

No. 829,152.

PATENTED AUG. 21, 1906.

E. L. HOCQUART.
TRAVELING STAIROASE.
APPLICATION FILED JUNE 6, 1906.

3 SHEETS—SHEET 1.

Fig. 17

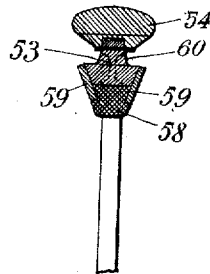
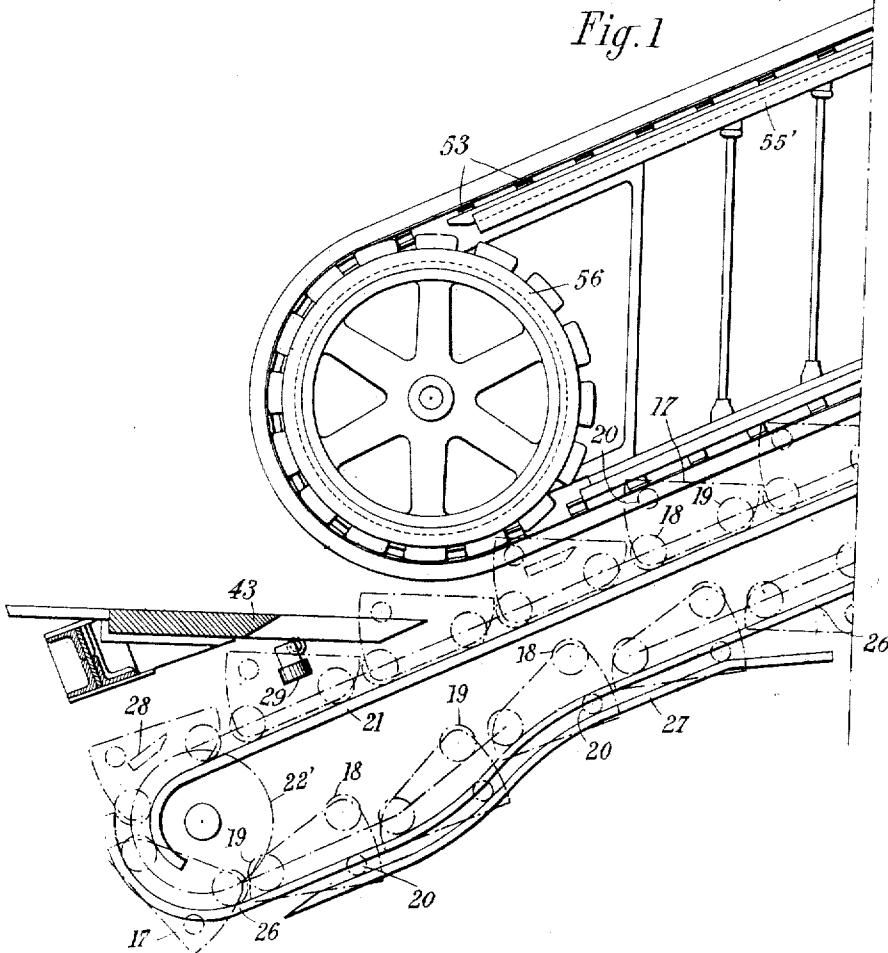


