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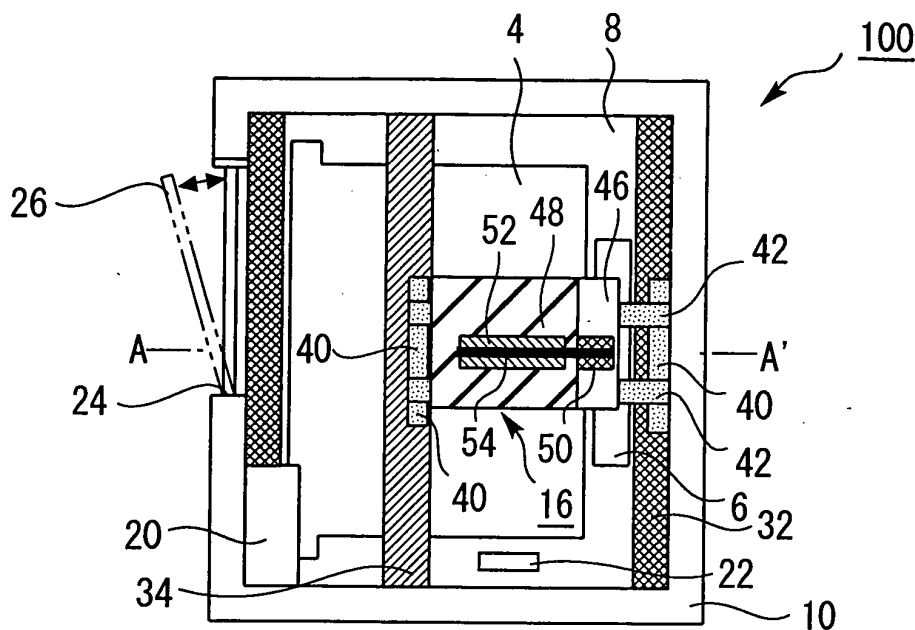
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(54) **ELEVATOR APPARATUS**

(57) An elevator system includes an hoistway (2) for moving up and down an elevator car (4), a machine room (8) provided above the hoistway, and a machine room floor portion (12) which separates the hoistway (2) from the machine room (8). Also, an entrance (24) is provided on one side of a side wall (10) of the machine room

(8), and a machine foundation (14) is arranged in the machine room floor portion (12) at a predetermined distance from the entrance (24). Further, a pair of support beams (32, 34) are provided at a lower part of the machine room floor portion (12) to support the machine foundation (14).

Fig. 1



Description

Technical Field

[0001] The present invention relates to an elevator system. More particularly, it relates to a favorable elevator system having a machine room provided above a hoistway through which an elevator car rises and lowers.

Background Art

[0002] Figure 10 is a top view for illustrating a conventional elevator system 500, including partial see-through portions. Figure 11 is a sectional view taken along the line F-F' of Figure 10.

[0003] As shown in Figures 10 and 11, in the elevator system 500, a hoistway 2 is provided, and a car 4 and a balancing weight 6 are hung therein. Also, a machine room 8 is provided above the hoistway 2.

[0004] The hoistway 2 and the machine room 8 are surrounded on all sides by side walls 10. Also, the machine room 8 is separated from the hoistway 2 by a machine room floor portion 12.

[0005] On the machine room floor portion 12 of the machine room 8 is provided a machine foundation 14, and on the machine foundation 14 is provided a traction machine 16 by which the car 4 hung in the hoistway 2 is raised and lowered therethrough. Also, in the machine room 8, a control panel 20 for controlling the rotation of the traction machine 16 and a governor 22 are provided. Further, an entrance 24 is provided on one side of the side walls 10 of the machine room 8, and a machine room door 26 is provided in the entrance 24. One can go into and out of the machine room 8 by opening the machine room door 26.

[0006] The machine foundation 14 includes two bed portions 80 arranged in parallel with each other in the direction parallel with the side wall 10 in which the entrance 24 is provided, and two supporting beams 82 arranged under both end portions of the bed portions 80 so as to be perpendicular to the bed portions 80.

[0007] As shown in Figures 10 and 11, the horizontal cross-sectional area in Figure 10 of the conventional machine room 8 is larger than that of the hoistway 2. However, in order to save a space etc., it is desirable to make the cross-sectional area of the machine room 8 equal to that of the hoistway 2, that is, to make the side walls on all sides of the hoistway 2 continuous with the side walls of the machine room 8.

[0008] However, if the machine room 8 constructed as described above has the same width as that of the hoistway 2, the machine foundation 14 is arranged near the entrance 24. In this case, it is necessary to take measures so that the entrance 24 may not be obstructed by the machine foundation by providing a sill surface of the entrance 24 at a position higher than the top surface of the machine foundation 14.

[0009] In the case where the machine foundation 14 is high, an external floor on the outside of the side wall 10 must be provided at a position higher than the surface of the machine room floor portion 12 so as to match the height of the sill surface to permit ease of entrance into and exit from the machine room 8, or a stool or the like must be used. In this case, however, since the external floor is provided aside from the machine room floor portion 12 or the stool is used, costs and time for installing the elevator system increase.

[0010] Also, even in the machine room 8 whose width is decreased to the same width as that of the hoistway 2, equipment necessary for the elevator system, such as the control panel 20 and the governor 22, and the like, is arranged in an unoccupied space. However, the space in the machine room 8 is further decreased, so that when any repair, maintenance, and the like of the equipment is needed, the worker must move by striding over protrusions of the machine foundation 14 etc. to reach the equipment to be checked. Therefore, the repair or inspection requires much time. Furthermore, if the elevator must be stopped or decreased in speed during the operation, the elevator service is degraded.

Disclosure of the Invention

[0011] The present invention has been made to solve the above problems, and accordingly an object thereof is to provide an improved elevator system in which even in a machine room responding to the downsizing of elevator system, the entrance into and exit from the machine room and the movement in the machine room can be made easy.

[0012] To achieve the above object, a elevator system in accordance with the present invention includes an hoistway for moving up and down an elevator car, a machine room provided above the hoistway, a machine room floor portion which separates the hoistway from the machine room, and an entrance provided on one side of a side wall of the machine room. Also, this elevator system includes a machine foundation arranged in the machine room floor portion at a predetermined distance from the entrance, and a pair of support beams, which are provided at a lower part of the machine room floor portion, for supporting the machine foundation.

[0013] Alternatively, a elevator system in accordance with the present invention includes an hoistway for moving up and down an elevator car hung by a rope, a machine room provided above the hoistway, a machine room floor portion which separates the hoistway from the machine room, an entrance provided on one side of a side wall of the machine room, and a machine foundation arranged in the machine room floor portion. Also, this elevator system includes a rope support portion which is arranged in the machine room floor portion at a predetermined distance from the entrance and fixes at least one end of the rope, and a pair of support beams, which are provided at a lower part of the machine room

floor portion, for supporting the rope support portion.

