

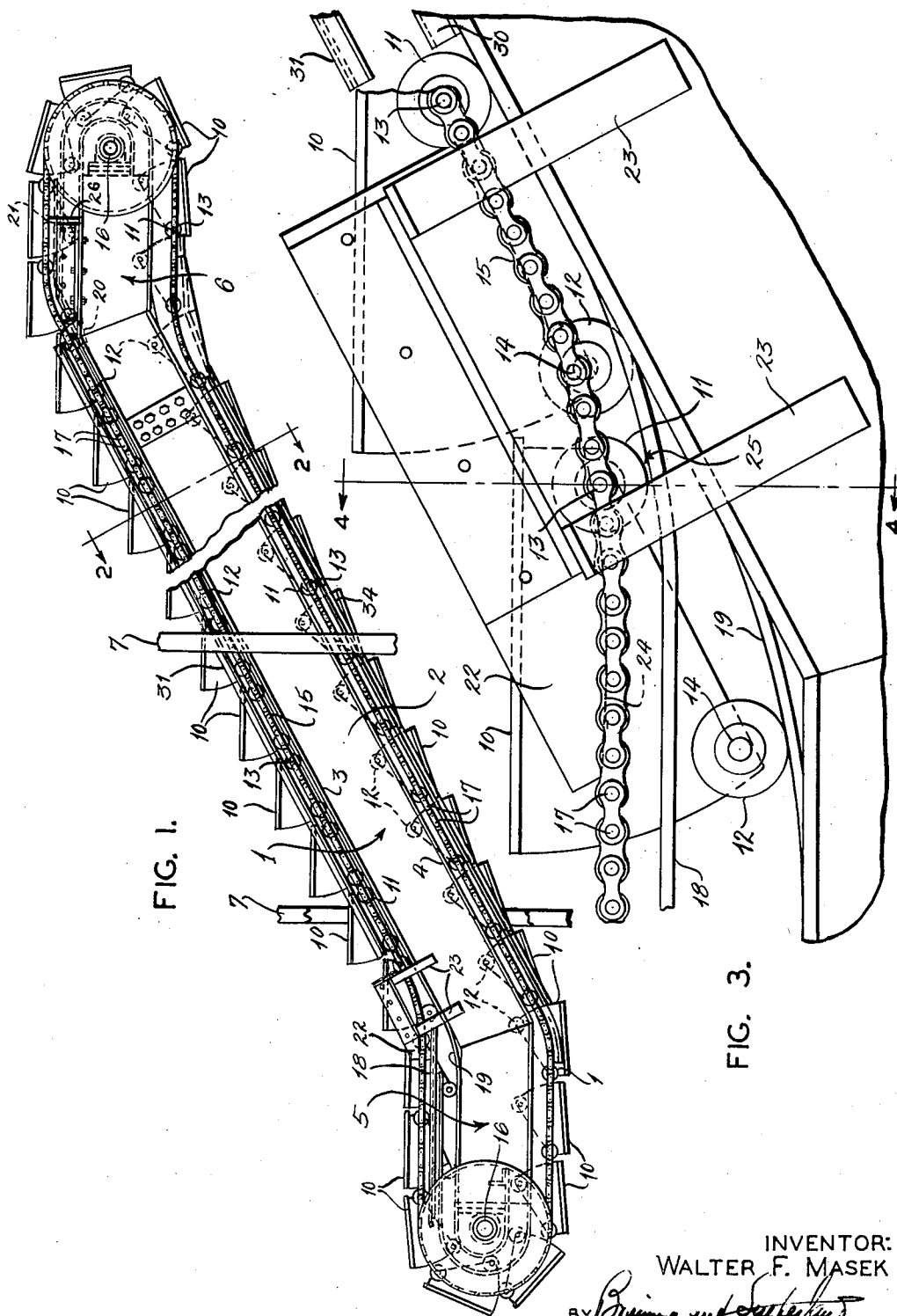
Oct. 20, 1953

W. F. MASEK
MOVING STAIRWAY

2,656,031

Filed July 7, 1950

3 Sheets-Sheet 1



INVENTOR:
WALTER F. MASEK
BY *W. F. Masek*
ATTORNEYS.

Oct. 20, 1953

W. F. MASEK
MOVING STAIRWAY

2,656,031

Filed July 7, 1950

3 Sheets-Sheet 2

FIG. 2.

