

No. 751,702.

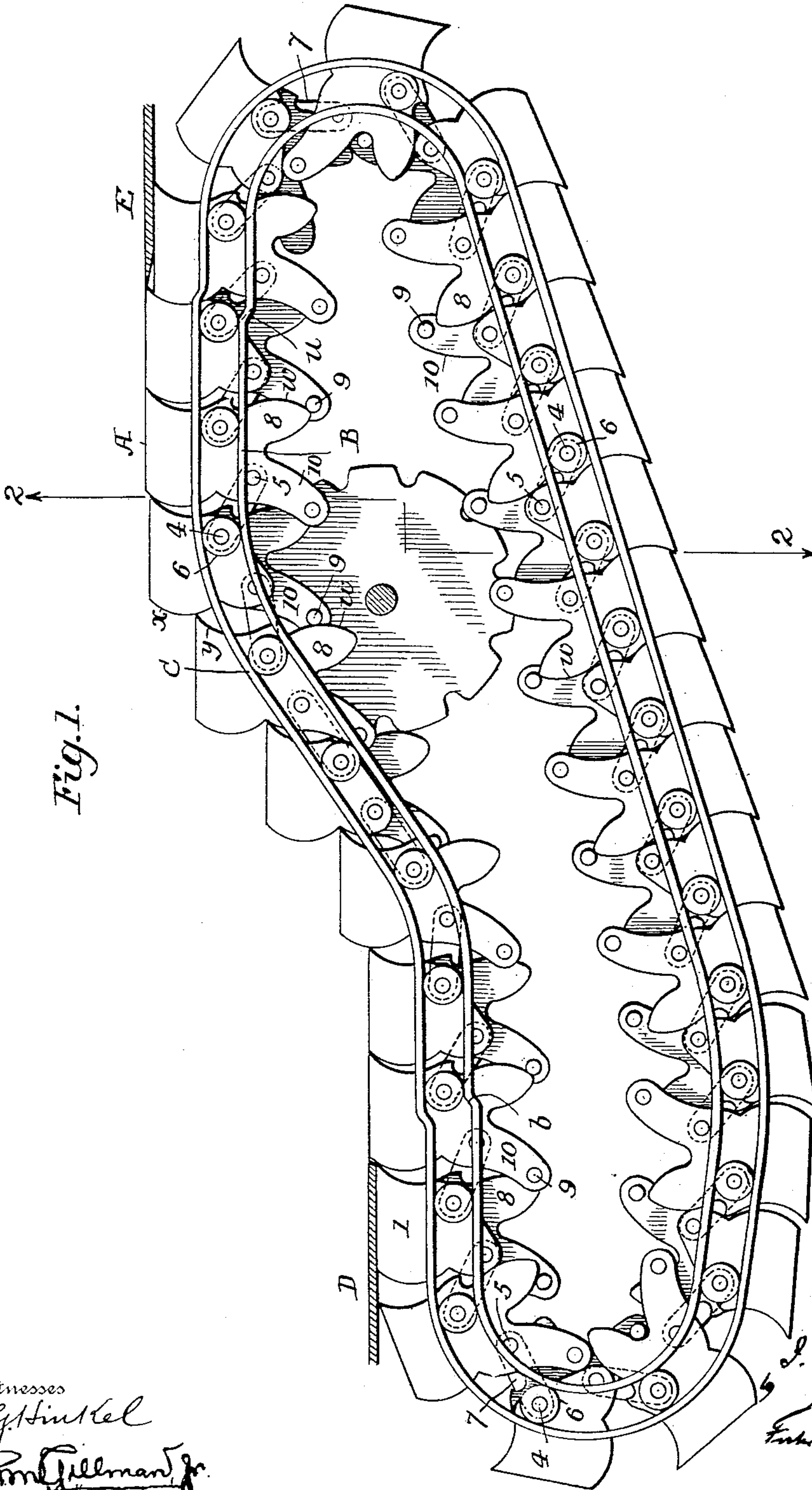
PATENTED FEB. 9, 1904.