[0014] In this way, a flat portion of floor can be secured between the entrance and the machine foundation. Therefore, the worker etc. engaging in maintenance, repair, and the like can go into and out of the machine room easily and can move on the flat floor at the time of work, so that the work time can be shortened, by which the elevator service can be improved.

[0015] Alternatively, in the machine room of the elevator system in accordance with the present invention, the floor includes an opening at a position at which the machine foundation or the rope support portion is arranged, and the machine foundation or the rope support portion is arranged in the opening portion.

[0016] By this construction, protrusions near the entrance of the machine room can be restrained, and the flat portion can further be increased, so that the worker engaging in maintenance etc. can move in the machine room easily.

Brief Descriptions of Drawings

[0017]

Figure 1 is a top view for illustrating the elevator system in accordance with the first embodiment of the present invention, including partial see-through portions.

Figure 2 is a sectional view of the elevator system taken along the line A-A' of Figure 1.

Figure 3 is a top view for illustrating an elevator system in accordance with the second embodiment of the present invention, including partial see-through portions.

Figure 4 is a sectional view taken along the line B-B' of Figure 3.

Figure 5 is a top view for illustrating the elevator system, including partial see-through portions.

Figure 6 is a sectional view taken along the line C-C' of Figure 5.

Figure 7 is a top view for illustrating the elevator system in accordance with the fourth embodiment of the present invention, including partial see-through portions.

Figure 8 is a sectional view taken along the line D-D' of Figure 7.

[0018] Also, Figure 9 is a sectional view taken along the line E-E' of Figure 7, illustrating a rope support portion of the elevator system in accordance with the fourth embodiment of the present invention.

[0019] Figure 10 is a top view for illustrating a conventional elevator system, including partial see-through portions.

[0020] Figure 11 is a sectional view of elevator system taken along the line F-F' of Figure 10.

Best Mode for Carrying Out the Invention

[0021] Embodiments of the present invention will now be described with reference to the accompanying drawings. In the drawings, the same reference numerals are applied to the same or equivalent elements, and the explanation thereof will be simplified or omitted.

[0022] First, an elevator system 100 in accordance with a first embodiment of the present invention will be described with reference to Figures 1 and 2.

[0023] Figure 1 is a top view for illustrating the elevator system 100 in accordance with the embodiment of the present invention, including partial see-through portions. Figure 2 is a sectional view taken along the line A-A' of Figure 1.

[0024] As shown in Figures 1 and 2, the elevator system 100 includes a hoistway 2, a car 4, a balancing weight 6, and a machine room 8.

[0025] The car 4 and the balancing weight 6 are hung in the hoistway 2. Also, the machine room 8 is provided above the hoistway 2. The hoistway 2 and the machine room 8 are surrounded on all sides by side walls 10. Each side of the side walls 10 is continuous from the hoistway 2 to the machine room 8 above the hoistway 2. In other words, the horizontal cross-sectional area in Figure 1 of the machine room 8 is equal to that of the hoistway 2.

[0026] The machine room 8 is a space separated from the hoistway 2 by a machine room floor portion 12. In the machine room 8, a machine foundation 14, a traction machine 16, a control panel 20, a governor 22, and the like are provided.

[0027] Also, an entrance 24 is provided on one side of the side wall 10 of the machine room 8, and a machine room door 26 is provided in the entrance 24. The entrance 24 is open so that the height of a sill surface separating the inside of machine room from the outside thereof is equal to the height of the surface of machine room floor portion 12. By opening the machine room door 26, one can go into and out of the machine room 8 through the entrance 24.

[0028] As used herein, the side on which the entrance 24 is provided is referred to as a front side (left-hand side in Figures 1 and 2), and the opposite side as a back side (right-hand side in Figures 1 and 2). Also, the direction parallel with the front side and the back side is referred to as a width direction, and the direction perpendicular to the front side and the back side as a depth direction. A door for entrance into and exit from the car 4 opens and closes in the width direction.

[0029] The machine room floor portion 12 includes a floor 30, building beams 32 and 34, and an external floor 36. The floor 30 is provided at an upper part of the hoistway 2 so as to be substantially perpendicular to the elevating direction of the car 4. Two rope holes 38 penetrating from the machine room 8 to the hoistway 2 are provided in the floor 30.

[0030] Two building beams 32 are arranged in parallel

along the side walls 10 on the front and back sides of the side walls 10 surrounding the hoistway 2 and the machine room 8 on all sides. The building beam 34 is arranged near the central portion of the machine room 8 so as to be parallel with the building beams 32. The floor 30 is arranged on these three building beams 32 and 34, and is supported at an upper part of the hoistway 2 by the building beams 32, 34.

[0031] The external floor 36 is provided on the outside of the side wall 10 on the front side. The surfaces of the external floor 36 and the floor 30 are at the same level as the bottom of the entrance 24.

[0032] The machine foundation 14 is provided on the floor 30. The machine foundation 14 includes two supporting beams 40 and two H-shaped structural steels 42. The two supporting beams 40 are arranged in the width direction on the floor 30. One of the supporting beams 40 is arranged, via the floor 30, above the building beam 32 provided along the side wall 10 on the back side. The other of the supporting beams 40 is arranged above the building beam 34 via the floor 30. The two H-shaped structural steels 42 are arranged in parallel with each other in the direction perpendicular to the supporting beams 40. One end of each of the H-shaped structural steels 42 is supported on the supporting beam 40 above the building beam 32, and the other end thereof is supported on the supporting beam 40 above the building beam 34. That is to say, the machine foundation 14 is a bed portion having a ladder shape viewed from the top, which is formed by combining the two H-shaped structural steels 42 to be laid across the two supporting beams 40. The H-shaped structural steel 42 has a larger height than the supporting beam 40.

[0033] The traction machine 16 is mounted on the machine foundation 14. The traction machine 16 includes a traction machine base 46, a traction machine body 48, a deflector sheave 50, and a traction sheave 52. The traction machine base 46 is arranged on the machine foundation 14 to be laid across the two H-shaped structural steels 42. The traction machine body 48 is mounted on the traction machine base 46. The traction machine base 46 is fitted rotatably with the deflector sheave 50, and the traction machine body 48 is fitted rotatably with the traction sheave 52.

