J. W. RENO.

CONVEYER.

APPLICATION FILED FEB. 8, 1916.

1,288,196.

Patented Dec. 17, 1918.

2 SHEETS—SHEET 1.

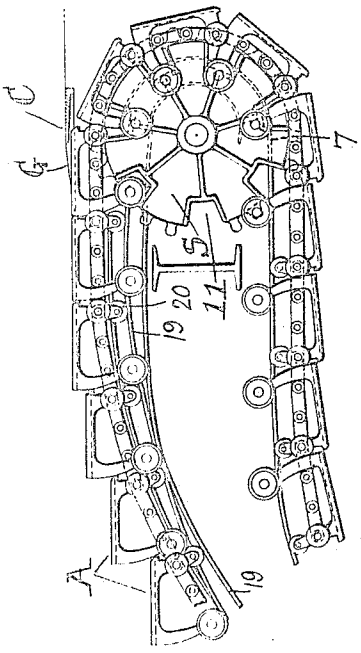


Fig. 1.

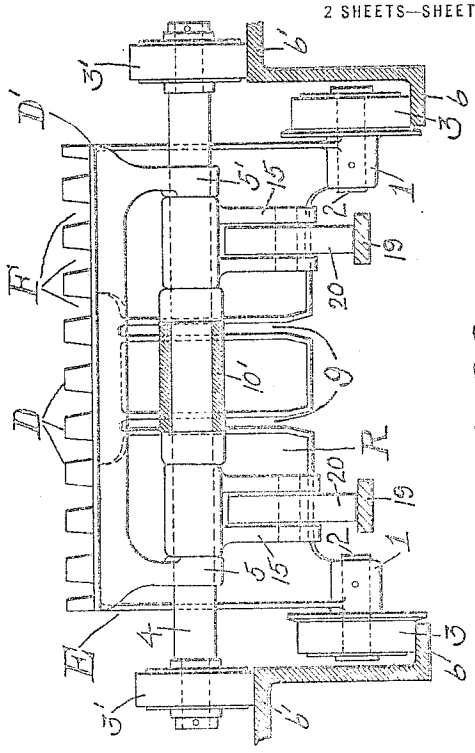


Fig. 2.

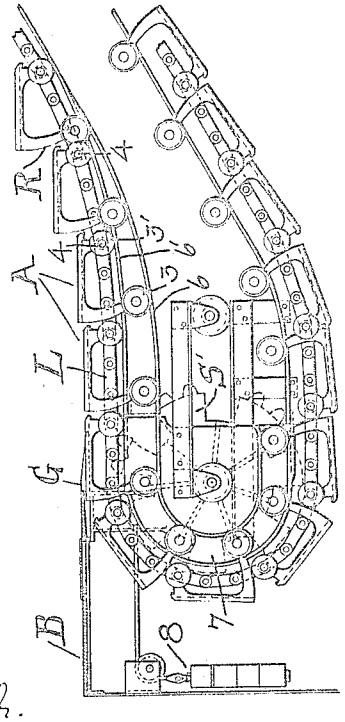


Fig. 3.

WITNESSES:

Ernest L. Gale Jr.

James G. Bethell.

INVENTOR

Jesse W. Reno

BY L. N. Campbell.

ATTORNEY

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2 SHEETS—SHEET 2.