Fig. 1



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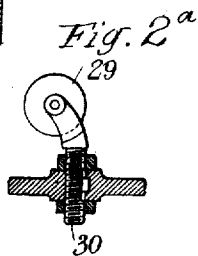
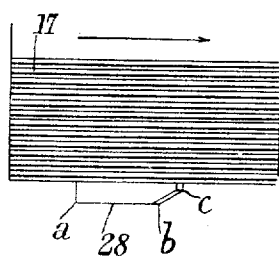
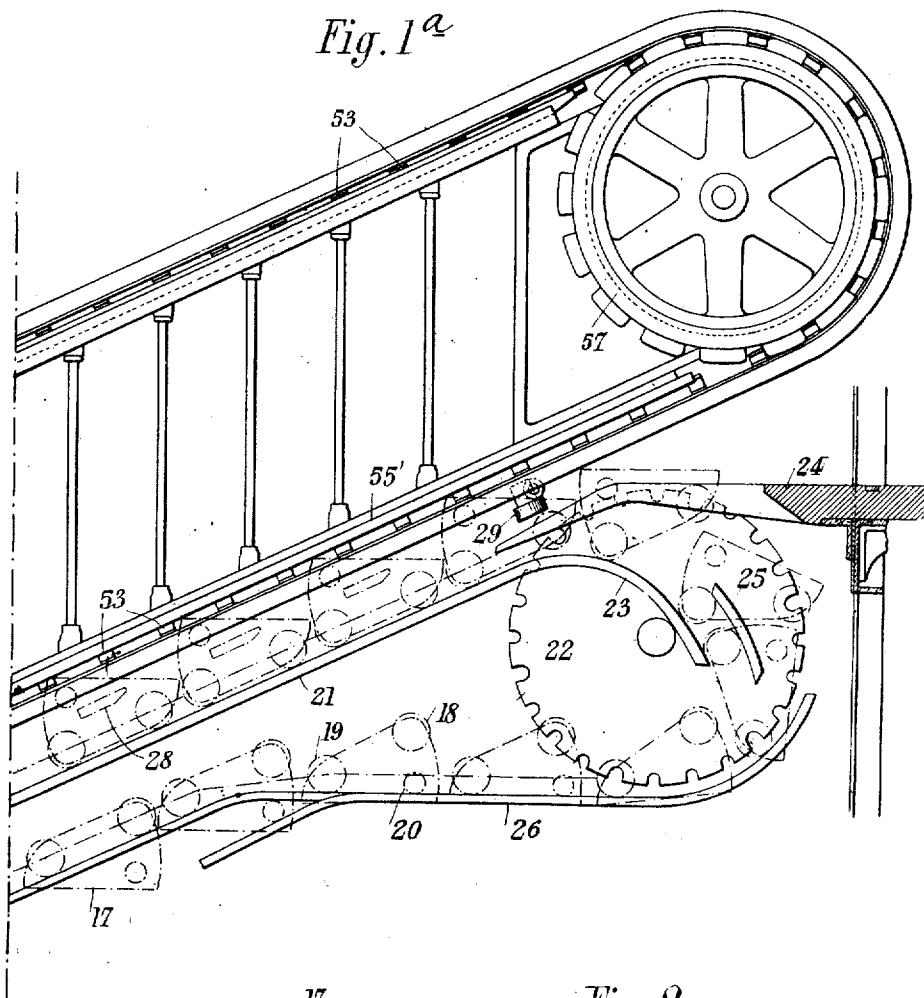
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3 SHEETS—SHEET 2.

