March 3, 1942. O. HOHNECKER 2,275,048

HANDRAIL FOR MOVING STAIRWAYS

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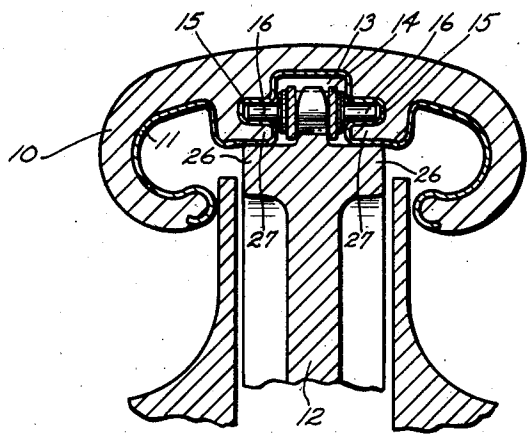


FIG. 1.

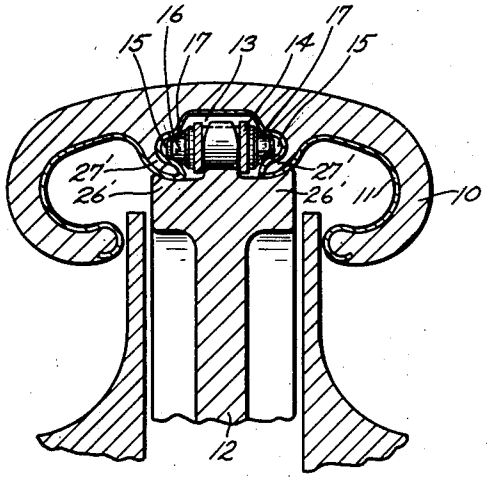


FIG. 2.

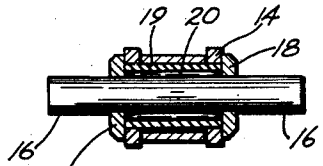


FIG. 3.

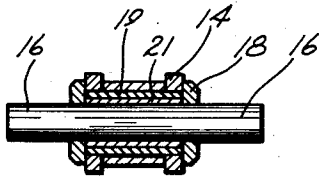


FIG. 4.

Inventor

OTTO HOHNECKER

By Owen & Owen

Attorneys

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HANDRAIL FOR MOVING STAIRWAYS

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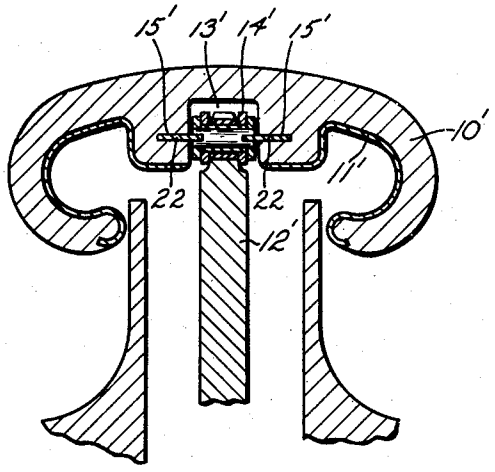


FIG. 5.

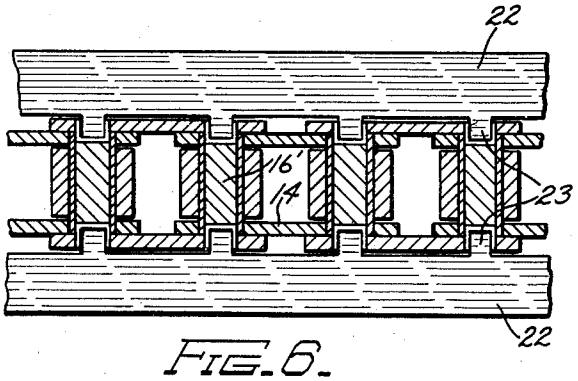


FIG. 6.

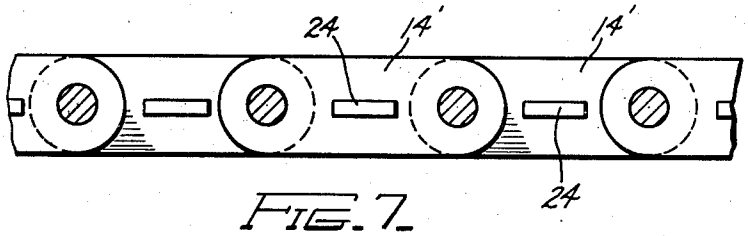


FIG. 7.

