Feb. 5, 1957 R. G. TILTON 2,780,338

HAND RAIL CONSTRUCTION FOR MOVING STAIRS

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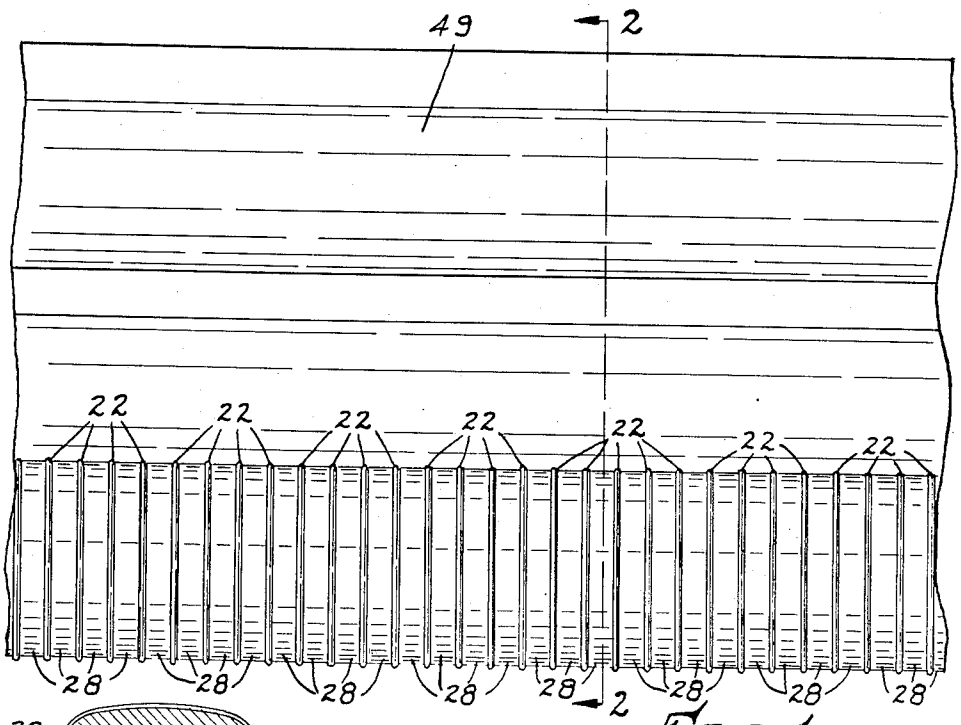


FIG. 1.

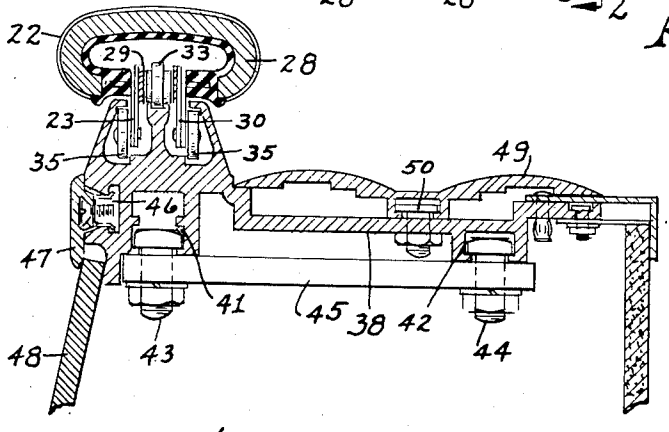


FIG. 2.

RUSSELL G. TILTON,
INVENTOR.

BY Donald E. Windle
ATTORNEY.

