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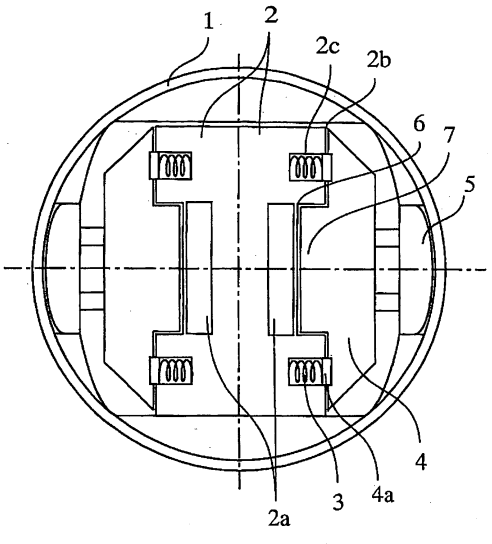
(54) BRAKE DEVICE OF HOIST FOR ELEVATOR

(57) A braking device of an elevator traction machine including a brake drum 1 formed in a rotationally driving element for moving an elevator up and down; a fixed iron core 2 which is arranged in the center of the brake drum 1 and is provided with electromagnet coils 2a and attraction surfaces 2b in both side parts; moving iron cores 4 which are arranged so as to face to the attraction surfaces 2b on both sides of the fixed iron core 2, which are urged in the direction toward the brake drum 1 by urging springs 3, and which are attracted to the fixed iron core 2 by the electromagnetic force of the electromagnet coils 2a; and brake shoes 5 which are provided on the moving iron cores 4 and are arranged so as to face to the brake drum 1, **characterized in that** the braking device further includes engagement means 6 and 7 which are provided on the attraction surfaces 2b of the fixed iron core 2 and on the moving iron cores 4 facing to the attraction surfaces 2b and are engaged with each other so that the moving iron cores 4 can be moved in the direction of the rotation axis of the brake drum 1 while the own weight of the moving iron core 4 is supported by the fixed iron core 2.

【FIG. 1】



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Description

Technical Field

[0001] The present invention relates to a braking device of a traction machine in an elevator system.

Background Art

[0002] Conventionally, in a braking device for an elevator traction machine using an electromagnet, an electromagnet coil attached to a fixed iron core is energized to attract moving iron cores at the time of brake releasing, by which brake shoes are separated from a brake drum. At the time of brake applying, the electromagnet coil is de-energized, by which the brake shoes moving in association with the moving iron cores are pressed against the brake drum by springs in the fixed iron core to apply the brake (for example, refer to Patent Document 1). Further, an armature, which is a moving iron core, is configured so as to be supported on a guide rod by a spherical bearing (for example, refer to Patent Document 2).

[0003]

Patent Document 1: Japanese Patent Laid-Open No. 2005-178969

Patent Document 2: Japanese Patent Laid-Open No. 2004-189418 (Figure 3)

Disclosure of the Invention

Problem to be solved by the Invention

[0004] In a conventional braking device of an elevator traction machine, the moving iron core is elastically supported by spring a bearer fitted under pressure in the fixed iron core. Therefore, when the moving iron core is taken out, the moving iron core is removed from an elastically supporting part, and the worker must support the weight of the moving iron core. As a result, in case where the moving iron core has a large size, workability is decreased in removing the moving iron core.

[0005] Further, in the braking device of an elevator traction machine described in Patent Document 2, when the armature (moving iron core) is to be taken out, the worker performs the removing work while supporting the weight of the armature. Therefore, the workability is decreased.

[0006] The present invention has been made to solve the above-described problems, and accordingly an object thereof is to provide a braking device of an elevator traction machine where a worker can perform work for removing a moving iron core without worrying about the weight thereof.

Measures to solve the Problem

[0007] A braking device of an elevator traction machine comprises: a brake drum formed in a rotationally driving element for moving an elevator up and down; a fixed iron core which is arranged in the center of the brake drum, the fixed iron core is provided with electromagnet coils and attraction surfaces in both side parts; moving iron cores which are arranged so as to face to the attraction surfaces on both sides of the fixed iron core, the moving iron core being urged in the direction toward the brake drum by urging springs, and the moving iron core being attracted to the fixed iron core by the electromagnetic force of the electromagnet coils; and brake shoes (5) which is provided on the moving iron core and is arranged so as to face to the brake drum, characterized in that the braking device further comprises engagement means which are provided on the attraction surface of the fixed iron core and on the moving iron core facing to the attraction surface and are engaged with each other so that the moving iron core can be moved in the direction of the rotation axis of the brake drum while the own weight of the moving iron core is supported by the fixed iron core.

