Sept. 1, 1970 W. J. HORGAN, JR 3,526,390

HANDRAIL FITTING

Filed June 23, 1969 3 Sheets-Sheet 1

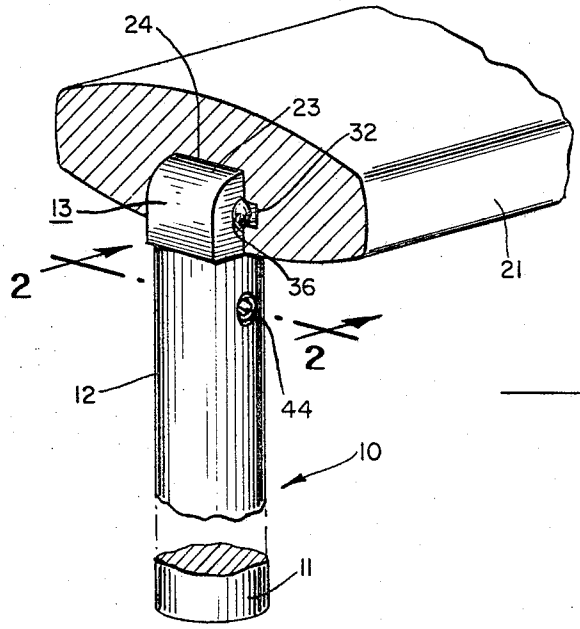


Fig. 1

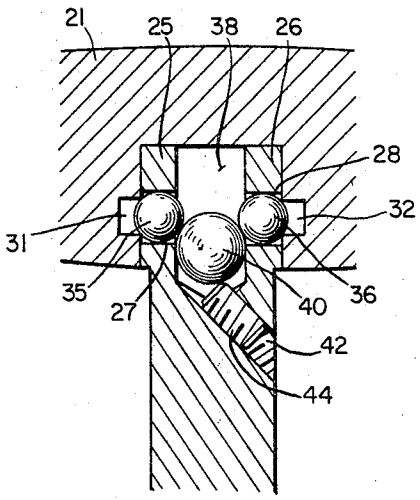


Fig. 2

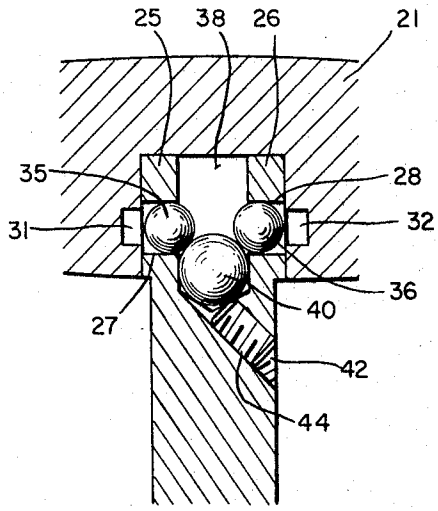


Fig. 3

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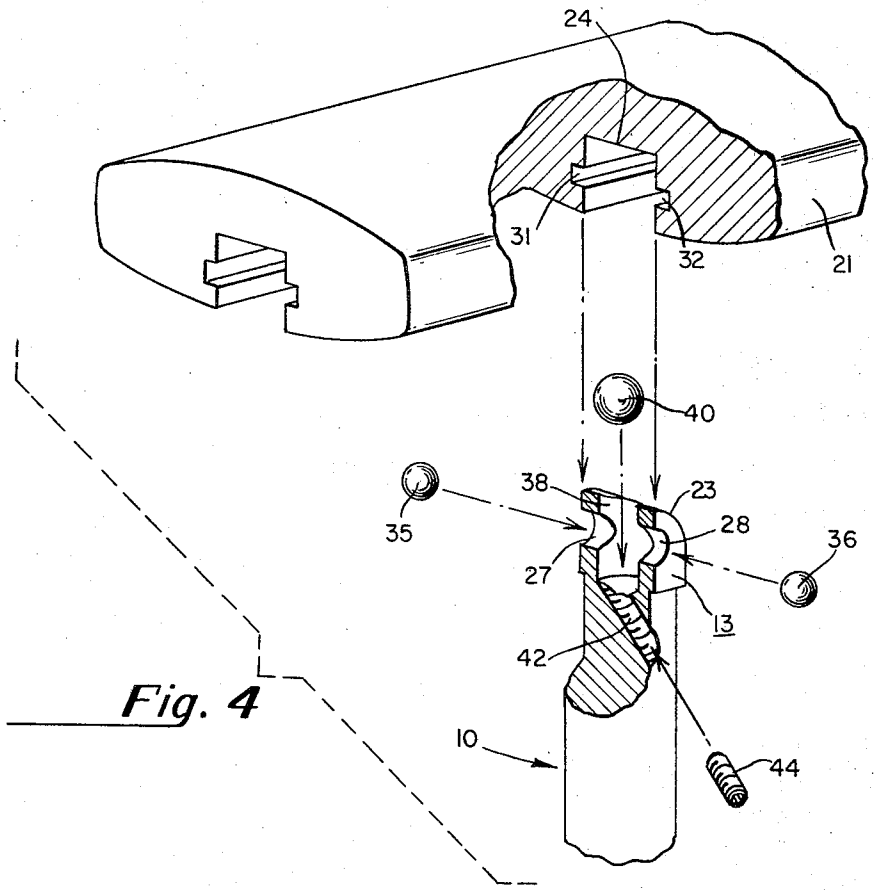
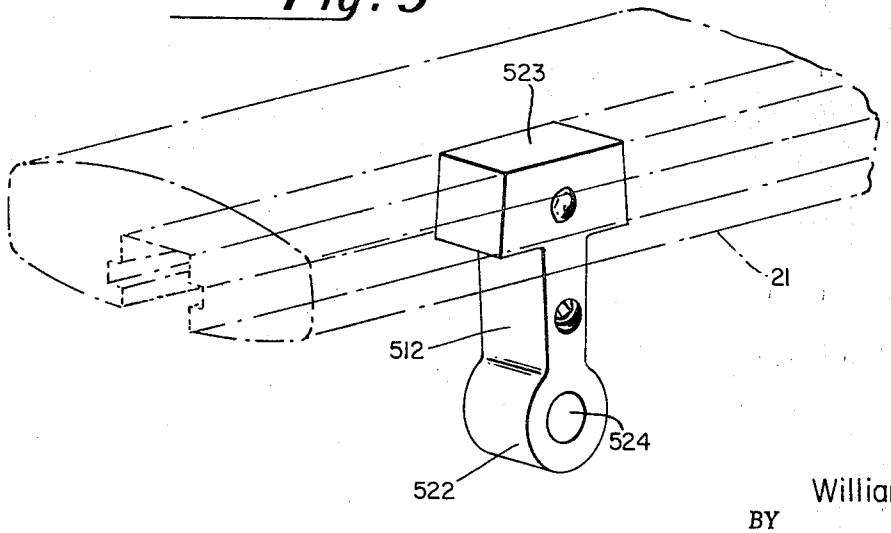


Fig. 4

Fig. 5



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HANDRAIL FITTING