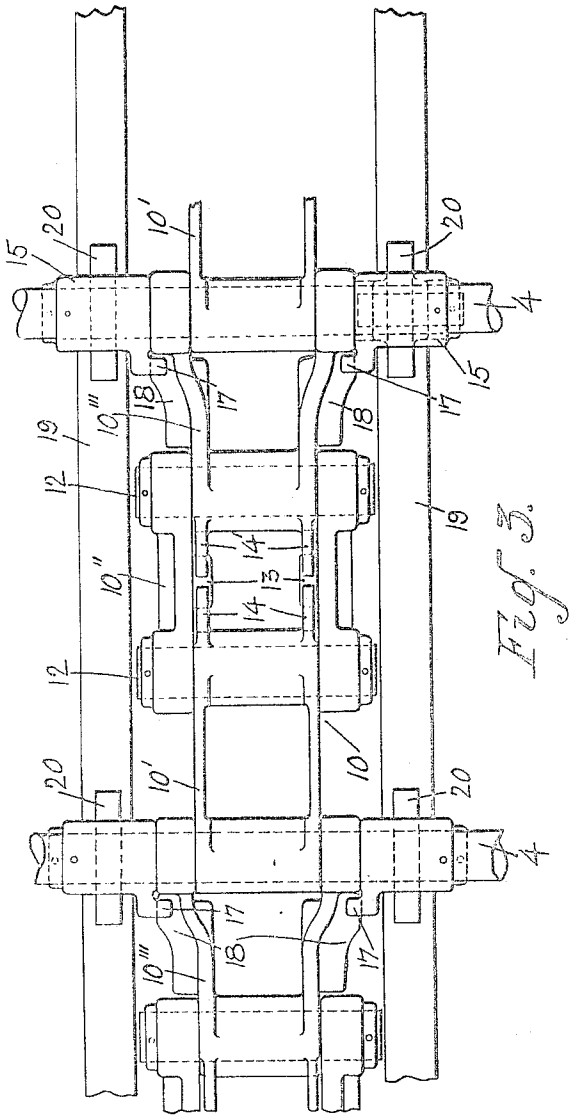


Fig. 3.

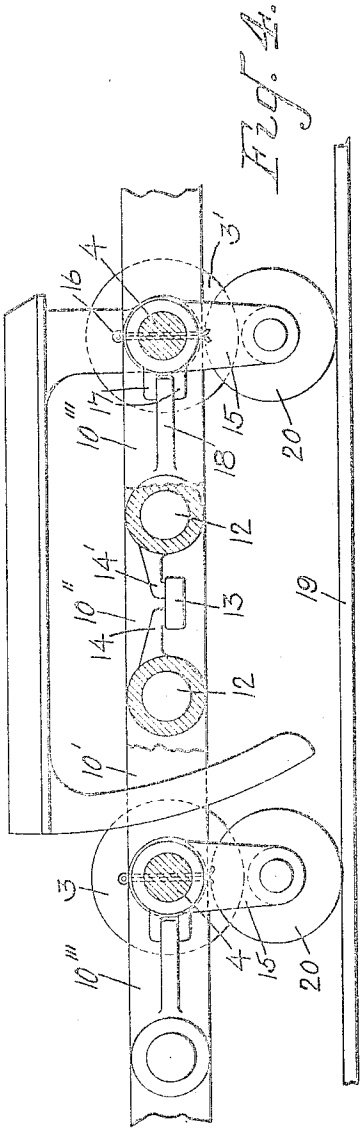


Fig. 4.

WITNESSES:

Ernest L. Gale Jr.

James G. Bethell.

INVENTOR

Jesse W. Reno

BY L. N. Campbell.

ATTORNEY

UNITED STATES PATENT OFFICE.

JESSE W. RENO, OF NEW YORK, N. Y., ASSIGNOR TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CONVEYER.

1,288,196. Specification of Letters Patent. Patented Dec. 17, 1918.

Application filed February 8, 1916. Serial No. 76,835.

To all whom it may concern:

Be it known that I, JESSE W. RENO, a citizen of the United States, residing in New York, in the county of New York and State of New York, have invented a new and useful Improvement in Conveyers, of which the following is a specification.

My invention relates to inclined endless conveyers, more particularly of the step type commonly known as escalators, it being directed to certain improvements on escalators having a single chain drive and slotted step risers, such as disclosed in my allowed application, Serial No. 13,303, filed March 10, 1915, Patent No. 1,178,102, April 4, 1916.

