Nov. 19, 1957 S. G. MARGLES 2,813,613

MOVING STAIRWAYS

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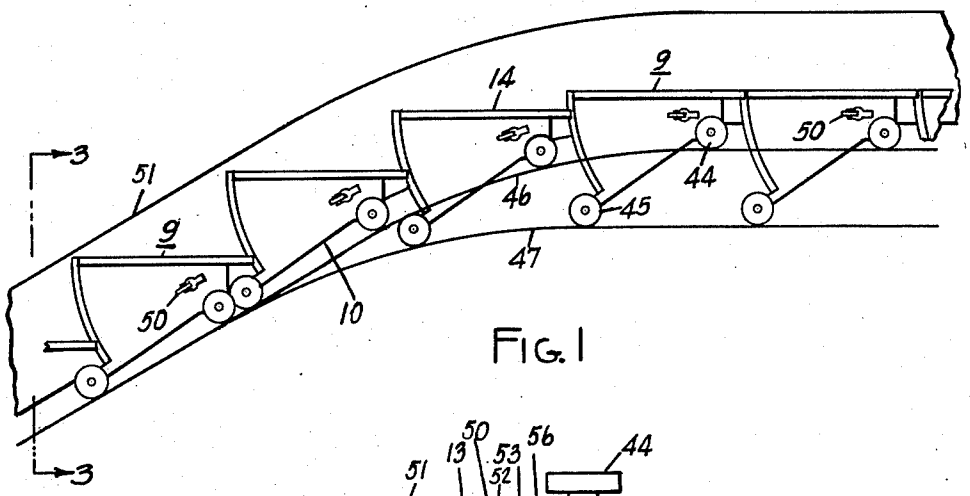