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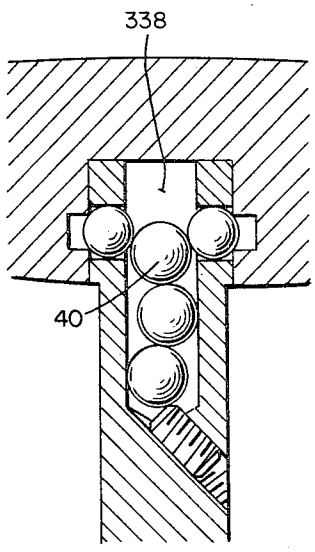


Fig. 6

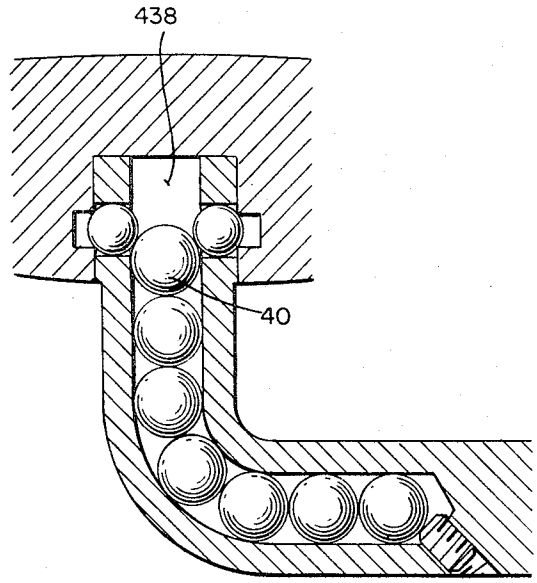


Fig. 7

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United States Patent Office 3,526,390 Patented Sept. 1, 1970

3,526,390

HANDRAIL FITTING

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Continuation-in-part of application Ser. No. 755,236, Aug. 26, 1968. This application June 23, 1969, Ser. No. 850,683