One of the objects of the invention is the provision of a driving chain for the escalator involving improved features of construction which admits of the use of a plain curved riser instead of a ribbed riser as provided in my application above noted, and which overcomes in a practical and simple manner certain difficulties as will be hereinafter fully pointed out.

Another object of the invention is to provide an escalator which is simple in construction and involves only a small cost to manufacture, and in which economy in space, as compared with other types of escalators, is very marked.

Other objects of the invention will appear more fully hereinafter, the novel combinations and arrangements of parts being set forth in the appended claims.

In the accompanying drawings, Figure 1, illustrates in longitudinal section, a side view of an escalator constructed in accordance with the present invention; Fig. 2, illustrates a front view of one complete step with certain other parts in section; Fig. 3 illustrates in plan view, a portion of the driving chain of my improved construction, and Fig. 4, illustrates with certain parts in section, substantially an elevation of Fig. 3, with a step shown in addition thereto.

The conveyer comprises a series of steps A, which form an endless movable tread platform or surface connecting different floor levels B and C. The tread surface proper of each step may be of either the plain or rib type. The latter type of tread is illustrated herein, it comprising longitudinal ribs D, suitably secured to a horizontal web D′ forming an integral part of a one-piece step frame E. The ribs are so spaced as to produce a shallow groove F therebetween. A usual form of comb landings G, are provided at the floor levels, the landings having teeth or prongs adapted to register with the grooves F of the steps.

Each step proper, as hereinbefore pointed out, may be made up in one piece or casting, comprising more essentially the horizontal web D′, and a plain curved riser R. The riser at its lower end terminates in bearings 1, in which are contained pins 2, carrying a pair of inner truck wheels 3, these wheels being flanged. A pair of outer, or what may be termed the front truck wheels 3′ are carried at the outer ends of a transverse axle 4, supported by a pair of separated bearings 5, 5′, which form an integral part of the step frame. The rear and front truck wheels are adapted to travel respectively on suitable track rails such as 6, 6′. The track rails are arranged in a well known manner to form a horizontal run at the landings and an inclined run between the landings, these rails forming an upper and lower run for the steps, and being united at their ends by suitable carriages such as 7, the lower carriage being floating, and connected to a tensioning device 8.

There is provided for the purpose of driving the steps, a single endless chain, L, arranged on a center line coinciding with the center line of the escalator, the riser of each step being slotted as indicated at 9 in Fig. 2. to accommodate the chain.

The idea in general of using a single driving chain and providing slotted risers to accommodate the chain is shown and described fully in my allowed application heretofore noted, but the present invention is directed more particularly to an improved driving chain which overcomes certain difficulties and affords certain benefits which I will now point out in detail.

The driving chain in the present instance comprises a series of links 10 pivotally connected with the step axles to form the endless chain L. The driving chain passes around sprocket wheels S, S′, at the upper and lower landings, respectively. Either one or both of these sprocket wheels may be driven from any suitable source of power. The sprocket wheels are preferably constructed with cut out portions such as 11,

to accommodate the step risers. The chain is so constructed, that the links thereof forming the connection between the step axles 4, will form a rigid or straight line connection between the axles while the chain is in commission on the upper run of the escalator, while at the same time it will accommodate itself to, or in other words flex or bend around the sprocket wheels S, S', in the same manner as an ordinary chain, and pass through the various curved tracks forming the lower run, with perfect freedom.

The construction of the driving chain to admit of the above noted characteristics is shown in detail in Figs. 3 and 4, these figures illustrating only a portion of the endless chain such as connects adjacent step axles. The step axles are connected by a number of links, the latter in the present instance being three in number, which I will designate 10', 10'', 10'''. The links 10' and 10''' are connected to the adjacent axles 4, and to the middle link 10'' by means of connecting pins 12. The side bars which form the middle link are provided with lugs 13, there being formed integrally with each of the links 10'', 10''' a pair of arms or projections 14, 14', respectively, which co-act with the lugs 13, to form a straight line or rigid connection between the step axles while the chain is in commission on the upper or working run of the escalator, and in the other instance to permit the links to accommodate themselves to, or bend around the sprocket wheels in the usual manner. This driving chain it will now be noted, acts both rigidly and flexibly during the path of movement of the steps, these opposite or reverse actions of the chain being caused by the movement of the steps in following the reverse curvatures of the track rails which guide the steps in their travel.

