Sept. 5, 1933. J. DUNLOP 1,925,867

ELEVATOR GUIDE RAIL SUPPORTING DEVICE

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Fig. 1.

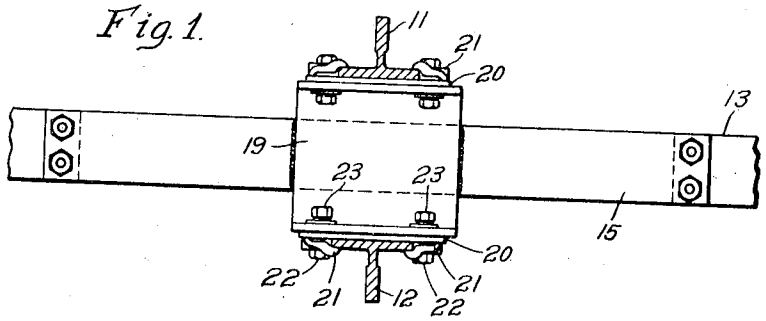


Fig. 2.

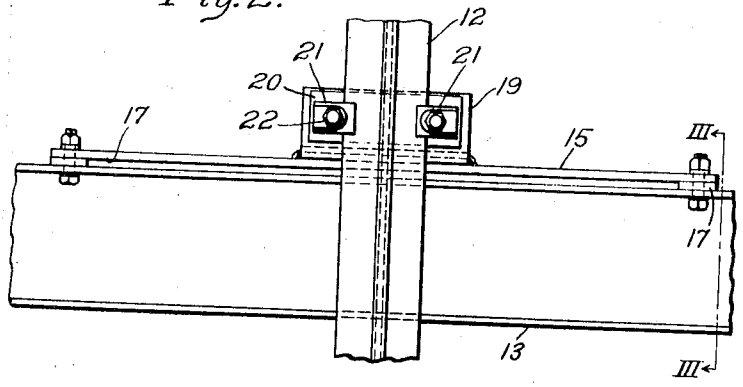


Fig. 3.

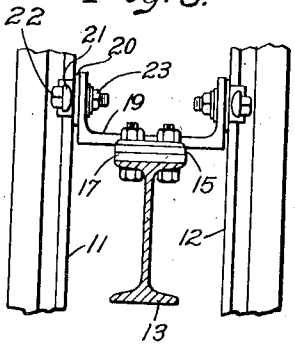
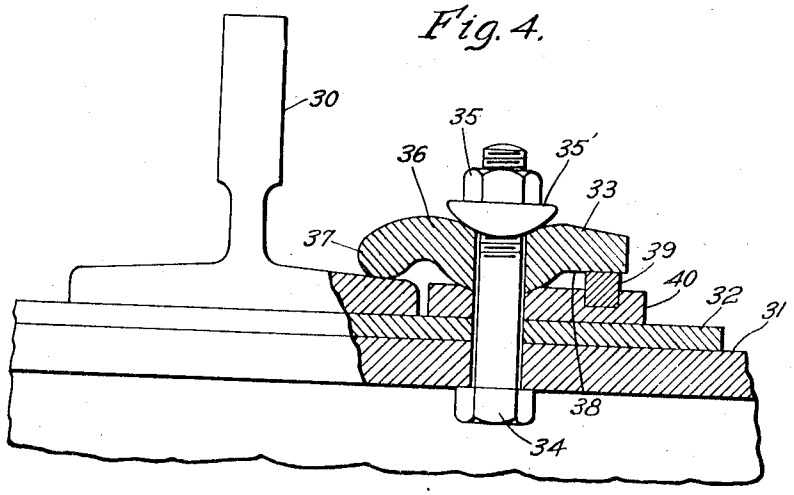


Fig. 4.



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ELEVATOR GUIDE RAIL SUPPORTING DEVICE

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Fig. 5.

