speed detector 18 is mounted to the main shaft 4. Consequently, the maintenance space can be placed on one side in an axial direction of the main shaft 4, and the maintenance space that must be secured can be made smaller. Therefore the elevator hoisting machine can also be installed in a small space, and this is effective for applications to machine-room-less elevators, and the like.

[0025] Further, the manual-operation handle 14 can be mounted even if the speed detector 18 is not removed, and manual rotation operations of the drive sheave 7 can thus be performed with ease. In addition, even for cases where the main shaft 4 does not rotate, the drive sheave 7 can be rotated manually by using the manual-operation handle 14.

[0026] Additionally, the notches 8c are disposed sym-

metrically with respect to the main shaft 4, and therefore a rotational force from the manual-operation handle 14 can be transmitted to the rotary portion 5 with good efficiency, even though the manual-operation handle 14 is not supported by the main shaft 4.

[0027] Additionally further, the notches 8c are exposed from the apertures 3a that are used for maintenance on the brake device 13, and consequently the manual-operation handle 14 can be mounted even if the rear plate 3 is not removed. The operability of the manual rotation operation of the drive sheave 7 can thus be improved.

[0028] Furthermore, the rotary portion 5 in which the drive sheave 7 and the brake drum 8 are provided integrally is used, and the notches 8c are formed in the second end portion 8b of the brake drum 8. Consequently, the rotation force can be transmitted from the manual-operation handle 14 to the sheave 7 with good efficiency.

[0029] In addition, operation by the manual-operation handle 14 can be performed from the same side as the maintenance work on the brake device 13, and therefore the maintenance space can be made smaller.

[0030] Additionally further, the rotary portion side engaging portion is composed of the notches 8c, and the handle side engaging portion is formed of the projections 16. The manual-operation handle 14 can thus engage with the rotary portion 5 through a simple structure.

[0031] It should be noted that although the notches 8c are shown as the rotary portion side engaging portion in the example described above, bolt holes 8e may also be formed in an end surface 8d of the brake drum 8 as the rotary portion side engaging portion as shown in Fig. 3, for example. In this case the bolt holes 8e can also be used for material handling during assembly within a factory.

[0032] Further, although the notches 8c are formed in the inner circumferential surface side of the second end portion 8b in the example described above, notches 8f may also be formed in an outer circumferential surface side of the second end portion 8b, provided that the entire second end portion 8b is exposed from the rear plate 3c.

[0033] In addition, although the apertures 3a are divided into two apertures in the example explained above, the apertures may also be divided into three apertures. In this case the rotary portion side engaging portion may be disposed at the vertex of an equilateral triangle. Similarly, the present invention can also be applied to cases where the aperture is divided into four or more apertures.

[0034] Additionally further, although the main shaft is fixed in the example described above, the present invention can also be applied to a hoisting machine in which the main shaft rotates integrally with the rotary portion.

[0035] Furthermore, although the notches 8c are formed in the brake drum from 8 among the constituents of the rotary portion 5, the rotary portion side engaging portion may also be provided in a portion other than the brake rotary body of the rotary portion, such as the drive sheave or the motor rotor, for example.

Claims

1. An elevator hoisting machine comprising:

a main shaft;
a rotary portion having a drive sheave around which an elevator main rope is wrapped, the rotary portion rotating about the main shaft;
a motor that causes the rotary portion to rotate; and
a brake device for braking the drive sheave,

wherein the rotary portion has a plurality of rotary portion side engaging portions with intervals therebetween in a circumferential direction, and

the elevator hoisting machine further comprises a manual-operation handle for manually rotating the rotary portion, the manual-operation handle having a plurality of handle side engaging portions that engage the rotary portion side engaging portions.

2. An elevator hoisting machine according to claim 1, wherein the rotary portion side engaging portions are disposed symmetrically with respect to the main shaft.

3. An elevator hoisting machine according to claim 1, further comprising:

a case that houses the main shaft, the rotary portion, the motor, and the brake device, the case having an aperture in order to perform maintenance on the brake device,

wherein the rotary portion side engaging portions are exposed from the aperture.

4. An elevator hoisting machine according to claim 1,

wherein: the brake device has a brake rotary body that rotates integrally with the drive sheave, and a brake device main body for braking the brake rotary body;

the rotary portion includes the brake rotary body;

the brake rotary body has a first end portion in which the drive sheave is provided, and a second end portion positioned on a side opposite to that of the first end portion; and

the rotary portion side engaging portions are provided in the second end portion of the brake rotary body.

5. An elevator hoisting machine according to claim 4, wherein the brake rotary body is a cylindrical brake drum, and a plurality of notches are formed in the second end portion of the brake drum as the rotary portion side engaging portions.

6. An elevator hoisting machine according to claim 5, wherein the manual-operation handle has a plurality of projections as a handle side engaging portion that engages the notches as a handle side engaging portion.

