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RAIL POSITIONING AND FASTENING DEVICE

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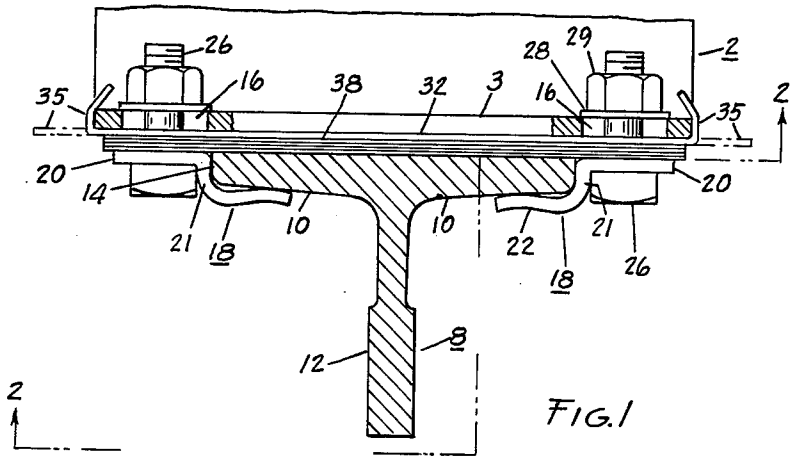

FIG. 1

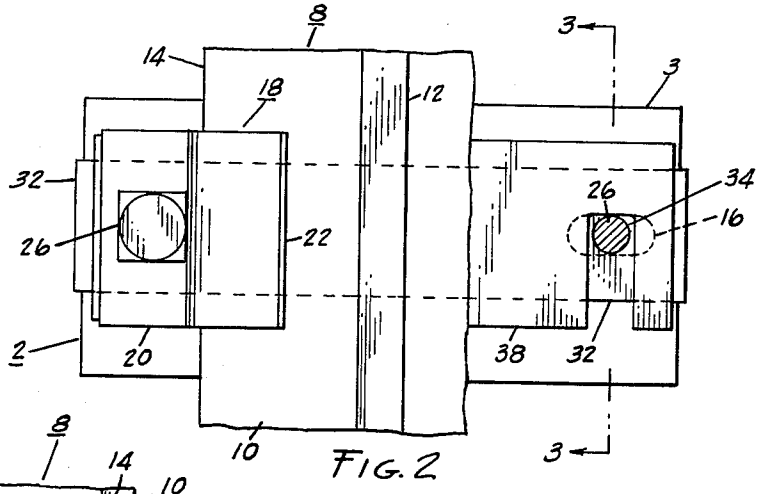

FIG. 2

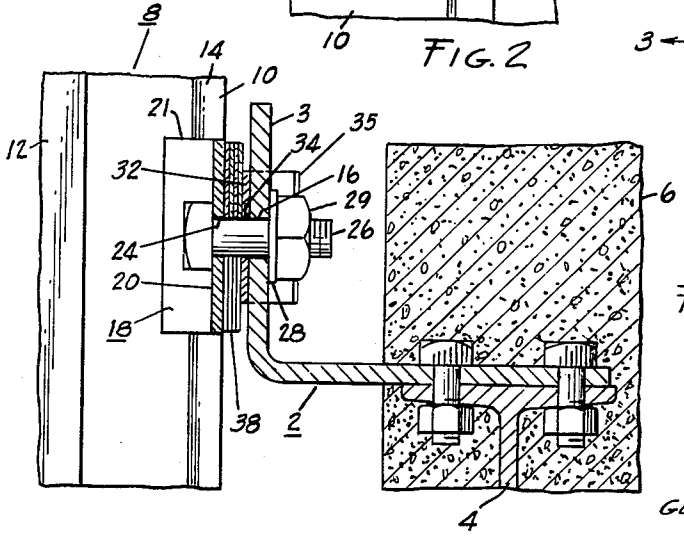

FIG. 3

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RAIL POSITIONING AND FASTENING DEVICE

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4 Claims. (Cl. 189—36)

This application is a continuation of the copending application of George Clifford Anderson, Serial No. 87,002, filed February 3, 1961, now abandoned, for Rail Positioning and Fastening Device.

This invention relates to positioning and fastening devices for guide rails, especially to devices for attaching guide rails for elevators to a supporting structure.