[0008] Further, in the braking device of an elevator traction machine according to the present invention, the engagement means consist of a concave part provided in the fixed iron core and a convex part provided on the moving iron core and fitted in the concave part.

[0009] Further, in the braking device of an elevator traction machine according to the present invention, the engagement means consist of key grooves provided in the fixed iron core and the moving iron core so as to face to each other and a key fitted in the key grooves.

[0010] Further, in the braking device of an elevator traction machine according to the present invention, jig holes for attaching and detaching the moving iron core are provided at positions which are not affected by a magnetic field in the moving iron core.

Advantageous Effect of the Invention

[0011] According to the present invention, the working load for removing the moving iron core is well decreased.

Brief Description of the Drawings

[0012]

Figure 1 is a front view of a braking device of an elevator traction machine in accordance with a first embodiment of the present invention;

Figure 2 is a front view of a braking device of an elevator traction machine in accordance with a second embodiment the present invention; and

Figure 3 is a front view of a braking device of an elevator traction machine in accordance with a third embodiment of the present invention.

Description of Symbols

[0013]

1 brake drum
2 fixed iron core
2a electromagnet coil
2b attraction surface
2c spring hole
3 urging spring
4 moving iron core
4a spring bearer
5 brake shoe
6 concave part
7 convex part
8 key groove
9 magnetic field
10 jig hole

Best Mode for Carrying Out the Invention

[0014] In the embodiments of the present invention, a drum-type braking device for an elevator traction machine is explained as an example.

First embodiment

[0015] Figure 1 is a front view of a braking device of an elevator traction machine in accordance with the first embodiment 11111of the present invention. In Figure 1, symbol 1 denotes a brake drum formed in a rotationally driving element (not shown) for moving an elevator up and down, and symbol 2 denotes a fixed iron core arranged in the center of the brake drum 1. On both sides of the fixed iron core 2, a pair of electromagnet coils 2a and attraction surfaces 2b are provided. Symbol 2c denotes spring holes concavely provided in the attraction surfaces 2b of the fixed iron core 2, symbol 3 denotes urging springs provided in the spring holes 2c, and symbol 4 denotes a pair of moving iron cores arranged so as to face to the attraction surfaces 2b on both sides of the fixed iron core 2. The moving iron cores 4 are always urged in the direction toward the brake drum 1 by the urging springs 3, and are attracted to the fixed iron core 2 by the electromagnetic force of the paired electromagnet coils 2 at the brake releasing time. Symbol 4a denotes spring bearers that are provided on the paired moving iron cores 4, and fitted under pressure in the spring holes 2c in the fixed iron core 2 to bear the urging springs 4, and symbol 5 denotes a pair of brake shoes that are provided on the paired moving iron cores 4 and arranged so as to face to the brake drum 1.

[0016] At the brake releasing time, the electromagnet coils 2a are energized to attract the paired moving iron cores 4 to the fixed iron core 2, by which the paired brake shoes 5 are separated from the brake drum 1. At the brake applying time, the electromagnet coils 2a are de-energized, by which the paired brake shoes 5 moving in association with the paired moving iron cores 4 are pressed against the brake drum 1 by the urging springs 3 in the fixed iron core 2.

[0017] Also, the paired moving iron cores 4 are elastically supported on the fixed iron core 2 by the spring bearers 4a fitted under pressure in the spring holes 2c in the fixed iron core 2. At the maintenance time, the moving iron cores 4 can be removed by removing the spring bearers 4a and the springs 3 and by moving the moving iron cores 4 to the frond side in the rotation axis direction of the brake drum 1.

[0018] The above-described configuration is the same as the configuration of the conventional braking device. Hereunder, feature in the configuration of the present invention is explained. Symbol 6 denotes a first engagement means consisting of concave parts provided in the attraction surfaces 2b on both sides of the fixed iron core 2, and symbol 7 denotes a second engagement means consisting of convex parts that are provided on the paired moving iron cores 4 and fitted in the concave parts 6. The second engagement means supports the weights of the paired moving iron cores 2 together with the elastic support of the spring bearers 4a. The concave part 6 and the convex part 7 engage with each other so as to be slidable in the rotation axis direction of the brake drum 1. Thereby, even in the state of not being elastically supported by the spring bearers 4a, the paired moving iron cores 4 can be moved in the direction of the rotation axis of the brake drum 1 while the own weight thereof is supported by the fixed iron core 2.

