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(54) **ELEVATOR DEVICE**

AUFZUGSEINRICHTUNG

DISPOSITIF ASCENSEUR

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Description

TECHNICAL FIELD

[0001] This invention relates to a vibration damping apparatus for damping vibration/shaking of a passenger car of an elevator system, and more particularly the invention is concerned with an elevator system equipped with the vibration damping apparatus mounted on the passenger car.

BACKGROUND TECHNIQUES

[0002] Figure 7 is a sectional view showing an elevator shaft structure of a conventional elevator system known heretofore such as disclosed, for example, in Japanese Patent Application Laid-Open Publications No. 18577/1991 (JP-A-03 018 577). Figure 8 is a view showing an outer appearance of a passenger car of a conventional elevator system. Referring to the figures, a passenger car 1 and a counterweight 2 are movable within an elevator shaft not shown, being guided by upstanding guide rails 5 disposed vertically through the medium of respective guide shoes 4. The car 1 is connected to ropes 3 at one ends thereof, while the counterweight 2 is connected to the other ends of the ropes 3. The ropes 3 are wound around a drive sheave 6 mounted internally of a machine room which is installed at a top portion of the elevator shaft although it is omitted from illustration.

[0003] Upon operation of the elevator system, the drive sheave 6 is rotated and the passenger car 1 is moved up and down in accompanying the rotation of the drive sheave. In conjunction with the operation of the elevator system such as mentioned above, there are widely known a traction system in which a driving force is transmitted under the action of friction acting between the drive sheave 6 and the ropes 3, as shown in Fig. 7, and a winding drum system in which the ropes 3 suspending the passenger car 1 is simply wound around a drum, although not shown. The present invention can effectively be applied to both the systems.

[0004] Referring to Fig. 8, passengers can get on and off the car by opening and closing a car door 8 suspended by a door opening/closing unit 7 which is installed at a top portion of the passenger car 1.

[0005] With the elevator system of the structure such as described above, magnitude of vibration or shaking of the passenger car brought about by the change of load imposed on the car 1 is determined by variation of elongation of the ropes 3 when the span thereof between the passenger car 1 and the drive sheave 6 is long either in the traction type system or the winding drum type system. Accordingly, in the elevator system installed in a skyscraper in which a rope of great length is employed or in the elevator system in which a reduced number of thin ropes are employed for the purpose of miniaturization and space-saving, the vibration or shaking of the passenger car 1 brought about by the change or variation of

the load imposed on the car 1 becomes more remarkable.

[0006] Further, in future elevator systems in which a synthetic fiber rope, a high-strength wire rope or the like is expected to be employed, the relative elastic modulus will become lower when compared with that of the rope actually employed at present. Accordingly, it is expected that the passenger car 1 will become more likely to shake or vibrate.

[0007] Such being the circumstances, in the elevator system disclosed in Japanese Patent Application Laid-Open Publications No. 18577/1991 cited previously, the vibration damping apparatus provided for the passenger car 1 includes a mechanism for pressing or pushing the guide rails 5 from the passenger car 1 to thereby suppress displacement of the passenger car 1 while suppressing vibration or shaking thereof.

[0008] However, realization of the proposed mechanism encounters a great difficulty because of shortage of the space available for installation or because of excessive increase of the weight of the passenger car 1, rendering it difficult or impossible to install the vibration damping apparatus on the passenger car 1 in practical applications.

[0009] Further, as other method of suppressing or damping the displacement and vibration or shaking of the passenger car 1, there may be conceived the measures such as increasing the number of the ropes 3 or diameter thereof, which will however be accompanied with remarkable increase in the cost for structurization of the elevator system, giving rise to a problem.

[0010] The present invention has been made with a view to solve the problem described above and contemplates as an object thereof to provide an elevator system capable of solving the above problem satisfactorily with a structure which can be realized inexpensively in light weight without requiring a large space while allowing the elevator system to be realized with significant reduction of the cost.

DISCLOSURE OF THE INVENTION

[0011] The elevator system which the present invention concerns includes an elevator shaft having elevator halls and guide rails, a passenger car disposed within the elevator shaft so as to be reciprocally moved up and down by means of a hoisting machine through the medium of ropes, being guided by the guide rails, and a vibration damping apparatus operatively coupled to a door opening/closing unit of the passenger car and so arranged as to operate in accompanying opening/closing operation of a car door to press a vibration damping member to the elevator shaft to thereby suppress shaking of the passenger car.

[0012] The vibration damping apparatus is composed of a link mechanism disposed between a car door and the guide rail and designed for pressing against the guide rail a frictionally slidable member provided on the vibration damping member to thereby suppress shaking of the

passenger car.

[0013] Alternatively, the vibration damping apparatus may be composed of engaging members disposed between the car door and a hall door to serve as the vibration damping members for causing the car door and the hall door to engage with each other upon opening/closing of the car door of the passenger car for transmitting a driving force of the door opening/closing unit to the hall door to thereby suppress shaking of the passenger car.

[0014] In that case, the engaging members may be composed of a car door engaging member provided on the car door and a hall door engaging member provided on the hall door, wherein a frictionally slidable member is disposed between the engaging members.

[0015] Further, the car door engaging member may be so implemented as to have a substantially C-like cross-section and extends in the up/down direction of the passenger car while the hall door engaging member is so implemented as to have a substantially C-like cross-section and disposed to face in opposition to the car door engaging member so as to be engageable therewith, wherein the frictionally slidable member is provided on a surface of the car door engaging member or the hall door engaging member of the substantially C-like cross-section, which surface is pushed upon opening/closing of the car door.

[0016] Preferably, the frictionally slidable member should be provided on the car door engaging member.

[0017] Further, the vibration damping apparatus may be composed of a clamping unit installed on one of the passenger car and the elevator hall and designed for operating in accompanying opening/closing operation of the car door, and a clamped member installed on the other of the passenger car and the elevator hall to be clamped by the clamping unit.

[0018] In that case, the clamping unit is provided with a frictionally slidable member for increasing friction acting between the clamping unit and the clamped member.

[0019] Further, the car door and the hall door may include a plurality of rollers, respectively, for holding respective suspension rails each in a state sandwiched between the rollers in the up/down direction.

[0020] The frictionally slidable member may be formed of a polyurethane resin.

[0021] Alternatively, the frictionally slidable member may be formed of a macromolecular polyurethane resin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

Fig. 1 is a partially enlarged view showing an outer appearance of an elevator system according to a first embodiment of this invention,

Fig. 2 is a front view showing a door opening/closing unit according to a second embodiment of this invention,

Fig. 3 is a front view showing a hall door unit accord-

ing to the second embodiment of this invention,

Fig. 4 is an enlarged top-side view showing engaging members for causing a car door and a hall door to engage with each other,

Fig. 5 is a front view showing a door opening/closing unit according to a third embodiment of this invention,

Fig. 6 is a front view showing a hall door unit according to the third embodiment of this invention,

Fig. 7 is a sectional view showing an elevator shaft structure of a conventional elevator system, and

Fig. 8 is a view showing an outer appearance of a passenger car of a conventional elevator system.

BEST MODES FOR CARRYING OUT THE INVENTION

Embodiment 1

[0023] Figure 1 is an outer appearance view of an elevator system according to a first embodiment of this invention and shows a portion thereof, being enlarged. Referring to Fig. 1, a cam 8a is mounted on a top portion of a car door 8 at an outer end thereof. When the car door 8 is opened, the cam 8a pushes upwardly one end portion of a lever 9a constituting a part of a link mechanism 9. The lever 9a is rotatably supported on a bracket 9c. When the one end portion of the lever 9a is pushed upwardly, a vibration damping member 9e is pressed against a guide rail 5. A frictionally slidable member capable of producing friction increasingly is fixedly secured onto a surface of the vibration damping member 9e which oppositely faces the guide rail 5 although illustration of the frictionally slidable member is omitted.