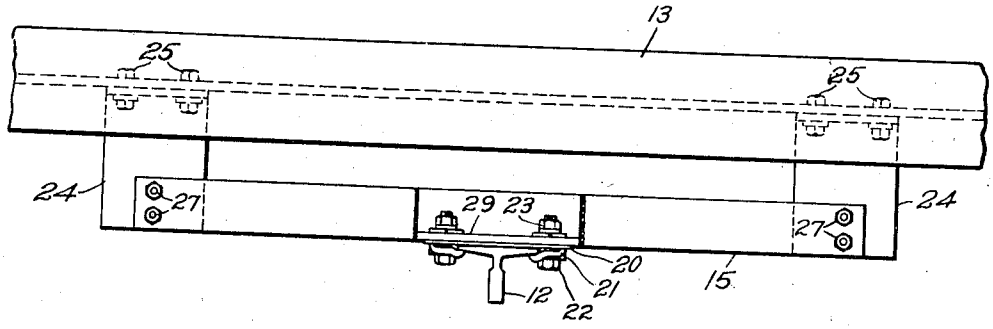

Fig. 6.

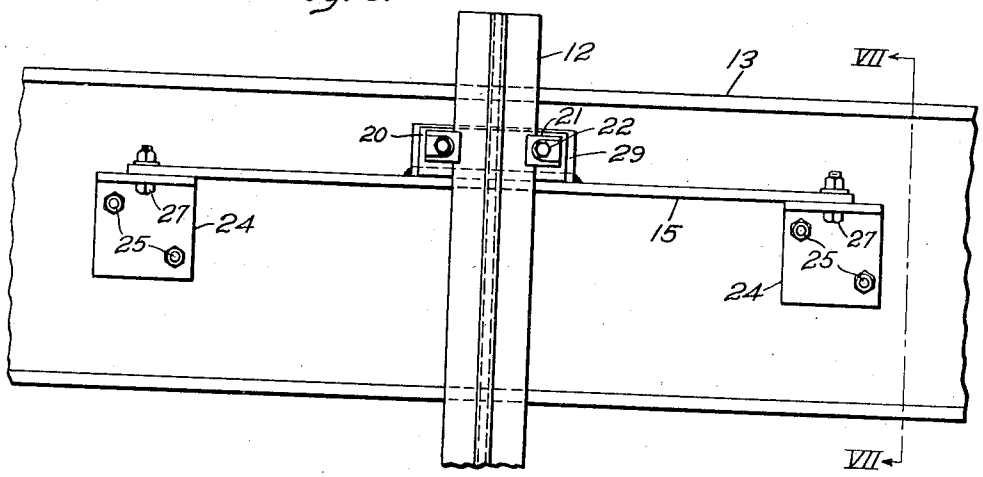

Fig. 7.

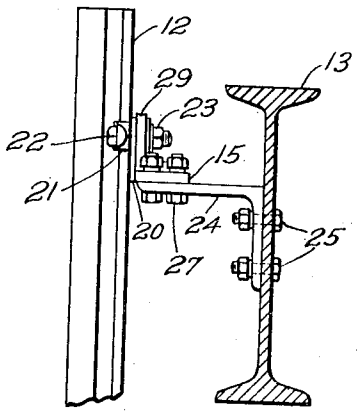

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Fig. 8.

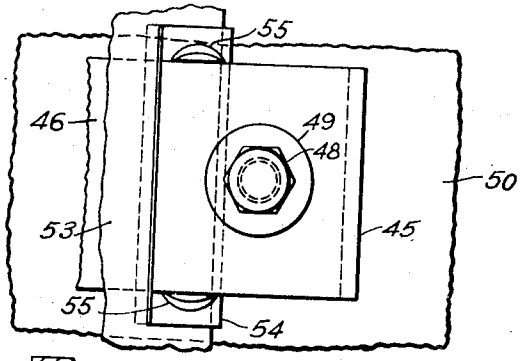


Fig. 9.