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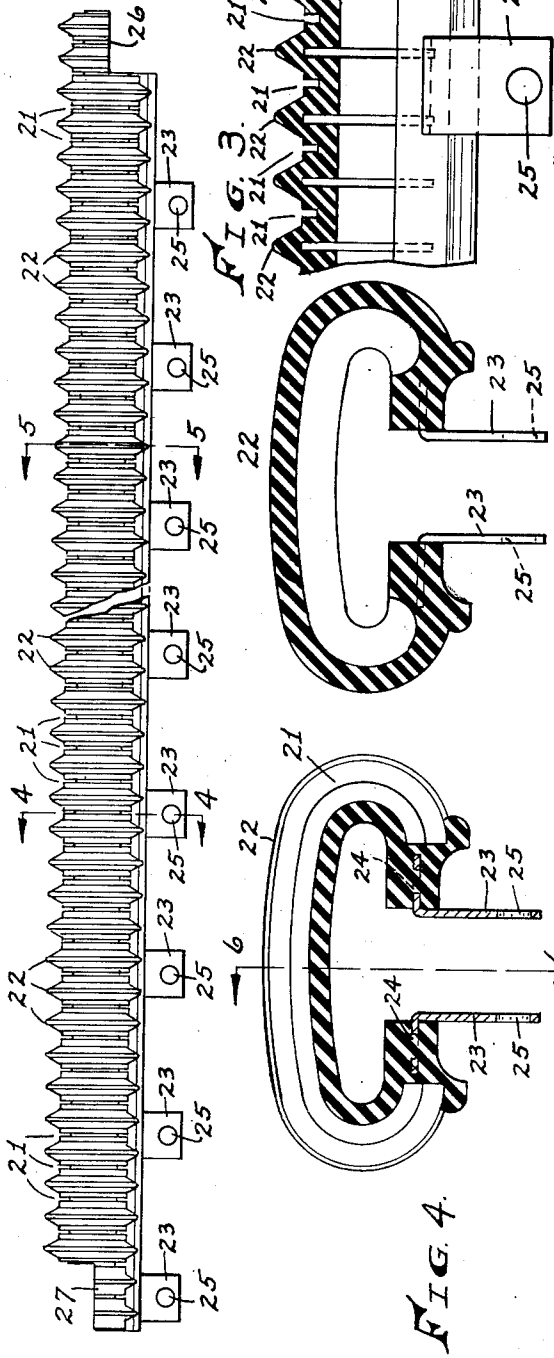


FIG. 4.

FIG. 3.

FIG. 5.

FIG. 6.

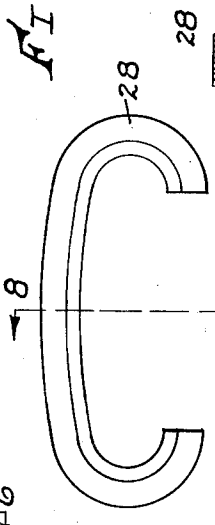


FIG. 7.

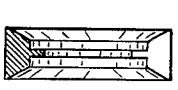


FIG. 8.

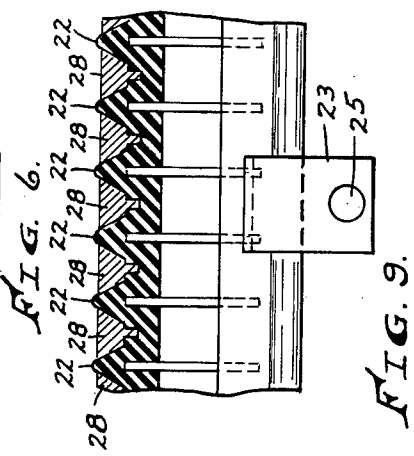


FIG. 9.

RUSSELL G. TILTON,
INVENTOR.

BY Donald E. Windle.

ATTORNEY.

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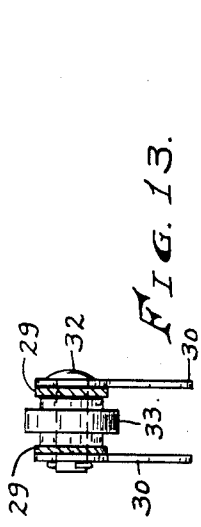


FIG. 13.