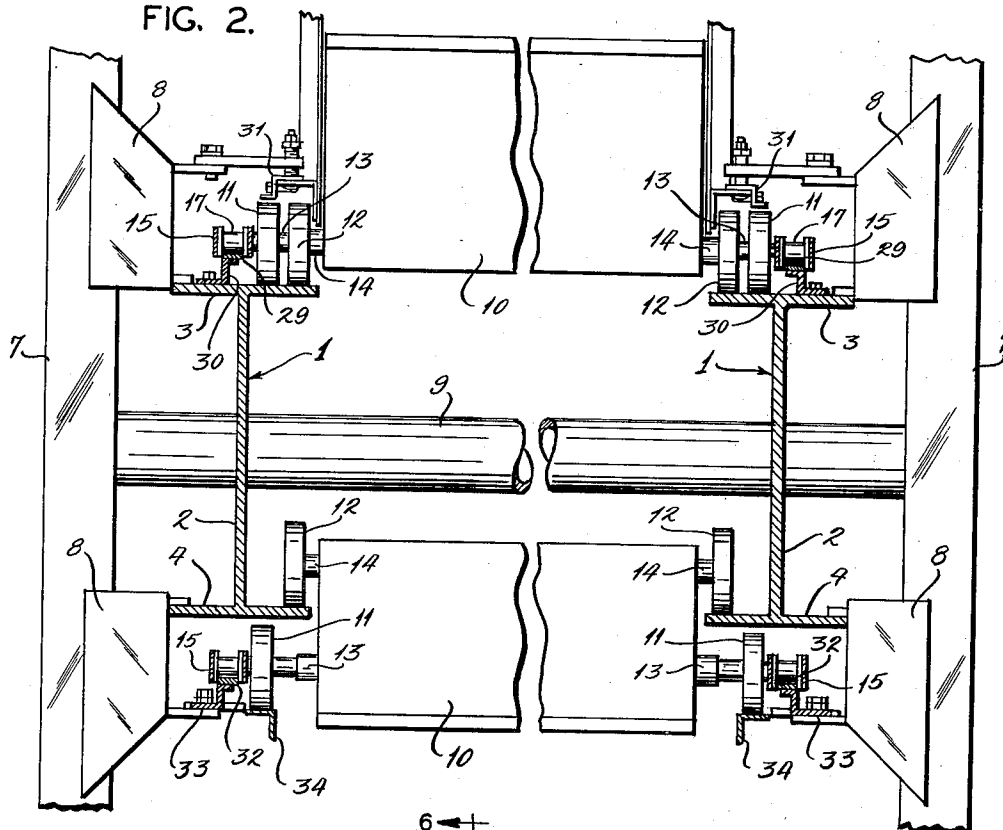
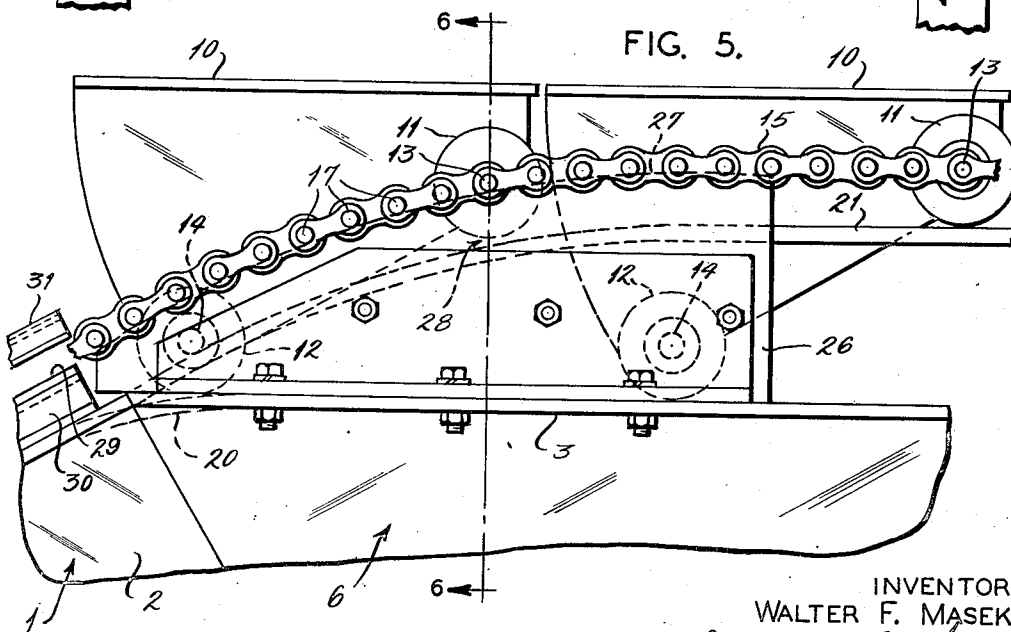