[0019] According to the elevator braking device configured as described above, the concave parts 6 are provided on both sides of fixed iron core 2, and convex parts 7 fitted in the concave parts 6 are provided on the paired moving iron cores 4, by which the paired moving iron cores 4 are supported on both sides of the fixed iron core 2 and do not fall freely as in the conventional braking device wherein the moving iron cores 4 are not elastically supported by the spring bearers 4a. Thereby, during the work for removing the paired moving iron cores 4 and brake shoes 5, which is required at the time of maintenance of the elevator braking device, the worker can perform the removing work of the spring bearers 4a and the springs without worrying about the weights of the paired moving iron cores 4, and the worker can move and pull out the paired moving iron cores 4 in the direction of the rotation axis of the brake drum 1 along the engagement of the convex parts 7 with the concave parts 6, so that the working load can be reduced significantly. Also, this configuration can accommodate an increase of the size of the moving iron core 4.

Second embodiment

[0020] Figure 2 is a front view of a braking device of an elevator traction machine in accordance with the second embodiment of the present invention. In Figure 2, the same symbols are applied to elements that are equivalent to the elements in the first embodiment, and duplicated explanation is omitted.

[0021] In the second embodiment, the concave parts 6 and the convex parts 7 that engage with each other

can support the weights of the paired moving iron cores 4. In contrast, in the second embodiment, an engagement means consisting of two pairs of key grooves 8 each provided so as to face to each other is provided in upper parts of the fixed iron core 2 and the paired moving iron cores 4 so that the weights of the paired moving iron cores 4 can be supported by inserting keys (not shown) in the key grooves 8.

Third embodiment

[0022] Figure 3 is a front view of a braking device of an elevator traction machine in accordance with the third embodiment of the present invention. In Figure 3, the same symbols are applied to elements that are equivalent to the elements in the first embodiment, and duplicated explanation is omitted.

[0023] In Figure 3, symbol 9 denotes a magnetic field generated by the paired electromagnet coil 2a provided on the fixed iron core 2, the magnetic field 9 being shown schematically, and symbol 10 denotes jig holes that are provided in the front surfaces of the paired moving iron cores 4 and arranged at positions that are not affected by the magnetic field 9. Thereby, the paired moving iron cores 4 are caused to take a shape such that the moving iron cores 4 are easy to grip, and also lifting equipment can be used in the work for removing the paired moving iron cores 4. Also, thereby, the working load at the maintenance time can be reduced without sacrificing the attraction force of the fixed iron core 2 and the paired moving iron cores 4.

Industrial Applicability

[0024] As described above, the braking device of an elevator traction machine in accordance with the present invention can be used for a braking device that requires the removal of the moving iron cores at the time of maintenance.

Claims

1. A braking device of an elevator traction machine comprising:

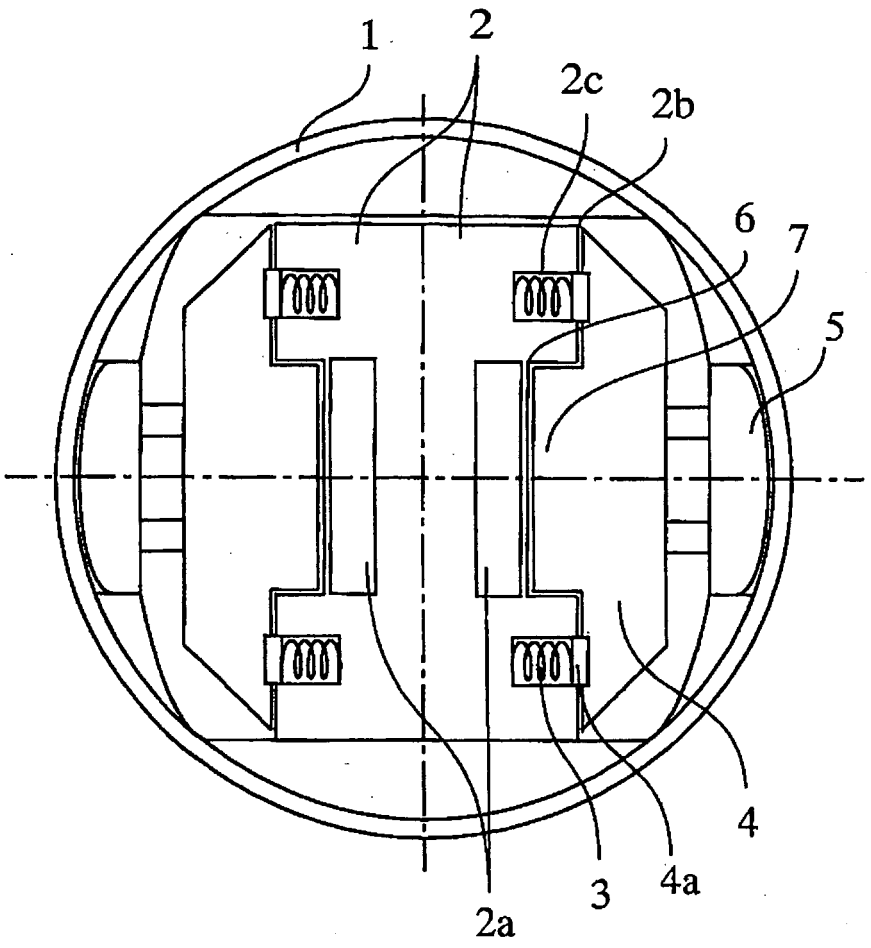
a brake drum formed in a rotationally driving element for moving an elevator up and down;
a fixed iron core which is arranged in the center of said brake drum, said fixed iron core is provided with electromagnet coils and attraction surfaces in both side parts;
moving iron cores which are arranged so as to face to the attraction surfaces on both sides of said fixed iron core, said moving iron core being urged in the direction toward said brake drum by urging springs, and said moving iron core being attracted to said fixed iron core by the electromagnetic force of said electromagnet coils; and
brake shoes which is provided on said moving iron core and is arranged so as to face to said brake drum, **characterized in that**
said braking device further comprises engagement means which are provided on said attraction surface of said fixed iron core and on said moving iron core facing to the attraction surface and are engaged with each other so that said moving iron core can be moved in the direction of the rotation axis of said brake drum while the own weight of said moving iron core is supported by said fixed iron core.