FIG. 1

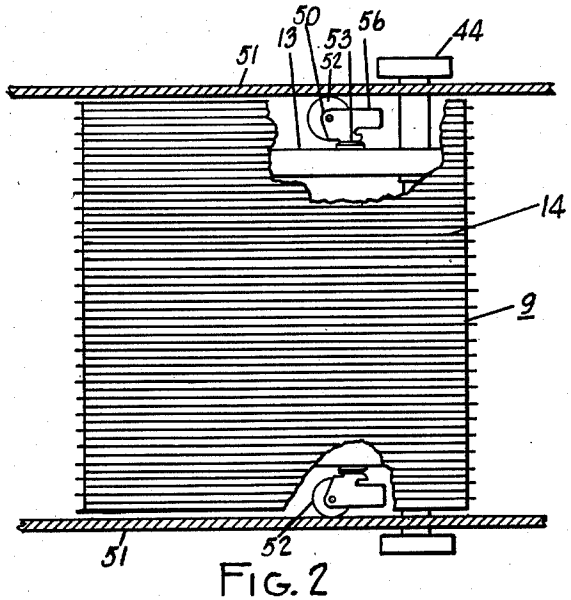



FIG. 2

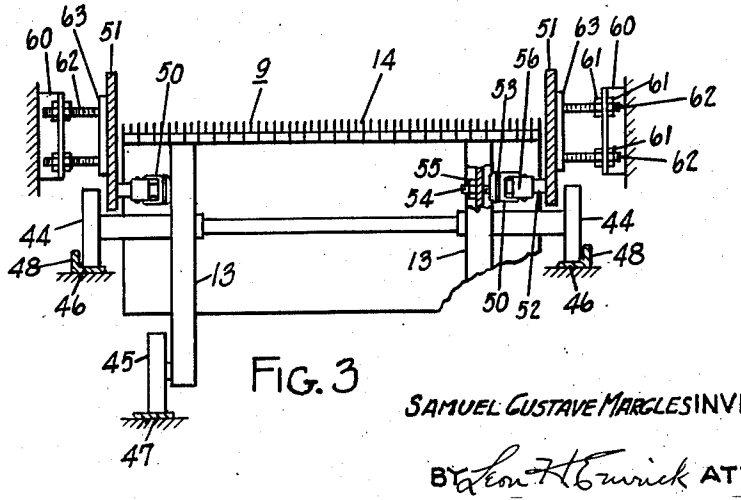



FIG. 3

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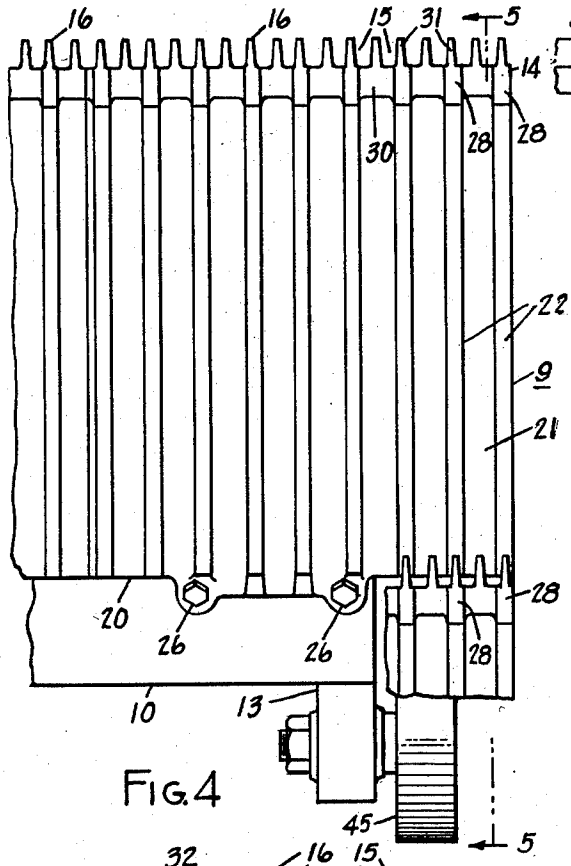