[0024] In the state where the car door 8 is closed, the lever 9a is pulled down by a pull spring 9b to be retained at a standby position by means of a stopper 9d. In this standby state, a gap makes appearance between the guide rail 5 and the vibration damping member 9e, and thus no vibration damping action is effective in this state.

[0025] In the case of the conventional vibration damping apparatus disclosed, for example, in Japanese Patent Application Laid-Open Publications No. 18577/1991, an especial dedicated pressing device or unit is installed on the passenger car for the purpose of damping the vibration. However, with such scheme, not only a large space is required for the installation but also the weight of the passenger car increases although the aimed vibration damping action can be achieved. Besides, the cost therefor is remarkably high.

[0026] By contrast, the vibration damping apparatus according to the instant embodiment of the invention is operatively combined with a door opening/closing unit of the passenger car and so arranged as to operate in accompanying the opening/closing operation of the car door 8 to press the vibration damping members 9e against the guide rail serving as a lift path member for thereby suppressing the vibration or shaking of the cage.

[0027] The vibration damping apparatus includes the

link mechanism 9 arranged to press against the guide rail 5 the frictionally slidable member provided on the vibration damping member 9e disposed between the car door 8 and the guide rail 5 to thereby suppress the shaking of the passenger car.

[0028] Analyzing the force which is effective for pressing the vibration damping member 9e against the guide rail 5, it is arithmetically determined that the frictional force on the order of 10 kg or more is required for a nine-passenger car in a conventional elevator system whose up/down lift or stroke length is of 80 m.

[0029] Such being the circumstances, the vibration damping apparatus according to the instant embodiment of the invention is operatively coupled to the door opening/closing unit of the passenger car which is intrinsically provided in the elevator system and so arranged as to operate in accompanying the opening/closing operation of the car door 8 to press the vibration damping member 9e against the lift path member for thereby suppressing the shaking of the passenger car. Thus, the vibration damping apparatus does not require a large space for the installation thereof and can be implemented inexpensively in low weight. By virtue of this feature, the elevator system can be realized with significant reduction of the cost.

Embodiment 2

[0030] Figure 2 is a front view showing a door opening/closing unit of an elevator system according to a second embodiment of this invention. Figure 3 is a front view of a hall door unit. Figure 4 is an enlarged top-side view showing engaging members for causing a car door and a hall door to engage with each other.

[0031] Referring to Fig. 2, the door opening/closing unit 7 is mounted at a front top portion of a passenger car. The car door 8 suspended by a suspension member 7a is adapted to be opened and closed by means of an electric motor 7c which is operatively connected to the car door 8 through the medium of an interlink rope 7b.

[0032] At a predetermined position of the car door 8, a car door engaging member 8b serving as the vibration damping member is disposed at the position corresponding to a hall door unit 10. The car door engaging member 8b is implemented in a substantially C-like cross-section and extends in the up/down direction of the passenger car.

[0033] Referring to Fig. 3, the hall door unit 10 is mounted at a front top portion of a hall. A suspension rail 10e is so disposed as to be sandwiched between a roller 10c and a roller 10d while a hall door 10b suspended on the suspension rail 10e is adapted to be movable in the left/right direction along the suspension rail 10e.

[0034] At a predetermined position of the hall door 10b, a hall door engaging member 10a serving as the vibration damping member is disposed at the position corresponding to the door opening/closing unit 7. The hall door engaging member 10a is implemented in a substantially C-

like cross-section and extends in the up/down direction of the passenger car.

[0035] When the passenger car is positioned at a hall, the car door engaging member 8b and the hall door engaging member 10a face in opposition to each other and engage with each other, as can be seen in Fig. 4. As the car door 8 is opened/closed by the door opening/closing unit 7, the hall door 10b is also opened/closed in linkage with the movement of the car door 8.

[0036] In the case of the instant embodiment of the invention, the driving force of the electric motor 7c is intensified to an appropriate magnitude. Accordingly, the driving force of the door opening/closing unit 7, i.e., the driving force of the electric motor 7c, is transmitted to the hall door 10b defining the lift path by way of the engaging members 8b and 10a. In this manner, shaking of the passenger car can be suppressed.

[0037] According to the teaching of the invention incarnated in the instant embodiment, a frictionally slidable members 8c are provided between the car door engaging member 8b and the hall door engaging member 10a for increasing the frictional force. More specifically, the frictionally slidable member 8c is provided on a surface 8b1 of the car door engaging member 8b implemented substantially in a C-like cross-section which surface is pushed against the hall door engaging member upon opening of the car door and a surface 8b2 which is pushed upon closing of the car door. By virtue of this arrangement, the frictional force of the engaging members 8b and 10a increases, whereby the vibration of the passenger car is further damped. Besides, vibration of the passenger car can be attenuated even in the course of opening or closing the door or in the state in which the door is held fully opened.

[0038] Incidentally, the frictionally slidable members 8c may be provided in combination with either the car door engaging member 8b or the hall door engaging member 10a. However, since the car door engaging member 8b is shorter than the hall door engaging member 10a, it is preferred to provide the frictionally slidable member 8c for the car door engaging member 8b because then the frictionally slidable member 8c can be formed in a reduced size inexpensively.

[0039] Further, in the vibration damping apparatus for the elevator system according to the instant embodiment of the invention, there can be expected no more than the vibration damping effectuated by the frictional force equivalent to the door weight of the car door and the hall door in the course of operation for opening the doors. However, the pushing force in the state where the door is fully opened can be regulated with high degree of freedom by adjusting the driving force of the electric motor 7c.

[0040] Furthermore, in the vibration damping apparatus according to the instant embodiment of the invention, each of the car door and the hall door includes a plurality of rollers which are so arrayed as to sandwich the suspension rail in the vertical direction. In this conjunction, it is noted that when a gap exists in the top portion or

bottom portion of the door, vibration of the passenger car in the state where the car door engaging member 8b and the hall door engaging member 10a engage with each other will cause the doors to move within the range delimited by the gap, giving rise to jolting, vibration and noise while possibly involving damage to the life of the machinery. Accordingly, by disposing the rollers on and under the rail for guiding the door upon opening/closing thereof while sandwiching the rail between the rollers, there can be realized the structure in which the gap is blocked up. Incidentally, although such structure is adopted in which the top door rail is sandwiched between the rollers in the case of the vibration damping apparatus according to the instant embodiment of the invention, it goes without saying that essentially same action and effect can be assured by providing the rail at the bottom portion or restricting the movement of the door in the vertical direction at the door sill section.

Embodiment 3

[0041] Figure 5 is a front view showing a door opening/closing unit of the elevator system according to a third embodiment of this invention. Figure 6 is a front view of a hall door unit. Referring to Fig. 5, a car door 8 is provided with a fixed clamping member 8d and a movable clamping member 8e which cooperate to constitute a clamping device or unit. The distance between the fixed clamping member 8d and the movable clamping member 8e changes in dependence on the opening condition of the car door 8. A frictionally slidable member not shown is provided on each of the opposite surfaces of the fixed clamping member 8d and the movable clamping member 8e. So long as the passenger car is not at a predetermined position, the fixed clamping member 8d and the movable clamping member 8e are opened or separated so widely that a hall door engaging member 10f serving as member to be clamped can smoothly move between the fixed clamping member and the movable clamping member. The hall door engaging member 10f includes a row of rollers arrayed along the up/down direction of the passenger car.

[0042] At the time point, when the car door 8 is opened with the passenger car having been stopped at a predetermined position, both the clamping members 8d and 8e are still opened or separated widely at the beginning of the door opening operation. As the car door 8 is opened increasingly, the movable clamping member 8e is forced to move toward the fixed clamping member 8d by means of a cam 8f till the hall door engaging member 10f is fixedly held by the fixed clamping member and the movable clamping member, being sandwiched therebetween. In this conjunction, it should be mentioned the shape of the cam 8f is so determined that the holding force exerted by the movable clamping member 8e remains constant even when the car door 8 is completely opened. By changing the shape of the cam 8f, magnitude of the holding force as well as change rate of the holding

force as a function of the door position can be set with high degree of freedom.