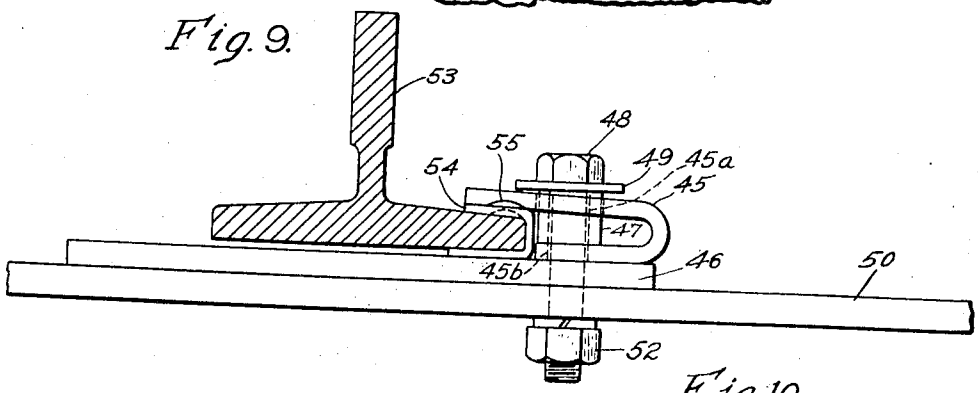


Fig. 10.

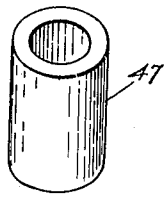


Fig. 11.

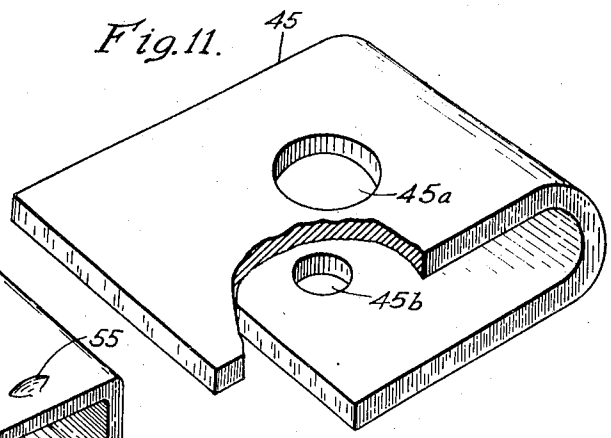
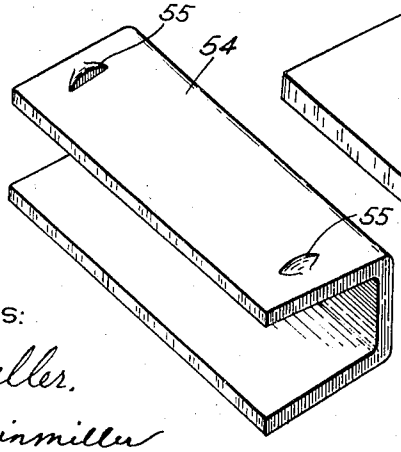


Fig. 12.



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UNITED STATES PATENT OFFICE

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ELEVATOR GUIDE-RAIL SUPPORTING DEVICE

James Dunlop, Park Ridge, Ill., assignor to Westinghouse Electric Elevator Company, a corporation of Illinois

Application November 21, 1931
Serial No. 576,499

10 Claims. (Cl. 187—95)

My invention relates to elevator guide rails and, more particularly, to means for supporting them and maintaining the alignment thereof.

The method now extensively employed of supporting elevator guide rails in a building structure is to rigidly secure them to structural members. In the event of a settling of the building, or a change in length of the guide rail due to a change in temperature, guide rails thus rigidly supported are distorted or bowed and the alignment of the rails is destroyed.

In order to prevent excessive wear on the guide shoes of an elevator car, as well as to ensure smooth travel of the car, it is necessary that the alignment of the guide rails be maintained.