It will be pointed out here, that with the use of an ordinary driving chain without this rigid characteristic, there is a tendency for the chain to sag, between its points of connection with adjacent steps, the sagging being greatest during the transition stage of the steps between the horizontal and incline run at the lower end of the escalator, and gradually diminishing as the steps reach the top landing. This sagging of the chain is objectionable for the reason that it causes the treads of the steps to rub against the risers of adjacent steps, this resulting in wear and noise and a possibility of accident.

The present invention entirely overcomes these objectionable features, and affords advantages of importance, for the reason that the links serve as straight rigid bars connecting adjacent axles. This rigid connection in effect, maintains a uniform relation between the tread of one step, and the riser of an adjacent step, and thus admits of the use of a plain curved riser as is herein illustrated, instead of a ribbed riser as provided in my allowed application.

Another difficulty encountered in this class of apparatus, is occasioned by a downward thrust of the driving chain, this action taking place at the curved track portion of the escalator which connects the incline working run with the upper horizontal run. This action imposes a severe strain on the steps particularly at the point of connection between the step and the chain, and in apparatus heretofore used, the parts forming the connection between the step and chain were, in order to withstand this strain, of large dimensions and weight to an objectionable extent. According to the present invention I eliminate the use of weighty parts of large dimensions, and meet the difficulty in a simple and practical manner by associating with each step axle 4, a pair of rollers 20, the latter being carried by members 15 connected to the axle by cotter pins 16. The members 15 are provided with lugs 17, forming a slot into which fit pins 18 formed integrally with the links 10'''. The rollers are adapted to coact with a pair of short length rails 19 positioned at the point above noted whereat the thrust takes place. With this arrangement the entire downward thrust of the chain at the point indicated is taken up by the rollers 20 and their coacting tracks, thus relieving the step axles from strain, and permitting the use of axles of comparatively small dimensions and light weight, these items of course being of considerable importance since they tend materially to reduce the cost of the apparatus.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. A conveyer comprising a sectional carrying surface, the sections being connected by means separate therefrom acting rigidly under pressure in one direction, and flexibly under pressure in an opposite direction.

2. A conveyer comprising a sectional tread surface, and means separate from the sections connecting the same and acting rigidly under pressure in one direction, and flexibly under pressure in an opposite direction.

3. A conveyer comprising steps, and a series of links connecting adjacent steps, and acting rigidly and flexibly.

4. A conveyer comprising steps, and links connecting the steps at the front end only, and acting rigidly and flexibly.

5. An escalator comprising steps, means to guide the steps in a path of travel, and means connecting the steps acting rigidly during movement of the steps in following a curvature, and flexibly in following a curvature reverse to the first named curvature.

6. An escalator comprising steps, means to guide the steps in a path of travel, and a chain connecting the steps acting rigidly

during movement of the steps in following a curvature formed by the guiding means, and flexibly in following a curvature reverse to the first named curvature.

7. An escalator comprising steps, means to guide the steps in a path of travel, and a chain connecting the steps at their front end, the chain acting rigidly during movement of the steps in following a curvature formed by the guiding means, and flexibly in following a curvature reverse to the first named curvature.

8. An escalator comprising steps, and means connecting the steps and acting rigidly to maintain a uniform distance between the steps during the transition stage of the steps between the horizontal and the inclined runs.

9. An escalator comprising steps, and links connecting each step to an adjacent step acting rigidly to maintain a uniform distance between the steps during the transition stage of the steps between the horizontal and the inclined runs.