[0043] The cam 8f can move in accompanying the opening/closing operation of the car door 8 owing to a link 8h by means of which a pin 7d provided on the door opening/closing unit 7 and a pin 8g provided on the car door 8 are linked to each other. Further, owing to this arrangement, the cam 8f can produce a clamping or gripping force of appropriate magnitude.

[0044] When the passenger car tends to move in the state where the hall door engaging member 10f is clamped or gripped by the movable clamping member 8e, there may take place arise slippage in the clamping or gripping portion. However, in that case, a suspension rail 8i of the car door 8 is sandwiched between the rollers 8j and 8k while the suspension rail 10e of the hall door 10b is sandwiched between the rollers 10c and 10d, whereby the car door 8 of the passenger car and the hall door 10b are prevented from moving in the up/down or vertical direction. Owing to this feature, there can be realized the vibration damping action very effectively.

[0045] At this juncture, it should be added that although the clamping unit according to the instant embodiment of the invention is installed in association with the passenger car with a view to simplifying the structure, the clamping unit may be provided on the side of the elevator hall or the elevator shaft. Further, although the hall door engaging member 10f is implemented in the form of the roller array, it goes without saying that similar action and effect can be achieved even when a flat plate is employed instead of the rollers.

[0046] In the vibration damping apparatus described above in conjunction with the first to third embodiments, it is presumed that the frictionally slidable member is formed of a polyurethane resin. Since the polyurethane resin exhibits enhanced friction characteristic and is excellent in respect to the abrasion resistance as well, sufficient vibration damping effect can be expected even when the opening force of the door opening/closing unit is small. Thus, not only miniaturization of the machinery can be realized but also use over an extended period can be ensured. Besides, because hardness of the frictionally slidable member can be selected with high degree of freedom, the action for buffering collision noise generated at the engaging portion can be regulated with high degree of freedom, whereby enhanced vibration damping effect and silentness feature can compatibly be realized.

[0047] As a version of the invention, the frictionally slidable member may be formed of a macromolecular polyurethane resin. The macromolecular polyurethane resin is capable of exhibiting stabilized vibration damping characteristic because of substantially no significant difference between the static friction characteristic and the dynamic friction characteristic. Besides, the macromolecular polyurethane resin is excellent in the abrasion resistance and thus can be used over an extended period. Although the coefficient of friction is not excessively

large, the macromolecular polyurethane resin can ensure an excellent silentness feature. Thus, it is safe to say that the macromolecular polyurethane resin is also advantageously suited for use in the vibration damping apparatus installed at a location in the vicinity of the elevator hall where many passengers come and go.

INDUSTRIAL APPLICABILITY

[0048] The present invention has proposed the elevator system includes the elevator shaft having elevator halls and guide rails, the passenger car disposed within the elevator shaft so as to be reciprocally moved up and down by means of the hoisting machine through the medium of ropes, being guided by the guide rails, and the vibration damping apparatus operatively coupled to the door opening/closing unit of the passenger car and so arranged as to operate in accompanying opening/closing operation of the car door to press the vibration damping member to the elevator shaft to thereby suppress shaking of the passenger car. With the structure described above, shaking or vibration of the passenger car brought about by the change of the load imposed on the passenger car upon getting on/off of the passenger (s) can be suppressed without requiring any especial driving source because the door opening/closing unit is made use of. Further, installation of the vibration damping apparatus does not require a large space. Besides, the weight of the passenger car can be prevented from increasing extremely. Thus, there can be realized the elevator system of a simplified and inexpensive structure favorably from the standpoint of the manufacturing cost.

[0049] The vibration damping apparatus is composed of the link mechanism disposed between the car door and the guide rail and designed for pressing against the guide rail the frictionally slidable member provided on the vibration damping member to thereby suppress shaking of the passenger car. With this arrangement, the vibration damping apparatus can be realized with a simplified structure while ensuring operation with high reliability. Additionally, because the vibration damping apparatus can be implemented in light weight, the passenger car can be protected from increasing in weight.

[0050] The vibration damping apparatus can alternatively be composed of engaging members disposed between the car door and the hall door to serve as the vibration damping members for causing the car door and the hall door to engage with each other upon opening/closing of the car door of the passenger car for transmitting the driving force of the door opening/closing unit to the hall door to thereby suppress shaking of the passenger car. With this arrangement, the structure of the vibration damping apparatus can be simplified and thus the weight of the passenger car can be prevented from increasing excessively.

[0051] The engaging members are composed of the car door engaging member provided on the car door and the hall door engaging member provided on the hall door,

wherein the frictionally slidable member is disposed between the engaging members. Thus, the vibration of the passenger car can further be suppressed while vibration of the passenger car can be attenuated even in the course of opening the door.

[0052] Further, the car door engaging member is so implemented as to have the substantially C-like cross-section and extends in the up/down direction of the passenger car while the hall door engaging member is so implemented as to have the substantially C-like cross-section and disposed to face in opposition to the car door engaging member so as to be engageable therewith, wherein the frictionally slidable member is provided on the surface of the car door engaging member or the hall door engaging member of the substantially C-like cross-section, which surface is pushed upon opening/closing of the car door. By virtue of this structure, the shaking or vibration of the passenger car can be damped not only upon opening of the door but also upon closing of the door.

[0053] Furthermore, the frictionally slidable member is provided on the car door engaging member. Thus, the frictionally slidable member can be formed in a reduced size inexpensively.

[0054] Further, the vibration damping apparatus can alternatively be composed of the clamping unit installed on one of the passenger car and the elevator hall and designed for operating in accompanying opening/closing operation of the car door, and the clamped member installed on the other of the passenger car and the elevator hall to be clamped by the clamping unit. With this structure, the vibration or shaking due to change of the load imposed on the passenger car can be prevented with high reliability.

[0055] In that case, the clamping unit is provided with the frictionally slidable member for increasing friction acting between the clamping unit and the clamped member. Thus, the vibration or shaking of the passenger car can positively be suppressed.

[0056] Further, the car door and the hall door include a plurality of rollers, respectively, for holding respective suspension rails each in the state sandwiched between the rollers in the up/down direction. Owing to this arrangement, jolting, vibration and noise can be suppressed, ensuring extended life for the machinery.

[0057] The frictionally slidable member is formed of a polyurethane resin. Since the polyurethane resin exhibits enhanced abrasion resistance and is excellent in respect to the friction characteristic as well, sufficient vibration damping effect can be expected even when the opening force of the door opening/closing unit is small. Thus, not only miniaturization of the machinery can be realized but also use over an extended period can be ensured. Besides, because hardness of the frictionally slidable member can be selected with high degree of freedom, the action for buffering collision noise generated at the engaging portion can be regulated with high degree of freedom, whereby enhanced vibration damping effect and

silence feature can compatibly be realized.

[0058] Alternatively, the frictionally slidable member can be formed of a macromolecular polyurethane resin. The macromolecular polyurethane resin is capable of exhibiting stabilized vibration damping characteristic because of substantially no significant difference between the static friction characteristic and the dynamic friction characteristic. Besides, the macromolecular polyurethane resin is excellent in the abrasion resistance and thus can be used over an extended period. Further, the macromolecular polyurethane resin can ensure an excellent silence feature. Thus, the macromolecular polyurethane resin is advantageously suited for use in the vicinity of the elevator hall where many passengers come and go.

Claims

1. An elevator system, comprising:

an elevator shaft including an elevator hall and guide rails 5;
a passenger car disposed within said elevator shaft so as to be reciprocally moved up and down by means of a hoisting machine through the medium of ropes, being guided by said guide rails; and
a vibration damping apparatus 8a, 8b, 8d, 8e, 9 to press a vibration damping member 8c, 9e to said elevator shaft to thereby suppress shaking of said passenger car, **characterized in that** said vibration damping apparatus is operatively coupled to a door opening/closing unit of said passenger car and so arranged as to operate in accompanying opening/closing operation of a car door.