FIG. 4

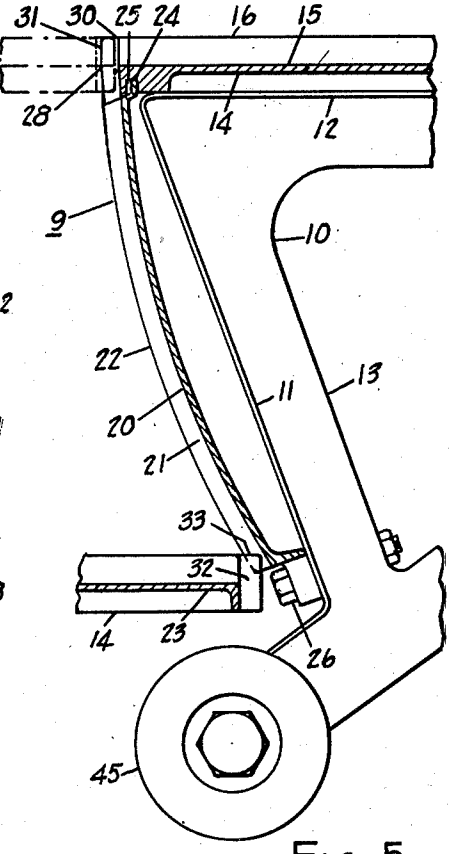



FIG. 5

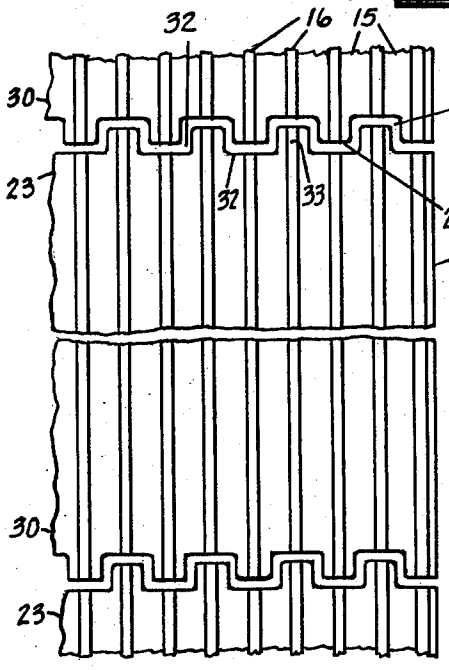



FIG. 6

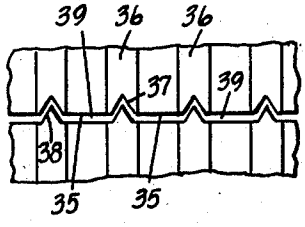



FIG. 7

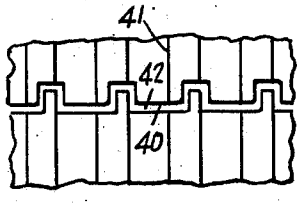



FIG. 8

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United States Patent Office 2,813,613 Patented Nov. 19, 1957



2,813,613

# MOVING STAIRWAYS

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Application March 22, 1954, Serial No. 417,901

2 Claims. (Cl. 198—16)

The invention relates to moving stairways.

Moving stairways comprise an endless series of steps which are moved from one landing to another for the purpose of conveying passengers. The steps are supported on wheels which run on tracks extending between the ends of the stairway. The step wheel tracks are provided with side flanges which cooperate with the sides of the step wheels to guide the steps in their movement along the incline. Notwithstanding a small clearance between the wheels and flanges, lost motion in the running gear permits a considerable amount of side motion of the steps. Therefore, the skirt panels of the stairway balustrading, between which the steps run, are set to allow for this side motion. As a result, there is a possibility of objects, such as overshoes, being caught in the space between the sides of the step treads and the skirt panels of an ascending stairway and between the sides of the riser and the skirt panels of a descending stairway.

The object of the invention is to provide protection against objects getting caught between the sides of the steps and the skirt panels.

The invention involves the provision of spacing rollers between the sides of the steps and the skirt panels to prevent side shifting of the steps and to enable a minimum uniform clearance to be had between the steps and the skirt panels. In carrying out the invention in accordance with the arrangement which will be described, spacing rollers in the form of casters are secured in horizontal position to the step frame of each step, one on each side of the step. The caster rollers extend out from the step tread an amount to provide a minimum clearance between the skirt panels and the step treads and the skirt panels are adjusted against the rollers to provide a constant uniform clearance throughout the height of the stairway. The casters are counterbalanced so as to enable the rollers to run without sliding on the skirt panels and follow the curves involved in the transition between step and platform formation at the ends of the stairway.

Another possibility of objects being caught is between adjacent steps in the transition from step to platform formation on an ascending stairway. This is obviated by providing cleats on the riser extending into recesses in the tread of the following step and extending the riser cleats to the top of the tread cleats, with at least a portion of the riser cleats in line with the tread cleats and without obstructing the grooves between tread cleats. The spacing rollers are of a further advantage in that they assist in maintaining the riser cleats in the desired relation to the recesses in the tread of the step which follows.

Features and advantages of the invention will be seen from the above statements and from the following description and appended claims.

In the drawings:

Figure 1 is a diagrammatic representation in side elevation of the upper end of a moving stairway, with the steps provided with side spacing rollers in accordance with the invention;



Figure 2 is a plan view, somewhat diagrammatic, of the step and skirt panel arrangement of Figure 1 for one step;

Figure 3 is a sectional view of the same, taken along line 3—3 of Figure 1;

Figure 4 is a fragmental view, facing the riser of a step, of adjacent steps with meshing riser cleats and tread cleats;

Figure 5 is a view in section, taken along the line 5—5 of Figure 4, showing the construction of the riser and also illustrating adjacent steps both in step and in platform formation;

Figure 6 is a plan view of the steps of Figures 4 and 5 in platform formation;

Figure 7 is a view, similar to Figure 6, of another arrangement of riser cleats and tread cleats; and

Figure 8 is a view similar to Figure 6 of still another arrangement of riser cleats and tread cleats.