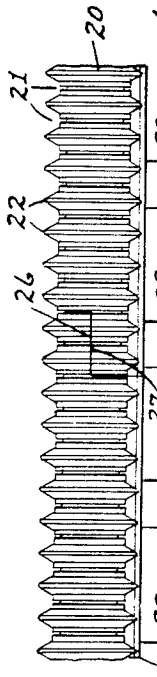


FIG. 10.

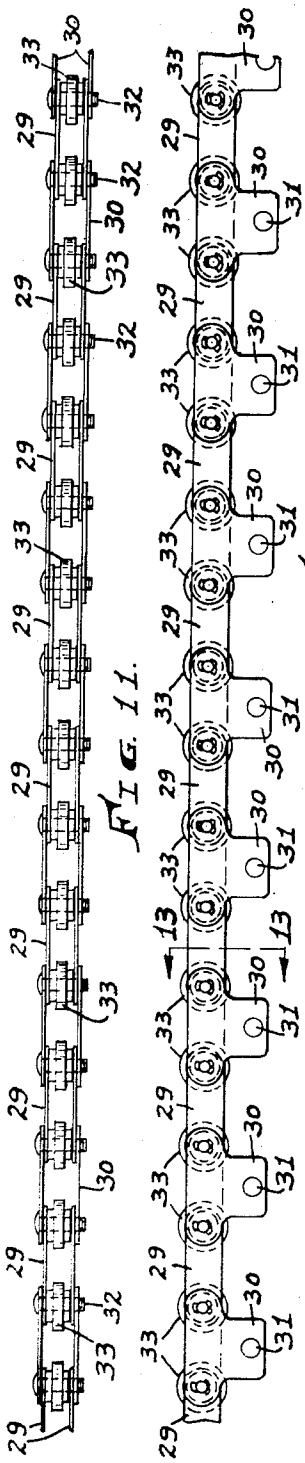


FIG. 11.

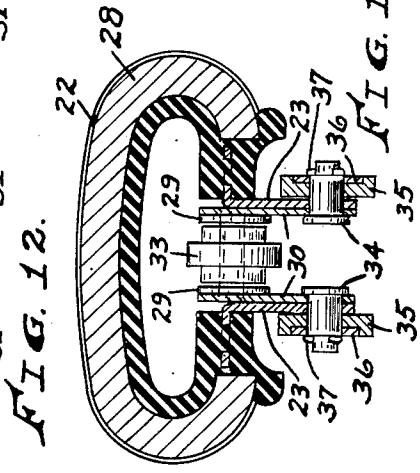


FIG. 12.

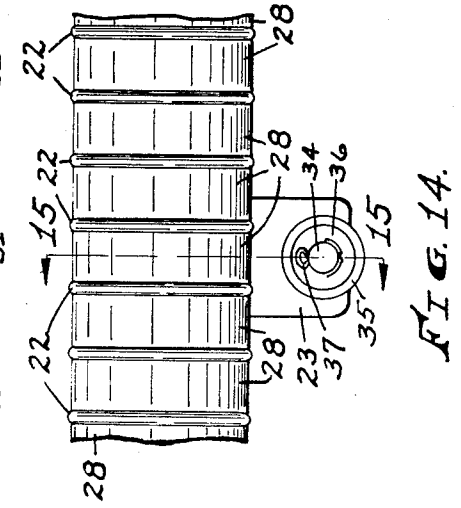


FIG. 14.

FIG. 15.

RUSSELL G. TILTON,
INVENTOR.

BY Donald E. Windle.
ATTORNEY.