10. An escalator comprising steps, and a connection between each adjacent step comprising links connected to the front end of the step, the links acting rigidly to maintain a uniform distance between the steps during the transition stage of the steps between the horizontal and the inclined runs.

11. An escalator comprising a driving wheel, steps, and links operable by the driving wheel connecting the steps, the links acting rigidly during movement of the steps on the upper run of the escalator, and flexibly to accommodate themselves to the driving wheel.

12. An escalator comprising a sprocket wheel, steps, and links operable by the sprocket wheel connecting the steps, the links acting rigidly during movement of the steps on the upper run of the escalator, and flexing to make an approximate half turn about the sprocket wheel.

13. An escalator comprising steps connecting different levels, links connecting the steps, and means to prevent sagging of the chain during the transition stage of the steps between the floor level and the inclined run of the steps.

14. An endless conveyer comprising carrying sections, upper and lower runs, forming an endless path of travel for the conveyer comprising horizontal and inclined ways, curved ways uniting the upper and lower runs, and a connection between the steps acting rigidly during movement of the conveying sections on the ways forming the upper run, and flexibly during movement of the carrying sections at the curved ways uniting the upper and lower runs.

15. An escalator comprising steps connected to a single driving chain constructed to act rigidly and flexibly, and risers for the steps constructed to accommodate the chain.

16. An escalator comprising steps pivotally connected at one end only, to a single driving chain, the chain being constructed to act rigidly and flexibly, and risers for the steps constructed to accommodate the chain.

17. An escalator comprising steps each bearing an axle at the front end, and a single driving chain connecting the axles, the chain forming a rigid and flexible connection between the steps during movement thereof in following reverse curvatures.

18. The combination with a series of steps, and a driving chain therefor comprising an endless series of sections acting rigidly during movement of the steps in following one curvature, and flexibly during movement of the steps in following a reverse curvature.

19. The combination with a series of steps, and driving chain therefor comprising an endless series of links forming sections acting rigidly during movement of the steps in following one curvature, and flexibly during movement of the steps in following a reverse curvature.

20. The combination with a series of steps, and a driving chain therefor, comprising an endless series of sections connected to the steps, each section comprising links forming a rigid connection between the steps in following one curvature, the said links flexing during movement of the steps in following a reverse curvature.

21. A conveyer comprising axles connected to a driving chain arranged on the longitudinal center line of the conveyer, wheels supporting the axles, and means to prevent bending of the axles by the downward thrust of the chain.

22. A conveyer comprising step axles connected to a driving chain arranged on the longitudinal center of the step, wheels supporting the axles, and means forming a bearing for the axle intermediate the supporting wheels.

23. A conveyer comprising an axle connected to a single driving chain only, and means to form a bearing for the axle, said means being connected with both the axle and driving chain.

24. A conveyer comprising an axle connected to a single driving chain only, means forming a bearing for the axle comprising a roller, and member supporting the roller on the axle, said member being connected with the chain.

25. A conveyer comprising an axle connected to a single driving chain only, means forming a bearing for the axle comprising a pair of rollers, and members on opposite sides of the chain and connected thereto, supporting the rollers on the axles.

26. A conveyer comprising an axle connected to a single driving chain arranged on

the longitudinal center of the conveyer, supporting wheels carried by the axle near the ends thereof, and auxiliary rollers carried by the axle intermediate the supporting wheels.

27. A conveyer comprising an axle, a driving chain connected to the axle and arranged on the longitudinal center of the conveyer, supporting wheels carried by the axle near the ends thereof, an auxiliary roller, a member supporting the roller on the axle intermediate the supporting wheels, and a connection between the chain and said member.

28. An escalator comprising a step having an axle, rollers supporting the step, a chain connected to the axle and arranged on the longitudinal center of the step, and auxiliary rollers carried by the axle and connected to the chain.

29. An escalator comprising a step having an axle, rollers supporting the step, a chain connected to the axle, auxiliary rollers carried by the axle, means forming a trackway for the rollers, and an auxiliary trackway positioned at a predetermined point in the run of the step and adapted for engagement by the auxiliary rollers, the latter bearing on the top face of the trackway.