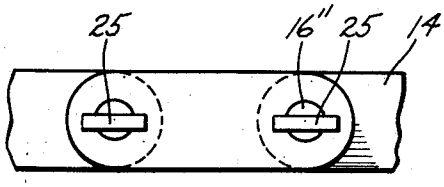


FIG. 8.

Inventor

OTTO HOHNECKER

By Owen & Owen

Attorneys

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HANDRAIL FOR MOVING STAIRWAYS

Otto Hohnecker, Toledo, Ohio, assignor to The Haughton Elevator Company, Toledo, Ohio, a corporation of Ohio

Application October 2, 1940, Serial No. 359,315

7 Claims. (Cl. 198—16)

This invention relates to a hand rail for a moving stairway and more particularly to improved means for driving such a hand rail.

The object of the invention is to provide means which will drive the hand rail positively with a minimum of wear upon the hand rail and with a minimum of difficulty in assembling or repairing the hand rail.

Details of the invention will appear as the description proceeds.

In the accompanying drawings forming a part of this specification,

Figure 1 is a cross-section of a hand rail being driven by a sprocket wheel and embodying one form of the invention;

Fig. 2 is a section similar to Fig. 1, but showing a slightly modified form;

Figs. 3 and 4 are sections through the sprocket chain showing two ways of mounting the pins;

Fig. 5 is a section similar to Figs. 1 and 2, but showing another form of the invention;

Fig. 6 is an enlarged longitudinal section of the chain employed in the form shown in Fig. 5;

Figs. 7 and 8 are enlarged side elevations of still different forms of chains employable with the type of hand rail disclosed in Fig. 5.

It will be readily understood that this invention relates to the usual type of moving stairway where a hand rail of flexible material, such as rubber reinforced with canvas runs over a suitable supporting guide and over an idler at one end and over a driving sprocket wheel at the other end. In Fig. 1, there is shown the hand rail 10, without any attempt to indicate in detail the composition or construction of the hand rail since this is not a part of the present invention except as to features which will be later pointed out, but the form shown is illustrated as being lined with canvas 11 which slides over the guide rail somewhat more easily than the rubber.

The hand rail is driven by a sprocket wheel 12. The hand rail is provided with a continuous longitudinal recess 13 for accommodating the sprocket chain 14. At each side of the recess is a slot 15 into which projects the elongated pivot pins 16 of the sprocket chain.

In Fig. 2 a construction similar to Fig. 1 is disclosed, but with additional anti-friction washers 17 placed upon the pins 16.

As will appear from detailed Figs. 3 and 4, hard bushings 18 may be employed in position to contact the sprocket wheels and take the wear. Preferably anti-friction means is employed around the pivot pin in order to render unnecessary greasing of the chain. In Fig. 3, this anti-friction means is indicated as needles 20, while in Fig. 4, there is indicated an oilless bushing 21.

In Fig. 5, there is disclosed a modified form of hand rail 10' having lining 11' and a longitudinal recess 13' for chain 14'. This hand rail likewise is provided with lateral slots 15' opening into the recess 13'. Slots 15' are much narrower than the slots 15 indicated in Figs. 1 and 2. As will be readily seen from detail in Fig. 6, the chain 14 employed in this form of the invention is similar to that disclosed in Figs. 1 and 2 except that pivot pins 16' are relatively short. This makes possible the positioning of a continuous metallic strip or ribbon 22 on each side of the chain in slots 15'. The strip is driven by means of projections 23 which project into slotted recesses provided in the pivot pins 16'.

In Fig. 7, there is shown a modified chain 14' each link of which is provided with a projection 24 which may project into slot 15' of hand rail 10' when this form of chain is employed. If preferred, the projections 24 might be employed on only the outside links.

In Fig. 8, there is shown a modified form of chain provided with the usual links 14, but having the pivot pins 16'' each provided with an outwardly extending projection 25, which is adapted to enter slot 15' in hand rail 10'. The projection may be attached to the pin in any desired way.

The parts are so proportioned that the normal center of bending of the hand rail as it passes around the sprocket is in approximately the same curved plane as the pitch line of the sprocket chain. Since the projections are in the same plane, this avoids any necessity for endwise movement of the projections from the chain with respect to the portions of the hand rail which they contact. If these projections were at either side of the pitch line of the chain and the normal plane of bend of the hand rail, they would be either separated or brought closer together during the passage around the sprocket wheel than when moving with the hand rail straight. This would necessarily cause appreciable wear on the hand rail.