FIG. 5.



INVENTOR:
WALTER F. MASEK
BY *Bruening and Sutherland*
ATTORNEYS.

Oct. 20, 1953

W. F. MASEK
MOVING STAIRWAY

2,656,031

Filed July 7, 1950

3 Sheets-Sheet 3

FIG. 4.

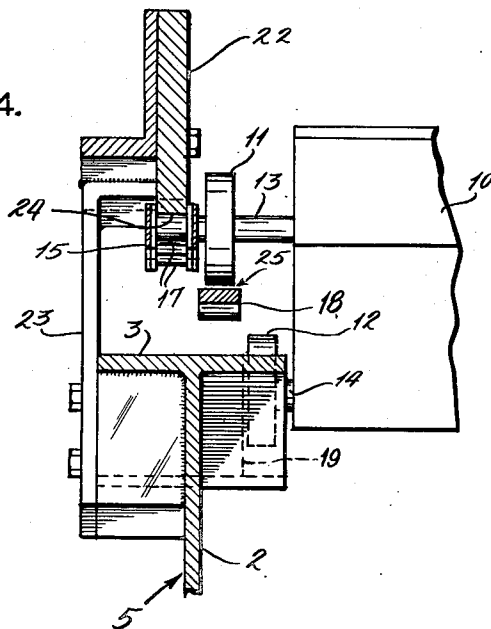
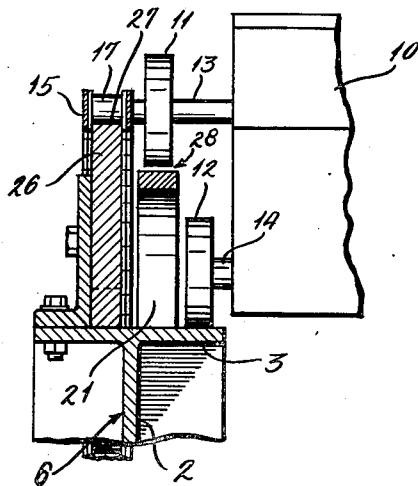


FIG. 6.



INVENTOR:
WALTER F. MASEK

BY *Brining and Schenk*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,656,031

MOVING STAIRWAY

Walter F. Masek, Richmond, Ind., assignor to
Multiscope, Inc., Richmond, Ind., a corporation of Kansas

Application July 7, 1950, Serial No. 172,505

6 Claims. (Cl. 198—16)

1

This invention relates generally to moving stairs of the character wherein a series of wheeled steps are driven about an orbit by an endless chain. As to common subject-matter, this application is a continuation of my prior copending application, Serial No. 741,180, filed April 14, 1947 and now abandoned.

In moving stairways of the character aforesaid, a track is provided, along which the wheels of the steps may roll, and the track is generally provided with horizontal portions at each end of an inclined portion, so that the steps may level out at the upper and lower landings. The driving chain is connected to each of the steps of the series and driven by sprockets at one or both ends of the track. In the arrangements of this character heretofore provided, the tendency of the driving chain to flatten at the junctures between the inclined and horizontal portions of the track has created a substantial radial thrust upon the wheels of the steps with the result that the wheels of an individual step are required to sustain, at these points, more load than that which results from the weight of a passenger standing upon that particular step. In other words, a substantial vertical component of the entire load of the apparatus and passengers on other steps is sustained by the wheels of each step as they traverse the junctures between the horizontal and inclined runs of the track.

The object of the present invention, generally stated, is to provide a moving stairway structure which is economical to manufacture and convenient to assemble and disassemble.