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4 Sheets-Sheet 4

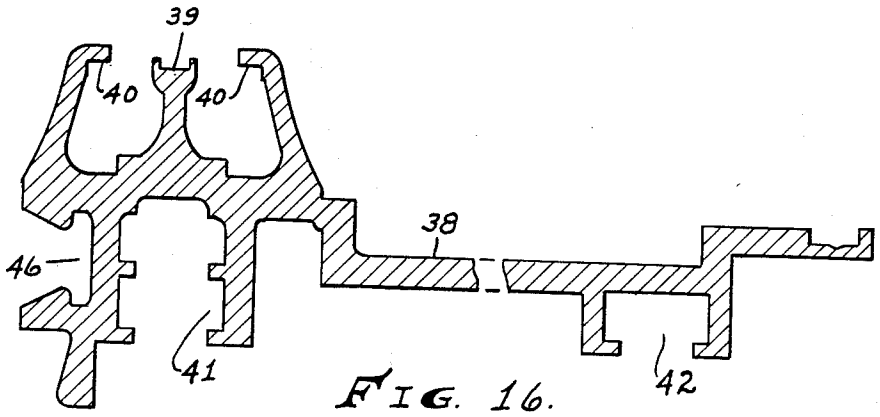


FIG. 16.

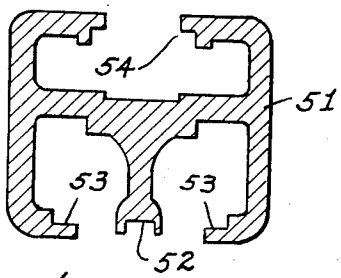


FIG. 17.

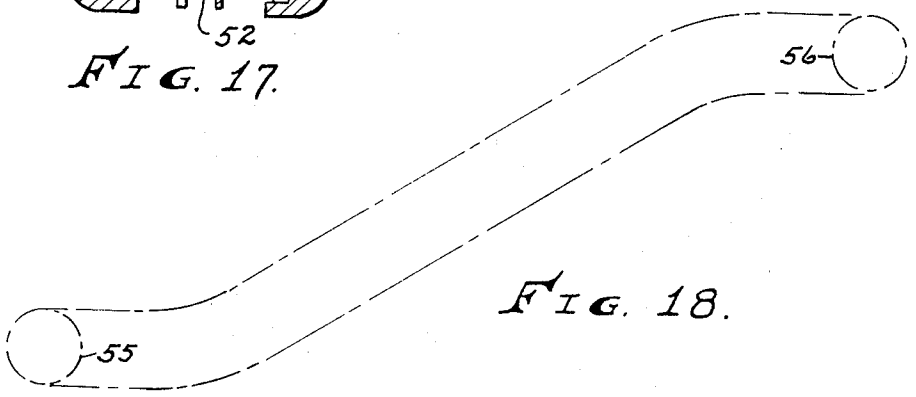


FIG. 18.

RUSSELL G. TILTON,
INVENTOR.

BY Donald E. Windle.
ATTORNEY.

United States Patent Office 2,780,338
Patented Feb. 5, 1957

2,780,338

HAND RAIL CONSTRUCTION FOR MOVING STAIRS

Russell G. Tilton, Mountain Lakes, N. J., assignor to Multiscope, Inc., Brooklyn, N. Y., a corporation of Kansas

Application July 5, 1955, Serial No. 519,979

4 Claims. (Cl. 198—16)

The present invention relates to hand rails used in conjunction with moving stairs and forming a part thereof, and which travel in unison with the steps of the moving stairs. In this connection, it is proposed to provide such hand rails which are of simple construction and which are easy of installation.

The principal object of the invention is to provide a hand rail construction which is smooth in its operation and without the usual degree of jerkiness found in the conventional types of hand rails.

A second object is the provision of a hand rail which is not subject to stretching in continual service.

A third object is the provision of a hand rail construction in which the chain thereof is provided with wheels and rollers forming a part thereof and which are adapted to run on tracks provided therefor.

A further object is the provision of a hand rail of such character as to provide a feeling of security to passengers using the stairs.

Further objects and particular advantages of the invention will become evident in the course of the following description, and that which is new will be pointed out in the appended claims.

The most satisfactory manner of accomplishing the objects of the invention is illustrated in the accompanying drawings, in which:

Figure 1 is a partial top plan view of a hand rail embodying the features of the invention, and with the same being shown in its relation with deck trim members.