2. The braking device of an elevator traction machine according to claim 1, **characterized in that** said engagement means consist of a concave part provided in said fixed iron core and a convex part provided on said moving iron core and fitted in said concave part.

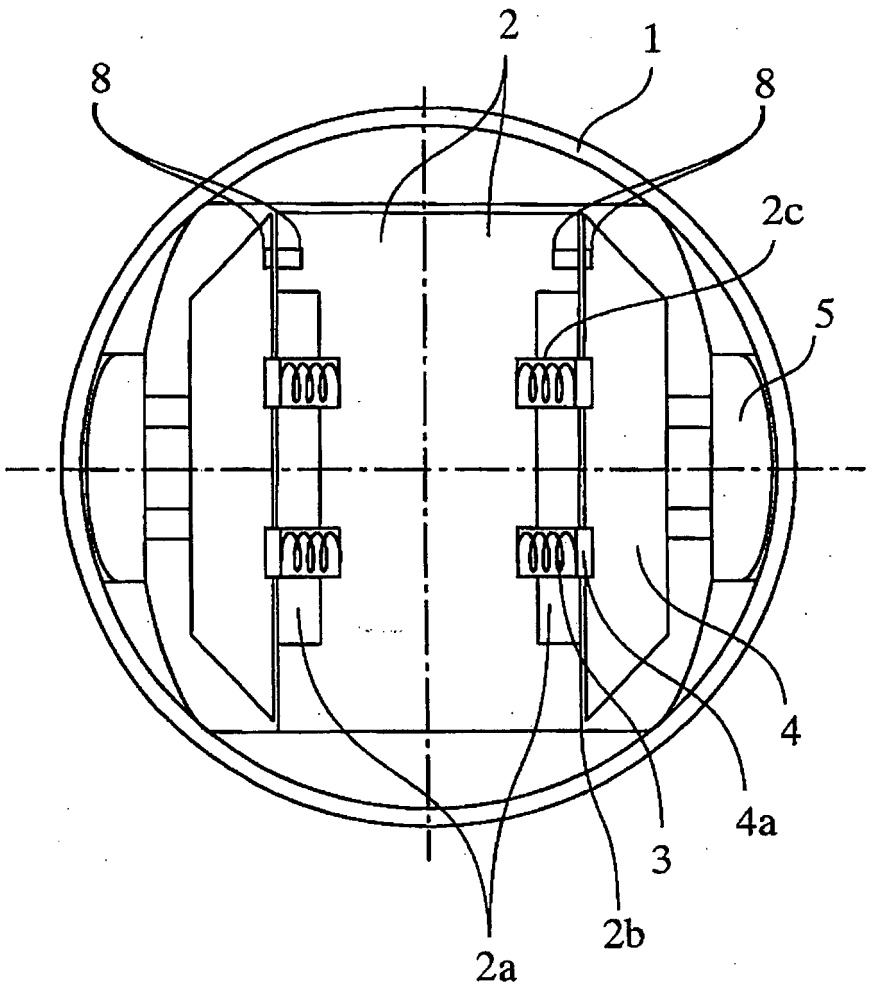
3. The braking device of an elevator traction machine according to claim 1, **characterized in that** said engagement means consist of key grooves provided in said fixed iron core and said moving iron core so as to face to each other and a key fitted in said key grooves.