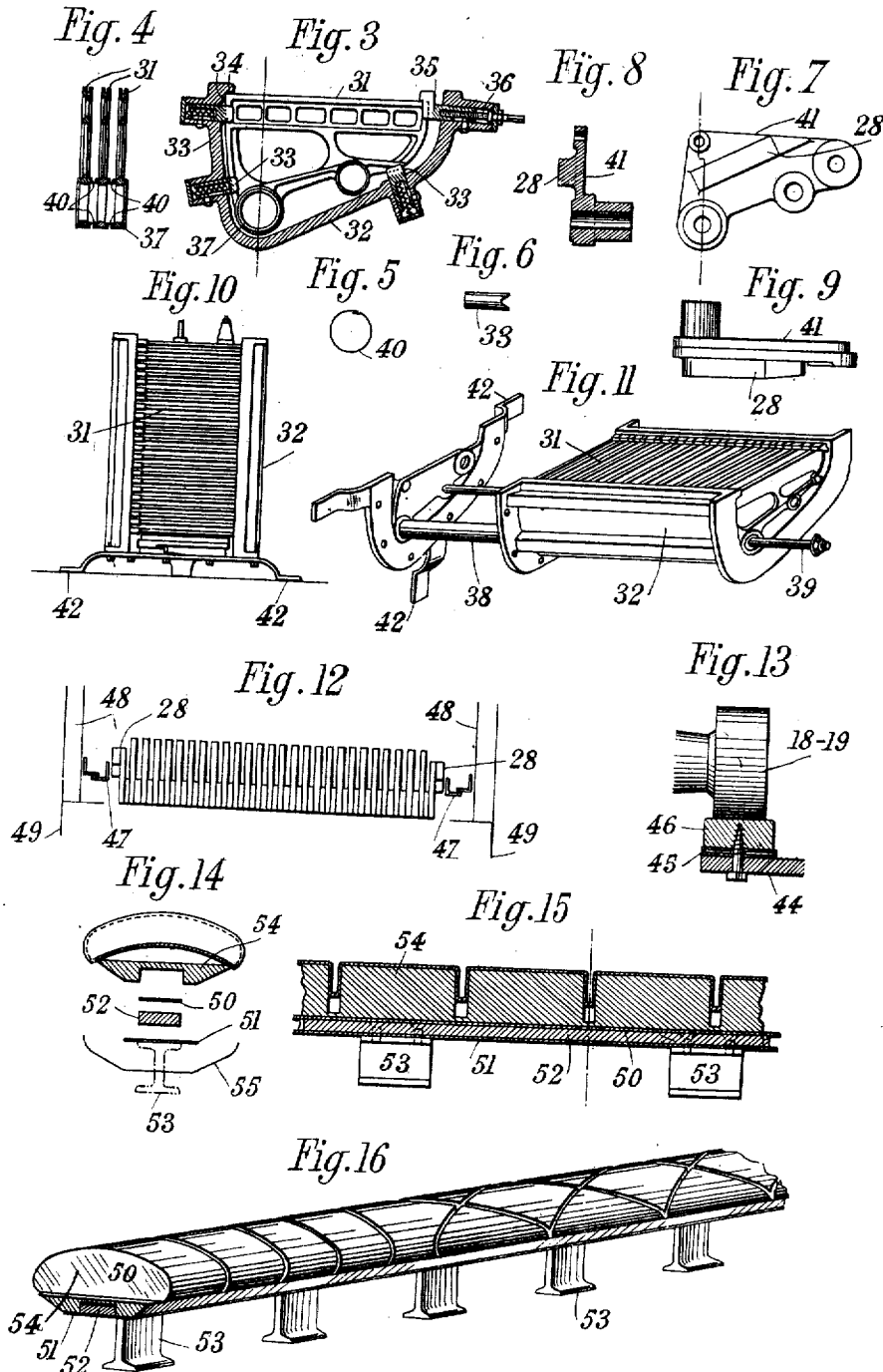


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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

EDOUARD LOUIS HOCQUART, OF PARIS, FRANCE.

TRAVELING STAIRCASE.

No. 829,152.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed June 6, 1905. Serial No. 283,905.

To all whom it may concern:

Be it known that I, EDOUARD LOUIS HOCQUART, a citizen of the Republic of France, residing at Paris, France, have invented new and useful Improvements in or Relating to Traveling Staircases, of which the following is a specification.

This invention relates to a traveling staircase with moving hand-rails, and is particularly adapted for transport of persons.

A staircase according to this invention is illustrated, by way of example, in the accompanying drawings, in which—

Figure 1 shows the staircase in vertical and longitudinal section. Fig. 2 is a plan of one of the steps. Fig. 2^a is a sectional elevation showing a roller. Fig. 3 is a sectional elevation showing a casing for the separate elements of a step with one of the elements therein. Fig. 4 is an end elevation showing the separate elements of a step juxtaposed. Fig. 5 is an end view of an elastic split ring. Fig. 6 is a side view of one of the spring-pins detached. Fig. 7 is a side view of a bracket; Fig. 8, a vertical section through the dotted line of Fig. 7, and Fig. 9 a plan view corresponding with Figs. 7 and 8. Fig. 10 is an elevation showing several elements of a step located in a casing. Fig. 11 is a view in perspective, showing a casing and several elements of a step located therein. Fig. 12 is an end view showing the angle-irons for guiding the steps. Fig. 13 is a section and elevation showing the track and one of the rollers mounted thereon. Fig. 14 is a cross-section and elevation on a plane through the dotted line in Fig. 15; Fig. 15, a longitudinal section and elevation; and Fig. 16 a view in perspective, showing the construction of the hand-rail. Fig. 17 is a cross-section and elevation showing the hand-rail.

In all the figures like reference characters wherever they occur indicate corresponding parts.

