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

(11) EP 2 308 788 A1

(12) EUROPEAN PATENT APPLICATION

published in accordance with Art. 153(4) EPC

(43) Date of publication:
13.04.2011 Bulletin 2011/15

(21) Application number: **08777091.3**

(22) Date of filing: **02.06.2008**

(51) Int Cl.:
B66B 11/08 *(2006.01)*

(86) International application number:
PCT/JP2008/060140

(87) International publication number:
WO 2009/147708 (10.12.2009 Gazette 2009/50)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

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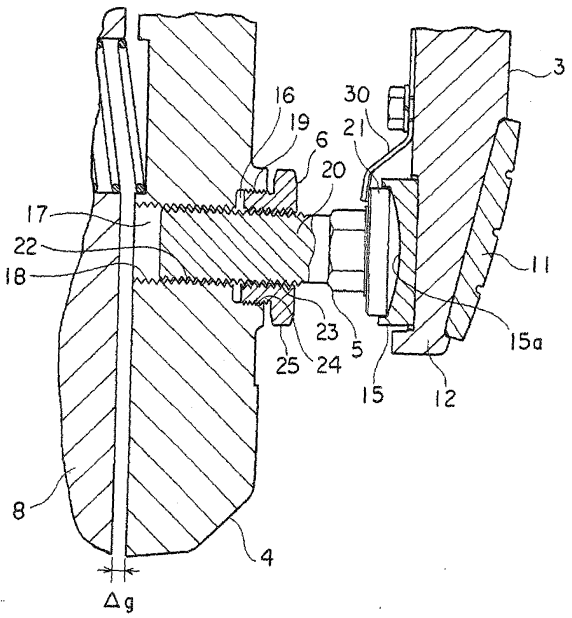
(54) BRAKE DEVICE FOR ELEVATOR HOIST

(57) In an elevator hoisting machine braking apparatus, a brake shoe and a movable core are coupled by a coupling member. The movable core is forced by a forcing body in a direction in which the brake shoe contacts a rotating body. The movable core displaces the brake shoe away from the rotating body in opposition to the force from the forcing body by electric power being supplied to an electromagnet. A holding helical portion is disposed on either one of the brake shoe or the movable core. An adjusting helical portion that can be screwed together with the holding helical portion is disposed on the coupling member. A position of the adjusting helical portion relative to the holding helical portion is fixed by a fixing means. The fixing means fixes the position of the adjusting helical portion relative to the holding helical portion by pressing the adjusting helical portion against the holding helical portion in a direction in which the brake shoe and the movable core approach each other.

FIG. 2



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Description

TECHNICAL FIELD

[0001] The present invention relates to an elevator hoisting machine braking apparatus for braking raising and lowering of a car and a counterweight.

BACKGROUND ART

[0002] Conventionally, elevator hoisting machine braking apparatuses have been proposed that are disposed inside a brake drum that rotates together with a motor shaft, and that brake rotation of the brake drum by pressing a brake shoe against an inner surface of the brake drum (See Patent Literature 1).

[0003] Figure 6 is a partial cross section that shows a conventional elevator hoisting machine braking apparatus. In the figure, disposed inside a brake drum 101 are: a brake shoe 102 that can contact with and separate from an inner circumferential surface of the brake drum 101; a movable core 103 that is disposed away from the brake shoe 102; coupling members 104 that link the brake shoe 102 and the movable core 103 to each other; a spring 105 that forces the movable core 103 in a direction in which the brake shoe 102 comes into contact with the inner circumferential surface of the brake drum 101; and an electromagnet 106 that displaces the movable core 103 in a direction in which the brake shoe 102 separates from the inner circumferential surface of the brake drum 101 in opposition to the force from the spring 105.

[0004] Figure 7 is a cross section that shows the brake shoe 102, the movable core 103, and a coupling member 104 from Figure 6. In the figure, a threaded aperture 107 is disposed on the movable core 103. An internal screw thread portion 107a is formed on an inner circumferential portion of the threaded aperture 107. An external screw thread portion 104a that can be screwed together with the internal screw thread portion 107a is formed on an outer circumferential portion of the coupling member 104. The coupling member 104 is mounted to the movable core 103 by the external screw thread portion 104a being screwed together with the internal screw thread portion 107a.

[0005] A locknut 108 for fixing the coupling member 104 to the movable core 103 is screwed together with the external screw thread portion 104a. The locknut 108 fastens the coupling member 104 to the movable core 103 when placed in contact with the movable core 103. The external screw thread portion 104a is prevented from rotating relative to the internal screw thread portion 107a by the locknut 108 fastening the coupling member 104 to the movable core 103.

[0006] The movable core 103 is displaced away from the brake drum 101 by supplying electric power to the electromagnet 106, and is displaced toward the brake drum 101 by stopping the supply of electric power to the electromagnet 106. The stroke Δg of the movable core 103 is adjusted by adjusting the amount of thread engagement of the external screw thread portion 104a with the internal screw thread portion 107a.

[0007] Adjustment of the stroke Δg of the movable core 103 is performed by the following procedure. First, the locknut 108 is loosened with the brake shoe 102 pressed against the brake drum 101 by the force from the spring 105. The coupling member 104 is then temporarily positioned relative to the movable core 103 by adjusting the amount of thread engagement of the external screw thread portion 104a in the internal screw thread portion 107a by turning the coupling member 104.

[0008] Now, Figure 8 is an enlarged cross section that shows a state in which the locknut 108 from Figure 7 is loose. As shown in Figure 8, when the coupling member 104 is positioned temporarily relative to the movable core 103, the movable core 103 is being pushed toward the brake shoe 102 (to the right in Figure 8) by the force from the spring 105. Consequently, the ridge of the internal screw thread portion 107a is pushed toward the brake shoe 102 against the ridge of the external screw thread portion 104a.

[0009] After the coupling member 104 is positioned temporarily relative to the movable core 103, the coupling member 104 is fastened to the movable core 103 by turning the locknut 108. The coupling member 104 is thereby restrained by the movable core 103.

[0010] Figure 9 is an enlarged cross section that shows a state in which the locknut 108 from Figure 8 is placed against the movable core 103 and fastened. When the locknut 108 that has been placed in contact with the movable core 103 is turned and fastened, the coupling member 104 is pushed toward the brake shoe 102 (to the right in Figure 9) relative to the movable core 103 by the fastening force from the locknut 108. Thus, the ridge of the external screw thread portion 104a separates from the ridge of the internal screw thread portion 107a, moves by a minute distance Δd to the right in Figure 9, and contacts a different ridge of the internal screw thread portion 107a. Consequently, the coupling member 104 moves relative to the movable core 103 during fastening of the locknut 108, and is restrained at a position that has drifted from the temporary position.

[0011]

[Patent Literature 1]
Japanese Patent Laid-Open No. 2002-242961 (Gazette)

DISCLOSURE OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0012] In conventional elevator hoisting machine braking apparatuses of this kind, because the position at which the coupling member 104 is restrained by the movable core 103 drifts from the temporary position, it is impossible to adjust the stroke of the movable core 103

accurately.