Int. Cl. E04h 17/14

U.S. Cl. 256—65 17 Claims

ABSTRACT OF THE DISCLOSURE

A handrail fitting fits into a slot in the underside of a handrail. The slot is in the shape of a cross and the fitting is provided with a horizontally extending hole in alignment with the horizontal portion of the slot. Means are provided in sliding engagement with the hole in the handrail fitting, which can be extended into the slot to grip the handrail. These means are preferably steel balls which are forced apart by a separate steel ball which is driven between them. The separate steel ball is disposed in a vertical hole in the fitting and is acted upon by a set screw or alternatively, by one or more other balls which are acted upon by a set screw, said set screws being disposed at an upward angle to the vertical hole to contact and move said balls and being accessible to a tool from below the handrail.

CROSS-REFERENCES TO RELATED APPLICATION

This application is a continuation-in-part of my prior copending application Ser. No. 755,236, filed Aug. 26, 1968 and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to means for attaching a handrail to a post or other mounting means, and more particularly, to means for use with handrails supported by posts which means are disposed in slots along the underside of the handrail.

As the art has recently developed, handrails in a variety of shapes have come to be constructed with slot means in the underside thereof for reception of various means which can be referred to as support means or connector means or adapter means and which are designed to connect the handrail to whatever support structures are provided. The problem faced in the prior art is to provide a great deal of flexibility in installation of the handrail units, particularly ornamental handrail units which require the fittings to be attractive in appearance and not detract from the overall appearance of the handrail unit, and also which are easily installed and adjusted.

SUMMARY OF THE INVENTION

The present invention comprises a fitting for use on the end of a post or other support means which is inserted into the slot on the other underside of a handrail, said fitting having a hole extending therethrough communicating with the side walls of the slot and a plurality of gripping members disposed in sliding engagement within the hole and acted upon by separate actuating means disposed within said fitting, whereby said gripping members are forced into contact with the walls of the slot to form a firm connection between the handrail fitting and the handrail. In the preferred embodiment of my invention the gripping means are steel balls and the actuating means is likewise a steel ball of somewhat larger diameter disposed in a vertical hole intersecting the horizontal hole in the fitting and coacting with a set screw disposed in a threaded hole at an upwardly inclined angle to the vertical hole and

accessible from below the handrail for insertion of a tool to turn said set screw.

A further preferred feature of this invention is a self-centering means provided by a clearance between the large diameter actuating ball and the vertical hole in which it moves.

In alternate embodiments a plurality of balls are provided between the set screw and the actuating ball whereby as the screw is advanced the balls move to drive the actuating ball. In one of these embodiments the hole in which the actuating ball and the plurality of intermediate balls are disposed is formed along a curved path, as for example, a bent conduit.

Accordingly, it is an object of this invention to provide an attractively ornamental fitting for use with ornamental handrailings and support means, to connect the elements with a great deal of flexibility and ease in installation, and to provide a fitting which is adaptable to various slot configurations in handrails currently being used.

It is a further object of this invention to provide a versatile handrail fitting connecting means for connecting the fitting to a slotted handrail by providing a novel gripping means and actuating means allowing for self-centering, firm gripping, and flexibility of application to the varying shapes of the support means.

These and other objects of the invention will become apparent from the following description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective of a preferred embodiment of my invention showing the handrail fitting in operative position with a slotted handrail and post;

FIG. 2 is a view taken as indicated by the lines and arrows 2—2 in FIG. 1;

FIG. 3 is a view similar to FIG. 2 with a portion of the handrail fitting in an alternate position;

FIG. 4 is an exploded view of the parts of the handrail fitting and handrail shown in the previous figures;

FIG. 5 is a perspective view of an alternate embodiment of my invention with the handrail shown in phantom operative position;

FIG. 6 is a view similar to FIG. 2 showing an alternate embodiment of my invention; and

FIG. 7 is a view similar to FIG. 2 showing a further alternate embodiment of my invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although specific forms of the invention have been selected for illustration in the drawings, and the following description is drawn in specific terms for the purpose of describing these forms of the invention, this description is not intended to limit the scope of the invention which is defined in the appended claims.