Referring first to Figures 1, 2 and 3, each step **9** comprises a step frame **10** including a pair of yokes **13**, one at each side of the step. Supported on the yokes is a tread plate **14**. Each step is provided at each side with a step wheel **44** and a trailer wheel **45** mounted on the step yokes. These wheels run on tracks **46** and **47**, these tracks being merged on the incline. The outer edges of tracks **46** are provided with flanges **48** for guiding the steps, these flanges being set with a minimum operating clearance with respect to the step wheels, say one-sixty-fourth of an inch on each side. Notwithstanding this, it has been found with prior constructions, due to lost motion in the wheels, running gear chains and other parts, a considerable side motion of the step is possible. As a result, the skirt panels **51**, which form the lower part of the balustrading, have to be set with sufficient clearance to allow for this side motion. Thus a considerable clearance may arise between a step and skirt panel due to shift of the step to one side, as much as one-eighth of an inch, or even more with certain constructions, which increases with wear, having been found in practice. Thus there is the possibility of an object such as an overshoe being drawn into and caught in this gap.

In the improved construction illustrated, each step is provided with a pair of spacing rollers in the form of casters **50**, one on each side thereof, which extend horizontally and run beneath the step tread **14** on the skirt panels **51**. The casters are mounted on the step frame yokes **13**. Each caster comprises a wheel **52** of fairly hard rubber rotatably mounted in a stock **53**. The stock is pivotally mounted on a spindle **54** with ball bearings (not shown) in accordance with usual caster construction. The spindle is threaded for securing the caster in a horizontal threaded aperture in the yoke **13**. A lock nut **55** secures the caster in place. The stock is weighted, as at **56**, to counterbalance the weight of the wheel **52**. Thus the caster is in a state of neutral equilibrium so that it will readily follow without sliding the step in its movement between landings.

The wheels **52** of the casters extend out slightly beyond the step tread **14**. The skirt panels **51** are mounted on brackets **60** secured to the stairway truss (not shown) and adjusted so as to contact the wheels, this being somewhat schematically illustrated as effected by nuts **61**, arranged one on each side of the brackets, on studs **62** extending from plates **63** secured to the skirt panel. This enables a small constant operating clearance to be maintained between the step **9** and the skirt panels **51**, say one thirty-second of an inch on each side and prevents side shifting of the step with respect to the skirt panels. Thus, the possibility of objects being drawn into the space between the skirt panels and step tread of an ascending stairway is minimized. Also the possibility, due to misuse of the stairway, of objects being

caught in the space between the skirt panel and riser of a descending stairway is minimized. Also, this insures the proper lining up of the steps so as to maintain proper clearance between riser cleats and the recesses in adjacent step treads.

Referring now to Figures 4, 5 and 6, the step frame **10** has a riser portion **11** and a tread portion **12**, secured at the sides to yokes **13**. The tread plate **14** is mounted on the tread portion **12** and is made up of sections, each provided with a plurality of longitudinally extending grooves **15** to form cleats **16**. The riser portion **11** of the step frame is provided with a facing **20** formed in sections, each provided with a plurality of vertically extending grooves **21** to form cleats **22**. Across the top of the riser facing are formed lip portions **24**. These hook in slots **25** in the tread to secure the facing in place at the top. At the bottom the facing is held in place by means of screws **26**.