[0013] Adjustment precision of the stroke Δg can also be improved by adjusting the restrained position of the coupling member 104 relative to the movable core 103 by measuring the stroke Δg of the movable core 103 using a measuring instrument such as a dial gauge, etc., while turning the coupling member 104 and the locknut 108, respectively, but because the adjustment work becomes a complicated operation that involves constantly checking the measuring instrument, adjustment work on the stroke Δg becomes very time-consuming.

[0014] In addition, the coupling member 104 can also be prevented from moving relative to the movable core 103 during fastening of the locknut by disposing a penetrating threaded aperture on the brake shoe 102, making a coupling member 104 that is screwed into the penetrating threaded aperture project into a space between the brake shoe 102 and the brake drum 101, and fastening the locknut by screwing it together with a projecting portion of the coupling member 104, but because it is necessary to ensure space between the brake shoe 102 and the brake drum 101 for inserting tools to turn the locknut, for example, the elevator hoisting machine braking apparatus is enlarged.

[0015] The present invention aims to solve the above problems and an object of the present invention is to provide an elevator hoisting machine braking apparatus that enables movable core stroke adjustment to be performed more accurately, and also enables stroke adjustment work to be facilitated.

MEANS FOR SOLVING THE PROBLEM

[0016] In order to achieve the above object, according to one aspect of the present invention, there is provided an elevator hoisting machine braking apparatus characterized in including: a rotating body; a brake shoe that can be displaced in such a direction as to contact with or separate from the rotating body; a movable core that is disposed away from the brake shoe in the direction in which the brake shoe can be displaced; a linking member on which an adjusting helical portion is disposed that can be screwed together with a holding helical portion that is disposed on either one of the brake shoe or the movable core, the linking member linking the brake shoe and the movable core to each other, and spacing between the brake shoe and the movable core being adjusted by adjusting an amount of thread engagement of the adjusting helical portion with the holding helical portion; a fixing means that fixes a position of the adjusting helical portion relative to the holding helical portion by pressing the adjusting helical portion against the holding helical portion in a direction in which the brake shoe and the movable core approach each other; a forcing body that forces the movable core in a direction in which the brake shoe contacts the rotating body; and an electromagnet that displaces the movable core in a direction in which the brake shoe separates from the rotating body in opposition to force from the forcing body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Figure 1 is a partial cross section that shows an elevator hoisting machine braking apparatus according to Embodiment 1 of the present invention;

Figure 2 is a cross section that shows a brake shoe, a movable core, an adjusting bolt, and a locknut from Figure 1;

Figure 3 is an enlarged cross section that shows a state in which the locknut from Figure 2 is loose;

Figure 4 is an enlarged cross section that shows a state in which the locknut from Figure 3 is fastened;

Figure 5 is a partial cross section that shows an elevator hoisting machine braking apparatus according to Embodiment 2 of the present invention;

Figure 6 is a partial cross section that shows a conventional elevator hoisting machine braking apparatus;

Figure 7 is a cross section that shows the brake shoe, the movable core, and a coupling member from Figure 6;

Figure 8 is an enlarged cross section that shows a state in which the locknut from Figure 7 is loose; and

Figure 9 is an enlarged cross section that shows a state in which the locknut from Figure 8 is placed against the movable core and fastened.

BEST MODE FOR CARRYING OUT THE INVENTION

[0018] Preferred embodiments of the present invention will now be explained with reference to the drawings.

Embodiment 1

[0019] Figure 1 is a partial cross section that shows an elevator hoisting machine braking apparatus according to Embodiment 1 of the present invention. In the figure, a motor (not shown), a driving sheave (not shown) that is rotated by a driving force from the motor, and a braking apparatus (an elevator hoisting machine braking apparatus) 1 that can brake rotation of the driving sheave are mounted to an elevator hoisting machine. A plurality of main ropes (not shown) that suspend a car and a counterweight are wound around the driving sheave. The car and the counterweight are raised and lowered inside a hoistway by the rotation of the driving sheave.

[0020] The braking apparatus 1 has: a brake drum (a rotating body) 2 that is rotated together with a rotating shaft of the motor; a brake shoe 3 that can be displaced in a such a direction as to contact with or separate from the brake drum 2; a movable core 4 that is disposed away from the brake shoe 3; an adjusting bolt (a coupling member) 5 that links the brake shoe 3 and the movable core 4 to each other, and that can adjust the spacing between

the brake shoe 3 and the movable core 4; a locknut (a fixing means) 6 that fixes the spacing between the brake shoe 3 and the movable core 4 that has been adjusted by the adjusting bolt 5; a forcing spring (a forcing body) 7 that forces the movable core 4 in a direction in which the brake shoe 3 contacts the brake drum 2; and an electromagnet 8 that displaces the movable core 4 in a direction in which the brake shoe 3 separates from the brake drum 2 in opposition to the force from the forcing spring 7.

[0021] The brake drum 2 has an annular portion 9 that is disposed coaxially with the rotating shaft of the motor. The brake shoe 3, the movable core 4, the adjusting bolt 5, the locknut 6, the forcing spring 7, and the electromagnet 8 are disposed inside the annular portion 9. The electromagnet 8 is mounted to a mounting member 10 that supports the rotating shaft of the motor.

[0022] The brake shoe 3 has: a plurality of linings 11 that contact with and separate from an inner circumferential surface of the annular portion 9; and a lining holding member 12 that holds the linings 11. Rotation of the brake drum 2 is braked by the linings 11 contacting the inner circumferential surface of the annular portion 9. Braking of the rotation of the brake drum 2 is released by the linings 11 separating from the inner circumferential surface of the annular portion 9.

[0023] The movable core 4 is disposed at a position that is further away from the annular portion 9 than the brake shoe 3 in the direction in which the brake shoe 3 is displaced. The adjusting bolt 5 and the locknut 6 are disposed between the brake shoe 3 and the movable core 4. The brake shoe 3, the movable core 4, the adjusting bolt 5, and the locknut 6 are displaced together.

[0024] The electromagnet 8 is disposed at a position that is further away from the annular portion 9 than the movable core 4 in the direction in which the brake shoe 3 is displaced. In other words, the movable core 4 is disposed between the brake shoe 3 and the electromagnet 8. Consequently, the brake shoe 3 is displaced toward the annular portion 9 by the movable core 4 being displaced away from the electromagnet 8, and is displaced away from the annular portion 9 by the movable core 4 being displaced toward the electromagnet 8.

[0025] The forcing spring 7 is compressed between the movable core 4 and the electromagnet 8 so as to generate elastic repulsive force. The movable core 4 is forced away from the electromagnet 8 by the elastic repulsive force from the forcing spring 7.

[0026] The electromagnet 8 has: a fixed core 13; and an electromagnetic coil 14 that is disposed on the fixed core 13, and that generates electromagnetic attraction that attracts the movable core 4 on receiving a supply of electric power. The movable core 4 is displaced toward the electromagnet 8 in opposition to the elastic repulsive force from the forcing spring 7 by supplying electric power to the electromagnetic coil 14, and is displaced away from the electromagnet 8 in accordance with the elastic repulsive force of the forcing spring 7 by stopping the supply of electric power to the electromagnetic coil 14.