In FIG. 1, a handrail support means in accordance with the preferred embodiment of my invention, is shown in assembled position with an ornamental handrailing and post. The support means comprises a fitting designated **10** which can be mounted or fixed in any suitable fashion (as illustrated by the broken lines) on or as part of any type of post **11** or baluster, or can be attached or affixed to an adapter which in-turn can be fixed to the post (see for example Blum et al. Pat. No. 3,351,324). The fitting consists of a support member **12** which can be of any suitable design and can be, for example, square, round, or rectangular, in cross-section, and made of metal such as steel or aluminum as is well know in the art. The support member **12** terminates in a head **13** disposed in the slot in the underside of the railing **21**. In the embodiments shown in FIGS. 1 through 4 the head is essentially rectangular in an overall cross-section

at the base thereof, and terminates in an upper rounded surface as at **23**. Thus the flat side walls of the head parallel the side walls of the slot and can be in sliding engagement therewith or a slightly looser fit can be provided by a minimum clearance on either side. The upper rounded surface of the head normally abuts the handrail at the bottom **24** of the slot and not only can slide against the surface which it abuts, but also can roll slightly due to its rounded surface.

Disposed in each side wall **25** and **26**, FIG. 2, of the head there is a ball (**35** and **36** respectively) preferably made of stainless steel which is slidably mounted in the holes **27** and **28** respectively within the walls. The slot in the handrail is cross-shaped or T-shaped as desired and has at least two opposed longitudinal slots **31** and **32**, one in each wall thereof, which can be rectangular in cross-section as desired. The height of the slots as shown in the figures is somewhat less than the diameter of the steel balls **35** and **36**, so that the corners of the slots will engage the surface of the balls.

Disposed in the fitting is an axial bore **38**, extending downwardly from the upper rounded terminal end thereof and containing a large diameter steel ball **40**. The ball is preferably larger in diameter than either of the two steel balls which are disposed in the laterally extending holes. The bore **38**, extends sufficiently deep into the fitting so that the large diameter ball when resting at the bottom of the bore will not interfere with the two smaller balls to the extent that they can be withdrawn completely within the confines of the head, but will interfere with them to prevent them from completely entering the bore **38** as shown in FIG. 3. The bottom of the axial bore communicates with a hole **42** extending at an angle to the axis downwardly through the exterior surface of the fitting. An angle of 45° is preferable but can be varied within the scope of this invention. The hole is threaded to receive a set screw **44** in threaded engagement therewith as shown. As the set screw is turned to advance it in the hole, it contacts the large diameter ball and forces it up the axial bore and into engagement with the smaller diameter balls. Upon continued advancement of the set screw the large diameter ball rises further in the axial bore and causes the smaller balls to diverge laterally and roll or slide in their respective holes until they extend from the side walls of the head and come into engagement with the corners of the adjacent slots, as shown in FIG. 2. The center lines of the holes containing the balls are conveniently positioned with respect to the upper-rounded terminal surface so that when the fitting is inserted into the slot and the upper-rounded terminal surface meets the handrail surface the balls will be aligned with the side slots. The set screw is then tightened to drive the smaller balls out against the handrail for positive locking engagement therewith. It is preferable during assembly to advance the set screw slightly at first to a point where the smaller balls extend from their holes into the slots in the handrail, allowing a degree of sliding motion between the fitting and handrail for positioning it. Once in proper position, the set screw is tightened to bind the fitting firmly to the handrail.

In an alternate embodiment shown in FIG. 5 the upper surface **523** of the head is a flat rectangular shape, so that it lays flush with the under surface of the handrail formed by the slot and provides a sliding bearing surface. The head then tapers down from this bearing surface as shown, to the support portion of the fitting. The larger diameter ball, the two small diameter balls, and the set screw function in exactly the same manner as that previously described. However, this configuration does not provide for a rotational adjustment of the head of the fitting in the slot in the handrail. It is desirable to provide a means for rotational adjustment, and such is provided as shown by the lower terminal portion **522** of the support **512**. As shown in FIG. 5, the support **512** terminates in a rounded bushing **522** having a bore **524** therein for connection to a laterally extending support member (not shown, but known as for instance, that shown and described in Blum et al. Pat. No. 2,807,834, issued Oct. 1, 1967). This arrangement allows for rotational adjustment to accommodate variations present in mounting handrails.

It will be appreciated that when the handrail portion of the railing is placed on a plurality of posts, all disposed at slightly varying angles and at slightly varying heights all the posts will not normally engage the slot in the underside of the handrail in exactly the same manner. Thus, during installation, the rounded portion of the fitting as shown in FIGS. 1 through 4, serves a function in providing for rotational adjustment.

In the alternate embodiment shown in FIG. 6 the handrail, slot, fitting, set screw, smaller balls, and actuating ball **40** are all exactly the same as those described with respect to FIGS 1 through 4 the difference in this embodiment is that the bore **338** has been extended vertically to accommodate a plurality of larger balls. These larger balls are disposed between the set screw and the actuating ball **40** and maintain and move the actuating ball in response to movement of the set screw in the manner previously described with respect to the set screw acting upon the large ball by itself. The advantage of this embodiment is that it allows the set screw to be positioned more remotely from the underside of the handrail.