In the preferred form, the slots 15 or 15' are continuous. In the form shown in Figs. 1 and 2, the sprocket wheel is broadened so as to provide shoulders 26 or 26', respectively, adapted to engage ears 27 or 27' of the hand rail between said shoulders and the pins 16 of the sprocket chain. The parts are so proportioned that the tension of the chain is applied to the ears 27 or 27' so

that they are pinched between the pins and the sprocket chain. This insures a positive drive of the hand rail since it prevents movement of the hand rail with respect to the sprocket wheel or pins while the hand rail is passing around the sprocket chains. At the same time, the slots 15 being continuous, there is no difficulty in applying the hand rail to the chain or in properly adjusting the length of the chain to the length of the hand rail. It will be readily understood that the hand rail is normally formed in one endless belt. With continuous slots 15, a chain may be employed initially with the number of links that most nearly approximates the length of the hand rail, and the number of links can be changed at any time to equalize the length of chain and rail if their relative lengths change after use.

While the combination of the continuous slots and the shoulders for squeezing the lower wall of the slot against the projections is preferred, it will be understood even if the slot were not continuous and the projections were inserted in pockets, it would be advantageous to provide the shoulders since this would take up part of the pull between the shoulders and the projections and would thereby lessen the tendency to elongate or tear out the pockets.

With the form of hand rail disclosed in Fig. 5, whether employed with the chain shown in Fig. 6, Fig. 7, or Fig. 8, it is preferred to employ shoulders upon the sprocket wheel similar to those shown in Figs. 1 and 2. However, this may not be absolutely necessary because the hand rail may be made to maintain sufficient friction against strips 22 or projections 24 or 25, as the case may be, where they pass around the sprocket wheel, so as to drive the hand rail. Also, there is an advantage in having the projections from the chain at the pitch line of the chain and in the bending plane of the hand rail even if they are inserted into pockets in the hand rail instead of into continuous slots, although the continuous slot is preferred for reasons stated above.

In Figs. 1 and 2, the canvas lining 11 is indicated as completely lining recess 13 and slots 15. In Fig. 5, the lining 11' stops short of the recess 13'. The construction disclosed in Figs. 1 and 2 may be convenient for some purposes, but the lining of the recess and slots is not necessary for operative purposes and in fact is disadvantageous from the standpoint of reducing friction between the projections and the slot where friction is desirable. Also, if the guide rail was so shaped that it would not contact the hand rail where shoulders 26 or 26' contact it, the lining might be stopped short of where this contact was made so that the greater friction of the rubber portion of the hand rail against the shoulders of the sprocket wheel would be utilized.

While several different forms of the invention have been illustrated and further possibilities referred to above, it will be readily understood that other modifications may be made within the scope of the appended claims.

What I claim is:

1. In a moving stairway comprising a hand rail with a longitudinal recess, a chain in the recess and means to drive the chain, projections driven by the chain and projecting into and driving the hand rail, said projections extending in the plane of the pivots of the chain.

2. In a moving stairway comprising a hand rail with a longitudinal recess, a chain in the recess and means to drive the chain, projections driven by the chain and projecting into and driving the hand rail, said projections extending in the central plane of bending of the rail, and in the plane of the pivots of the chain.

3. In a moving stairway comprising a hand rail with a longitudinal recess, a chain in the recess and means to drive the chain, continuous open slots in the sides of the recess, and projections driven by said chain and located in said slots and substantially in the plane of the pivots of the chain.

4. In a moving stairway comprising a hand rail with a longitudinal recess, a chain in the recess, a sprocket for driving the chain, and projections engaging the rail and driven by the chain, shoulders on the sprocket wheel adapted to engage portions of the rail at the sides of the recess, the parts being proportioned and arranged to squeeze said portions between the shoulders and projections.

5. In a moving stairway comprising a hand rail having a longitudinal recess, a chain in the recess, and a sprocket wheel driving the chain, the rail having a continuous slot in each side of the recess, projections driven with the chain and extending into the slots, and shoulders on the sprocket wheel engaging portions of the rail at the sides of the recess, the parts being arranged and proportioned so that said portions are squeezed between the projections and the shoulders.

6. In a moving stairway comprising a hand rail having a longitudinal recess, a chain in the recess, and a sprocket wheel driving the chain, the rail having a continuous slot in each side of the recess, projections driven with the chain and extending into the slots, the slots being in the middle bending plane of the rail and in the plane of the chain pivots.

7. In a moving stairway, a hand rail having a longitudinal recess, a chain in the recess, a sprocket wheel driving the chain, and means clamping the rail against longitudinal movement with respect to the chain where they pass around the sprocket wheel while leaving them free for relative longitudinal movement where they extend in substantially straight runs.

OTTO HOHNECKER.