[0027] Figure 2 is a cross section that shows the brake shoe 3, the movable core 4, the adjusting bolt 5, and the locknut 6 from Figure 1. In the figure, a spherical seat 15 that faces the movable core 4 is disposed on the lining holding member 12. A bearing portion 15a that is formed so as to have a curved surface is disposed on the spherical seat 15.

[0028] A nut insertion recess aperture 16 that faces the spherical seat 15, and a bolt insertion aperture 17 that extends from a bottom portion of the nut insertion recess aperture 16 toward the electromagnet 8 (away from the brake shoe 3) are disposed on the movable core 4. The nut insertion recess aperture 16 has a predetermined depth in a thickness direction of the movable core 4 (the direction in which the movable core 4 is displaced). An inside diameter of the nut insertion recess aperture 16 is greater than an inside diameter of the bolt insertion aperture 17. The bolt insertion aperture 17 passes through the movable core 4. The nut insertion recess aperture 16 and the bolt insertion aperture 17 are disposed coaxially in the thickness direction of the movable core 4.

[0029] A first holding internal screw thread portion (a holding helical portion) 18 is disposed on an inner circumferential portion of the bolt insertion aperture 17. A second holding internal screw thread portion 19 is disposed on an inner circumferential portion of the nut insertion recess aperture 16. Consequently, the first and second holding internal screw thread portions 18 and 19 are disposed coaxially in the thickness direction of the movable core 4. In other words, the respective ridges of the first and second holding internal screw thread portions 18 and 19 are formed into helical shapes around a common axis in the thickness direction of the movable core 4. A diameter of the second holding internal screw thread portion 19 is larger than a diameter of the first holding internal screw thread portion 18. In addition, directions of the helices of the respective ridges of the first and second holding internal screw thread portions 18 and 19 are in reverse directions to each other. In this example, a pitch of the ridge of the first holding internal screw thread portion 18 is greater than a pitch of the ridge of the second holding internal screw thread portion 19.

[0030] The adjusting bolt 5 has: a bolt portion 20 that can be inserted into the bolt insertion aperture 17; and a head portion 21 that is disposed on an end portion of the bolt portion 20, and that can be mounted onto the spherical seat 15. An outside diameter of the head portion 21 is larger than an outside diameter of the bolt portion 20.

[0031] A leaf spring (a holder) 30 that presses the head portion 21 against the bearing portion 15a is disposed on the lining holding member 12. The head portion 21 is mounted to the spherical seat 15 by being pressed against the bearing portion 15a. A portion of the head portion 21 that contacts the bearing portion 15a is formed into a curved surface so as to match the shape of the bearing portion 15a. Consequently, the brake shoe 3 can

pivot relative to the adjusting bolt 5.

[0032] An adjusting external screw thread portion (an adjusting helical portion) 22 that can be screwed into the first holding internal screw thread portion 18 is disposed on an outer circumferential portion of the bolt portion 20. Spacing between the brake shoe 3 and the movable core 4 can be adjusted by adjusting the amount of thread engagement of the adjusting external screw thread portion 22 in the first holding internal screw thread portion 18. The stroke Δg of the movable core 4 is determined by the spacing between the brake shoe 3 and the movable core 4.

[0033] The locknut 6 is inserted into the nut insertion recess aperture 16. The bolt portion 20 is passed through the locknut 6. In addition, the locknut 6 is constituted by a nut member on which are disposed: a fixing internal screw thread portion 23 that can be screwed together with the adjusting external screw thread portion 22; a fixing external screw thread portion 24 that can be screwed together with the second holding internal screw thread portion 19; and an engaging portion 25 with which a tool for turning the locknut 6 (a spanner, etc., for example) can engage.

[0034] The fixing internal screw thread portion 23 and the fixing external screw thread portion 24 are disposed coaxially. Directions of the helices of the respective ridges of the fixing internal screw thread portion 23 and the fixing external screw thread portion 24 are in reverse directions to each other. A diameter of the fixing internal screw thread portion 23 is identical to a diameter of the first holding internal screw thread portion 18. A pitch of a ridge of the fixing internal screw thread portion 23 is identical to a pitch of a ridge of the first holding internal screw thread portion 18. A diameter of the fixing external screw thread portion 24 is larger than a diameter of the fixing internal screw thread portion 23.

[0035] The adjusting bolt 5 is restrained by the movable core 4 by being fastened in the direction in which the locknut 6 is inserted into the nut insertion recess aperture 16 at an engaging portion between the fixing external screw thread portion 24 and the second holding internal screw thread portion 19.

[0036] Figure 3 is an enlarged cross section that shows a state in which the locknut 6 from Figure 2 is loose. In the figure, when the locknut 6 is loose, the movable core 4 is pushed toward the brake shoe (to the right in Figure 3) by the force from the forcing spring 7. Consequently, a ridge of the first holding internal screw thread portion 18 is pushed toward the brake shoe 3 against a ridge of the adjusting external screw thread portion 22. In this state, the adjusting external screw thread portion 22 can be turned around relative to the first holding internal screw thread portion 18 by a predetermined actuating force.

[0037] Figure 4 is an enlarged cross section that shows a state in which the locknut 6 from Figure 3 is fastened. In the figure, when the locknut 6 is turned, respective ridges of the fixing internal screw thread portion 23 and the fixing external screw thread portion 24 are moved in opposite directions to each other. Consequently, by turning the locknut 6 in a predetermined fastening direction, the ridge of the fixing external screw thread portion 24 is moved out of the nut insertion recess aperture 16 (direction A in Figure 4), and the ridge of the fixing internal screw thread portion 23 is moved into the bolt insertion aperture 17 (direction B in Figure 4).

[0038] Consequently, when the locknut 6 is turned in the predetermined fastening direction, the movable core 4 is pushed toward the brake shoe 3 (to the right in Figure 4), and the adjusting bolt 5 is pushed in a direction in which the brake shoe 3 approaches the movable core 4 (to the left in Figure 4). Thus, the force with which the ridge of the first holding internal screw thread portion 18 is pressed against the ridge of the adjusting external screw thread portion 22 increases, and the adjusting external screw thread portion 22 is held so as not to turn relative to the first holding internal screw thread portion 18. In other words, by the locknut 6 being turned in the predetermined fastening direction, the adjusting external screw thread portion 22 is pressed against the first holding internal screw thread portion 18 in a direction in which the brake shoe 3 and the movable core 4 approach each other, and the position of the adjusting external screw thread portion 22 is fixed relative to the first holding internal screw thread portion 18.

[0039] Next, a procedure for mounting the adjusting bolt 5 and the locknut 6 to the movable core 4 will be explained. First, the locknut 6 is inserted into the nut insertion recess aperture 16 while screwing the fixing external screw thread portion 24 together with the second holding internal screw thread portion 19.