Present-day multi-storied buildings are usually constructed of a framework or skeleton of structural steel, consisting of vertically disposed supporting columns to which horizontal cross members are fastened at various heights to provide the structural framework for the various floors of the building. This steel framework is erected floor by floor, starting at the foundation, and, as the erection proceeds, the steel beams are encased in concrete to increase the structural strength of the building framework. The pouring of concrete closely follows the progress of the steel erection (approximately two to three floor heights behind).

In such buildings, it is desirable that elevator service be provided as soon as is practicable. Therefore, the rails for guiding the vertical movements of the elevators are installed as fast as the erection of the steel framework permits and are secured thereto. To accomplish this, rail mounting brackets are rigidly secured to the steel framework (before it is encased in concrete) at predetermined spaced intervals along the path of travel of the elevator and the rails are fastened thereto by means of rail clips which frictionally engage the flanges of the rails.

For proper elevator operation it is highly desirable to install the rails as near to plumb as the building structure will allow, preferably within about 1/64 of an inch of plumb. Such installation requires considerable skill and is time consuming, making it difficult for the rail erectors to keep ahead of the concrete pouring. To avoid such difficulty, it is desirable that the rail mounting brackets be of a type which facilitates the proper alignment of the rails subsequent to the pouring of concrete. Such mounting brackets may be secured to the steel framework in approximate alignment with each other and the rails may be installed and aligned later, thereby enabling the mounting bracket erectors to keep in step with the erection of the steel framework.

As the erection of the building progresses, the additional weight of the steel and concrete at the higher landings results in compression of the building framework with a slight lateral shifting of the position of the rail mounting brackets. This shifting results in misalignment of rails previously installed at lower landings of the building and necessitates realignment of such rails. It is therefore desirable to provide a rail supporting and attaching arrangement which facilitates the alignment and locking of the rails in position subsequent to their initial installation.

It is therefore an object of this invention to provide a guide rail positioning and fastening arrangement which facilitates the installation and approximate alignment of elevator guide rails initially, while permitting them to be subsequently fine aligned and locked in final position readily and easily.

Features and advantages of the invention will be seen from the above, from the following description of the operation of the preferred embodiment when considered in conjunction with the drawings and from the appended claims.

In the drawings:

FIGURE 1 is a sectional plan view with portions broken away of an elevator guide rail attached to the building structure in accordance with the invention;

FIGURE 2 is a sectional view taken along the line 2–2 of FIGURE 1; and

FIGURE 3 is a sectional view taken along the line 3–3 of FIGURE 2.

Referring to the drawings, a rail mounting or supporting bracket 2 of L cross-sectional shape for supporting a guide rail 8 is bolted to the structural steel framework 4 of a building, which steel framework is then encased in concrete 6. T-shaped guide rail 8 has a mounting web formed by a pair of oppositely disposed attaching or mounting flanges 10, and a guiding web 12 disposed perpendicularly to the mounting web. Each flange 10 tapers from a relatively thick dimension at its junction with guiding web 12 to a relatively thin dimension at its lateral edge 14. Although only a portion of guide rail 8 is shown, it is to be understood that this invention is applicable to the entire length of a guide rail which is secured to the structural steel framework at approximately twelve foot intervals throughout an elevator hoistway to guide the travel of the elevator. Upwardly extending or vertically disposed leg 3 of mounting bracket 2 has defined therein a pair of horizontally disposed elongated slots 16, spaced apart and in horizontal alignment with each other. One slot is utilized in conjunction with the left flange 10 of the guide rail while the other is for the right flange.

Guide rail 8 is mounted on or supported against mounting bracket 2 by means of a pair of rail clips 18, one for each flange. Each rail clip 18 is made of spring steel and has an attaching or base portion 20, shoulder portion 21 and an offset clamping portion 22 to clamp the rail flange 10 to the mounting bracket. An aperture 24 in attaching portion 20 snugly receives a bolt 26, having its head positioned contiguous to the shoulder portion 21 which acts as a stop to prevent rotation of the bolt. The vertical length of rail clip 18 is almost as long as the vertical dimension of leg 3 of mounting bracket 2, and is so designed in order to resist effectively rotative forces tending to pivot it into binding engagement with rail edge 1.