Figure 2 is a detail section, taken on line 2—2 of Figure 1, showing the hand rail and deck construction.

Figure 3 is a side elevation of a length of the bellows member of the hand rail construction.

Figure 4 is a detail section through the bellows member, taken on line 4—4 of Figure 3.

Figure 5 is also a detail section through the bellows member, with the same being taken on line 5—5 of Figure 3.

Figure 6 is a detail longitudinal section through the bellows member, taken on line 6—6 of Figure 4.

Figure 7 is an elevational view of one of the hand rail inserts.

Figure 8 is a detail section through the insert, taken on line 8—8 of Figure 7.

Figure 9 is a detail section similar to that shown in Figure 6, but with the inserts being shown in connection with the bellows member.

Figure 10 is a partial side elevation showing the manner in which the adjacent ends of bellows are brought together in splicing the members.

Figure 11 is a partial plan view showing the hand rail chain.

Figure 12 is a partial side elevation of the hand rail chain.

Figure 13 is a detail section, taken on line 13—13 of Figure 12, through the hand rail chain.

Figure 14 is a partial elevation of the hand rail bellows with inserts and with the chain inserted therein.

Figure 15 is a detail section through the hand rail members and the chain, as taken on line 15—15 of Figure 14.

Figure 16 is a detail cross sectional detail through the upper hand rail track and deck.

Figure 17 is a detail cross sectional detail through the lower or return hand rail track.

Figure 18 is a diagrammatical detail showing the run of the hand rail.

Like characters of reference denote like parts throughout the several views of the drawings.

In order that the construction of the hand rail and the elements thereof may be more fully understood and appreciated, I will now take up a detailed description thereof in which the same will be more fully and comprehensively set forth.

Referring now to the drawings in detail, the hand rail is primarily composed of a bellows 20 having grooves 21 formed partially therearound and providing raised dividing ridges 22 between the grooves. The bellows is moulded from suitable materials such as rubber, rubber composition, neoprene, or other suitable materials which are of high resistance against cracking or decomposing. Bellows plates 23 are preferably formed of metal in an angle shape and are inserted in the moulds at the time the bellows is poured, with the embedded leg thereof having an elongated aperture 24 formed therethrough and permitting the bellows material to bond therethrough. A bore 25 is formed through each of the depending legs of the plates, the purpose of which will be more fully set forth hereinafter. Each of the lengths of bellows has splicing portions 26 and 27 formed at the ends thereof, and with the splicing portion 26 of one length matching the splicing portion 27 of the adjacent length of the bellows when the members are brought into end-to-end engagement. The respective splicing portions 26 and 27 of the bellows are held together by means of insert members 28, one of which is positioned in each of the grooves 21 throughout the length of the completed hand rail. The inserts 28 are preferably made of plastics or suitable metals, with the same being of colors which contrast with relation to the ridges 22 of the bellows.

The hand rail chain has the usual inner links 29, with each of the outer links thereof having a depending lug 30 formed thereon, and with an aperture 31 being formed through each of the depending lugs. The chain links are secured together by means of the usual pins 32 and with each having a roller 33 mounted thereon between the opposed inner links 29.

In the assembly of the bellows and the hand rail chain, the chain is moved upwardly between the plates 23, and with the apertures 31 of the lugs 30 coinciding with apertures 25 of the plates 23, stud pins 34 are placed through the coinciding apertures, after which a wheel 35 is placed on the outer end of each of pins 31. The wheels are recessed for the reception of washers 36 which are secured therein by means of the cotters 37, as more clearly shown in Figure 15.