A further advantage in this embodiment is shown by the position of the balls within the bore **338**. Note that there is a space between the balls and one or more portions of the bore **338**. This is because the bore has been made slightly oversized and the ball **40** is no longer in complete sliding engagement with the bore along all surfaces. This feature of the invention provides for self-centering of the large steel ball in engaging the smaller balls being forced outwardly. The self-centering effect provides for uniformity of force and load distribution in clamping the fitting to the slot on the underside of the handrail.

In the further alternate embodiment shown in FIG. 7 the bore **438** follows a curved path in the handrail support structure; which itself resembles a bent conduit. In this embodiment even more balls are provided so that the power transmission between the set screw and the actuating ball **40** can be even further extended and can be made to follow varying geometric structures which may be encountered in the existing handrail art.

It will further be understood that the "Abstract of the Disclosure" set forth above is intended to provide a non-legal technical statement of the contents of the disclosure in compliance with the Rules of Practice of the U.S. Patent Office, and is not intended to limit the scope of the invention described and claimed herein.

What is claimed is:

1. A handrail support means for a handrail of the type having a longitudinally extending slot therein, comprising:

(a) a support extending into said slot and having a transverse hole therein communicating with the walls forming said slot, and a longitudinal hole therein communicating with said transverse hole;

(b) engagement means in said transverse hole, positionable to extend therefrom and engage said walls; and

(c) actuating means in said longitudinal hole moveable to contact and position said engagement means into contact with said walls.

2. The invention of claim **1** wherein said longitudinal hole comprises a first portion communicating with said transverse hole and a second portion providing access to said first portion from without said support.

3. The invention of claim **2** wherein said actuating means comprises means mounted in said second portion of said longitudinal hole, adjustable to a plurality of posi-

tions, and means freely moveable longitudinally within said first portion of said longitudinal hole to position said engagement means as aforesaid in response to adjustment of said last mentioned means.

4. The invention of claim 1 wherein said engagement means comprises at least one ball.

5. The invention of claim 1 wherein said actuating means comprises at least one ball.

6. The invention of claim 2 wherein said second portion is threaded, and a portion of said actuating means comprises a screw in threaded engagement therewith.

7. The invention of claim 1 wherein said engagement means comprises at least two steel balls, one on each side of said longitudinal hole.

8. The invention of claim 7 wherein said actuating means comprises at least one steel ball.

9. The invention of claim 7 wherein said longitudinal hole comprises a first portion communicating with said transverse hole and a second portion providing access to said first portion from without said support, and said actuating means comprises at least one steel ball moveably disposed in said first portion and means mounted in said second portion adjustable to a plurality of positions to engage said steel ball and move it to contact and position said steel balls in said transverse hole as aforesaid.

10. The invention of claim 5 wherein said ball in said actuating means which contacts said engagement means is smaller in diameter than the smallest transverse dimension of said longitudinal hole.

11. The invention of claim 10 wherein said actuating means comprises a plurality of balls, one of which positioned to engage said engagement means to reposition said engagement means, each ball being in contact with only one other ball, and a screw threaded through said support communicating with said longitudinal hole, said screw being adjustable to contact the ball most remote from the ball engaging said engagement means and moveable in response to movement of said screw to position said engagement means as aforesaid.

12. The invention of claim 1 wherein said longitudinal hole follows a curved path.

13. The invention of claim 1 wherein the slot in the handrail is T-shaped in section and means are provided on said support to coact with said handrail to position said transverse hole opposite to the cross portion of said T-shaped slot.

14. The invention of claim 13 wherein said engagement means comprises a plurality of balls at least two of which extend from said support into the cross portion of said slot.

15. The invention of claim 14 wherein the diameter of said balls is greater than the opening of the cross portion of said slot whereby said balls will be forced into engagement with the edges of the handrail forming the cross portion of said slot upon appropriate actuation of said actuating means.

16. The invention of claim 14 wherein said actuating means is self-centering in its contact with said engagement means.

17. The invention of claim 16 wherein said self-centering is provided by a ball of larger diameter engaging the balls of said engagement means said ball being of smaller diameter then the maximum transverse dimension of said longitudinal hole.

References Cited

UNITED STATES PATENTS

2,232,340	2/1941	Olson.	
2,762,639	9/1956	Molter et al.	
3,455,586	7/1969	Kurtzmann	287—53 X

FOREIGN PATENTS

575,355	2/1946	Great Britain.
663,801	8/1938	Germany.

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U.S. Cl. X.R.

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