A riser cleat is provided for only every other tread cleat **16** and is aligned therewith. The riser cleats extend to the top of the facing and the grooves **21** between them are of uniform depth throughout their height. Cleats **22** are extended in effect to the top of the tread cleats by forming extensions **28** on the forward end **30** of the tread, the ends **31** of the tread cleats forming the top ends of the riser cleats. The extensions **28** project out substantially the same distance as cleats **22**, it being preferred to set them back slightly, as exaggeratedly illustrated, to avoid any possibility of their being extended beyond cleats **22** on assembly. Below the ends **31**, the riser cleats are made wider than the tread cleats as they are double the pitch and space permits. The rear end **23** of the step tread is formed with recesses **32** to receive the riser cleats of the step ahead. These recesses are in line with the tread cleats opposite the riser cleats of the step ahead so as to enable the inbetween tread cleats to mesh with the riser cleats. The curvature of the riser cleats **22** is such as to correspond with the path of movement of the tops **33** of the inbetween tread cleats at the end of the step facing the riser of the step ahead during the transition from step to platform formation. With this arrangement, a uniform operating clearance, of say three thirty-seconds of an inch, is maintained between the riser cleats and the tread cleats throughout the transition from step to platform formation, and a zigzag line of clearance of dentate form is provided between the riser and step tread of adjacent steps throughout the transition and while in platform formation. Inasmuch as the riser cleats are aligned with tread cleats, they can be run to the top of the tread cleats without danger of interference with the combplate teeth. It is preferred to utilize a construction in which the tread cleats are narrow and of small pitch, say one-third of an inch, and with shallow grooves between treads, as this assists in providing protection.

Another arrangement is illustrated in Figure 7 in which the riser cleats **35** alternate with the tread cleats **36**. Grooves **37** are provided in the riser to form the riser cleats, these grooves being V-shaped and being aligned with the tread cleats. The riser cleats at the top of the step are formed by the tread cleats at the sides of the grooves. In this way a portion of the riser cleat is aligned with and extends to the top of the tread cleat. The ends **38** of the tread cleats of the succeeding step facing the riser are reciprocally V-shaped to extend into the grooves **37**, the riser cleats **35** in turn extending into recesses **39** between ends **38**. Thus a serrated form of zigzag line of clearance is provided between adjacent



steps. This arrangement is more suitable for constructions utilizing wider tread cleats and grooves.

Still another arrangement is illustrated in Figure 8 which is particularly suitable for constructions utilizing wider tread cleats and grooves. In this construction a riser cleat **40** is provided for each step tread cleat **41**, with a portion of the riser cleat aligned with a portion of the tread cleat. The rear end of the tread is formed with recesses **42** extending from one side of a tread cleat into a portion of the adjacent tread cleat and the riser cleats are formed to extend into these recesses. Here again a portion of the riser cleats extends to the top of the tread cleats and a dentate line of clearance is provided between steps throughout their transition from step to platform formation.

It is to be understood that the spacing rollers are applicable to other step constructions, with or without cleated risers and that the cleated riser construction may be employed without spacing rollers. Also, with the spacing rollers provided, it may be possible to dispense with the flanges **48** on tracks **46**.

As many changes could be made in the above constructions and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A straight line moving stairway in which an endless series of steps run from one platform to another between balustrading skirt panels, one on each side of the steps, in which each step has a step frame, in which each step has supporting wheels carried by the step frame which run on tracks between the ends of the stairway and in which the skirt panels are provided with means for adjustably mounting them in relation to the steps, characterized in that each step has a pair of counterbalanced casters pivotally mounted on the step frame to extend sidewise therefrom on each side of the step horizontally to just beyond the step, with the skirt panels adjusted to be in contact with the rollers so that the rollers run on the skirt panels.

2. A straight line moving stairway in which an endless series of steps run from one platform to another between balustrading skirt panels, one on each side of the steps, in which each step comprises a step frame having a pair of yokes, in which each step has supporting wheels carried by the step frame which run on tracks between the ends of the stairway and in which the skirt panels are provided with means for adjustably mounting them in relation to the steps, characterized in that each step has a pair of side spacing rollers mounted one on each step yoke and extending outwardly therefrom horizontally a slight distance beyond the sides of the step, each spacing roller being in the form of a caster counterbalanced to a state of neutral equilibrium, and that the skirt panels are adjusted to contact the rollers so that the rollers run on the skirt panels, preventing side shifting of the step and thus maintaining a constant minimum clearance between the step and the skirt panels.

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