FIG. 1

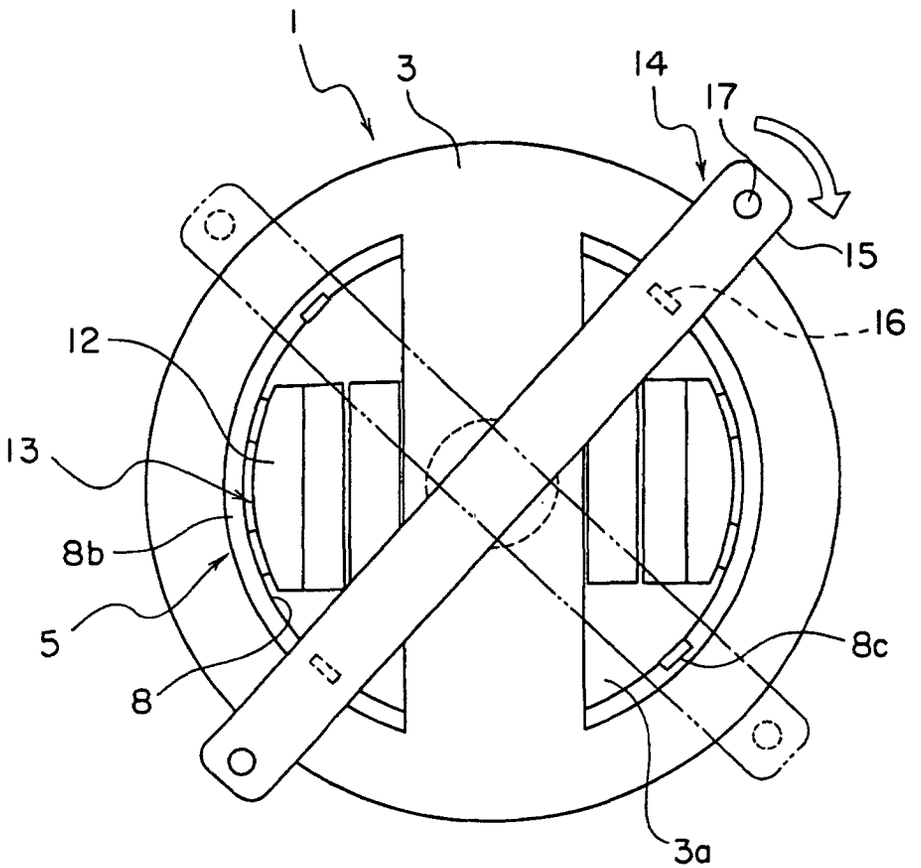


FIG. 2

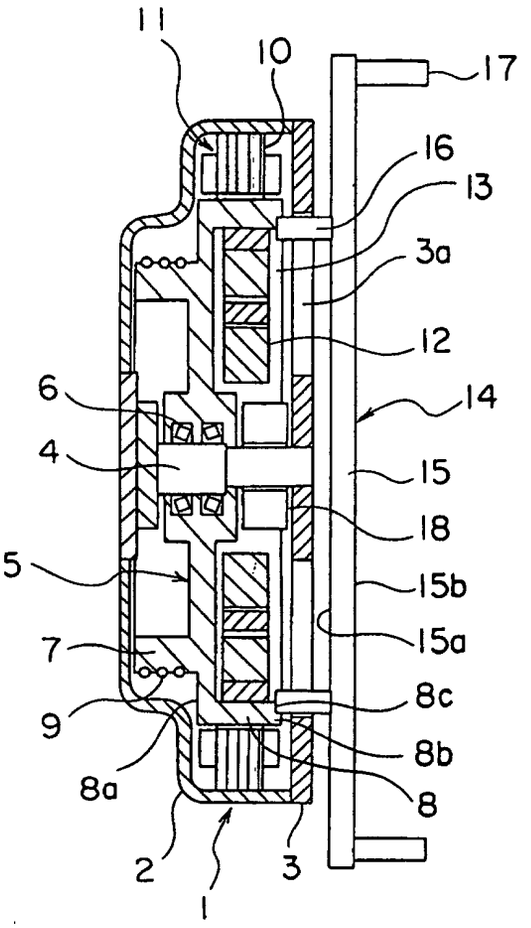


FIG. 3

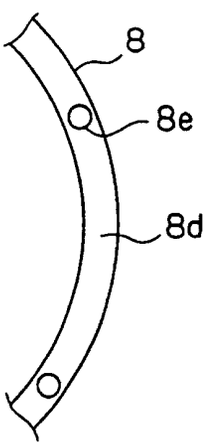
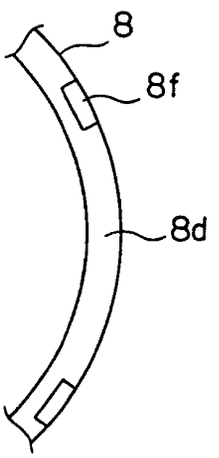


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/06167

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] B66B5/00

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] B66B5/00

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	1996-2002
Kokai Jitsuyo Shinan Koho	1971-2002	Toroku Jitsuyo Shinan Koho	1994-2002

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.
Y	JP 64-2989 A (Mitsubishi Electric Corp.), 06 January, 1989 (06.01.89), (Family: none)	1-6
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 99719/1984 (Laid-open No. 15281/1986) (Toshiba Corp.), 29 January, 1986 (29.01.86), (Family: none)	1-6
Y	JP 58-125596 A (Yamakyu Chain Kabushiki Kaisha), 26 July, 1983 (26.07.83), (Family: none)	1-6

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Date of the actual completion of the international search	Date of mailing of the international search report
20 September, 2002 (20.09.02)	29 October, 2002 (29.10.02)
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