[0040] The adjusting external screw thread portion 22 is subsequently screwed together sequentially with the fixing internal screw thread portion 23 and the first holding internal screw thread portion 18 while turning the adjusting bolt 5, and the bolt portion 20 is passed through the locknut 6 and the bolt insertion aperture 17. Here, because the first holding internal screw thread portion 18 cannot be screwed together with the adjusting external screw thread portion 22 if the position of the fixing internal screw thread portion 23 drifts, the locknut 6 is turned a little at a time while the position of the fixing internal screw thread portion 23 is adjusted such that the respective ridges of the fixing internal screw thread portion 23 and the first holding internal screw thread portion 18 are disposed on an identical helix.

[0041] The amount of thread engagement of the adjusting external screw thread portion 22 in the first holding internal screw thread portion 18 is subsequently adjusted to temporarily position the adjusting external screw thread portion 22 relative to the first holding internal screw thread portion 18. At this point, the movable core 4 is being forced toward the brake shoe 3 by the forcing spring 7. Consequently, the ridge of the first holding internal screw thread portion 18 is being pushed toward the brake shoe 3 onto the ridge of the adjusting external screw

thread portion 22.

[0042] The locknut 6 is subsequently turned in the predetermined fastening direction using a spanner, etc., for example. The ridge of the fixing external screw thread portion 24 is thereby moved out of the nut insertion recess aperture 16 (direction A in Figure 4), and the fixing internal screw thread portion 23 is moved into the bolt insertion aperture 17 (direction B in Figure 4). Fastening force from the locknut 6 is thereby applied to the movable core 4 and the adjusting bolt 5 in a direction in which the force with which the respective ridges of the adjusting external screw thread portion 22 and the first holding internal screw thread portion 18 are pushed against each other is increased. Consequently, when the locknut 6 is fastened, the adjusting bolt 5 is held at the temporary position relative to the movable core 4 without the respective ridges of the adjusting external screw thread portion 22 and the first holding internal screw thread portion 18 separating from each other. Moreover, because the locknut 6 is moved within a range of a pitch of the respective ridges of the fixing internal screw thread portion 23 and the fixing external screw thread portion 24 at this time, the amount that the locknut 6 is turned is minute.

[0043] In an elevator hoisting machine braking apparatus of this kind, because an adjusting external screw thread portion 22 is pressed against a first holding internal screw thread portion 18 in a direction in which a brake shoe 3 and a movable core 4 approach each other by a fastening force from a locknut 6, the locknut 6 can be fastened without moving the temporary position of an adjusting bolt 5 relative to the movable core 4 when the adjusting bolt 5 is fixed to the movable core 4. Consequently, adjustment of a stroke Δg of the movable core 4 can be made more accurately. Because it is no longer necessary to use a measuring instrument such as a dial gauge, etc., during adjustment work on the stroke Δg of the movable core 4, adjustment work on the stroke Δg can be facilitated. Consequently, reductions in work time for adjustment of the stroke Δg can be achieved. In addition, because it is no longer necessary to dispose the locknut 6 between the brake shoe 3 and the brake drum 2, size reductions in the elevator hoisting machine braking apparatus can be achieved.

[0044] Because a second holding internal screw thread portion 19 and an adjusting external screw thread portion 22 are disposed on a movable core 4 and an adjusting bolt 5, respectively, and a fixing internal screw thread portion 23 that can be screwed together with the adjusting external screw thread portion 22 and a fixing external screw thread portion 24 that can be screwed together with the second holding internal screw thread portion 19 are disposed on a locknut 6, and directions of the helices of the respective ridges of the fixing internal screw thread portion 23 and the fixing external screw thread portion 24 are in reverse directions to each other, the configuration for fixing the adjusting bolt 5 to the movable core 4 can be simplified.

[0045] Moreover, in the above example, the first holding internal screw thread portion 18 and the second holding internal screw thread portion 19 are disposed on a common movable core 4, but the movable core 4 may also be configured such that the first and second holding internal screw thread portions 18 and 19 are disposed on separate core members, and the core member on which the second holding internal screw thread portion 19 is disposed is fixed to the core member on which disposed the first holding internal screw thread portion 18 is disposed.

[0046] In the above example, a locknut 6 that screws together with both a movable core 4 and an adjusting bolt 5 is used as a fixing means, but is not limited to this, provided that the adjusting bolt 5 is pressed against the movable core 4 in a direction in which a brake shoe 3 and the movable core 4 approach each other. For example, a projecting portion may also be disposed on a side surface of the adjusting bolt 5, and a leaf spring that presses the projecting portion toward the movable core 4 used a fixing means.

[0047] In the above example, an adjusting bolt 5 is inserted into a bolt insertion aperture 17 that is disposed on a movable core 4, but a rod-shaped bolt shank may also be disposed on the movable core 4, and an insertion aperture into which the bolt shank is inserted disposed on the adjusting bolt 5. In that case, a first holding external screw thread portion can be disposed as a holding helical portion on the bolt shank, and an adjusting internal screw thread portion that can be screwed together with the first holding external screw thread portion can be disposed in the insertion aperture as an adjusting helical portion. In this manner, the locknut 6 can also be fastened without moving the temporary position of the adjusting bolt 5 relative to the movable core 4, enabling adjustment of the stroke Δg of the movable core 4 to be made more accurately.

Embodiment 2

[0048] Figure 5 is a partial cross section that shows an elevator hoisting machine braking apparatus according to Embodiment 2 of the present invention. In the figure, a spherical seat 15 that faces a brake shoe 3 is disposed on a movable core 4. A nut insertion recess aperture 16 that faces the spherical seat 15, and a bolt insertion aperture 17 that extends from a bottom portion of the nut insertion recess aperture 16 toward an annular portion 9 (away from the movable core 4) are disposed on a lining holding member 12. The nut insertion recess aperture 16 and the bolt insertion aperture 17 are disposed coaxially in the thickness direction of the lining holding member 12.

[0049] A first holding internal screw thread portion 18 is disposed on an inner circumferential portion of the bolt insertion aperture 17. A second holding internal screw thread portion 19 is disposed on an inner circumferential portion of the nut insertion recess aperture 16.

[0050] A leaf spring 30 that presses a head portion 21

of an adjusting bolt 5 against a bearing portion 15a of the spherical seat 15 is disposed on the movable core 4. The head portion 21 is mounted to the spherical seat 15 by being pressed against the bearing portion 15a.

[0051] An adjusting external screw thread portion 22 that can be screwed into the first holding internal screw thread portion 18 is disposed on a bolt portion 20 of the adjusting bolt 5. Spacing between the brake shoe 3 and the movable core 4 can be adjusted by adjusting the amount of thread engagement of the adjusting external screw thread portion 22 in the first holding internal screw thread portion 18. The stroke Δg of the movable core 4 is determined by the spacing between the brake shoe 3 and the movable core 4.

[0052] Disposed on a locknut 6 are: a fixing internal screw thread portion 23 that can be screwed together with the adjusting external screw thread portion 22; a fixing external screw thread portion 24 that can be screwed together with the second holding internal screw thread portion 19; and an engaging portion 25 with which a tool for turning the locknut 6 (a spanner, etc., for example) can engage.