[0034] A rope 54 is wound on the traction machine 16. One end of the rope 54 is fixed to the car 4. The rope 54, one end of which is fixed to the car 4 in the hoistway 2, extends from the car 4 of the hoistway 2 through one of the rope holes 38 provided in the floor 30 and into the machine room 8. The rope 54 is wound on the traction sheave 52 and the deflector sheave 50 in the machine room 8, passing through the other rope hole 38, and again enters the hoistway 2. The other end of the rope 54 is fixed to the balancing weight 6. Specifically, the rope 54, which is supported by an intermediate portion thereof wound on the traction sheave 52 and the deflector sheave 50, is fixed to the car 4 at one end to hang the car 4 in the hoistway 2, and is fixed to the balancing

weight 6 at the other end to hang the balancing weight 6 in the hoistway 2.

[0035] In the elevator system 100, by the rotation of the traction sheave 52 and the deflector sheave 50 of the traction machine 16, the rope 54 is moved, by which the car 4 and the balancing weight 6 are moved up or down in a well-balanced state. The traction machine 16 is connected with the control panel 20 and the governor 22 so that the rotation thereof is controlled.

[0036] As described above, the floor 30 is supported by the building beams 32 provided along the side walls 10 on the front and side and the building beam 34 provided near the center of the machine room 8 so as to be parallel with the building beams 32. Also, one end of the machine foundation 14 is supported on the building beam 32 provided along the side wall 10 on the back side, and the other end thereof is supported on the building beam 34 arranged near the center of the machine room floor portion 12 of the machine room 8. Since the building beam 34 is arranged near the central portion of the floor of the machine room 8 in this manner, the machine foundation 14 for supporting the traction machine 16 for hanging the car 4 can be supported sufficiently in this portion. Therefore, there is no need for arranging a long machine foundation extending from the front side to the back side to be laid across the building beams 32 arranged at both ends on the front and back sides. As a result, the machine foundation 14 can be arranged at a position distant from near the entrance 24, and thus a flat space having some degree of area can be secured near the entrance 24. Thereby, the external floor 36, the bottom of the entrance 24, and the surface of the floor 30 can be made to have the same height. That is to say, a flat floor can be secured from the outside of the entrance 24 to the interior of machine room 8 and from the entrance 24 to the machine foundation 14. Therefore, the worker etc. engaging in maintenance, repair, or the like work can move on the flat floor at the time of work, so that the work time for safety inspection etc. can be shortened, by which an elevator service can be improved.

[0037] In the first embodiment, the building beam 34 is arranged near the center of the machine room 8. However, the present invention is not limited to the configuration in which the building beam 34 is arranged in this portion. The building beam 34 may be arranged in any portion if it can support the machine foundation 14 when the machine foundation 14 is arranged at a proper position for securing a flat space near the entrance 24.

[0038] Also, a shape of the traction machine 16, a method of winding the rope for hanging the car 4 and the balancing weight 6, a shape of the machine foundation 14, and the like in the present invention is not limited to those described in the first embodiment. In particular, in the first embodiment, the elevator system of a 1:1 roping system has been explained, but the present invention may be applied to the elevator system of a 2:1 roping system. Also, explanation has been given of the

case where the horizontal cross-sectional area in Figure 1 of the machine room 8 is equal to that of the hoistway 2. However, the present invention is not limited to this configuration, but can be applied to an elevator system in which the horizontal cross-sectional area of the machine room 8 is different from that of the hoistway 2.

[0039] Next, a second embodiment of the present invention will be described with reference to Figures 3 and 4.

[0040] Figure 3 is a top view for illustrating an elevator system 200 in accordance with the second embodiment of the present invention, including partial see-through portions. Figure 4 is a sectional view taken along the line B-B' of Figure 3.

[0041] The elevator system 200 in accordance with the second embodiment is similar to the elevator system 100.

[0042] However, the elevator system 200 includes a machine room floor portion 56 different from the machine room floor portion 12 of the elevator system 100 and a machine foundation 58 different from the machine foundation 14.

[0043] The machine room floor portion 56 includes a floor 30 and building beams 32 and 60. The floor 30 is the same as the floor 30 explained in the first embodiment; it is provided with two rope holes 38. The building beams 32 are the same as those of the elevator system 100, and are provided along the side walls 10 on the front and back sides. Two building beams 60 are provided in parallel with each other in the direction perpendicular to the building beams 32.

[0044] The floor 30 is arranged on the building beams 32 and 60 constructed as described above, and is supported by these building beams.

[0045] Like the elevator system 100, the external floor 36 is provided on the outside of the side wall 10 on the front side. The floor 30, the external floor 36, and the bottom of the entrance 24 are at the same level.

[0046] The machine foundation 58 is provided on the floor 30. The machine foundation 58 includes H-shaped supporting beams 62 and two H-shaped structural steels 64. The two H-shaped supporting beams 62 are provided in parallel with each other, with a predetermined distance therebetween, in the direction perpendicular to the building beams 60. Both ends of each of the H-shaped supporting beams 62 are supported on the two building beams 60 arranged in parallel with each other. The H-shaped structural steels 64 are provided in parallel with each other in the direction perpendicular to the two H-shaped supporting beams 62. Both ends of each of the H-shaped structural steels 64 are supported on the two H-shaped supporting beams 62 arranged in parallel. That is to say, the machine foundation 58 is arranged in a ladder shape viewed from the top, being formed by combining the two H-shaped structural steels 64 to be laid across the two H-shaped supporting beams 62.

[0047] On the machine foundation 58 constructed as

described above, the traction machine 16 is provided to be laid across the two H-shaped structural steels 64. Also, like the elevator system 100, the control panel 20, the governor 22, and the like are provided in the machine room 8.

[0048] As described above, in the elevator system 200, the machine foundation 58 can be supported by the building beams 60 provided under the floor 30 so as to be perpendicular to the entrance 24. Thereby, the machine foundation 58 can be arranged at a position distant from the entrance 24. Therefore, a flat portion can be secured on the floor extending from the entrance 24 to the machine foundation 14. Thereby, the bottom of the entrance 24 is provided at the same level as that of the surface of the floor 30, and the external floor 36 is made to have the same height, by which a difference in level near the entrance 24 can be eliminated. This facilitates the entrance into and exit from the machine room 8 and the movement in the machine room 8, so that work can be performed safely and quickly at the time of repair, maintenance, etc., by which the elevator service can be improved.

[0049] In the second embodiment, the machine foundation 58 includes the H-shaped supporting beams 62 and the H-shaped structural steels 64. However, the present invention is not limited to this configuration. For example, the machine foundation 14 as explained in the first embodiment may be arranged so as to be supported by the building beams 60. Also, the machine foundation 58 may be arranged so as to be supported by the building beams 32 and 34.

[0050] Other portions are the same as the portions of the first embodiment, so that the explanation thereof is omitted.