Each of the steps 17, the construction of which is hereinafter described, is provided on each side with three rollers 18, 19, and 20. The third roller 20 is preferably of a smaller diameter than the two others. The latter travel over the whole length of an upper track 21 until the steps arrive at the upper track supporting toothed wheel 22, which drives them by means of chains connecting a all the steps, the links of the said chains being pivoted on the pins of the rollers 19. On arriving at the wheel 22 the pins of the rollers

19 are supported directly by this wheel, while the other rollers 18 travel downward along a guide-curve 23, which forms a continuation of the flat track 21, in such manner that the step 17, while it remains in engagement with or proximity to an upper fixed platform 24, is maintained in horizontal position, and afterward it descends and disappears below the said platform, as shown in Fig. 1, after the traveler has alighted on the platform. Then the rollers 18 are stopped in the longitudinal direction by a small track 25, parallel to the curve 23 and intended to retain the said rollers, and to prevent the step from swinging out under the influence of its weight this curve is arranged in such manner that what was the upper roller 20 comes to lie without a shock on a lower curved track 26, widened to that end and made concentric to the wheel 22 at its beginning. The object of this arrangement is to allow the steps to turn without fouling each other, which would happen if they were not provided with the rollers 20. This arrangement has also the advantage of bringing the steps above the track into the lower horizontal portion and of reducing the space occupied to a minimum.

In order to cause the step to travel on the roller 18, the track of the roller 20 is separated from the track 26 and extended downward, so as to bring the roller 18 into contact with the track 26 without shock.

In order to prevent the steps from fouling each other at the lower end of their travel, another short track 27 raises each step by means of its roller 20, and thus prevents it from coming into contact with the adjoining step, owing to the suitably-designed curves of the said track. In the same way as in the case of the upper portion this track is at the side of the main track in the interior of the staircase.

At the bottom portion of the apparatus the track 26 is curved upward and made parallel to the bottom wheel 22', about which the chain connecting the rollers of the steps 17 passes.

The upper track 21 is curved downward at this point—that is to say, at its beginning—in order that the rollers 18 and 19 may be guided at the beginning of their ascension between the two main tracks 21 and 26.

In addition to the guides described the steps 17 are provided at each side with projections 28, parallel to the longitudinal move-

ment of the steps, the face *a b*, Fig. 2, of the said projection being parallel to the axis of the staircase and the wedge-face *b c* being at an angle to the said axis. These faces engage at the top and bottom (and before their steps engage with each platform or grating) with rollers 29, suitably arranged on brackets 30, secured to the framework on either side and adjustable by means of nuts and lock-nuts, as shown in Fig. 2^a.

When the staircase is traveling, the cam-faces *b c* of the projections 28 engage with the rollers 29 and the step moves in such manner that the faces *a b* pass between the said rollers. All these steps come, therefore, into an absolutely-fixed position and engage with the platforms always under the same conditions.

The bracket 30 is provided with a screw keyed in an opening in the framework, so that by turning the nut when it is desired to adjust the position of the roller 29 this bracket can only move longitudinally without turning.

Each step could be made in one or more parts; but it is preferable to make it of juxtaposed elements. In the present instance metallic elements or plates 31, which are all alike, are placed into a casing 32, Figs. 3 and 4, in the positions which they are to occupy after the erection. This casing is provided at the sides with, say, three spring pins or catches 33, with V-grooved ends intended for exact centering of each element 31 in the plane which it is to occupy. The casing is provided with two machined faces 34 at right angles, into the angle of which fits one of the angles of each of the elements 31. A fourth catch 35 besides having a V-shaped recess like the others is provided at its end with a flat face normal to the faces of the groove and forming a stop limiting the position of the upper face of the element 31, so that all the upper faces of the various elements should be exactly in the same plane and these elements should all be in the desired position. By means of a screw 36 the catch 35 is pushed so as to force the element against the faces 34, the said element being also applied against the said faces by the expansion of the springs of the catches 33.

When an element 31 has been put in place, another is juxtaposed, Fig. 4. Between the two adjacent elements there remains a small clearance at the widened portion 37, which latter forms a kind of bearing, through the center of which passes an erecting-tube 38, Fig. 11, through which in turn passes a spindle 39, which participates in the tightening of the elements. Between two adjoining elements there is placed in the bearings 37 an elastic or split ring 40, Figs. 4 and 5, the edges of which rest against the inner shoulders of the said bearings, which ring closes in a tight manner the interval between the latter.