[0053] Respective configurations of the first and second holding internal screw thread portions 18 and 19, the adjusting external screw thread portion 22, the fixing internal screw thread portion 23, and the fixing external screw thread portion 24 are similar to those of Embodiment 1. The rest of the configuration and operation are also similar to Embodiment 1.

[0054] Even if the first and second holding internal screw thread portions 18 and 19 are disposed on the lining holding member 12, and the spherical seat 15 is disposed on the movable core 4 in this manner, the locknut 6 can be fastened without moving the temporary position of an adjusting bolt 5 relative to the movable core 4 when the adjusting bolt 5 is fixed to the movable core 4, enabling similar effects to those in Embodiment 1 to be achieved.

[0055] Moreover, in the above example, the first holding internal screw thread portion 18 and the second holding internal screw thread portion 19 are disposed on a common lining holding member 12, but the lining holding member 12 may also be configured such that the first and second holding internal screw thread portions 18 and 19 are disposed on separate holding members, and the holding member on which the second holding internal screw thread portion 19 is disposed is fixed to the holding member on which disposed the first holding internal screw thread portion 18 is disposed.

[0056] In the above example, a locknut 6 that screws together with both a lining holding member 12 and an adjusting bolt 5 is used as a fixing means, but is not limited to this, provided that the adjusting bolt 5 is pressed against the lining holding member 12 in a direction in which a brake shoe 3 and a movable core 4 approach each other. For example, a projecting portion may also be disposed on a side surface of the adjusting bolt 5, and a leaf spring that presses the projecting portion toward the lining holding member 12 used a fixing means.

[0057] In the above example, an adjusting bolt 5 is inserted into a bolt insertion aperture 17 that is disposed on a lining holding member 12, but a rod-shaped bolt shank may also be disposed on the lining holding member 12, and an insertion aperture into which the bolt shank is inserted disposed on the adjusting bolt 5. In that case, a first holding external screw thread portion can be disposed as a first holding helical portion on the bolt shank, and an adjusting internal screw thread portion that can be screwed together with the first holding external screw thread portion can be disposed in the insertion aperture as an adjusting helical portion. In this manner, the locknut 6 can also be fastened without moving the temporary position of the adjusting bolt 5 relative to the lining holding member 12, enabling adjustment of the stroke Δg of the movable core 4 to be made more accurately.

[0058] In each of the above embodiments, a pitch of a ridge of a first holding internal screw thread portion 18 is greater than a pitch of a ridge of a second holding internal screw thread portion 19, but the pitches of the respective ridges of the first and second holding internal screw thread portions 18 and 19 may also be made identical, or the pitch of the ridge of the first holding internal screw thread portion 18 may also be made less than the pitch of the ridge of the second holding internal screw thread portion 19.

Claims

1. An elevator hoisting machine braking apparatus **characterized in** comprising:

a rotating body;
a brake shoe that can be displaced in such a direction as to contact with or separate from the rotating body;
a movable core that is disposed away from the brake shoe in the direction in which the brake shoe can be displaced;
a linking member on which an adjusting helical portion is disposed that can be screwed together with a holding helical portion that is disposed on either one of the brake shoe or the movable core, the linking member linking the brake shoe and the movable core to each other, and spacing between the brake shoe and the movable core being adjusted by adjusting an amount of thread engagement of the adjusting helical portion with the holding helical portion;
a fixing means that fixes a position of the adjusting helical portion relative to the holding helical portion by pressing the adjusting helical portion against the holding helical portion in a direction in which the brake shoe and the movable core approach each other;
a forcing body that forces the movable core in a

direction in which the brake shoe contacts the rotating body; and
an electromagnet that displaces the movable core in a direction in which the brake shoe separates from the rotating body in opposition to force from the forcing body.

2. An elevator hoisting machine braking apparatus according to Claim 1, **characterized in that**:

the holding helical portion is constituted by a first holding internal screw thread portion, and the adjusting helical portion is constituted by an adjusting external screw thread portion;
a second holding internal screw thread portion that has a diameter that is larger than a diameter of the first holding internal screw thread portion is disposed so as to be coaxial with the first holding internal screw thread portion on whichever member of the brake shoe and the movable core the first holding internal screw thread portion is disposed;
the fixing means is constituted by a nut member on which are disposed:

a fixing internal screw thread portion that can be screwed together with the adjusting external screw thread portion; and
a fixing external screw thread portion that can be screwed together with the second holding internal screw thread portion; and directions of helices of respective ridges of the first and second holding internal screw thread portions are in reverse directions to each other.