Rail positioning and locking plate means 32, having two horizontally spaced, bolt receiving apertures 34 defined therein, one for the right rail clip 18 and one for the left clip, is interposed between mounting flanges 10 of rail 8 and leg 3 of the mounting bracket. End or edge portions 35 of plate 32 in its unlocked condition (shown by broken lines in FIGURE 1) extend beyond the vertical side edges of leg 3 of the mounting bracket. Bolt 26 extends through aperture 24 of rail clip 18, aperture 34 of plate 32 and elongated slot 16 of mounting bracket 2 and co-operates with washer 28 and nut 29 to fasten the elements together. Bolt 26 is dimensioned so as to fit snugly into apertures 24 and 34 of the rail clips and locking plate, respectively, to obviate lateral shifting of the rail clips relative to the rail. Apertures 34 in plate 32 are accurately spaced apart to position (when the elements are assembled) shoulder portion 21 of rail clip 18 snugly but not tightly against lateral edge 14 of rail mounting flange 10. With shoulder portion 21 thus positioned to snugly abut rail edge 14, lateral or sidewise shifting of the rail relative to plate 32 is prevented. In the described embodiment, there is not complete surface contact between flange 10 and clamping portion 22 of the rail clip, but only a narrow band or line contact therebetween, as

is illustrated in FIGURE 1. The frictional engagement between rail clip means 18 and mounting flange 10, for the particular rail and rail clip combination, is such as to permit relative vertical movement between rail flange 10 and rail clip means 18, locking plate 32, and supporting bracket 2. Such relative vertical movement is desirable to allow for thermal expansion of the rail or building compression. Because the clamping portion 22 is offset from the attaching portion 20 an amount slightly greater than the thickness of flange edge 14, any excess tightening of nut 29 will not increase the force applied to rail flange 10 by the rail clip clamping portion 22, with the result that the relative vertical movement of the guide rail to its mounting bracket, rail clips and locking plate is not impeded by an abnormal pressure exerted on the attaching portion of the rail clip. Shims 38, each having two vertically extending slots, for fitting over bolts 26, may be positioned between mounting flanges 10 of rail 8 and plate 32 for lateral postwise adjustment of the rail.

It may be noted that rail 8 may be properly aligned either postwise by means of shims 38 or sidewise by means of bolts 26 positioned in elongated slots 16 by moving the entire assembly, consisting of rail 8, rail clips 18, locking plate 32 and bolts 26, as a unit. In so doing the position of clips 18 relative to attaching flanges 10 of the rail is not disturbed. Once positioned, the entire assembly may be secured to the mounting bracket by tightening nuts 29, and then locked into position by bending the edge portions 35 of locking plate 32 over the vertical side edges of leg 3 of mounting bracket 2. In one tested installation it has been found satisfactory to use a locking plate 32 which was approximately 1/16 of an inch thick, 2 inches wide and 10 3/8 inches long, allowing 1 3/8 inches of its length to be bent over the vertical side edges of leg 3 of the mounting bracket.

This mounting arrangement facilitates the installation of elevator guide rails, since the rail erectors may quickly "rough" align and secure the rail mounting brackets to the steel framework, thereby easily keeping ahead of the concrete pouring stage of the construction. Subsequent to the concrete pouring, the rails may be installed on their respective mounting brackets in approximate alignment and temporarily secured in position by the tightening of bolts 26, leaving the time consuming job of fine aligning the rails until a later date.

When it is desired to fine align the rails, bolts 26 may be loosened, enabling the rail, rail clips and locking plate to be moved laterally, as a unit, as has been previously described. The bolts may then be retightened and the rail securely locked against lateral shifting by bending the edge portions of the locking plate over the vertical side edges of the mounting bracket, as has been described.

It may be noted that, notwithstanding the positions of bolts 26 in elongated slots 16, locking plate 32 in conjunction with the aforementioned snug fit of bolts 26 in apertures 24 of the rail clips and apertures 34 of the locking plate directly couples the oppositely disposed rail clips to each other in a substantially rigid connection. With the clips thus coupled together a substantial frictional engagement exists between the locking plate and the contiguous surface of the mounting bracket, which engagement also acts to resist lateral shifting of the rail. This frictional engagement is substantial, since forces tending to move the rail laterally must overcome the frictional engagement due to the pressures exerted not by merely one of the securing bolts 26, but by both the bolts, acting in unison.