When all the elements 31, with their rings 40, have been put in place, the side bracket 41, carrying the above-described roller and guiding parts, is mounted on a cover or frame which is fixed to the end of the casing. This cover is so arranged that it receives the bracket in correct position, insured by means of spindles and of the erecting-tube. These parts are then threaded into the holes of the elements intended to receive them, the cover secured to the casing in correct position, and the casing 32 placed on feet 42, with which the said cover is provided, Fig. 10. The clearance between the walls of the bearings 37 and the tube 38 is sufficient to enable some suitable material—such as metal, cast-iron, cement, concrete, &c.—to be cast into it. As soon as these intervals are filled up and properly packed the last bracket is put on, so as to make the cast material to overflow, the nuts are tightened, and the step thus made. The rings 40 form tight joints between the elements, owing to the compression thus effected. As soon as the operation is finished the step is placed with its flat face on a bench arranged to receive it, the casing 32 is removed by removing the cover with the bracket 41 and by unscrewing the screws 36, whereupon another step can be made with the same casing or mold. After the step is finished it is left until the cast material solidifies. The step 17 thus forms at the top a grating the bars 31 of which can pass between the bars of the lower platform 43 and of the upper platform 24 of the staircase, Fig. 1.

In order to avoid the noise that would be caused by the rollers of the steps traveling on the tracks 21, 26, and 27, the latter are made in a special manner—i. e., to the metal part 44 of each track is applied a rubber band 45, and on this band is placed a preferably wooden rail 46, secured to the plate or rail 44 by means of metal or wooden screws, Fig. 13. At the curves the track may be faced with leather.

In order to guide laterally the steps 17 independently of the rollers 29, angle-irons 47, Fig. 12, are secured to brackets 48, mounted on string-boards 49, intended to carry the rails. These angle-irons engage with the projections 28 and extend from the lower rollers 29 to the upper rollers, and, if desired, they could replace these rollers by being extended to a sufficient extent. These angle-irons are bent at the beginning, so as to avoid shocks, and their position can be adjusted like that of the rollers 29.

The hand-rests of the staircase travel with it and at the same linear speed. Each of them is constituted by a strong canvas or other band 50, Figs. 14, 15, and 16, and a steel band 51, between which is inserted a lining 52 of cork or wood. The whole is properly connected together and provided at

intervals with guide-blocks 53. To the outer band 50 is secured a semi-elastic covering 54 of cork. The band of steel, the lining, and the facing of cork are incased in a canvas covering glued in place over them.

The cork facing 54 is slit by transverse or intersecting saw-cuts, Fig. 16, whereby a great flexibility is imparted to it, so that it can travel without breaking round the wheels 56 and 57. This facing is covered with some material, such as velvet, which is pressed into the saw-cuts, Fig. 15, so as not to be exposed to tension when the hand-rail is bent round a curve. The velvet is glued upon the canvas-covered cork, but only upon the exterior surface thereof. It is not glued in the saw-cuts, as in such case it would not accomplish the desired object.

The guide-blocks 53 engage with upper and lower fixed guides 55⁷, secured to the string-boards of the staircase, Fig. 1. The hand-rest constituted in the manner described passes over two toothed wheels 56 and 57, arranged, respectively, at the top and at the bottom of the staircase, so that the blocks 53 engage between the teeth of the said wheels for the purpose of driving the hand-rest. One only of these wheels—the top one—is driven by motive power at the same time as the wheel 22, driving the steps, the two latter wheels being properly connected in order that the hand-rest should move with the same linear speed as the steps of the staircase.

The wheels 56 and 57 are made as shown in the drawing in Fig. 17. To the rim 58

are secured lateral slightly-flaring cheeks 59, which laterally inclose the teeth or lugs with which the blocks 53 engage. On each tooth there is a projection 60, over which passes the steel band 51, so that the chain formed by the hand-rest curves exactly in accordance with the pitch of the corresponding wheel.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination of the platform, the string-boards, lateral guides for the steps, and guide-rollers in front of the grate-shaped platforms, to insure that the steps of corresponding shape shall engage with the platform without shock.

2. In a traveling staircase, a movable hand-rest comprising, in combination, a strong band of canvas and a band of steel between which is placed a suitable lining, the inner steel band being provided with guide-blocks and the upper band with a facing of cork suitably slotted so as to avoid tension at the curves, and covered with some material having folds pressed into cross-slots in the facing, the band of steel, the lining and the facing of cork being incased in a canvas covering.

In testimony whereof I have affixed my signature in presence of two subscribing witnesses.

EDOUARD LOUIS HOCQUART.

Witnesses:

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HANSON C. COXE.