FIG. 1

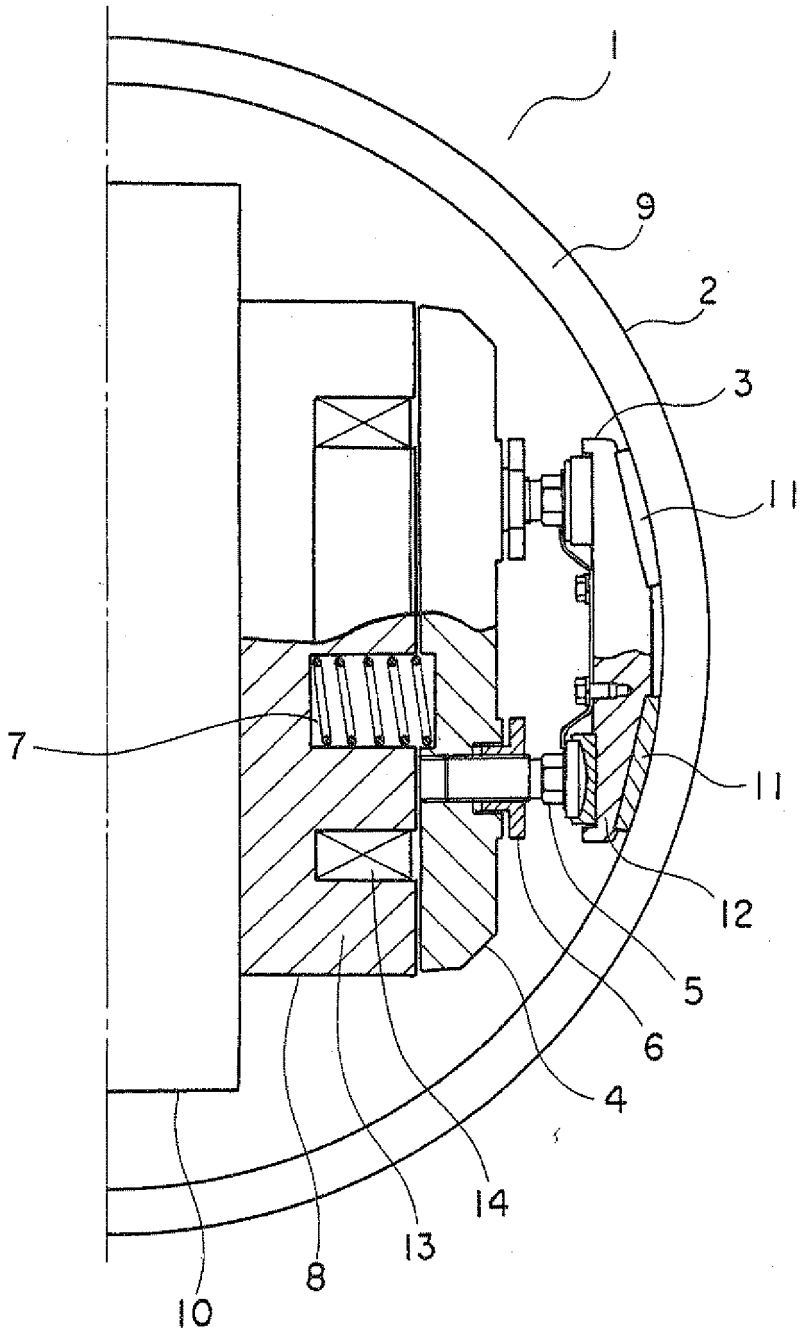

FIG. 2

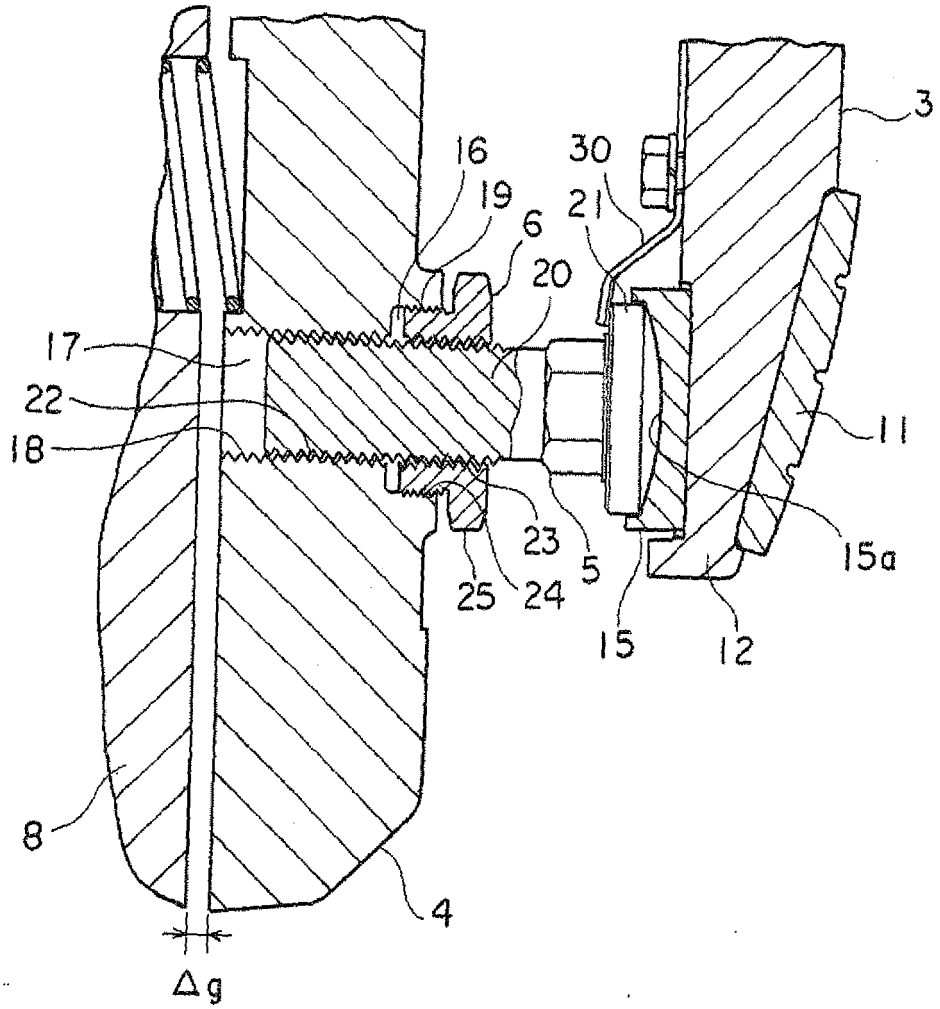

FIG. 3

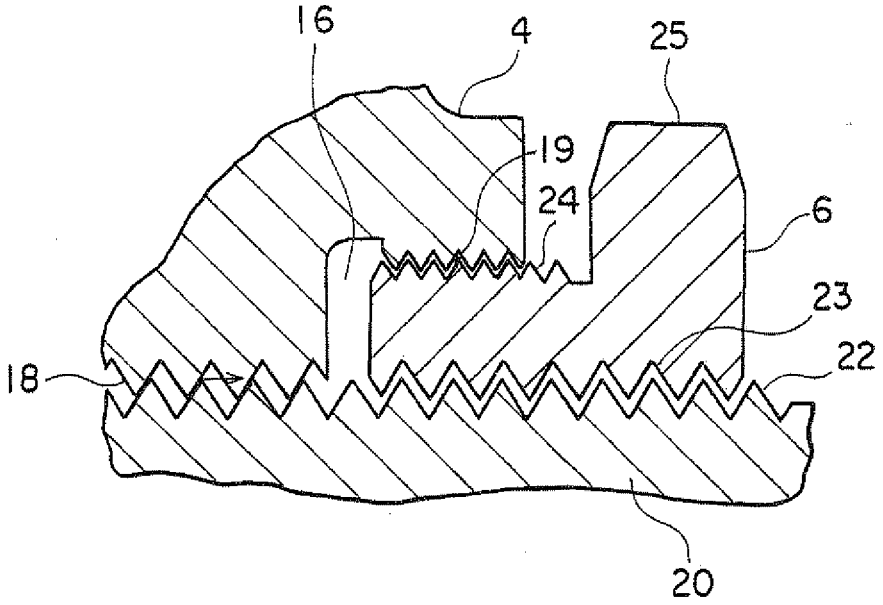

FIG. 4

