



# ELEVATOR HAVING ROLLER GUIDE ARRANGEMENTS

5           The present invention relates to an elevator having  
an passenger cage moved up and down along a pair of guide  
rails installed vertically. More particularly, it  
concerns an elevator having an passenger cage having  
roller guide arrangements having dampers for damping  
10 sustained horizontal vibrations.

          In general, an elevator has roller guide arrangements  
having dampers provided in an passenger cage to suppress  
sustained horizontal vibrations of the passenger cage to  
make comfortable in rising and falling. Each of the  
15 dampers is placed to connect a movable member for bearing  
the roller and a fixed member. The damper are turnably  
connected by pins at both ends thereof so that the damper  
does not undergo a bending moment by displacement of the  
movable member. Each of the pin connections has a  
20 precision bearing built therein to make it to turn  
smoothly. Such a prior construction as described above  
was disclosed by the Japanese Utility Model Laid-Open No.  
2-88984.

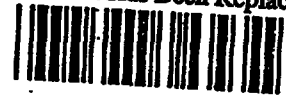
          The prior construction has the disadvantage that the  
25 damper structure is too complicated at the connections to  
assemble without high skill.



In view of solving the foregoing problems of the prior arts, preferably the present invention provides an elevator that can suppress sustained horizontal vibrations in simple construction and easy assembling.

Briefly, the foregoing is accomplished in accordance with aspects of the present invention by an elevator having roller guide arrangements for guiding an passenger cage to move up and down along a pair of guide rails placed vertically wherein each of the roller guide arrangements comprises: a pair of rollers placed to press the guide rails in pressing directions opposite to each other, suppressing means for suppressing change of each of the rollers to press only in one direction, one end of the suppressing means being held on one end of the roller and fixing side and the other end of the suppressing means being touched to the other end of the roller and the fixing side, and stabilizing means placed on the touching side of the suppressing means for giving stabilizing forces to the suppressing means.

As the one end of the suppressing means for suppressing change of pressure of the roller is held and the other is touched to the other side, the other end and the other side can be freely deviated from each other. As a result, the suppressing means has no bending force



caused thereto. For the reason, the both ends of the suppressing means have not to be made of turnable pin connection structure that is complicated and hard to assemble.

5 Further, as the suppressing means is effective only in one direction, it can absorb vibration energy generated in the passenger cage as pressure energy to accumulate when the pressure of roller to the guide rail increases. The suppressing means can release the pressure energy when  
10 the pressure decreases. As a result, the roller guide arrangements can effectively attenuate sustained horizontal vibrations transmitted to the passenger cage where the guide rail is sharply bent or different in level, thereby making passengers comfortable.

15 Embodiments of the invention will now be described by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a front view illustrating a roller guide arrangement of an embodiment of the present invention.

Fig. 2 is a side view illustrating the roller guide  
20 arrangement shown in Fig. 1.

Fig. 3 is a cross-sectioned outline illustrating a viscous damper.

Fig. 4 is a perspective view illustrating an passenger cage.

25 Fig. 5 is a front view illustrating a roller guide



arrangement of a second embodiment of the present invention.

5           The following describes in detail a first embodiment according to the present invention by reference to Figs. 1 to 4.

          In general, an elevator has a passenger cage 2 moved up and down along a pair of guide rails 1A and 1B  
10       installed vertically. The passenger cage 2 has a cage frame 3 formed square and a cage room 4 supported in the cage frame 3. The cage frame 3 has roller guide arrangements 5 provided to engage with the guide rails 1A and 1B.

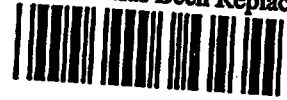
15           Each of the roller guide arrangements 5 has a base 6 fixed on the cage frame 3, three columns 7A, 7B, and 7C extended from the base member 6 in an elevation direction of the passenger cage 2, a cover member 8 supported on tops of the columns 7A, 7B, and 7C, and supporting members  
20       10A, 10B, and 10C to be swung to come nearer to and go away from the respective columns 7A, 7B, and 7C. Ends of the supporting members 10A, 10B, and 10C are turnably born by a pin bearing 9 each. Each of the roller guide arrangements 5 also has rollers 11, 12, and 13 born by  
25       respective roller shafts S provided through respective



centers of the supporting members 10A, 10B, and 10C, springs 14A, 14B, and 14C for pressing the respective rollers 11, 12, and 13 to respective guide surfaces of the pair of guide rails 1A and 1B, and bolts 16 having  
5 respective spring washers 15 for holding the respective springs 14A, 14B, and 14C put around through-holes of the respective supporting members 10A, 10B, and 10C to arrange the springs 14A, 14B, and 14C near the respective roller shafts S. Ends of the bolts 16 are supported by the  
10 respective columns 7A, 7B, and 7C, and the other ends are loosely passed through the respective supporting members 10A, 10B, and 10C. Each of the roller guide arrangements  
5 further has viscous dampers 18A, 18B, and 18C fixed to the cover member 8 to hold respective cylinders 19 by  
15 respective brackets 17.