2. An elevator system as set forth in claim 1, **characterized in that** said vibration damping apparatus includes a link mechanism disposed between a car door and said guide rail and designed for pressing against said guide rail a frictionally slidable member provided on said vibration damping member to thereby suppress shaking of said passenger car.

3. An elevator system as set forth in claim 1, **characterized in that** said vibration damping apparatus includes engaging members disposed between said car door and a hall door to serve as said vibration damping members for causing said car door and said hall door to engage with each other upon opening/closing of said car door of said passenger car for transmitting a driving force of said door opening/closing unit to said hall door to thereby suppress shaking of said passenger car.

4. An elevator system as set forth in claim 3,

characterized in that said engaging members are comprised of a car door engaging member provided on said car door and a hall door engaging member provided on said hall door, wherein a frictionally slidable member is disposed between said engaging members.

5. An elevator system as set forth in claim 4, **characterized in that** said car door engaging member is so implemented as to have a substantially C-like cross-section and extends in the up/down direction of said passenger car while said hall door engaging member is so implemented as to have a substantially C-like cross-section and disposed to face in opposition to said car door engaging member so as to be engageable therewith, wherein said frictionally slidable member is provided on a surface of said car door engaging member or said hall door engaging member of the substantially C-like cross-section, said surface being pushed upon opening/closing of said car door.

6. An elevator system as set forth in claim 5, **characterized in that** said frictionally slidable member is provided on said car door engaging member.

7. An elevator system as set forth in claim 1, **characterized in that** the vibration damping apparatus includes:

a clamping unit installed on one of said passenger car and said elevator hall and designed for operating in accompanying opening/closing operation of said car door; and
a clamped member installed on the other of said passenger car and said elevator hall to be clamped by said clamping unit.

8. An elevator system as set forth in claim 7, **characterized in that** said clamping unit is provided with a frictionally slidable member for increasing friction acting between said clamping unit and said clamped member.

9. An elevator system as set forth in claim 3 or 7, **characterized in that** said car door and said hall door include a plurality of rollers, respectively, for holding respective suspension rails each in a state sandwiched between said rollers in the up/down direction.

10. An elevator system as set forth in any one of claims 2, 4, 5, 6 and 8, **characterized in that** said frictionally slidable member is formed of polyurethane resin.

11. An elevator system as set forth in any one of claims 2, 4, 5, 6 and 8,

characterized in that said frictionally slidable member is formed of macromolecular polyurethane resin.

Patentansprüche

1. Aufzugsystem, umfassend:

einen Aufzugschacht mit einem Aufzugflur und Führungsschienen (5),
eine durch Führungsschienen geführte Fahrgastkabine, die innerhalb des Aufzugschachts angeordnet ist, damit sie mittels einer Hebemaschine durch Seile wechselseitig hoch und hinunter bewegt wird, und
eine Vibrationsdämpfungsvorrichtung (8a, 8b, 8d, 8e, 9), mit der ein Vibrationsdämpfungsbauteil (8c, 9e) an den Aufzugschacht gedrückt wird, um hierdurch ein Schütteln der Fahrgastkabine zu unterdrücken, **dadurch gekennzeichnet, dass** die Vibrationsdämpfungsvorrichtung betriebsmäßig mit einer Türöffnungs-/Verschleißeinheit der Fahrgastkabine gekoppelt ist und derart eingerichtet ist, dass sie gemeinschaftlich mit einem Öffnungs-/Verschleißbetrieb einer Kabinentüre arbeitet.

2. Aufzugsystem gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Vibrationsdämpfungsvorrichtung einen Verknüpfungsmechanismus aufweist, der zwischen der Kabinentüre und der Führungsschiene angeordnet ist, und ausgelegt ist, damit er ein am Vibrationsdämpfungsbauteil vorgesehenes, reibend gleitbares Bauteil gegen die Führungsschienen drückt, um hierdurch ein Schütteln der Fahrgastkabine zu unterdrücken.

3. Aufzugsystem gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Vibrationsdämpfungsvorrichtung Eingriffsbauteile aufweist, die zwischen der Kabinentür und der Flurtür angeordnet sind, damit sie als die Vibrationsdämpfungsbauteile dienen, um die Kabinentür und die Flurtür beim Öffnen/Verschließen der Kabinentür der Fahrgastkabine miteinander eingreifen zu lassen, um eine Antriebskraft der Türöffnungs-/Verschleißeinheit zur Flurtür zu übertragen, um hierdurch ein Schütteln der Fahrgastkabine zu unterdrücken.

4. Aufzugsystem gemäß Anspruch 3, **dadurch gekennzeichnet, dass** die Eingriffsbauteile ein an der Kabinentür vorgesehenes Kabinentüreingriffsbauteil und ein an der Flurtür vorgesehenes Flürtüreingriffsbauteil aufweisen, wobei ein reibend gleitbares Bauteil zwischen den Eingriffsbauteilen angeordnet ist.

5. Aufzugsystem gemäß Anspruch 4, **dadurch ge-**

kennzeichnet, dass das Kabinentüreingriffsbauteil so implementiert ist, dass es einen im Wesentlichen C-förmigen Querschnitt aufweist und sich in der Hoch-/Hinunterrichtung der Fahrzeugkabine erstreckt, während das Flürtüreingriffsbauteil so implementiert ist, dass es einen im Wesentlichen C-förmigen Querschnitt aufweist und so angeordnet ist, dass es zum Kabinentüreingriffsbauteil weist, damit es hiermit in Eingriff bringbar ist, wobei das reibend gleitbare Bauteil an einer Fläche des Kabinentüreingriffsbauteils oder des Flürtüreingriffsbauteils des im Wesentlichen C-förmigen Querschnitts vorgesehen ist, wobei die Fläche beim Öffnen/Verschließen der Kabinentür gedrückt wird.

6. Aufzugsystem gemäß Anspruch 5, **dadurch gekennzeichnet, dass** das reibend gleitbare Bauteil am Kabinentüreingriffsbauteil vorgesehen ist.

7. Aufzugsystem gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Vibrationsdämpfungsvorrichtung aufweist:

eine Klemmeinheit, die an entweder der Fahrgastkabine oder dem Aufzugflur installiert ist, und ausgelegt ist, damit sie gemeinschaftlich mit einem Öffnungs-/Verschleißbetrieb der Kabinentür arbeitet, und
ein geklemmtes Bauteil, das an dem anderen der Fahrgastkabine oder dem Aufzugflur installiert ist, damit es durch die Klemmeinheit geklemmt wird.

8. Aufzugsystem gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Klemmeinheit mit einem reibend gleitbaren Bauteil versehen ist, um eine zwischen der Klemmeinheit und dem geklemmten Bauteil wirkende Reibung zu erhöhen.

9. Aufzugsystem gemäß Anspruch 3 oder Anspruch 7, **dadurch gekennzeichnet, dass** die Kabinentür und die Flurtür entsprechend eine Vielzahl von Rollen aufweisen, damit sie entsprechende Aufhängeschienen halten, von denen sich jede in einem zwischen den Rollen in der Hoch-/Hinunterrichtung eingelegten Zustand befindet.

10. Aufzugsystem gemäß einem der Ansprüche 2, 4, 5, 6 und 8, **dadurch gekennzeichnet, dass** das reibend gleitbare Bauteil aus einem Polyurethanharz ausgebildet ist.

11. Aufzugsystem gemäß einem der Ansprüche 2, 4, 5, 6 und 8, **dadurch gekennzeichnet, dass** das reibend gleitbare Bauteil aus einem makromolekularen Polyurethanharz ausgebildet ist.