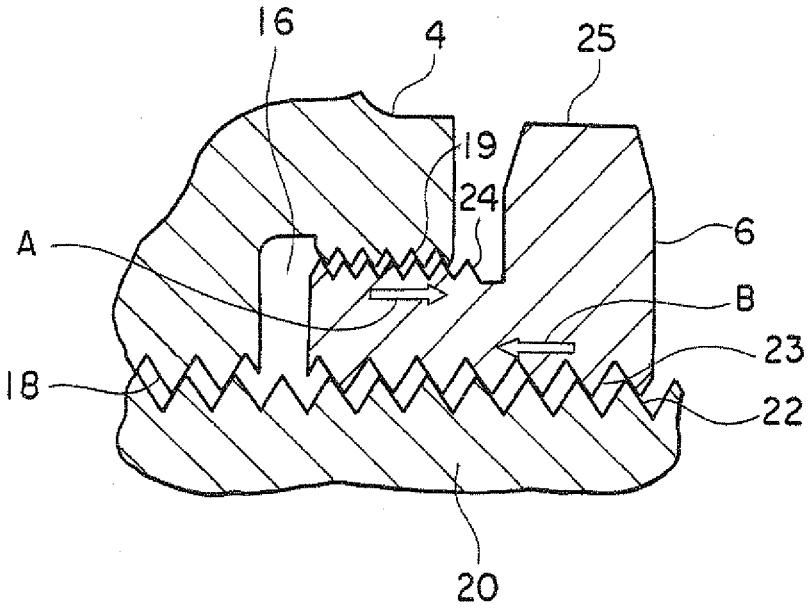

FIG. 5

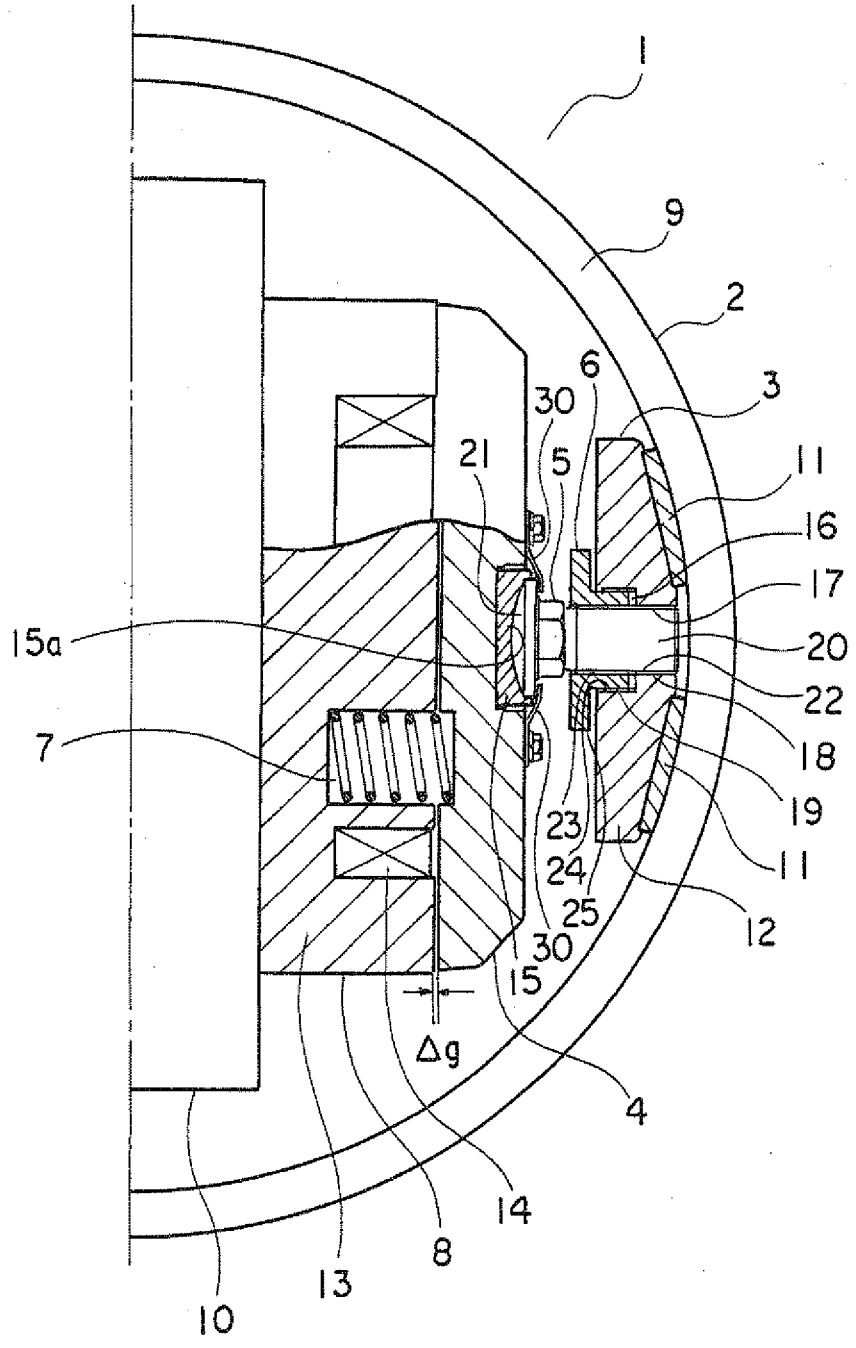
1
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FIG. 6