[0051] Next, an elevator system 300 in accordance with a third embodiment of the present invention will be described with reference to Figures 5 and 6.

[0052] Figure 5 is a top view for illustrating the elevator system 300, including partial see-through portions. Figure 6 is a sectional view taken along the line C-C' of Figure 5.

[0053] The elevator system 300 in accordance with the third embodiment is similar to the elevator system 100 in the first embodiment. A machine room floor portion 66 provided in the elevator system 300 includes a floor 30, building beams 32 and 34, and an external floor 36 like the machine room floor portion 12 provided in the elevator system 100.

[0054] However, differing from the machine room floor portion 12, the floor 30 of the machine room floor portion 66 has no rope hole 38, and an opening 68 is provided at a position at which the machine foundation 14 is mounted. The opening 68 is formed so as to have a size capable of embedding the machine foundation 16 as it is.

[0055] One of the two supporting beams 40 of the machine foundation 14 is directly mounted and supported on the building beam 34. The other supporting beam 40

is directly mounted and supported on the building beam 32 on the back side. The two H-shaped structural steels 42 are arranged in the direction perpendicular to the supporting beams 40, and are supported on the supporting beams 40. Thus, as shown in Figure 6, the machine foundation 14 is embedded in the opening 68 provided in the floor 30 of the machine room floor portion 66.

[0056] In the opening 68, a cover plate 70 is provided so as to be at the same level as that of the surface of the floor 30 in the state in which the machine foundation 14 is embedded. The cover plate 70 is formed with two rope holes 72, and the rope 54 is hung down in the hoistway 2 through these rope holes 72.

[0057] In this way, the machine foundation 14 can be embedded in the machine room floor portion 66 of the machine room 8. Therefore, a flat portion can further be secured between the entrance 24 and the traction machine 16. Thereby, the bottom of the entrance 24 is provided at the same level as that of the surface of the floor 30, and the external floor 36 is made to have the same height, by which a difference in level near the entrance 24 can be eliminated. This facilitates the entrance into and exit from the machine room 8 and the movement in the machine room 8, so that work can be performed safely and quickly at the time of repair, maintenance, etc., by which the elevator service can be improved.

[0058] In the third embodiment, explanation has been given of the case where the opening is provided in the machine room floor portion 12 having the building beams 32 and 34 as explained in the first embodiment, and the machine foundation 14 is embedded in the opening. However, the present invention is not limited to this configuration. For example, the configuration may be such that the opening is provided in a portion in which the machine foundation 58 of the elevator system 200 as explained in the second embodiment is mounted, and the machine foundation 58 is embedded in the opening.

[0059] Also, in the third embodiment, explanation has been given of the case where the cover plate 70 is provided in the opening 68. However, the present invention is not limited to this configuration. The cover plate need not necessarily be provided.

[0060] Other portions are the same as the portions of the first or second embodiment, so that the explanation thereof is omitted.

[0061] Next, an elevator system 400 in accordance with a fourth embodiment of the present invention will be described with reference to Figures 7 to 9.

[0062] Figure 7 is a top view for illustrating the elevator system 400, including partial see-through portions. Figure 8 is a sectional view taken along the line D-D' of Figure 7. Also, Figure 9 is a sectional view taken along the line E-E' of Figure 7, illustrating a rope support portion 74 of the elevator system 400.

[0063] The elevator system 400 in accordance with the fourth embodiment is similar to the elevator system 100 in the first embodiment. However, the elevator system 100 is an elevator system of a 1:1 roping system,

while the elevator system 400 is an elevator system of a 2:1 roping system.

[0064] In the elevator system 400, the machine foundation 14 is shifted toward the side wall 10 on the right-hand side as viewed toward the front (upper side in Figure 7), and the rope support portion 74 is provided in an empty space on the left-hand side as viewed toward the front (lower side in Figure 7).

[0065] The floor 30 is provided with an opening 76 for embedding the rope support portion 74. The rope support portion 74 is arranged so as to be directly supported by the building beams 32 and 34 in a state of being embedded in the machine room floor portion 12 through the opening 76. Also, a cover plate 78 is provided in the opening 76 so as to have the same height as the surface of the floor 30.

[0066] Specifically, the rope support portion 74 includes rope support supporting beams 80, rope support channel steel 82, and rope support plates 84 and 86. The two rope support supporting beams 80 are provided in parallel in the opening 76 in the floor 30. One of the two rope terminating support supporting beams 80 is supported by being arranged directly on the building beam 34, and the other thereof is supported by being arranged directly on the building beam 32 on the back side.

[0067] The rope support channel steel 82, which is formed of a channel steel having a "ㄣ" (of katakana) shape in cross section, has a notch in a portion in which it is supported on the rope support supporting beam 80. In this notch portion, a weld portion is provided in a portion in which the rope support channel steel 82 is in contact with the rope support supporting beam 80 to secure strength. Two rope support channel steels 82 constructed as described above are disposed at a predetermined interval in the direction perpendicular to the rope support supporting beams 80 in a state in which the open portions of the "ㄣ" (of katakana) shapes face to each other. One end of each of the rope support channel steels 82 is supported on the rope support supporting beam 80 arranged on the building beam 32 on the back side, and the other end thereof is supported on the rope support supporting beam 80 arranged on the building beam 34.

[0068] The rope support plates 84 and 86 are supported on the rope support channel steels 82. Specifically, as shown in Figures 7 to 9, the rope support plate 84 closer to the entrance 24 is arranged so as to be supported by the lower portions of the two rope support channel steels 82. Also, the rope support plate 86 closer to the side wall on the back side is arranged so as to be supported by the upper portions of the two rope support channel steels 82.

[0069] The rope support plates 84 and 86 each are provided with springs 88 and nuts 90. Each end portion of the rope 54 is fixed to the spring 88 and the nut 90. In the drawings, four springs 88 and four nuts 90 are shown for each of the rope support plates 84 and 86 because in this embodiment, the rope 54 for hanging

the car 4 and the balancing weight 6 consists of four ropes. As shown in Figures 7 to 9, the rope 54 is fixed by the spring 88 and nut 90 for each rope in the rope support portion 74.

[0070] In this state, the cover plate 78 is put in the opening portion from above the embedded rope support portion 74. The cover plate 78 is formed with an opening at a position corresponding to the rope support plate 86, so that the opening 76 is covered by the cover plate 78 in a state in which only the rope support plate 86 and the springs 88 and nuts 90 provided on the rope support plate 86 are exposedly located on the surface. Therefore, the portion in which the rope support portion 74 is arranged is also in a flat state having the same height as that of the floor 30. Also, the external floor 36, the floor 30, the cover plate 78, and the bottom of the entrance 24 are at almost the same level.