The novelty of my present invention comprises means for resiliently securing a guide rail to a structural member of a building, whereby the rail may move relatively to the structural member and thereby maintain its alignment, in the event of a settling of the building or in the event of a change in length of the rail itself due to a temperature change.

Further novelty of my invention lies in means for resiliently clamping a guide rail to a structural member whereby relative movement between the rail and the structural member is resistingly permitted and the alignment of the rail thereby maintained.

It is an object of my invention, therefore, to provide an improved support for elevator guide-rails.

It is another object of my invention to resiliently secure an elevator guide-rail to a structural member, included in a building, whereby relative movement between the rail and the structural member is resistingly permitted and the alignment of the rail thereby maintained.

Other objects of my invention will be understood from the following specification, when read in connection with the accompanying drawings, wherein

Figure 1 is a fragmentary plan view, showing a structural member and a pair of guide rails supported therefrom in accordance with my invention.

Fig. 2 is a view, in elevation, of the structure shown in Fig. 1.

Fig. 3 is a sectional view, taken on line III—III of Fig. 2.

Fig. 4 is an enlarged plan view, partly in section, showing in detail a modification of the clamping members shown in Figs. 1, 2 and 3.

Fig. 5 is a fragmentary plan view, showing a modification of the method for supporting the guide rail from a structural member as shown in Fig. 1.

Fig. 6 is a view, in elevation, of the structure shown in Fig. 5.

Fig. 7 is a sectional view taken on line VII—VII of Fig. 6.

Fig. 8 is a fragmentary plan view, showing a preferred modification of the clamping members shown in Figs. 1 and 5.

Fig. 9 is an elevational view, showing in further detail the structure of the clamping member shown in Fig. 8.

Figs. 10, 11 and 12 are enlarged perspective views, respectively, of three of the elements included in the clamping device shown in Figs. 8 and 9.

In Figs. 1, 2 and 3 is shown a method for providing a common supporting means, in accordance with the principles of my invention, for an elevator guide rail 11, disposed in one hatchway, and an elevator guide rail 12, disposed in an adjacent hatchway. A structural member 13, being of an I-beam, channel or other suitable cross-section and constituting a part of a building structure, is horizontally disposed between the vertically extending guide rails 11 and 12. The member 13 is of substantial rigidity and possesses the necessary strength for structural purposes. It will not, therefore, bend under forces exerted by changes in the length of guide rails attached thereto, as by changes in length due to temperature changes.

A flat resilient structural member 15 of such thickness that it is somewhat flexible, is suitably supported at both ends, in spaced relation to the upper surface or flange of member 13, by means of suitable washers or spacers 17, and is secured to the member 13 by bolts provided with nuts as indicated.

The height of the spacers 17 is such as to permit a flexure or bending of the central unsupported portion of the member 15, toward or away from the member 13.

A short channel member 19 is welded, or otherwise suitably secured, to the upper surface of the structural member 15 at the central portion thereof. The flanges of the channel member 19 are vertically disposed in parallel relation to the web of the member 13, and the width of the member 19 is such as to substantially bridge the distance between the flanges of the guide rails 11 and 12. Suitable shims 20 may be interposed between the vertical portions of the member 19 and the guide rails, as indicated.

Means for adjustably clamping or securing

the flanges of the rails 11 and 12, respectively, to the flanges of the channel member 19 may comprise, for example, lugs 21 and bolts 22 provided with nuts 23, for causing the lugs to engage and firmly press against the flanges of the rails 11 and 12 and the shims 20.

It will thus be clear that, in the event of an increase in length of a guide rail caused by expansion thereof occurring during an increase in temperature, the member 15 will flex or bend a sufficient amount to maintain the vertical alignment of the rails, although the member 13 remains rigid. It will be further apparent that the member 15 tends to resist relative movement between the guide rail and the member 13, and thus maintains a firm attachment of the guide rails to the structural member 13 while permitting relative movement therebetween.