4. The braking device of an elevator traction machine according to any one of claims 1 to 3, **characterized in that** jig holes for attaching and detaching said moving iron cores are provided at positions which are not affected by a magnetic field in said moving iron core.

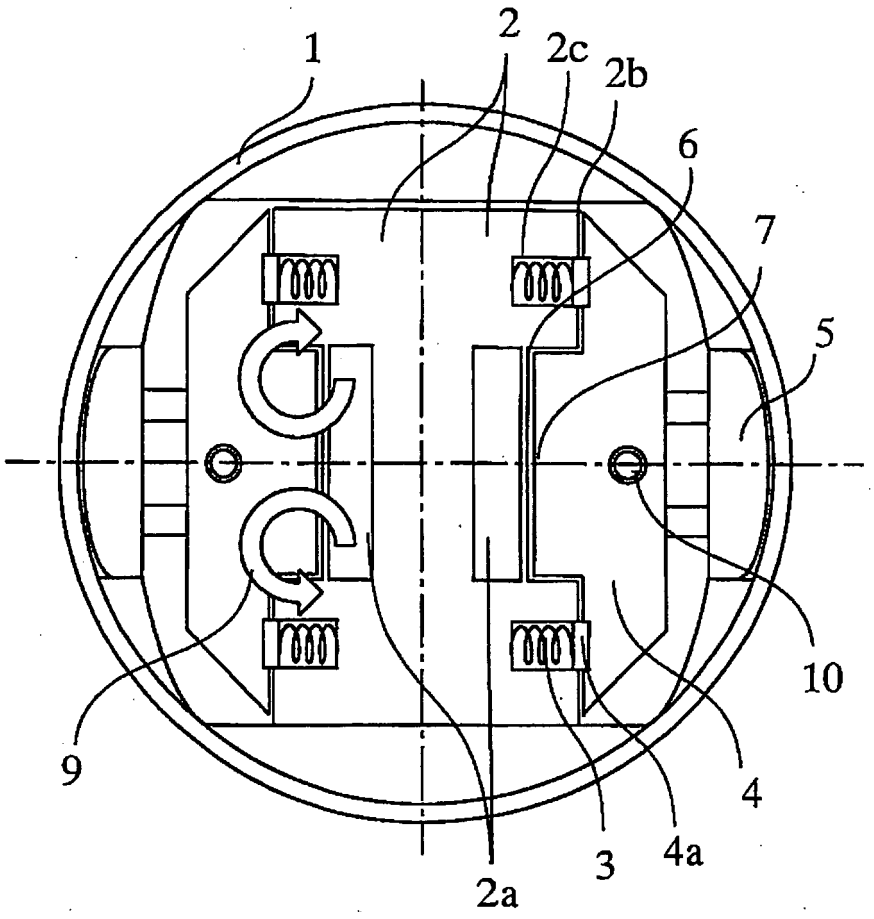
【FIG. 1】



【FIG. 2】



【FIG. 3】



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/305677

A. CLASSIFICATION OF SUBJECT MATTER
B66B11/08(2006.01)i

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)
B66B11/00-B66B11/08, B66D5/00-B66D5/34, F16D49/00-F16D71/04

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 1996-2006
Kokai Jitsuyo Shinan Koho 1971-2006 Toroku Jitsuyo Shinan Koho 1994-2006

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.
A	WO 2004/036080 A1 (Mitsubishi Electric Corp.), 29 April, 2004 (29.04.04), & EP 1553319 A1	1-2
A	JP 2002-242961 A (Sanyo Kogyo Kabushiki Kaisha), 28 August, 2002 (28.08.02), (Family: none)	1
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 164615/1988(Laid-open No. 086983/1990) (Mitsubishi Electric Corp.), 10 July, 1990 (10.07.90), (Family: none)	3

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 December, 2006 (14.12.06)	26 December, 2006 (26.12.06)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2006/305677

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 08-208142 A (Kabushiki Kaisha Hitachi Building System Service), 13 August, 1996 (13.08.96), (Family: none)	4

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2005178969 A **[0003]**
- JP 2004189418 A **[0003]**