30. An escalator comprising a step, a single driving chain only connected to the front end of the step, a roller connected to the chain at its point of connection with the step, and a short run track forming a bearing for the roller, to relieve strain on the steps as caused by a thrust of the chain.

31. A step for an escalator comprising a ribbed tread surface and a plain face slotted riser, the slot being open ended at its lower end and closed at its upper end.

32. A step for escalators comprising a one piece tread and riser, the riser being slotted.

33. A step for escalators comprising a one piece tread and riser, the riser being slotted and terminating into bearings.

34. A step for an escalator having a plain face curved riser, the riser being slotted.

35. A step for an escalator comprising front and rear truck wheels, a tread and riser formed in one piece, and bearings forming an integral part of the one piece member, containing wheel carrying members.

36. A step for an escalator comprising a one piece tread and riser, truck wheels, and bearings forming an integral part of the step containing wheel carrying members.

37. A step for an escalator comprising a one piece tread and riser, truck wheels, and an axle supported by bearings forming an integral part of the step, supporting the truck wheels.

38. A step for an escalator comprising a one piece tread and riser, inner and outer truck wheels, an axle supported by bearings forming an integral part of the step carrying the outer truck wheels, and additional bearings forming an integral part of the step supporting the inner truck wheels.

39. A step for an escalator comprising a one piece tread and riser, truck wheels, and bearings forming an integral part of the step, supporting the latter at the ends thereof.

40. A step for an escalator comprising a one piece tread and riser, inner and outer truck wheels, and bearings formed integrally with the step supporting the outer truck wheels at the front end of the step, and the inner truck wheels at the back end of the step.

41. A chain for conveyers, comprising a series of links, one of the links forming a bearing at a point substantially mid way thereon for an adjoining link.

42. A chain for conveyers, comprising a series of links pivoted together, one of the links forming a bearing at a point substantially mid-way of its length, for the two adjoining links.

43. A chain for conveyers, comprising a series of links pivoted together, and a member on one of the links forming a bearing common to the two adjoining links.

44. A chain for conveyers, comprising a series of links, one of the links having a projecting member, and means on adjoining links adapted to engage the said projecting member.

45. A chain for conveyers, comprising a series of links, a member projecting laterally from one of the links, and means on adjoining links adapted to engage the member.

46. A chain for conveyers, comprising a series of links, a member projecting from one of the links at a point substantially midway of its length, and means on an adjoining link adapted to engage the said member.

47. A chain for conveyers, comprising a series of links pivoted together, a projecting member on one of the links, and members on the two adjoining links projecting toward each other to bear on the said member.

48. A chain for conveyers, comprising a series of connected links, a member projecting from one of the links, and a member on an adjoining link projecting parallel with the first named link adapted to bear on the projecting member.

49. A chain for conveyers comprising a series of connected links, a member projecting from one of the links, and members on the adjoining links projecting parallel with the first named link adapted to bear on the projecting member.

50. A chain for conveyers comprising a series of connected links, a projection on one of the links, and members forming a part of each one of the two links adjoining the first named links projecting parallel therewith to engage the said projection.

51. A chain for conveyers comprising a series of connected links, two of the links having members projecting therefrom toward each other, and a member on the link intermediate the two links, adapted for engagement by the said projecting members.

52. A chain for a conveyer, comprising a series of connected links, one of the links having a member adapted to bear on an adjoining link at a point intermediate the ends thereof.

53. A chain for a conveyer, comprising a series of connected links, two of the links having a member adapted to bear on the link intermediate thereof, at a point intermediate its ends.

54. A chain for a conveyer comprising a series of connected links, two of the links having members projecting toward each other to bear on the intermediate link, at a point intermediate the ends thereof.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

JESSE W. RENO.

Witnesses:
JAMES G. BETHELL,
W. H. BRADY.