Referring to the modification shown in Figs. 5, 6 and 7, the resilient flexible structural member 15 is disposed horizontally and supported at the ends thereof on angle brackets 24, which are suitably secured to the structural member 13 at the neutral axis of the web thereof, by bolts 25 provided with nuts. Suitable bolts 27 and nuts therefor may also be employed to secure the ends of the member 15 to the brackets 24.

A short angle-bar 29 is suitably secured to the central portion of the member 15 midway between the brackets 24, as by welding, one face thereof extending parallel to the web of the member 13 for cooperating with the flange of a guide rail 12. A suitable shim 20 is interposed between the flange of the guide rail 12 and the face of the angle-bar 29, and suitable lugs, bolts and nuts corresponding to the lugs 21 and bolts and nuts 22 and 23, respectively, are provided for securing the rail to the member 29.

The foregoing methods of supporting guide rails effect a resilient attachment of the guide rails to structural members, such as the structural member 13, whereby the rails and structural members are relatively movable and whereby the alignment of the rails is maintained in the event of an increase in length of the guide rails caused by an increase in temperature. However, in the event of a settling of one side of a building resulting in the structural members 13 assuming a position at a slight angle to the horizontal, the change in the perpendicular relation between the guide rails and the structural member 13 would twist the lugs 21 and tend to loosen them.

I have provided, as one of the novel features of my invention, a clamping device, shown in Fig. 4, which is capable of maintaining a firm attachment of a guide rail to a structural member regardless of whether or not the building settles. The clamping device may be employed as a substitute for the clamping lugs 21, or may be employed to clamp a guide rail directly to a rigid structural member, such as the member 13, without the interposition of a flexible structural member corresponding to the member 15.

Referring to Fig. 4, a guide-rail 30 is clamped to a structural member 31, with a suitable shim 32 interposed therebetween, by means of a lug 33 and a bolt 34 provided with a nut 35. As above explained, the structural member 31 may be either rigid or flexible, that is, it may correspond to the member 13 or the member 15.

The lug 33, having a concave central portion 36, is provided, at one end thereof, with a ball-face 37 for engaging the flange of the guide rail 30, and, at the opposite end, with a flat face 38 for engaging a flat bearing member 39. The bearing member 39 is of suitable material, such as babbitt or lead, and is stationarily supported, as by being fitted into a slot in a flat member 40, which is interposed between the concave portion of the lug and the shim 32. The member 40 has a concave portion for cooperation with the convex portion of the lug to effect a firm seat for the latter.

A hole extends through the lug 33 in the center of the concave portion 36 for the reception of the bolt 34. A washer 35′ is provided for the nut 35 and it is sufficently convex, on one face thereof, to conform substantially to the concave central portion of the lug 33.

When the nut 35 is tightened, the ball-face 37 on the lug 33 is caused to exert a pressure against the upper face of the flange of the guide rail 30 and the smooth face 38 on the lug is firmly pressed against the bearing member 39. Thus the guide rail 30 is securely clamped to the structural member 31.

If relative movement between the guide rail 30 and the structural member 31 occurs, the force tending to raise the end 37 of the lug 33, causes the smooth face 38 to press more firmly on the bearing member 39. The bearing member 39, being of lead, babbitt or other similar material, is compressed within the elastic limit thereof and thus exerts a force of reaction which is transmitted through the lug 33, acting as a lever fulcrumed at the concave seat in the member 40, to the flange of the guide rail 30 whereby a resilient force is exerted to resist relative movement between the guide rail and the structural member 31.

Although only one clamping device is shown in Fig. 4, it should be understood that a similar device is employed for the oppositely extending flange of the guide rail.

Another modification of a clamping device is illustrated in Figs. 8 to 12. This modification is of such construction that the clamping member cannot turn or twist when relative movement between a guide rail and the supporting structural member occurs.