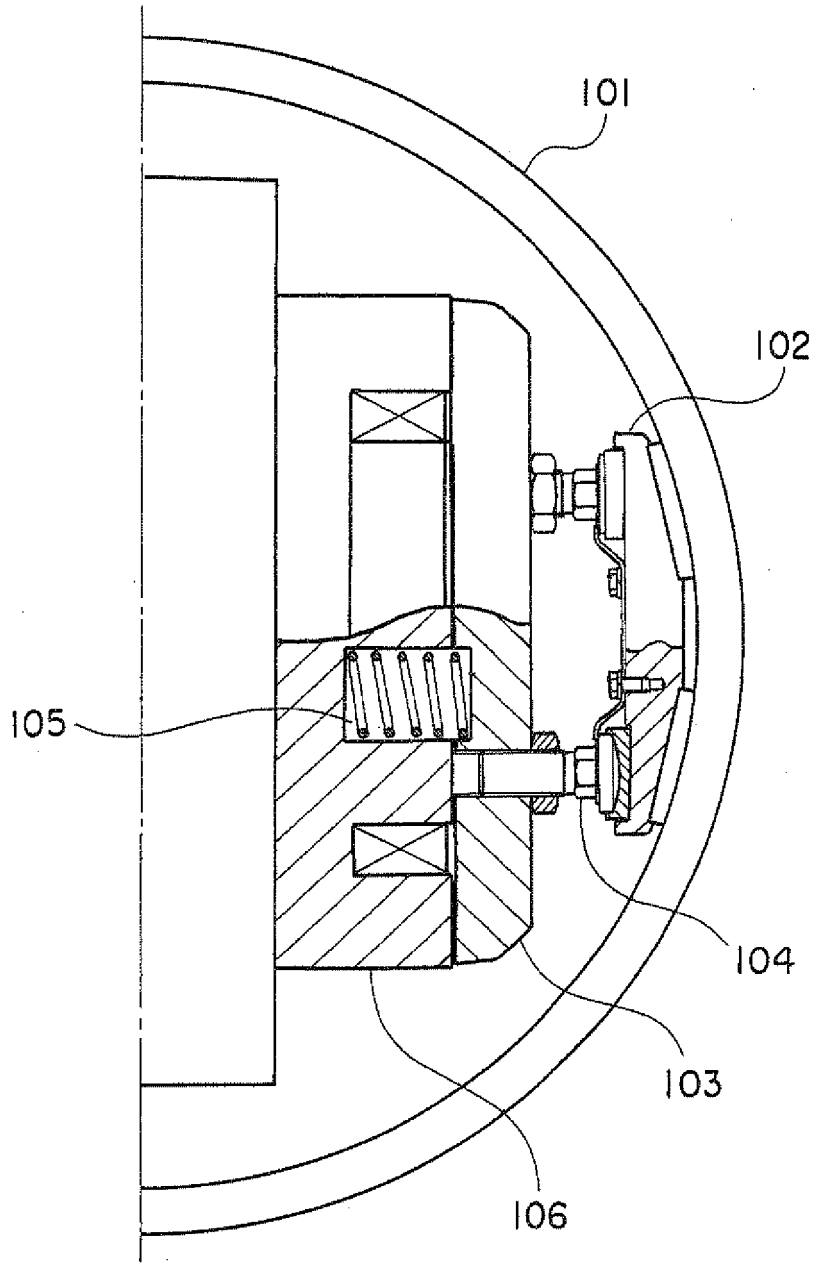


FIG. 7

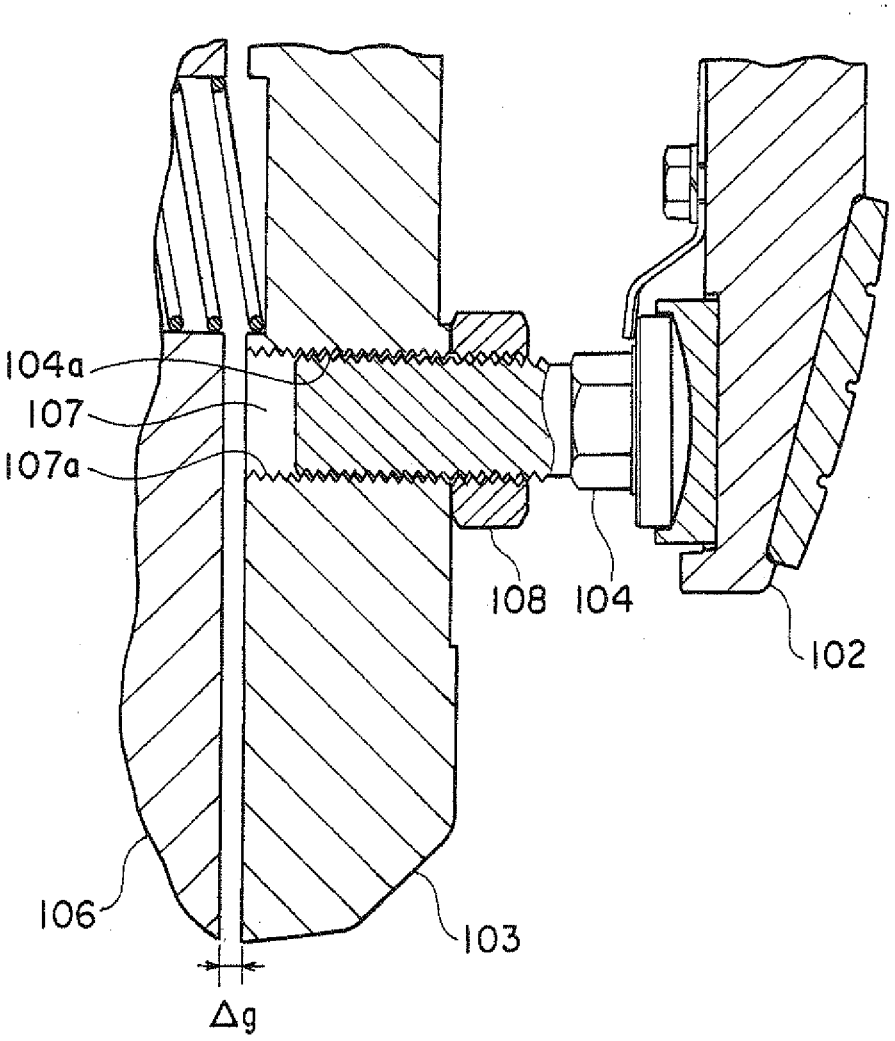


FIG. 8

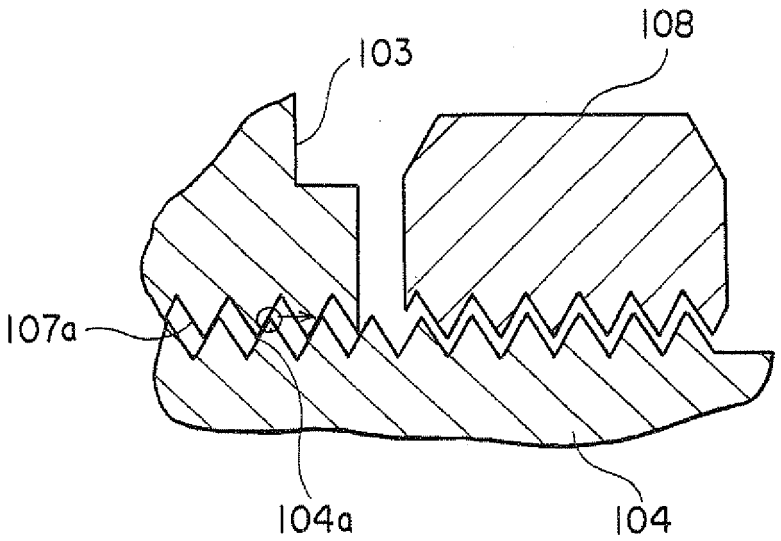
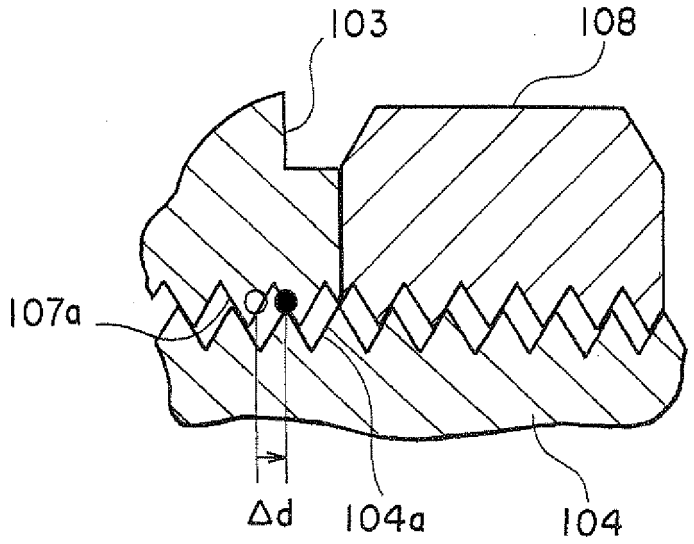


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2008/060140

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)
B66B11/08

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 1996-2009
Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009

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.
X A	WO 2004/036080 A1 (Mitsubishi Electric Corp.), 29 April, 2004 (29.04.04), Description, page 29, line 14 to page 30, line 27; Figs. 18 to 19 & EP 1553319 A1 & CN 1604998 A	1 2
A	WO 2004/024611 A1 (Mitsubishi Electric Corp.), 25 March, 2004 (25.03.04), Description, pages 2 to 5, mode 1 for carrying out the Invention; Figs. 1 to 3 & EP 1538123 A1 & CN 1561309 A	1-2

☐ 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
10 February, 2009 (10.02.09)	24 February, 2009 (24.02.09)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2002242961 A, Gazette **[0011]**