A further object of the invention is to provide a moving stairway structure wherein the loads are so distributed and transmitted from moving parts to stationary parts that light constructions may be employed with safety.

A more specific object of the invention is to relieve the step wheels of load other than that of a passenger on the particular step, and consequently to enable lighter construction of such wheels without damage thereto.

Other objects will become apparent to those skilled in the art when the following description is read in connection with the accompanying drawings, in which:

Figure 1 is a view in side elevation of the operative structure of a series of moving steps, their track, drive, and guide, constructed in accordance with the present invention;

Figure 2 is a sectional view taken along line 2—2 of Figure 1;

Figure 3 is an enlarged detail view of the wheel

2

track and chain guide at the juncture between the lower landing and the inclined portion of the track;

Figure 4 is a sectional view taken along line 4—4 of Figure 3;

Figure 5 is an enlarged detail view of the wheel track and chain guide at the juncture between the upper landing and the inclined portion of the track; and

Figure 6 is a sectional view taken along line 6—6 of Figure 5.

The present invention contemplates that the track for the series of wheeled steps of a moving stairway and the guide for the driving chain be so constructed and arranged that the wheels of an individual step sustain no more load than that which is imposed directly upon that step, as by a passenger standing thereon, and that the load of the entire apparatus be carried by a short-link driving chain and transmitted therethrough to stationary parts of the device.

The invention further contemplates that the track for the wheeled steps be provided by a supporting beam, such as an I-beam or channel section, whose web extends vertically and whose flanges extend horizontally. Such a beam is mounted on each side of the series of steps with flanges projecting toward each other and providing the track for the wheels of the steps on the upper or exposed run of the steps, as well as upon the lower or return run of the steps.

Referring now to Figures 1 and 2 of the drawings, the supporting structure of the moving stairway includes a pair of I-beams 1, whose webs 2 extend vertically, and whose flanges 3 and 4 extend horizontally, therefrom. The I-beam 1 has an intermediate inclined portion and horizontal portions 5 and 6 at each end thereof, representing respectively the upper and lower landings of the stairway. The I-beam 1 is suitably supported by the framework of the building in which the stairway is installed, as by a plurality of stanchions 7, which may be connected to the flanges of the I-beam by brackets 8, and connected to the web 2 of the I-beam as by a pipe 9 penetrating web 2 and having its ends welded or otherwise connected to the stanchions 7 on opposite sides thereof.

The I-beams 1 are arranged in parallel, horizontally spaced relation so as to accommodate therebetween a series of wheeled steps 10. The steps 10 are each provided with a pair of lead wheels 11 and a pair of trail wheels 12, mounted respectively upon axles 13 and 14. The axles 13 and 14 are connected to the step-structures so

3

that the tread surfaces of the steps are substantially horizontal as the steps traverse the inclined portions of their track on the exposed run. The axles 13 of the lead wheels 11 on each step are interconnected with drive chain 15, which is an endless short-link chain driven and guided by suitable sprockets mounted upon shafts 16 at opposite ends thereof. The chain 15 is a conventional roller chain wherein the successive links are connected together by pins 17, and the connections between the chain 15 and the individual axles 13 are effected so as to be coaxial with one of the pins 17. Furthermore, it is important that at least eight chain links intervene the connections between the chain and successive steps 10.

Throughout the horizontal and inclined portions of the I-beams 1, the flange 3 thereof provides the track upon which the trailing wheels 12 roll on the exposed or upper run of the stairway. Similarly, the lower flange 4 of the I-beams 1 provides the track upon which the trailing wheels 12 roll on the return or lower run of the stairway. At the horizontal portion 5 of I-beam 1, an auxiliary track 18 is provided for the leading wheels 11, said track being disposed in vertically spaced relation above the upper flange 3 of the I-beam thereat, so that, with wheels 11 rolling upon track 18, and wheels 12 rolling upon flange 3, the tread surface of the steps is substantially level at the landing. At the juncture between the horizontal portion 5 and the inclined portion of the I-beam, an arcuate member 19 is interposed so as to transfer wheels 11 tangentially between the angularly extending flange 3 of the horizontal and inclined portions of the I-beam.