Referring to Fig. 9, the clamping device comprises a resilient clamping member 45 of U-shape and preferably of steel or other suitable material, having one leg thereof adapted to be rigidly secured to a supporting member, and a longer leg for resiliently engaging the flange of a guide rail to resistingly permit movement of the rail. I prefer, in the present embodiment, to secure the spring clamp 45 in operative position by means which also serves to prevent straining the long leg of the member 45 beyond its elastic limit in order that the resiliency thereof may not be impaired.

The clamp 45, as shown in Fig. 11, has a circular hole 45*a* extending through the longer leg thereof and a smaller hole 45*b* extending through the short leg thereof, the two holes being coaxially disposed. A sleeve or bushing 47 (shown in Fig. 10), the outer diameter of which is smaller than the diameter of the hole 45*a* and the inner diameter of which is the same as the diameter of the small hole 45*b*, is adapted to be inserted through the large hole 45*a* and against the inner face of the short leg of the member 45. The length of the bushing 47 is such that when one end thereof engages the inner face of the short leg, the other end projects a slight amount beyond the outer face of the long leg.

As shown in Fig. 9, a bolt 48, having a collar or

washer 49 adapted to bear against the projecting end of the bushing 47, is inserted through the bushing and cooperating holes in the short leg of member 45, in the shim 46 and in the supporting structural member 50 and is provided with a suitable lock washer and nut 52 for securing the short leg of the member 45 to structural member 50.

The extending end of the long leg of the member 45 projects over the edge of the flange of a rail 53 and, when the nut 52 is tightened, exerts a resilient pressure upon the upper face of the flange of the rail to resistingly permit relative movement between the rail 53 and the structural member 50. It will be clear that when the nut 52 is tightened, the collar 49 on bolt 48 bears against the projecting end of bushing 47, and has no effect upon the resiliency of the clamping member 45.

A bearing member 54 (Figs. 9 and 12) of substantially channel shape, may be positioned around the edge of the flange of the rail 53 and beneath the end of the long leg of the member 45 for the purpose of reducing friction when the rail moves relatively to the structural member 50.

A pair of spaced integrally-formed, or punched, lugs 55 are provided on one face of the bearing member 54 for engaging opposite edges of the extending end of the long leg of member 45 to prevent relative movement between the bearing member 54 and the member 45.

When the rail 53 moves relatively to the structural member 50, which may be either rigid or flexible in character, the flange of the rail 53 slides in the bearing member 54 against the resisting force caused by the resiliently exerted pressure of the long leg of the spring member 45.

The collar 49, being disposed adjacent to the outer surface of the long leg of the member 45, serves as a limit to prevent the long leg from being sprung out of its normal position to a degree in excess of its elastic limit, and thus insures continued resiliency of the member.

Although only one clamping device is illustrated in Fig. 9, it should be understood that a similar clamping device may also be provided for securing the oppositely extending flange of the rail 53.

It should be understood, further, that the clamping device employing the spring member 45 enables a guide rail to be directly clamped to a rigid structural member of a building structure and thus the interposition of a flexible member, such as the member 15 in Figs. 1, 2 and 3, is unnecessary, although such flexible member may also be employed if desired.

It will thus be seen that my present invention comprises means for maintaining the alignment of elevator guide rails regardless of changes in the length thereof due to temperature changes, and regardless of a settling of the building structure in which the rails are disposed.

Furthermore, it will be seen that I have provided means for resiliently securing a guide rail to a rigid structural member to resistingly permit relative movement between a rail and the rigid structure whereby the alignment of the rail is maintained.

It will also be seen that I have provided a novel clamping device for resiliently securing an elevator guide rail directly to a rigid member of a building structure to resistingly permit relative movement between the rail and the rigid member without a loosening of the clamping device.