[0071] As described above, in the machine room 8 of the elevator system 400, the opening 76 is formed in the floor 30, the rope support portion 74 is embedded under the floor 30 through the opening 76, and further the cover plate 78 is put from the upside. Therefore, a flat portion can be secured in a portion ranging from the entrance 24 to the machine foundation 14 and in a portion in which the rope support plate 84 is provided. Thereupon, in the elevator system of a 2:1 roping system, the protrusions near the traction machine 16, the control panel 20, and the governor 22 can be restrained, and a larger area of the flat floor 30 can be secured. Therefore, the worker can move easily at the time of work for safety inspection, repair, or the like, and thus the time for elevator inspection can be shortened, by which the elevator service can be improved.

[0072] In the fourth embodiment, explanation has been given of the case where the machine foundation 14 etc. that are the same as those in the elevator system 100 are arranged. However, the present invention is not limited to this configuration. For example, the machine foundation 58 in the elevator system 200 may be provided.

[0073] Furthermore, for example, the building beams may be arranged as in the case of the elevator system 200. In this case, the configuration has only to be such that the building beams and the machine foundation are shifted to a position shown in Figures 3 and 4, an opening is provided in an empty portion near the entrance 24 of the floor 30 so that a part of at least two building beams is exposed, and the rope support portion 74 is provided so as to be supported by the two exposed building beams. Also, the configuration may be such that, for example, three building beams are provided at predetermined intervals in the direction perpendicular to the building beams 32 provided along the side walls 10 on the front and back sides, that is, one additional building beam is provided in parallel with the two building beams 60 shown in Figures 3 and 4, and the rope support portion 74 is provided by being supported by one of the building beams 60 and the newly provided build-

ing beam.

[0074] In the fourth embodiment, explanation has been given of the case where the machine foundation 14 projects above the floor 30. However, the present invention is not limited to this configuration. For example, as explained in the third embodiment, the machine foundation 14 may be embedded in the machine room floor portion 12.

[0075] In the fourth embodiment, explanation has been given of the case where only the rope support plate 84 is embedded under the floor 30 and the rope support plate 86 projects above the surface of the floor 30. This is because in a portion near the side wall 10 on the back side, any protrusion hinders work relatively less. However, the present invention is not limited to this configuration. Both of the two rope support plates 84 and 86 may be embedded under the floor 30.

[0076] In the fourth embodiment, explanation has been given of the case where the rope 54 consists actually of four ropes, and the rope support plates 84 and 86 each are provided with four springs 88 and four nuts 90. However, the present invention is not limited to this configuration. A necessary number of springs and nuts 90 may be provided according to the configuration of the rope. Also, the present invention is not limited to a configuration in which ends of rope are fixed by a spring and a nut. Any other fixing method that can fix the rope end surely can be used.

[0077] In the fourth embodiment, explanation has been given of the case where the cover plate 78 is provided. This is because the provision of the flat cover plate 78 makes worker's movement etc. easy. However, the present invention is not necessarily limited to the case where the cover plate 78 is provided.

[0078] Other portions are the same as the portions of the first to third embodiment, so that the explanation thereof is omitted.

[0079] A pair of beams in the present invention correspond, for example, to the building beam 32 on the back side in the first to fourth embodiments, the building beam 34 in the first, third and fourth embodiments, or the building beam 60 in the second embodiment. Also, in the present invention, a machine foundation opening corresponds, for example, to the opening 68 in the third embodiment, and a rope support portion opening corresponds, for example, to the opening 76 in the fourth embodiment.

Industrial Applicability

[0080] As described above, according to the present invention, since the machine foundation and rope support portion can be supported by a pair of support beams, they can be arranged at a predetermined distance from the entrance. Therefore, a flat portion of floor can be secured between the entrance and the machine foundation or the rope support portion. As a result, the worker etc. engaging in maintenance, repair, and the

like can go into and out of the machine room easily and can move on the flat floor at the time of work, so that the work time can be shortened, by which the elevator service can be improved.

[0081] Also, according to the present invention, in the elevator system in which the machine foundation or the rope support portion is arranged in the opening portion provided in the machine room floor portion, protrusions in the machine room can be restrained, and a larger area of flat portion can be secured. Therefore, the worker engaging in maintenance etc. can move in the machine room easily, so that the work efficiency can be improved.

Claims

1. An elevator system **characterized in that** it comprises:

an hoistway for moving up and down an elevator car;
a machine room provided above said hoistway;
a machine room floor portion which separates said hoistway from said machine room;
an entrance provided on one side of a side wall of said machine room;
a machine foundation arranged in said machine room floor portion at a predetermined distance from said entrance; and
a pair of support beams, which are provided at a lower part of said machine room floor portion, for supporting said machine foundation.

2. The elevator system according to claim 1, **characterized in that** at least one of said paired support beams is arranged in the direction substantially parallel with the side wall on the side opposed to the side on which said entrance is provided so as to have a predetermined distance from the side on which said entrance is provided.

3. The elevator system according to claim 1, **characterized in that** said paired support beams are arranged in parallel with each other at a predetermined interval in the direction substantially perpendicular to the side on which said entrance is provided.

4. The elevator system according to any one of claims 1 to 3, **characterized in that** said machine room floor portion includes a machine foundation opening at a position at which said machine foundation is arranged, and
said machine foundation is arranged in said machine foundation opening portion.

5. The elevator system according to any one of claims 1 to 4,

characterized in that,

said machine room further includes a rope support portion for fixing at least one end of a rope used for moving up and down said elevator car, and

said rope support portion is supported on said paired support beams and is arranged at a predetermined distance from said entrance.

6. An elevator system **characterized in that** it comprises:

an hoistway for moving up and down an elevator car hung by a rope;
a machine room provided above said hoistway;
a machine room floor portion which separates said hoistway from said machine room;
an entrance provided on one side of a side wall of said machine room;
a machine foundation arranged in said machine room floor portion;
a rope support portion which is arranged in said machine room floor portion at a predetermined distance from said entrance and fixes at least one end of said rope; and
a pair of support beams, which are provided at a lower part of said machine room floor portion, for supporting said rope support portion.

7. The elevator system according to claim 1, **characterized in that** at least one of said paired support beams is arranged in the direction substantially parallel with the side wall on the side opposed to the side on which said entrance is provided so as to have a predetermined distance from the side on which said entrance is provided.

8. The elevator system according to any one of claims 5 to 7, **characterized in that** said machine room floor portion includes a rope support portion opening at a position at which said rope support portion is arranged, and

said rope support portion is arranged in said rope support portion opening portion.

9. The elevator system according to claim 8, **characterized in that** a cover plate for closing said rope support portion opening is provided in said machine room floor portion, and

said cover plate is arranged above said rope support portion in said opening so as to have the same height as that of said floor.