Similarly, where the inclined portion of the I-beam 1 joins the horizontal portion 6 thereof, an arcuate part 20 is provided to transfer the wheels 12 between the horizontal and inclined portions of flange 3. In the construction of the arcuate part 20, an incision may be made in the flange 3, parallel to the length of the I-beam, so as to provide a strip which may be bent into an arc to form the part 20, it being understood that the wheels 12 travel only upon that increment of the flange 3 which is most remote from web 2.

At the upper landing, an auxiliary track 21, disposed in vertically spaced relation to the flange 3 of the horizontal portion 6, is provided for the leading wheels 11, so as to maintain the tread surface of the steps 10 horizontal as they traverse this portion of their path.

Adjacent the juncture between the inclined portion of the I-beam 1 and the horizontal portion 5, a chain guide 22 of sturdy construction is provided and securely connected, through brackets 23, to the I-beam 1, so as to transmit thrusts from the chain to the I-beam without subjecting the wheels 11 or 12 to radial thrust in excess of the load imposed directly on that step. The chain guide 22 is a steel plate having a thickness such as to be received between the links of chain 15, and has an arcuate edge 24, upon which the rollers surrounding the pins 17 may roll. The guide 22 is positioned with reference to flange 3 and track 18, so that the peripheries of wheels 11 are free of engagement with their track as they traverse the curve about the juncture, except when a passenger may be standing on that particular step. In practical operation, the guide 22 is positioned so that, when its edge 24 is engaged by the rollers of chain 15, approximately one thirty-second of an inch clearance remains between the outer periphery of wheel 11

4

and track 18, as shown (somewhat exaggerated) at 25. With such an arrangement, when the stairway is operating with a passenger on a given step as it traverses the curve at the juncture, the wheel 11 may engage its track, but, if that step be empty, the wheel 11 will ride free of engagement with its track as it traverses the curve.

At the juncture between the inclined portion of the I-beam and the horizontal portion 6, a chain guide 26 of sturdy construction is provided. The guide 26 is welded or otherwise suitably connected to the flange 3 of the horizontal portion 6 of I-beam 1, and has an arcuate edge 27 extending in such radially spaced relation from track 21 that the rollers of the chain 15, riding upon the edge 27, maintain the lead wheels 11 of any given step traversing that curve out of engagement with track 21, except when a passenger is standing upon that particular step. In practical operation, the arcuate edge 27 is disposed so as to maintain a clearance of about one thirty-second of an inch between the outer periphery of wheel 11 and the upper surface of track 21, as shown (exaggerated) at 28. As a given step traverses this curve, the load on the steps therebelow tends to straighten the chain in the region occupied by guide 26 and, if the wheels 12 were permitted to engage track 21, the radial thrust resulting from such tendency of the chain to straighten would be transmitted through the wheels to their track, resulting in excessive radial thrusts within the wheel and damage thereto, unless the wheels are constructed more sturdily than they need be to sustain the load of a passenger standing on their step. With the construction illustrated, however, where the thrust tending to straighten the chain is received from the chain by guide 26 and transmitted therethrough to a fixed portion of the structure, the wheels are relieved of the thrust tending to collapse them.

Along the inclined portion of I-beam 1, the chain 15 is provided with a guide of lighter construction than the guides 22 and 26 hereinbefore described. Along this portion of the path, which is rectilinear, there are no radial thrusts imposed upon the wheels of a step, except when it is occupied by a passenger, and accordingly it is unnecessary that the chain guide in this region be so sturdy as to protect the wheels. Accordingly, the chain guide in this region may consist of a strip 29 of plastic material such as linen-laminated thermoplastic resin. The strip 29 may be supported upon a light Z-bar 30 mounted, in turn, upon flange 3 of the I-beam. Along the rectilinear run, where the chain guide 29 is provided, a hold-down member 31, disposed in slightly spaced relation (on the order of one-sixteenth of an inch) above the upper periphery of wheel 11, is provided. Normally the wheel 11 does not engage hold-down member 31, but in the event of erratic operation, the hold-down member, by engagement with the surface of wheel 11, prevents chain 15 from disentraining itself with guide 29. In order to facilitate the assembly and disassembly of the apparatus, the hold-down member 31 is mounted for ready adjustment in the vertical direction, so that it may be drawn down into properly spaced relation with reference to the periphery of wheel 11 after the chain 15 is entrained upon its guide 29.