Revendications

1. Système d'ascenseur, comprenant :

une gaine d'ascenseur comportant une entrée d'ascenseur et des rails de guidage ;
 une cabine d'ascenseur disposée dans ladite gaine d'ascenseur de sorte à monter et descendre en va-et-vient au moyen d'une machine de levage au moyen de cordes, étant guidée par lesdits rails de guidage ; et
 un appareil d'amortissement de vibrations (8a, 8b, 8d, 8e, 9) pour presser un élément d'amortissement de vibrations (8c, 9e) contre ladite gaine d'ascenseur pour supprimer ainsi le secouement de ladite cabine d'ascenseur, **caractérisé en ce que** ledit appareil d'amortissement de vibrations est couplé de manière opérationnelle à une unité d'ouverture/fermeture de porte de ladite cabine d'ascenseur et agencé de sorte à fonctionner en accompagnement d'une opération d'ouverture/fermeture d'une porte de cabine.

2. Système d'ascenseur selon la revendication 1, **caractérisé en ce que** ledit appareil d'amortissement de vibrations comporte un mécanisme de liaison disposé entre une porte de cabine et ledit rail de guidage et conçu pour presser un élément coulissant en frottement pourvu sur ledit élément d'amortissement de vibrations contre ledit rail de guidage afin de supprimer le secouement de ladite cabine d'ascenseur.

3. Système d'ascenseur selon la revendication 1, **caractérisé en ce que** ledit appareil d'amortissement de vibrations comporte des éléments d'engagement disposés entre ladite porte de cabine et une porte d'entrée pour faire office desdits éléments d'amortissement de vibrations pour amener ladite porte de cabine et ladite porte d'entrée à s'engager l'une avec l'autre lors de l'ouverture/fermeture de ladite porte de cabine de ladite cabine d'ascenseur afin de transmettre une force d'entraînement de ladite unité d'ouverture/fermeture de porte à ladite porte d'entrée pour supprimer ainsi le secouement de ladite cabine d'ascenseur.

4. Système d'ascenseur selon la revendication 3, **caractérisé en ce que** lesdits éléments d'engagement sont composés d'un élément d'engagement de porte de cabine pourvu sur ladite porte de cabine et d'un élément d'engagement de porte d'entrée pourvu sur ladite porte d'entrée, où un élément coulissant en frottement est disposé entre lesdits éléments d'engagement.

5. Système d'ascenseur selon la revendication 4,

caractérisé en ce que ledit élément d'engagement de porte de cabine est mis en oeuvre de sorte à avoir une section transversale essentiellement en forme de C et s'étend dans la direction de montée/descente de ladite cabine d'ascenseur tandis que ledit élément d'engagement de porte d'entrée est mis en oeuvre de sorte à avoir une section transversale essentiellement en forme de C et disposé pour être en vis-à-vis en opposition audit élément d'engagement de porte de cabine de sorte à s'engager avec celui-ci, où ledit élément coulissant en frottement est pourvu sur une surface dudit élément d'engagement de porte de cabine ou dudit élément d'engagement de porte d'entrée de la section transversale essentiellement en forme de C, ladite surface étant poussée lors de l'ouverture/fermeture de ladite porte de cabine.

6. Système d'ascenseur selon la revendication 5, **caractérisé en ce que** ledit élément coulissant en frottement est pourvu sur ledit élément d'engagement de porte de cabine.

7. Système d'ascenseur selon la revendication 1, **caractérisé en ce que** l'appareil d'amortissement de vibrations comporte :

une unité de serrage installée sur l'une de ladite cabine d'ascenseur et de ladite entrée d'ascenseur et conçue pour fonctionner en accompagnement d'une opération d'ouverture/fermeture de ladite porte de cabine ; et
 un élément serré installé sur l'autre de ladite cabine d'ascenseur et de ladite entrée d'ascenseur devant être serré par ladite unité de serrage.

8. Système d'ascenseur selon la revendication 7, **caractérisé en ce que** ladite unité de serrage est dotée d'un élément coulissant en frottement pour accroître l'action de frottement entre ladite unité de serrage et ledit élément serré.

9. Système d'ascenseur selon la revendication 3 ou 7, **caractérisé en ce que** ladite porte de cabine et ladite porte d'entrée comportent une pluralité de rouleaux, respectivement, pour maintenir chacun parmi des rails de suspension respectifs dans un état pris dans lequel il est pris en sandwich entre lesdits rouleaux dans la direction de montée/descente.

10. Système d'ascenseur selon l'une quelconque des revendications 2, 4, 5, 6 et 8, **caractérisé en ce que** ledit élément coulissant en frottement est formé de résine polyuréthane.

11. Système d'ascenseur selon l'une quelconque des revendications 2, 4, 5, 6 et 8,

caractérisé en ce que ledit élément coulissant en frottement est formé de résine polyuréthane macromoléculaire.