In addition, it will be seen that I have provided a clamping device for resiliently securing an elevator guide rail directly to a rigid member included in a building structure to resistingly permit relative movement between the rail and the rigid member without a turning or pivoting of the clamping device.

It will be understood that my invention is capable of various other modifications without departing from the spirit and scope thereof. It is my intention, therefore, not to limit the scope of my invention except as necessitated by the prior art and as defined in the appended claims.

I claim as my invention:

1. In combination, a structural member, an elevator guide-rail adapted to be supported by said member, and means for maintaining the alignment of said rail including means for resiliently securing said rail to said member to resist relative movement therebetween.

2. In combination, a substantially rigid structural member, an elevator guide-rail adapted to be supported by said member, and means for maintaining the alignment of said rail, including a resilient member secured to and flexibly movable with respect to said rigid member, and means for securing said rail to said resilient member.

3. In combination, a substantially rigid structural member, an elevator guide-rail disposed to be supported by said member, and means for maintaining the alignment of said rail, including a resilient member secured to and flexibly movable with respect to said rigid member, and means including clamping means for securing said rail to said resilient member.

4. In combination, a structural member, an elevator guide-rail disposed to be supported by said member, and means for maintaining the alignment of said rail, including a clamping member having oppositely extending portions, a resilient bearing member supported on said structural member, and adjustable means for causing one of the portions of said clamping member to exert a pressure on said rail and for causing the other of said portions to exert a pressure on the said bearing member.

5. In combination, a structural member, an elevator guide-rail disposed to be supported by said member, and means for maintaining the alignment of said rail, including a resilient clamping member of substantially U-shape for securing said rail to said structural member to permit relative movement therebetween, said clamping member having a long leg and a short leg, and means for securing the short leg of said member rigidly in such position to said structural member as to cause the long leg of said member to resiliently exert a pressure on said rail to resist relative movement between said rail and said structural member.

6. In combination, a structural member, an elevator guide-rail disposed to be supported by said member, and means for maintaining the alignment of said rail, including a resilient clamping member of substantially U-shape for securing said rail to said structural member to permit relative movement therebetween, said clamping member having a long leg and a short leg, means for securing the short leg of said member rigidly in such position to said structural member as to cause the long leg of said member to resiliently exert a pressure against said rail to resist relative movement of said rail and said structural member, and a bearing member for engaging

said rail and reducing the friction between the long leg and said rail when relative movement therebetween occurs.

7. In an elevator guide-rail support, means for maintaining the alignment of an elevator guide-rail, including a resilient member of substantially U-shape, and means for securing one leg of said member stationarily and causing the other leg to resiliently exert a pressure on said rail, said securing means also limiting the movement of said other leg.

8. In an elevator guide-rail support, means for maintaining the alignment of an elevator guide-rail, including a resilient clamping member of substantially U-shape, one of the legs of said clamping member being longer than the other, the long leg having a hole therein and the short leg having a comparatively smaller hole therein disposed in coaxial relation, a bushing having an outer diameter slightly smaller than the diameter of the hole in the long leg and an inner diameter substantially equal to the diameter of the hole in the short leg, inserted in the large hole in said long leg, said bushing having a length such that when one end thereof engages the inner face of the short leg the other end thereof projects beyond the outer face of the long leg a predetermined distance, and adjustable means insertable through said bushing and holes for stationarily securing the short leg of said clamping member and limiting the movement of the long leg.

9. In combination, a substantially rigid structural member, an elevator guide-rail disposed to be supported by said member, and means for maintaining the alignment of said rail including a resilient member secured to and flexibly movable with respect to said rigid member, and means including clamping means for resiliently securing said rail to said resilient member.

10. In combination, a substantially rigid structural member, an elevator guide-rail disposed to be supported by said member, and means for maintaining the alignment of said rail including a resilient member secured to and flexibly movable with respect to said rigid member, and means including clamping means for resiliently securing said rail to said resilient member to resist relative movement therebetween.

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