In order that the hand rail may be guided about its orbit as shown in Figure 18, I have provided an extruded member 38 to form the deck portion, as more clearly shown in Figure 16. A track 39 is formed in the extrusion for the reception of rollers 33, and with surfaces 40 forming tracks against which wheels 35 are adapted to contact should there be a lifting of the hand rail from any cause and preventing any excessive amount of vertical movement of the hand rail in its travel of the upper run. Continuous longitudinal slots 41 and 42 are formed in the under side of the deck for the reception of respective bolts 43 and 44 for rigidly securing the deck member to frame members 45 of the stair construction. A continuous longitudinal slot 46 is formed in the side of the deck

member for the reception of spring clips provided for securing moulding **47** in place and which is provided for removably securing side panels **48** in place. Deck trim **49** is secured to the upper surface of the deck by means of bolts **50**. It will be observed from the description of the deck **38**, the mould **47** and the deck trim **49** eliminate externally exposed fastening means which might have a tendency to mar the outer surfaces of the completed assembly.

The lower or return run of track is formed of an extrusion **51**, as shown in Figure 17 with the same having a roller guide **52** formed therein for the travel of rollers **33**, and with bearing surfaces **53** forming tracks upon which wheels **35** ride. A continuous slot **54** is formed in the extrusion for the reception of bolts in securing the lower track to members of the stair construction.

In the operation of the hand rail, the hand rail chain runs over two sprockets (indicated as **55** and **56** in Figure 18), with one of the sprockets being power driven by the same source used to drive the steps of the stair, while the other sprocket serves only as a return idler. The portion of hand rail running along the upper run is supported on rollers **33** in their track **39**. On the return or lower run of the hand rail, the hand rail is suspended from the track wheels **35** riding on the surfaces **53**. The flexibility of the hand rail bellows permits the necessary flexing of the bellows while traveling around the sprockets **55** and **56**.

It will be noted that the exposed outer surfaces of the inserts **28** are recessed slightly below the ridges **22** of the bellows members and thereby forming a non-slip grip for passengers on the stair. It will be further noted, by referring to Figure 2, that there is no possibility of the passengers' fingers becoming wedged or otherwise injured while gripping the hand rail as the lower portion of the bellows members fit closely to the contour of the adjacent portion of the deck member.

The provision of alternating ridges and inserts in the hand rail provides a certain degree of safety to passengers, with the same providing a non-slip grip without the necessity of the passengers gripping the hand rail with force.

It is to be understood that I am not to be limited to the specific design of the parts or the arrangement thereof herein shown and described, but that minor changes and slight variations may be made therein, insofar as the changes or modifications may fall within the scope of the appended claims.

Having now shown and described the invention, what I claim and desire to secure by Letters Patent of the United States, is:

1. In a hand rail construction, a bellows forming a continuous loop, plate members imbedded in the bellows and extending therefrom, a hand rail chain having links with a portion thereof forming depending lugs adapted to register with the plate members of the bellows and secured thereto by means of pins, a wheel secured on the outer end of each of the pins, a roller mounted on and carried by each chain pin, and with the wheels providing bearing and guide means for the bellows.

2. In a hand rail construction, a bellows forming a continuous loop secured to and carried by a hand rail chain, said chain having a roller positioned on each of its pins with the rollers being located between the links, with each of the outer chain links having a depending lug formed thereon and secured to plate members of the bellows by means of respective pins, a wheel positioned on the outer end of each of the pins, and with the hand rail chain running over sprockets and carrying the bellows in its orbit about the sprockets.

3. In a hand rail construction for moving stairs, a series of bellows members secured in end-to-end relation to form a continuous loop with plates having one end thereof imbedded in the bellows members and extending therefrom, a hand rail chain, said chain having a roller positioned on each of the chain pins, with each outside chain link having a depending lug formed thereon, a pin extending through each of the plates and a respective depending lug, a wheel positioned on the outer end of each of the pins, a deck member having a track formed therein for the reception of the chain rollers and with surfaces being formed in the deck member providing a track for the wheels, and with the chain running over a pair of spaced-apart sprockets and carrying the bellows therewith.

4. A hand rail construction as set forth in claim 3, and with inserts being positioned in the outer surfaces of the bellows.

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