As changes can be made in the above described construction and many apparently different embodiments of this invention can be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown on the accompanying drawings be interpreted as illustrative only and not in a limiting sense.

What is claimed is:

1. Apparatus supporting a vertically disposed guide rail on a structure, comprising,
a mounting member attached to said structure and having a substantially vertical surface spaced therefrom,
said member having formed therein two elongated apertures the long axes of which are substantially horizontal,
said guide rail including a guiding web and a pair of oppositely disposed flanges,
a pair of rail clips each engaging one of said flanges and each having an aperture formed therein,
a pair of mounting bolts extending through said apertures in said clips with a snug fit and also extending through said elongated apertures, and
a locking plate positioned between said supporting member and said flanges and clips and having two apertures formed therein of such diameter as to receive said bolts with a snug fit,
said apertures in said locking plate being spaced apart a predetermined distance selected to properly position said clips with respect to said flanges,
said locking plate being positively locked to said mounting member to prevent relative lateral movement therebetween after said rail is aligned.

2. Apparatus supporting a vertically disposed guide rail on a structure, comprising,
a mounting member attached to said structure and having a substantially vertical surface spaced therefrom,
said member having formed therein two elongated apertures the long axes of which are substantially horizontal and aligned with each other,
said guide rail including a guiding web and a pair of oppositely disposed flanges,
a pair of rail clips each engaging one of said flanges and each having an aperture formed therein,
a pair of mounting bolts extending through said apertures in said clips with a snug fit and also extending through said elongated apertures,
a locking plate positioned between said supporting member and said flanges and clips and having two apertures formed therein of such diameter as to receive said bolts with a snug fit,
said apertures in said locking plate being spaced apart a predetermined distance selected to properly position said clips with respect to said flanges, and
a pair of nuts threaded onto said bolts,
whereby with said nuts loose said elongated apertures permit the rail to be aligned by laterally shifting the assembly comprising said rail, said clips, said nuts and bolts, and said locking plate with respect to said mounting member, after which said nuts may be tightened,
said locking plate being positively fastened to said mounting member to prevent relative lateral movement therebetween after alignment of said rail.

3. Means positioning and fastening a guide rail on a supporting bracket having bolt accepting apertures, said means comprising,
a pair of rail clips each having a clamping portion affixing said guide rail to said supporting bracket and a base portion with a bolt accepting aperture formed therein, and
a locking plate of greater width than said supporting bracket intermediate said supporting bracket on one side and transverse of said guide rail and said rail clips on the other side,
said locking plate having end portions and bolt accepting apertures through which bolts pass which in turn are secured by nuts,
said apertures being set apart an appropriate distance to fix the base portions of said rail clips in alignment laterally against the edge of the base of said

rail when the bolts are inserted through the apertures in the base portions of said rail clips and the apertures in said locking plate,

said apertures in said supporting bracket being elongated lateral slots thereby allowing said locking plate, said rail clips, and said threaded bolts and nuts and said guide rail to be shifted laterally as a unit until said nuts have been tightened on said threaded bolts,

said end portions of said locking plate being bent over and around the vertical side edges of said supporting bracket whereby said unit is fixed against further lateral movement.

4. Apparatus supporting a vertically disposed elevator guide rail on a structure, comprising,

a mounting member rigidly attached to said structure and having a substantially vertical surface spaced from said structure,

said member having formed therein two elongated apertures the long axes of which are horizontally disposed,

said elevator guide rail including a guiding web and a pair of oppositely disposed flanges,

first and second rail clips each engaging one of said flanges and each having an aperture formed therein,

a pair of mounting bolts extending through said apertures in said clips with a snug fit and also extending

through said elongated apertures and secured with nuts, and

a locking plate having two apertures formed therein of such diameter as to receive said bolts with a snug fit and spaced apart a predetermined distance selected to properly position said bolts and clips with respect to said flanges, which distance is substantially equal to the distance between centers of said elongated apertures,

said locking plate being positioned between said supporting member and said flanges and clips,

said locking plate being wider in the horizontal direction than said vertical surface of said mounting member,

opposite ends of said locking plate which extend beyond the sides of said mounting member being bent over the edges of said mounting member.

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