The rollers 11, 12, and 13 are arranged so as to roll on the three guide surfaces of the guide rails 1A and 1B, respectively. The rollers 11 and 12 are paired to pinch the guide surfaces paired on both sides of the single  
20 guide rail 1A or 1B. The rollers 13 are paired over the right and left guide rails 1A and 1B,

The supporting members 10A, 10B, and 10C are extended toward the cover member 8 beyond the roller shafts S. Free ends of the supporting members 10A, 10B, and 10C have  
25 respective free ends of piston ends 20 of the viscous



dampers 18A, 18B, and 18C touched therewith.

The cylinder 19 for the piston rod 20 has a piston 2 put therein. The piston 21 divides the cylinder 19 into oil rooms A and B. Both the oil rooms A and B are  
5 communicated with each other through an orifice 22 and a check-valve 23 provided on the piston rod 20.

The piston rod 20 had a spring washer 24 provided near an outside end thereof. A compression spring 25 is put between the spring washer 24 and the cylinder 16 to  
10 retrogress, or return, the piston rod 20 out of the cylinder 16.

Each of the cylinders 19 of the viscous dampers 18A, 18B, and 18C has oil filled therein. The oil is made to flow through the check-valve 23 to the oil room A easily  
15 when the piston 21 is moved to the oil room B. It takes a time for the oil to flow to the oil room B when the piston 21 is moved to the oil room B since the oil must pass through the orifice 22.

As the roller guide arrangements 5 are constructed as  
20 described above, the passenger cage 2 may be rolled, or horizontally swung, suddenly if the guide rail 1A or 1B is bent abruptly in Fig. 1. When the passenger cage 2 is displaced right and left to continue the rolling, the roller 11 is pressed left to incline the supporting member  
25 10A left as the pin bearing 9 is a fulcrum. Inclination



piston 21  
9 into  
1 a

of the supporting member 10A compresses the spring 14A and at the same time, pressed of the piston rod 20 of the viscous damper 18A to the free end of the supporting member 10A to compress the compression spring 25.

5 A contact point of the piston rod 20 and the supporting member 10A may displace as the supporting member 10A is inclined. The displacement is absorbed by dislocation of them as they are not connected. For the reason, the displacement will not cause a moment to bend  
10 the piston rod 20 even when the cylinder 19 is fixed.

On the other hand, the piston rod 20 put into the cylinder 19 of the viscous damper 18A as pressed by the free end of the supporting member 10A is made slow since the oil between the oil rooms A and B in the cylinder 19  
15 undergoes too high reaction to move fast as forced only by the orifice 22 of the piston 21. This can suppress the passenger cage 2 to continue rolling for a long time.

The roller 12 paired with the roller 11 displaces the supporting member 10B toward the guide rail 1A to incline,  
20 opposite to the inclination by the roller 11, to pull the spring 14B and the viscous damper 18B out. The piston rod 20 of the viscous damper 18B is pulled out of the cylinder 19 by the compression spring 25. The piston 21 is moved fast while making the oil in the oil room B flow to the  
25 oil room A through the check valve 23. In other words,



the compression force of the spring 14B is directly transmitted to the supporting member 10B to incline the roller 12 toward the guide rail 1A or 1B to follow.

In turn, the compression force of the spring 14A  
5 accumulated by the slow motions of the supporting member 10A inclined left and the viscous damper 18A tends to return the inclination of the supporting member 10A fast together with the fast returning force of the compression spring 25 of the viscous damper 18A. However, the slow  
10 motion of the viscous damper 18B on the side of supporting member 10B paired with the supporting member 10A will return the supporting member 10A slowly.

If the guide rail 1A or 1B is abruptly bent at, for example, a joint, the passenger cage 2 is displaced for a  
15 moment, but its rolling can be suppressed to continue afterward.

Fig. 5 depicts an elevation view illustrating a second embodiment of the elevator according to the present invention. The second embodiment is different from the  
20 first one in the mounting direction of the viscous dampers 18A and 18B. That is, the second embodiment has cylinders 19 of the viscous dampers 18A and 18B fixed to the columns 7A and 7B, respectively. The ends of the piston rods 20 are touched to the free ends of the supporting members 10A  
25 and 10B. Compressions of the springs 14A and 14B pressing



the rollers 11 and 12 to the guide rail 1A or 1B cause the viscous dampers 18A and 18B to extend. This makes small reactions to the viscous dampers 18A and 18B in their elongation directions and makes large reactions to them in the contraction direction.

If the passenger cage 2 is instantaneously caused to displace right by bend of the guide rail 1A or 1B, the supporting member 10A is inclined left to compress the spring 14A and at the same time, displaces the viscous damper 18A in the elongation direction. As the reaction in the elongation direction is low, the viscous damper 18A can be easily elongated so as to allow the passenger cage 2 to displace instantaneously. However, components, of the opposite paired roller 12, particularly the viscous damper 18B, undergo high reaction in the contraction. As a result, the supporting member 10B is made slow to incline toward the guide rail 1A or 1B. This can suppress the rolling to continue. The viscous dampers 18A and 18B, of course, can be easily mounted and assembled as in the first embodiment.