Fig. 1

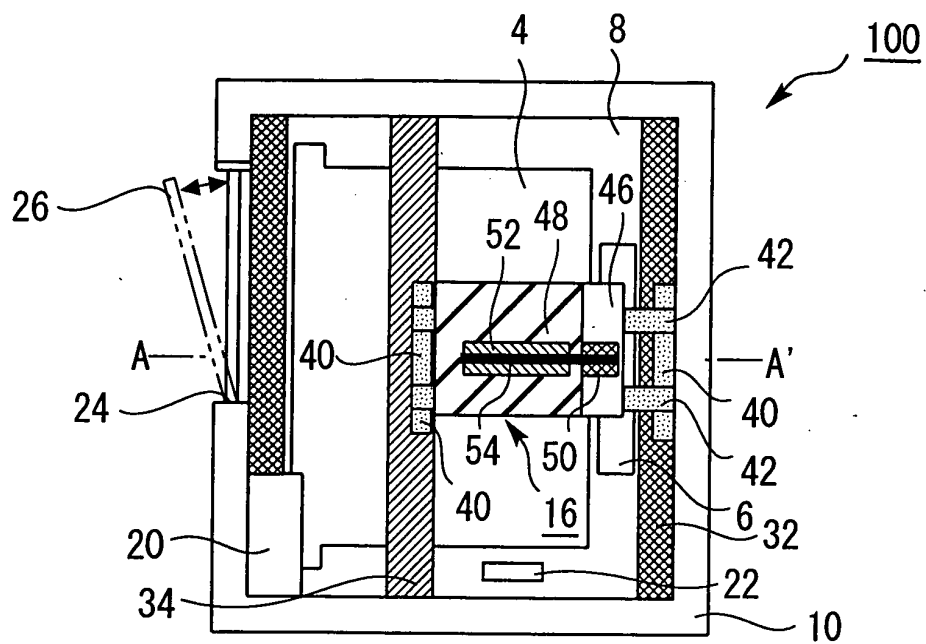


Fig. 2

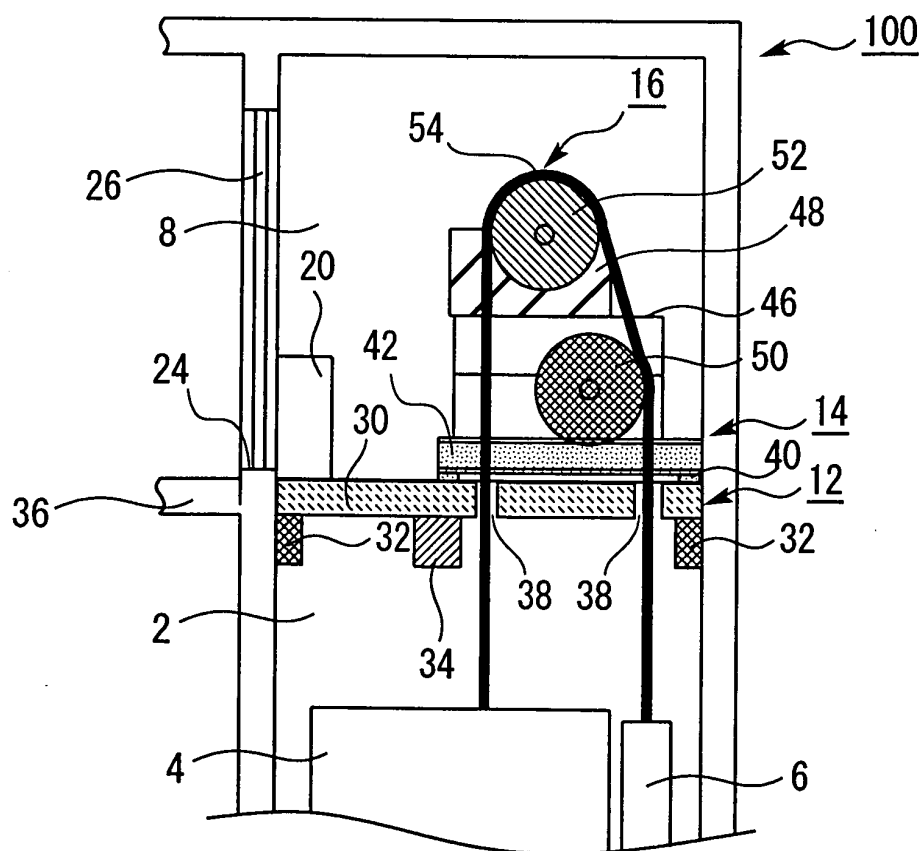


Fig. 3

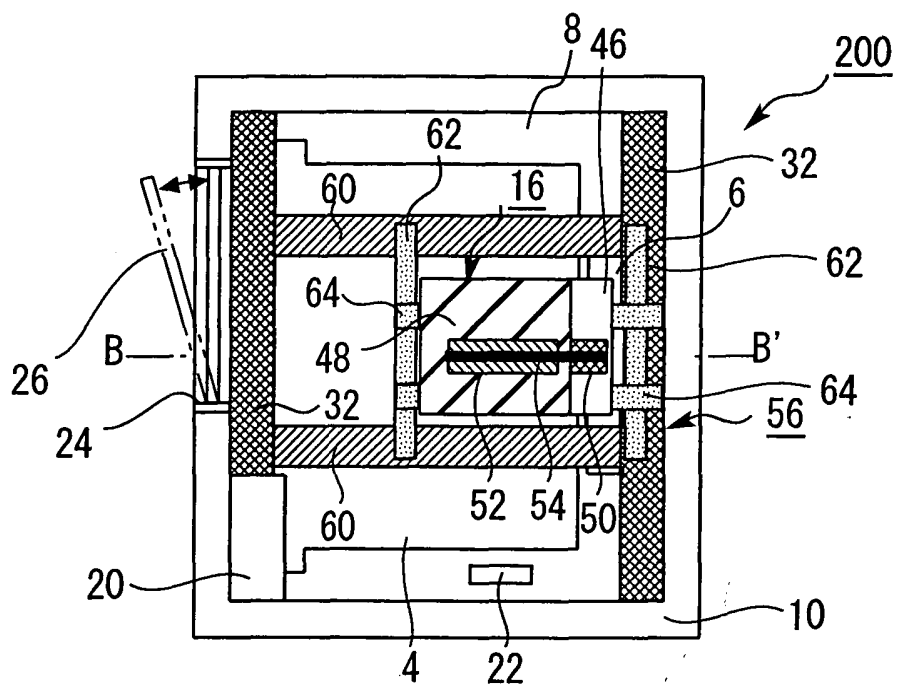


Fig. 4

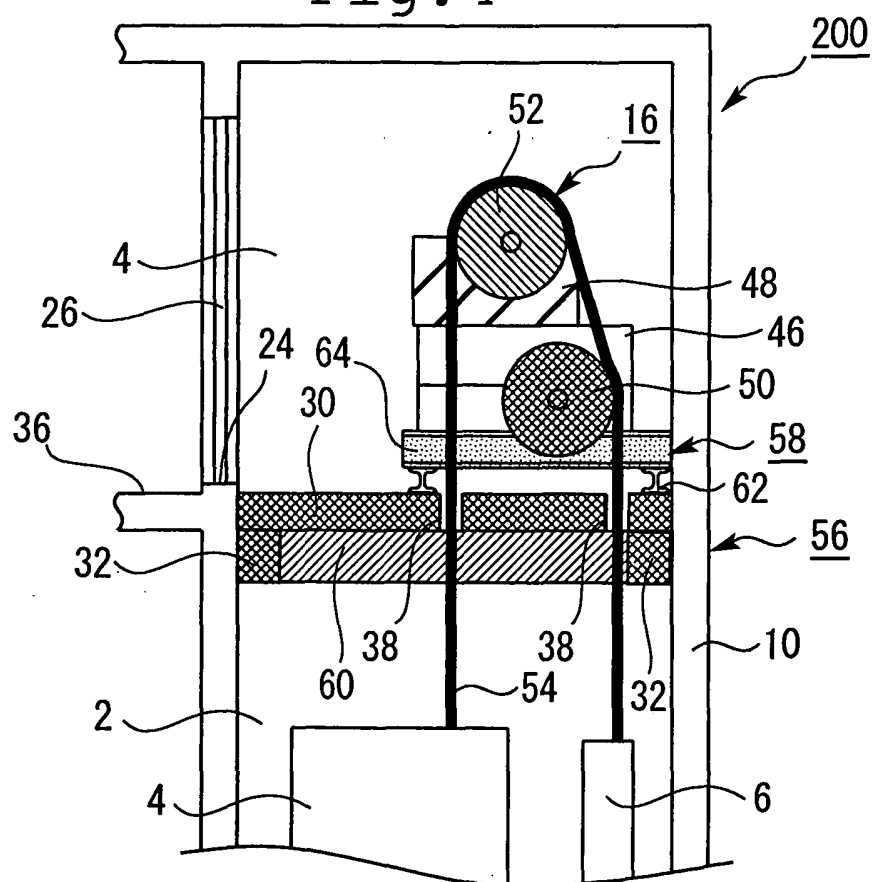


Fig. 5

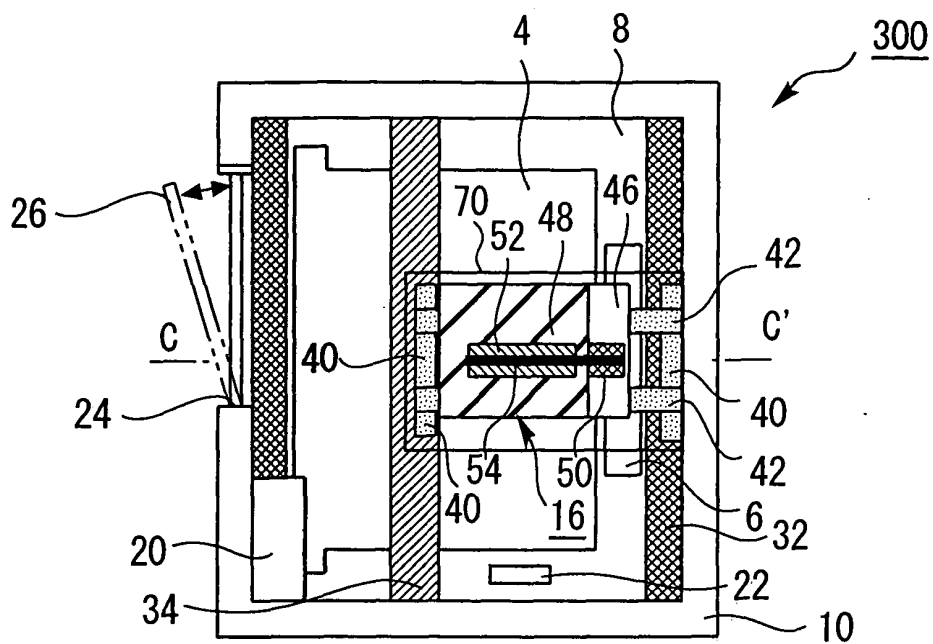


Fig. 6

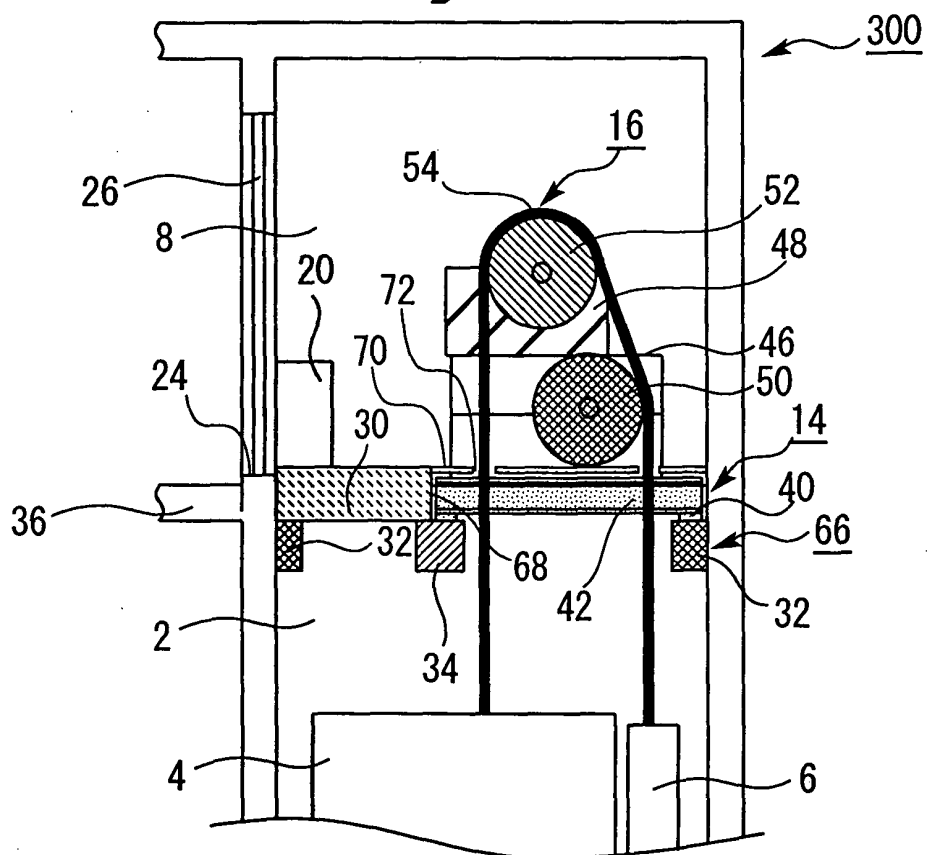


Fig. 7

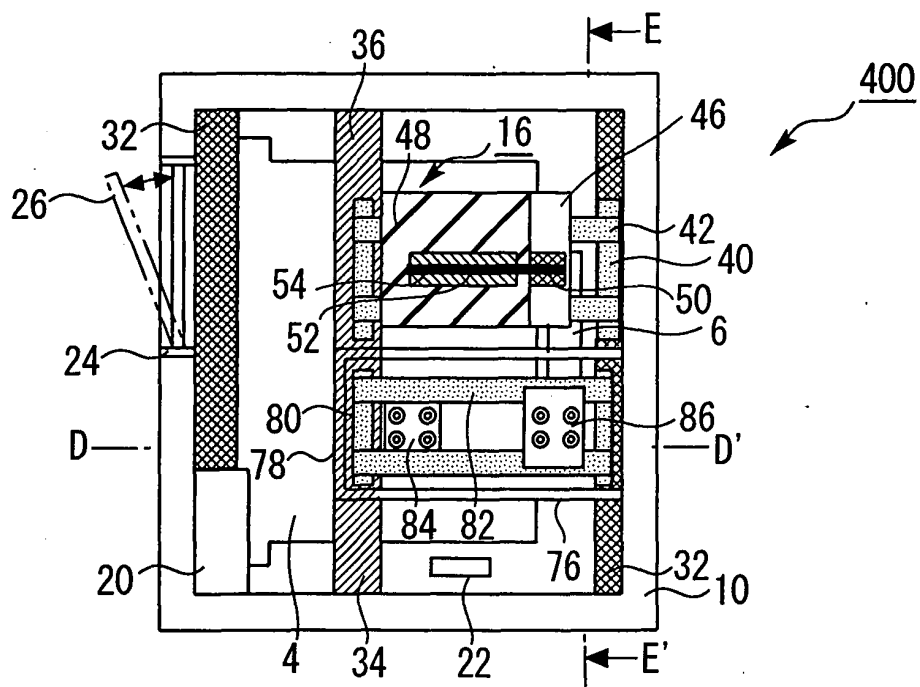


Fig. 8

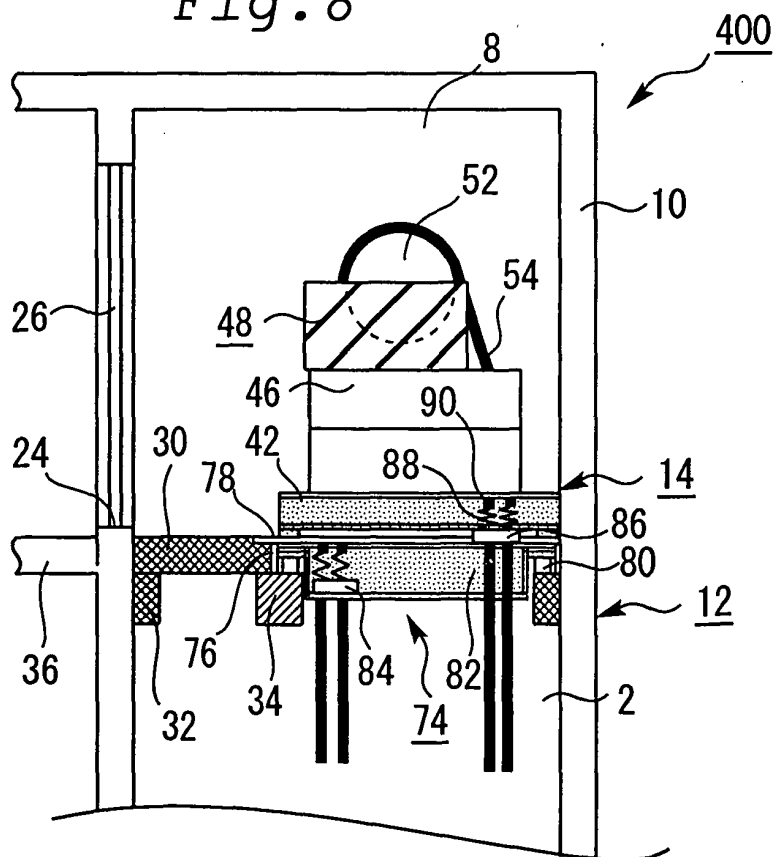
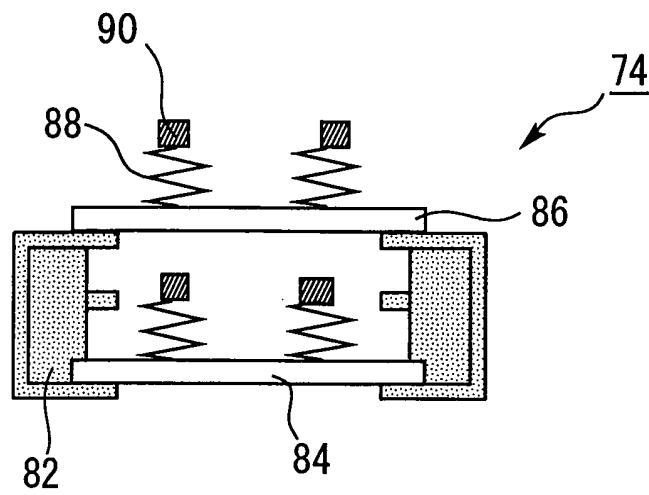


Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/13001

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl ⁷ B66B11/04		
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 B66B11/04		
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 1996-2003 Kokai Jitsuyo Shinan Koho 1971-2003 Toroku Jitsuyo Shinan Koho 1994-2003		
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	JP 9-20478 A (Mitsubishi Electric Corp.), 21 January, 1997 (21.01.97), (Family: none)	1-9
A	JP 8-67468 A (Taisei Corp.), 12 March, 1996 (12.03.96), (Family: none)	1
A	JP 2001-48441 A (Hitachi Building Systems Co., Ltd.), 20 February, 2001 (20.02.01), (Family: none)	2, 7
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
Date of the actual completion of the international search 11 September, 2003 (11.09.03)		Date of mailing of the international search report 07 October, 2003 (07.10.03)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)