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FIG. 1

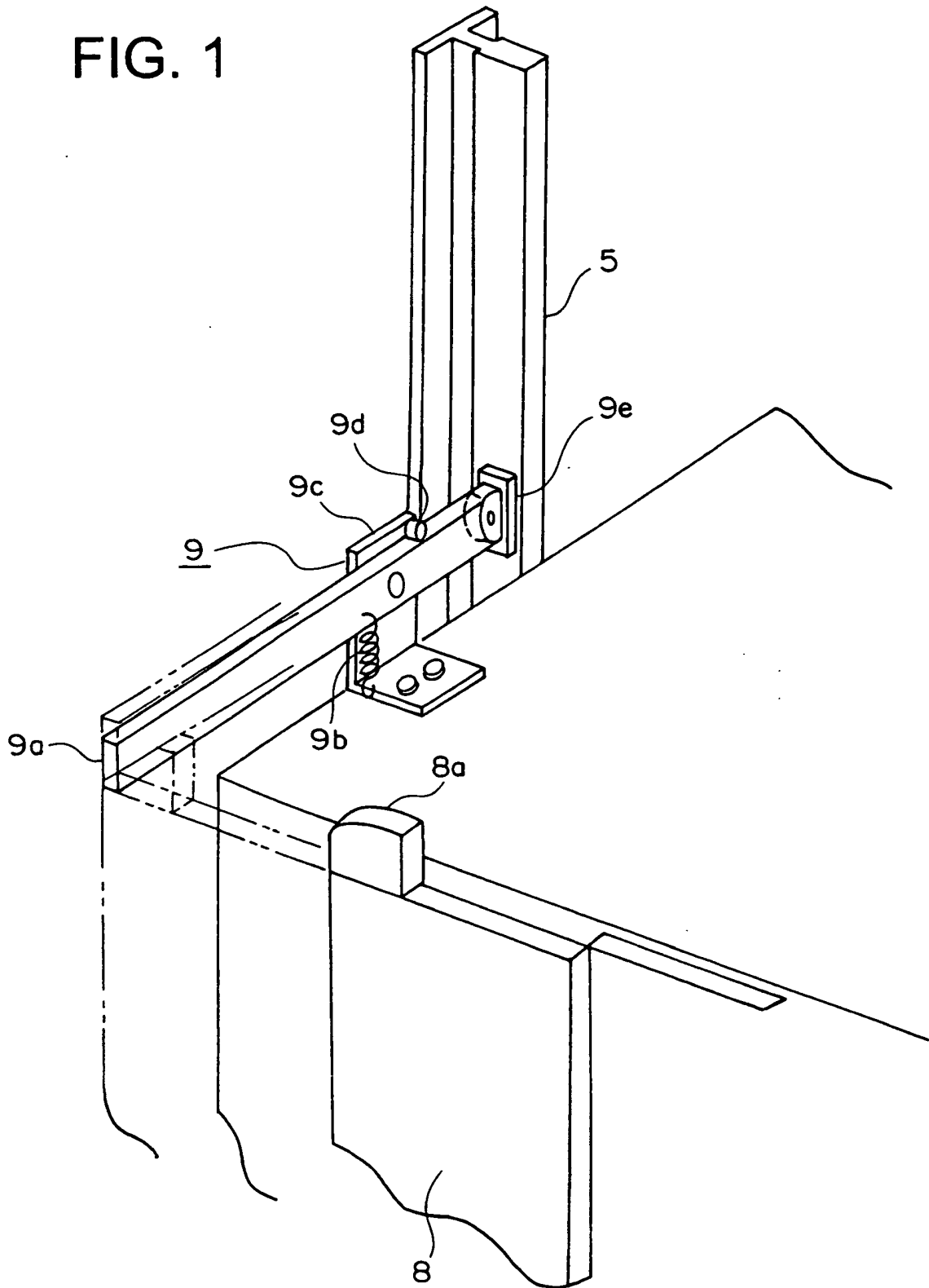


FIG. 2

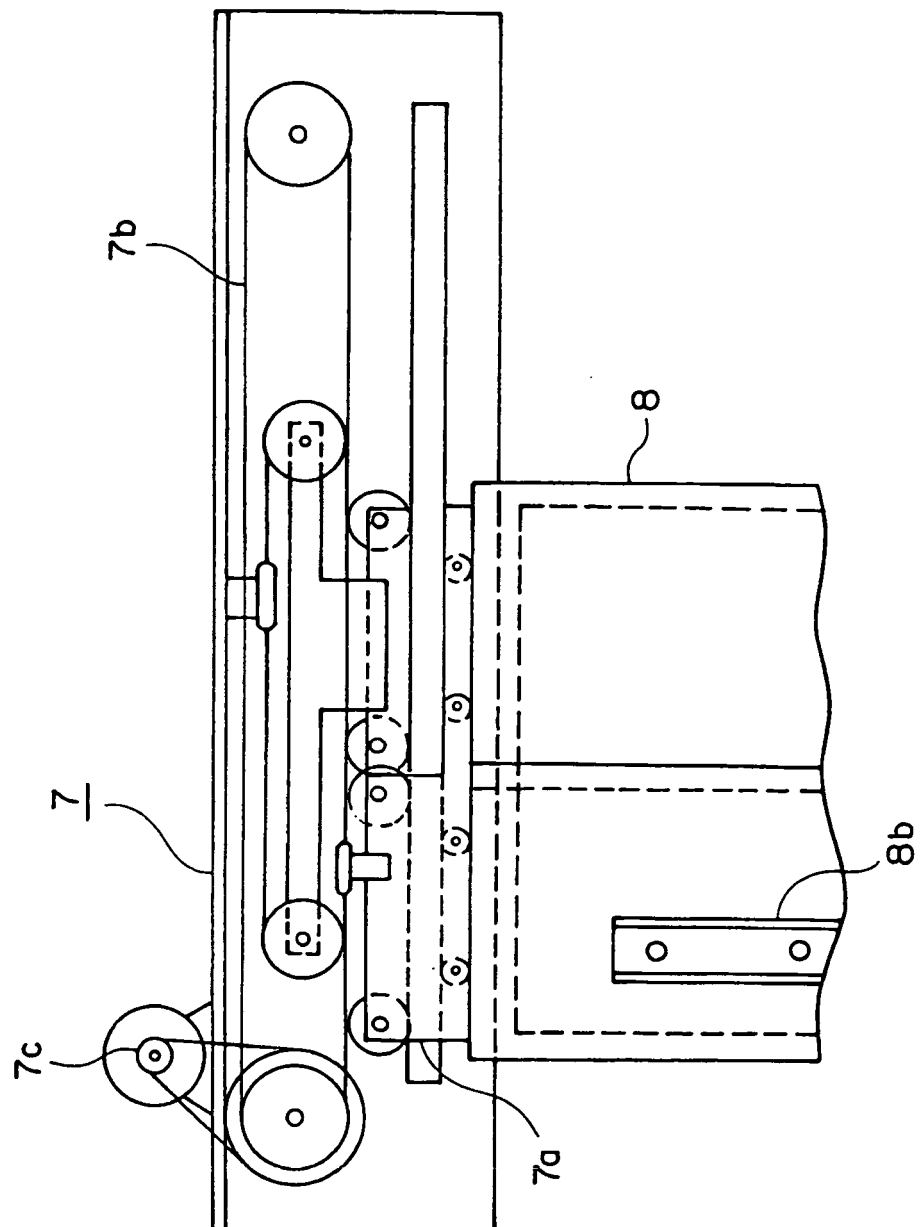


FIG. 3