On the return run of the chain 15, a corresponding chain guide 32, mounted upon Z-bar 33, is provided, and a light track 34 provided for wheels

5

11. Such a track 34 may be constructed of an angle bar suitably welded to parts connected to bracket 8.

At the opposite ends of the I-beam, i. e., beyond horizontal portions 5 and 6 thereof, any suitable semi-circular track, for directing the wheels 11 and 12 between the upper and lower tracks, is provided.

From the foregoing description, those skilled in the art should readily understand the construction and operation of the device and appreciate its advantages. The I-beam 1, with its horizontal portions 5 and 6, constitutes not only the supporting structure, but also the trackway for the wheels 12 along both levels and along the inclined portion of both the exposed and return run. The upper flange of said I-beam also constitutes the track for wheels 11 along the inclined portion of the exposed run. At the curves in the track, the wheels 11, being those whose axles are directly connected to the drive chain, are required to sustain only the load which may be imposed on the step to which they are connected, and are relieved of all radial thrusts incident to load on other steps or dead load of the apparatus, which otherwise would tend to collapse such wheels.

While one complete embodiment of the invention has been disclosed in detail, it is to be understood that the foregoing disclosure is by way of example only, and that the invention is not limited to the details of said disclosure. It is realized that many modifications and variations of the structure will present themselves to those skilled in the art without departing from the spirit of the invention, and it is therefore intended that such modifications and variations be contemplated by and within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In an escalator wherein a series of wheeled steps is arranged in a continuous loop and driven about a closed path including an active reach, a return reach, and reverse bends at the upper and lower landings between said reaches, the improvement which comprises a pair of standard structural beams each having a vertically extending web and flanges extending laterally from the upper and lower margins of the web, a supporting member extending between the webs of said beams and supporting the beams in parallel horizontally - spaced relationship with said flanges extending toward each other, said beams being otherwise supported to extend between the upper and lower landings, and means at the ends of said beams for guiding wheels of the steps into rolling engagement with the upper sides of the top and bottom flanges respectively of said beams, said beams thereby constituting the track-support and the track along which said wheels roll.

2. The improvement of claim 1 wherein the beams have horizontally extending portions at

6

each landing and arcuate junctures between the horizontal and inclined portions for guiding the wheels tangentially from one portion to another.

3. The improvement of claim 2 wherein the steps are connected concentrically with other wheels to an endless short-link chain and driven thereby, and rigidly supported chain guides at said junctures arranged so as to relieve said other wheels of chain thrusts in a direction radial to said arcuate junctures.

4. In an escalator wherein a series of wheeled steps is arranged in a continuous loop and chain-driven about a track including separated horizontal portions and an inclined portion therebetween, the improvement which comprises chain thrust-sustaining members each having an arcuate chain guiding surface extending for a substantial distance substantially parallel with the track adjacent the junctures between the horizontal and inclined portions of said track, said chain thrust-sustaining members being rigidly mounted to sustain the radial thrust components and maintain the wheels of an unladen step free of engagement with said track at said junctures.

5. In an escalator wherein a series of wheeled steps is arranged in a continuous loop and driven by an endless short-link chain along a track including an incline and an upper level, the improvement which comprises a chain guide having an arcuate surface extending for a substantial distance substantially parallel with the track adjacent the juncture between said incline and said upper level, said chain guide being rigidly supported above the track for a distance sufficient to maintain step wheels free of engagement with the track thereat.

6. In an escalator wherein a series of wheeled steps is arranged in a continuous loop and driven about a closed path having active and return reaches extending between upper and lower landings; the improvement that comprises a pair of standard-structural channel-type beams extending between the upper and lower landings and forming tracks for said wheeled steps, the tracks forming the active reach of said closed path being constituted by a flange extending inwardly from the upper margin of each beam and the tracks forming the return reach of said closed path being constituted by a flange extending inwardly from the lower margin of each beam, each beam having a connecting web extending vertically between its flanges, and a beam-supporting member extending horizontally between the vertical webs of said beams.

WALTER F. MASEK.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
672,823	Dodge	Apr. 23, 1901
1,668,644	Hocquart	May 8, 1928
2,023,067	Dunlop	Dec. 3, 1935
2,127,164	Dennerlein	Aug. 16, 1938
2,231,709	Dunlop	Feb. 11, 1941
2,260,591	Thurston	Oct. 28, 1941