Each of the viscous dampers 18A and 18B described above is basically formed of, but not limited to, the piston and the cylinder, which has the fluid viscous material, such as oil, filled therein.

The paired rollers 11 and 12 of the roller guide



arrangement 5 in the embodiments described above, of course, can be applied to the rollers 13 paired between the two roller guide arrangements 5.

5 As described so far, the elevator of the present invention can be made so simple in the construction and assembling as to suppress rolling to continue.



Claims

1. An elevator having roller guide arrangements for guiding an passenger cage to move up and down along a pair of guide rails placed vertically wherein each of the roller guide arrangements comprises:

a pair of rollers placed to press the guide rails in pressing directions opposite to each other,

suppressing means for suppressing change of each of the rollers to press only in one direction, one end of the suppressing means being held on one end of the roller and fixing side and the other end of the suppressing means being touched to the other end of the roller and the fixing side, and

stabilizing means placed on the touching side of the suppressing means for giving stabilizing forces to the suppressing means.

2. An elevator having roller guide arrangements for guiding an passenger cage to move up and down along a pair of guide rails placed vertically wherein each of the roller guide arrangements comprises:

a pair of rollers placed to press the guide rails in pressing directions opposite to each other,

dumping force exerting means for exerting dumping forces for displacements of the paired rollers in directions of increase of the pressing forces and for



releasing the dumping forces for displacements of the  
paired rollers in directions of decrease of the pressing  
forces, one end of the dumping force exerting means being  
held on one end of the roller and fixing side and the  
5 other end of the dumping force exerting means being  
touched to the other end of the roller and the fixing  
side, and

stabilizing means placed on the touching side of the  
suppressing means for giving stabilizing forces to the  
10 dumping force exerting means.

3. An elevator having roller guide arrangements for  
guiding an passenger cage to move up and down along a pair  
of guide rails placed vertically wherein each of the  
roller guide arrangements comprises:

15 a pair of rollers placed to press the guide rails  
through elastic members in compression directions of the  
elastic members opposite to each other,

force exerting means for exerting reactions for  
displacements of the elastic members of the paired rollers  
20 in the compression directions of and for releasing the  
reactions for displacements of the elastic members in  
elongation directions, one end of the force exerting means  
being held on one end of the roller and fixing side and  
the other end of the force exerting means being touched to  
25 the other end of the roller and the fixing side, and



stabilizing means placed on the touching side of the force exerting means for giving stabilizing forces to the force exerting means.

4. An elevator having a pair of guide rails placed vertically, an passenger cage to move up and down along the guide rails, and roller guide arrangements for guiding the passenger cage to move up and down for the guide rails mounted on the passenger cage, each of the roller guide arrangements comprising:

10 supporting members each of which has one end thereof born by the passenger cage,

rollers born by the supporting members to roll on guide surfaces of the guide rails,

15 elastic members for pressing the supporting members in directions of pressing the rollers to the guide surfaces of the guide rails, and

dampers placed between the supporting members and fixing members for dumping sustained vibrations of the supporting members by the elastic members,

20 wherein the roller guide arrangements are placed to pair so that the elastic members are opposite to each other in the directions of pressing the guide rails, each of the dampers has an end thereof held and the other end thereof touched, and each of the roller guide arrangements  
25 has stabilizing means for giving stabilizing forces to the



touched end.

5. The elevator according to claim 4 wherein a free end<sup>1</sup>  
of each of the supporting members is formed to extend from  
a roller shaft bearing and the each of the dampers is  
5 placed between the extended free end and the fixed member.

6. The elevator according to claim 4 or 5 wherein the  
damper is set so as to provide smaller reaction in an  
elongation direction than the one in a contraction  
direction.

10 7. The elevator according to claim 4 or 5 wherein the  
damper is placed so as to contract when the elastic member  
is compressed.

8. The elevator according to claim 4 or 5 wherein the  
damper is placed so as to elongate when the elastic member  
15 is compressed.

9. The elevator according to claim 4 or 5, each of the  
roller guide arrangements further comprising:

a base member held on the passenger cage,  
columns extended from the base member in a rising  
20 direction of the passenger cage, and  
a cover member supported by the columns,  
wherein the base member and the cover member have the  
supporting members, the rollers, the elastic members, and  
dampers arranged therebetween,  
25 each of the supporting members is born by the base



member and bears the roller at a center position thereof  
in a longitudinal direction,

the elastic members are arranged between a bearing  
for the supporting member and the roller shaft bearing and  
5 between the columns each, and

each of the dampers is arranged between and an end of  
the supporting member and the column, one end of the  
dumber being held on the cover member and the other end  
being touched to the end of the supporting member.

10. 10. An elevator substantially as any one embodiment  
herein described with reference to the accompanying  
drawings.