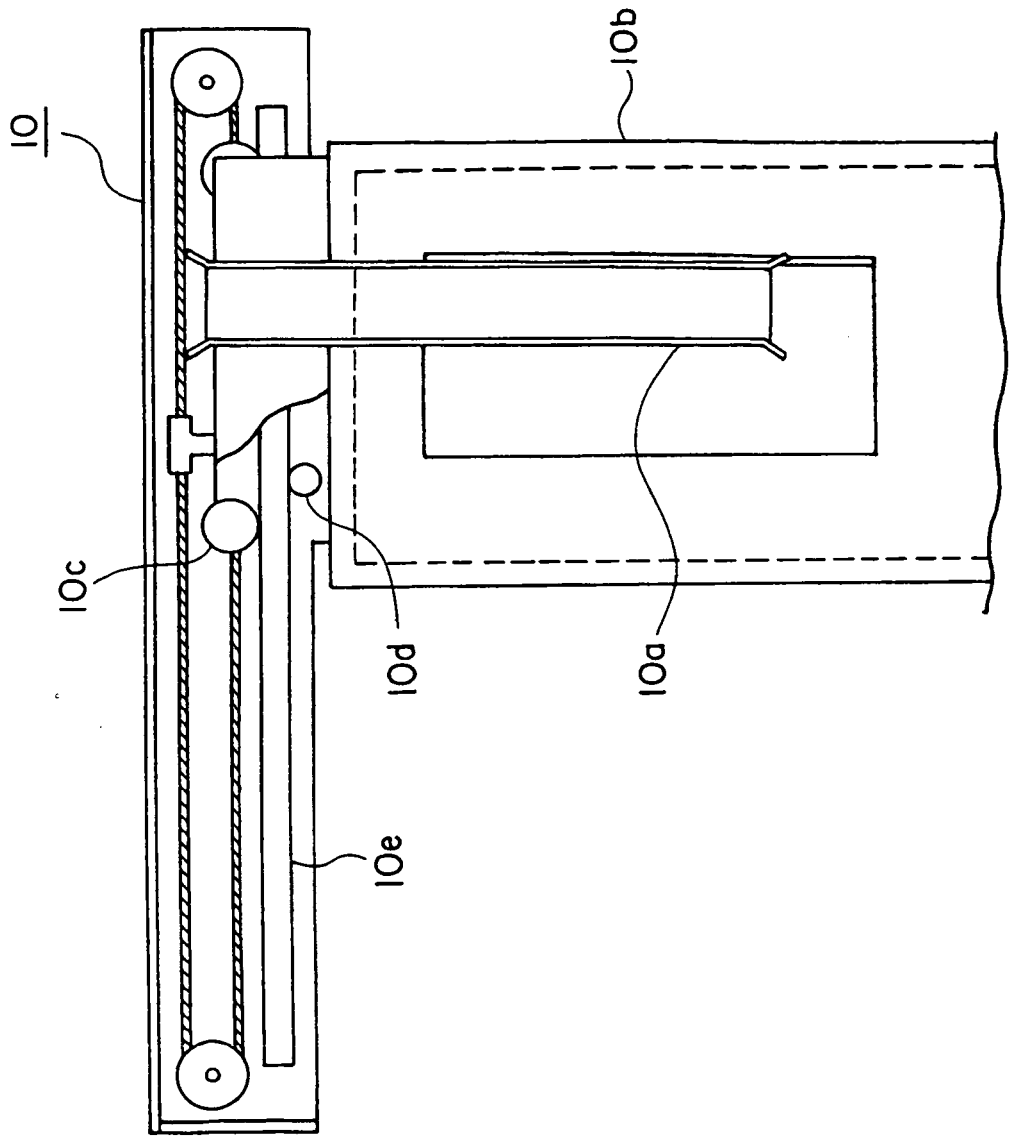


FIG. 4

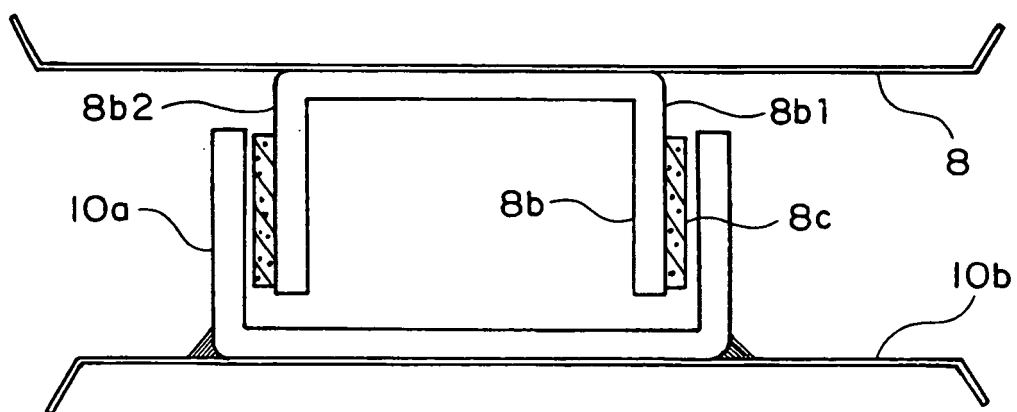


FIG. 5

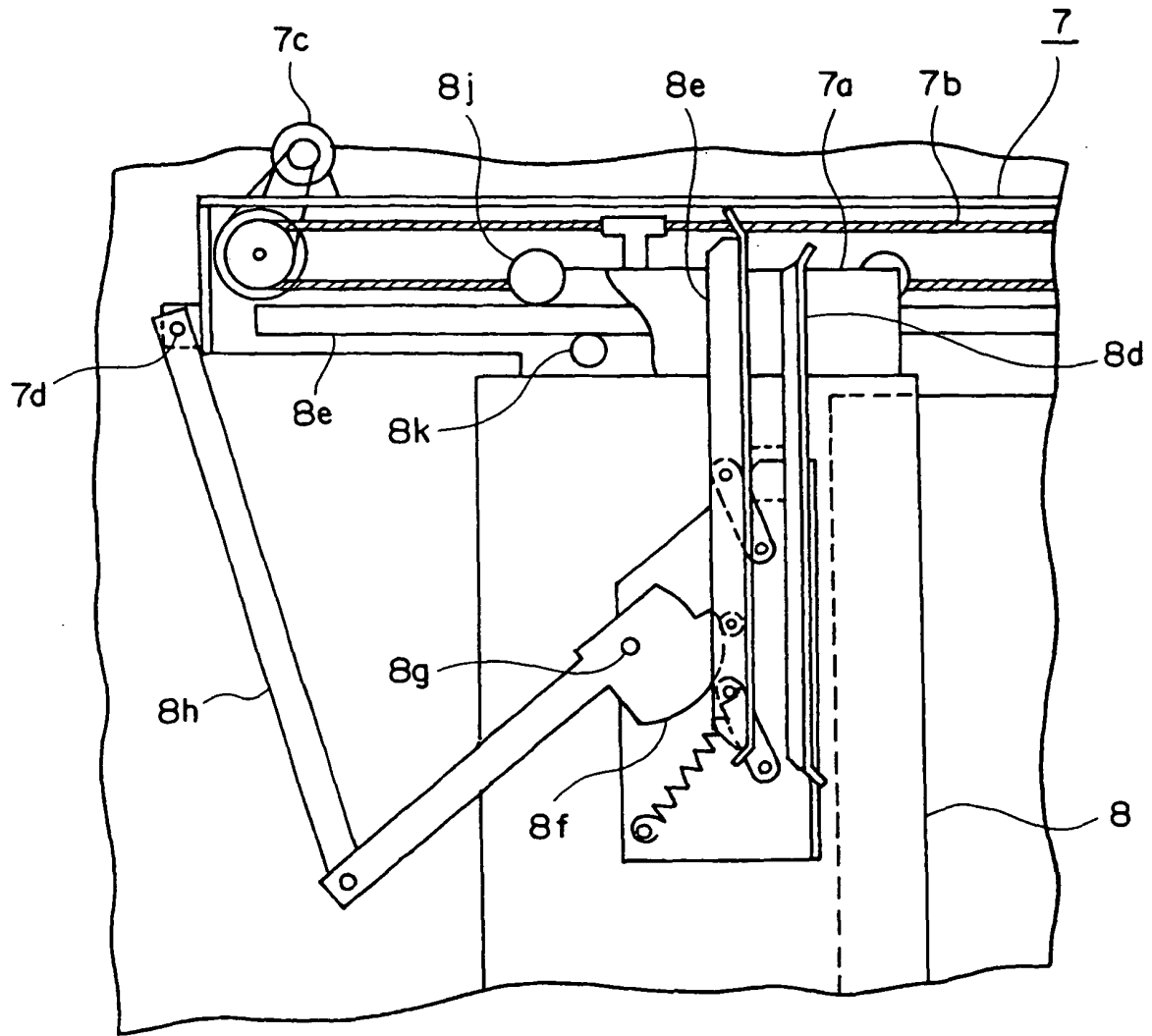


FIG. 6

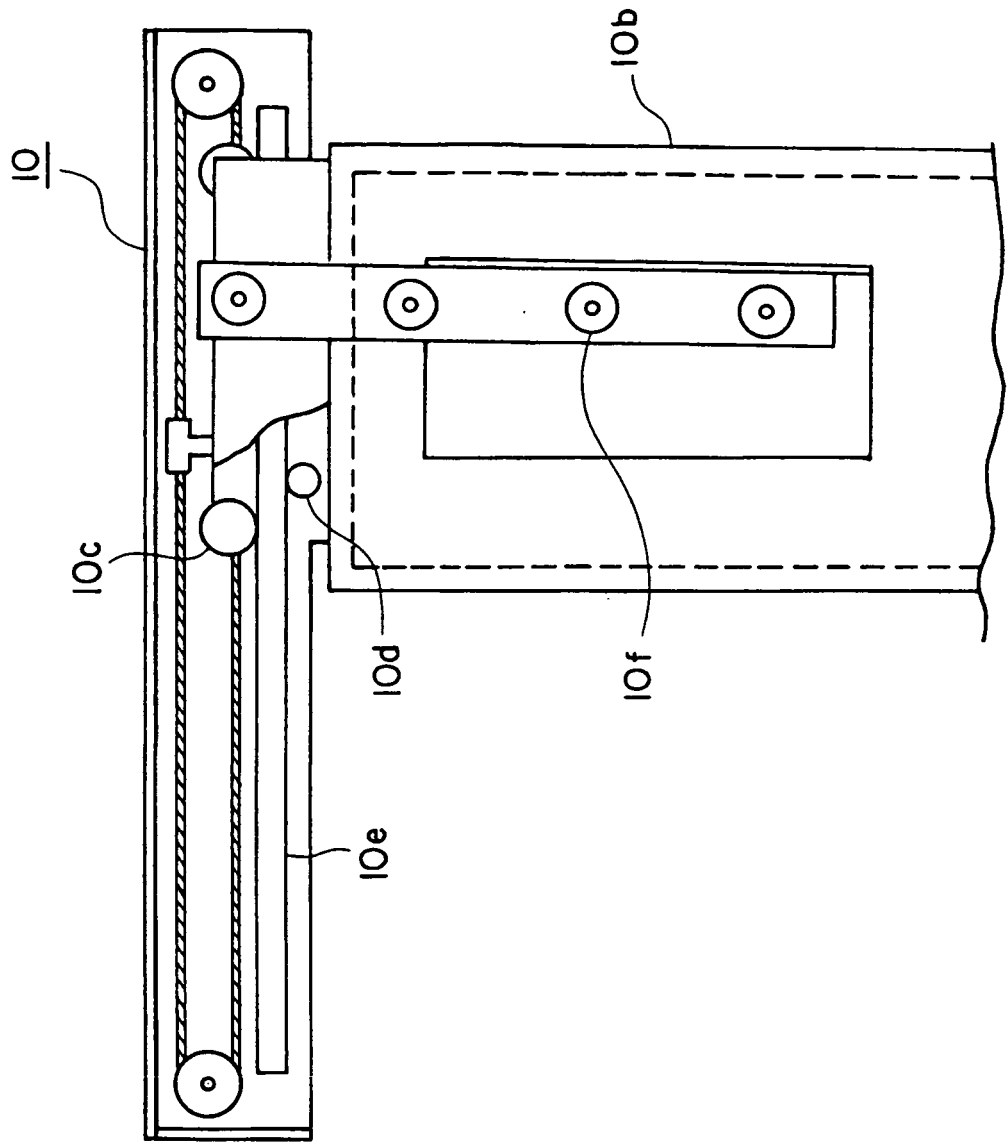


FIG. 7

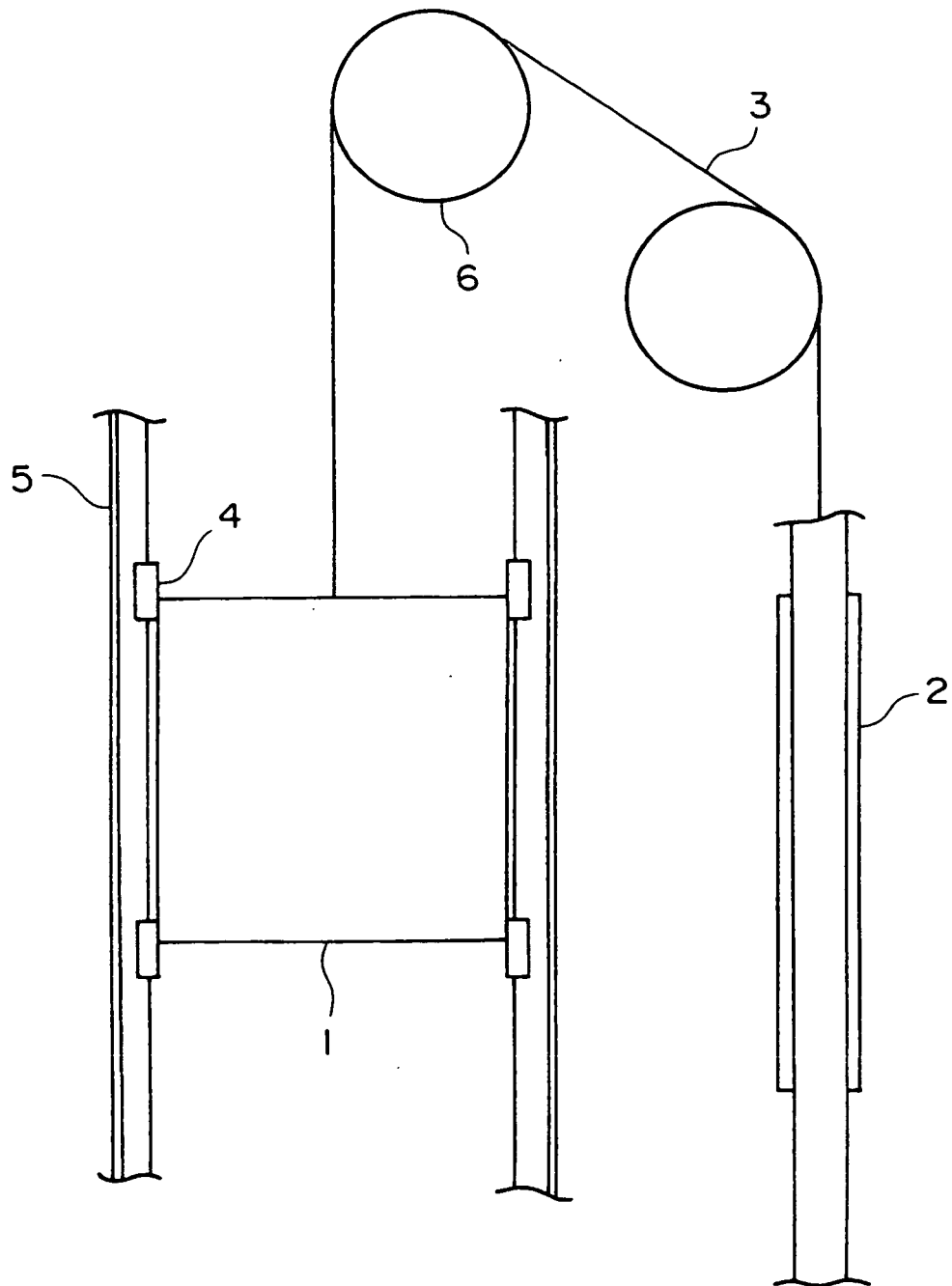
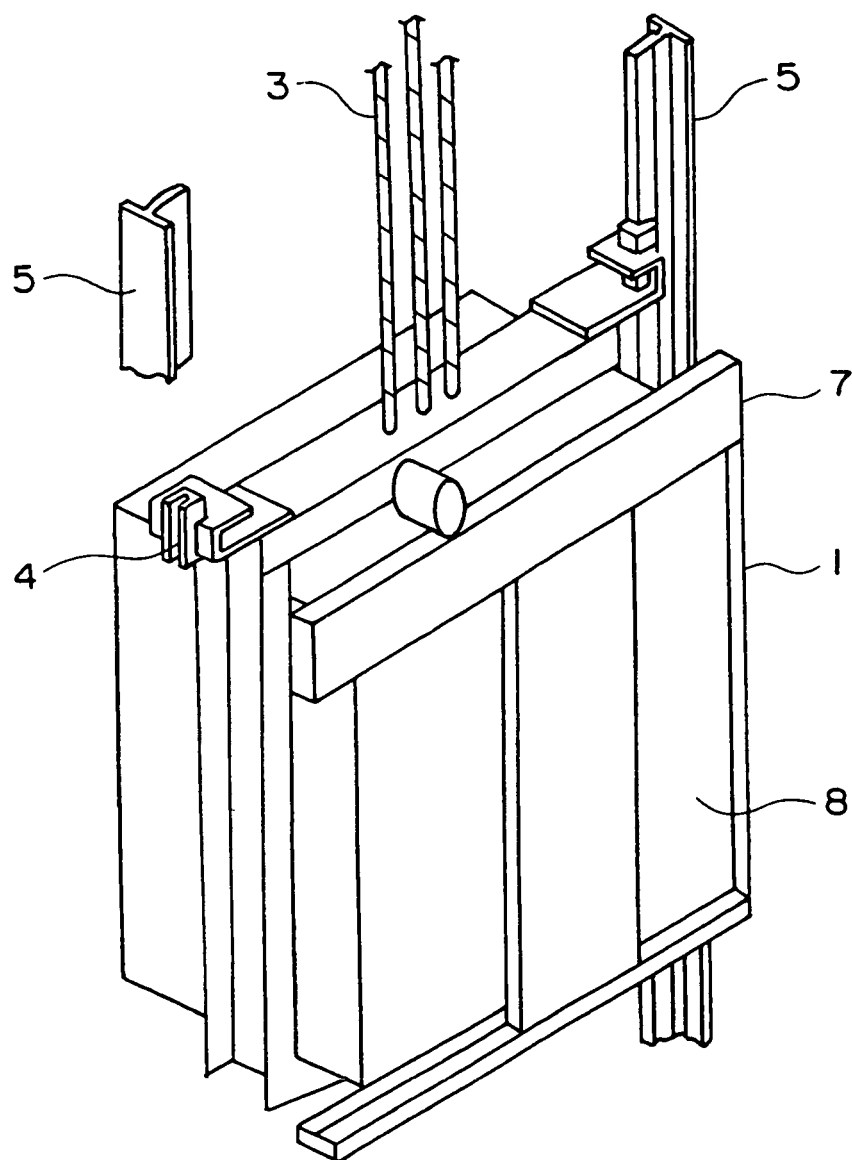


FIG. 8



REFERENCES CITED IN THE DESCRIPTION

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