I. H. VENN.  
TRAVELING STAIRWAY.

APPLICATION FILED AUG. 21, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses  
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*Samuel Gillman, Jr.*

Inventor  
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Attorneys

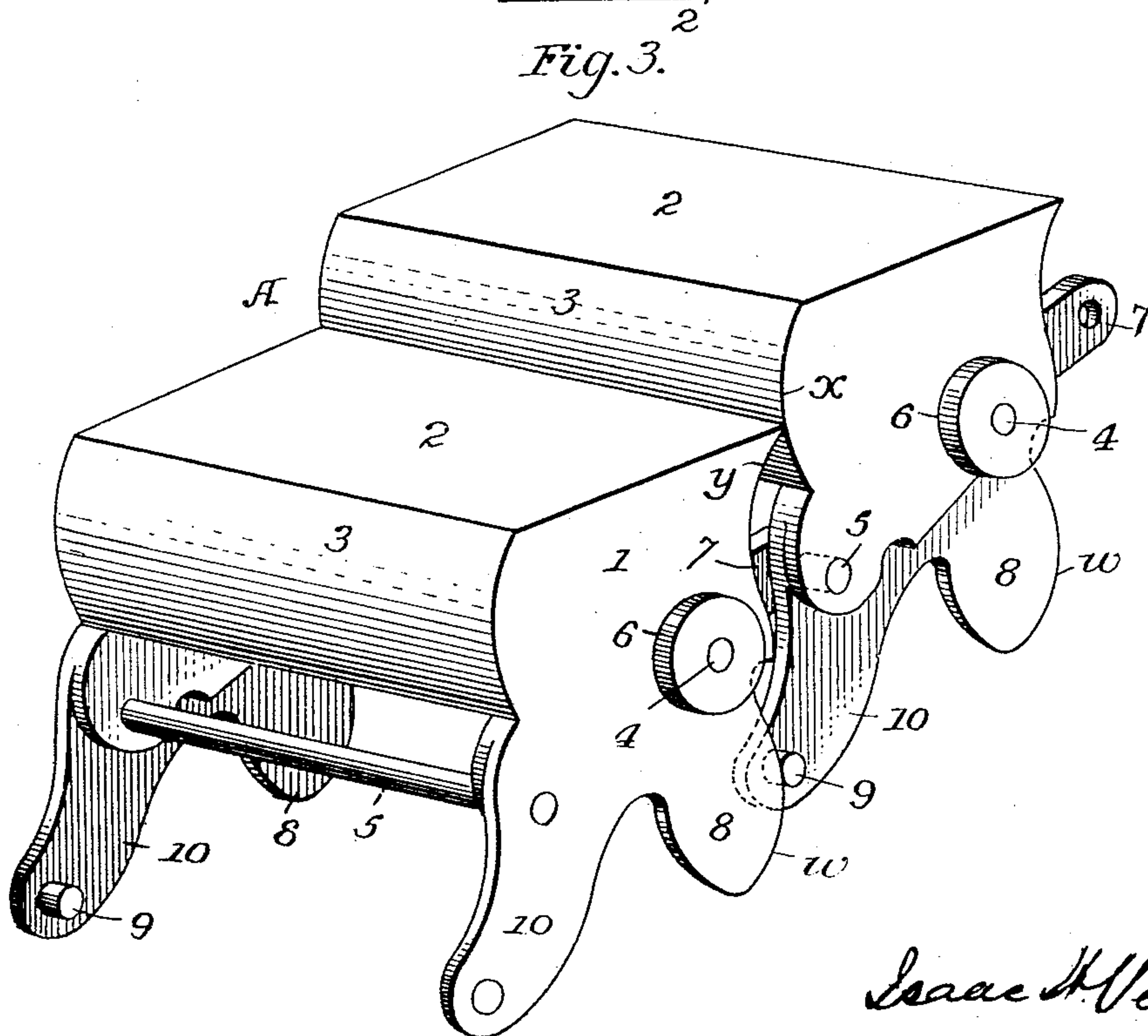
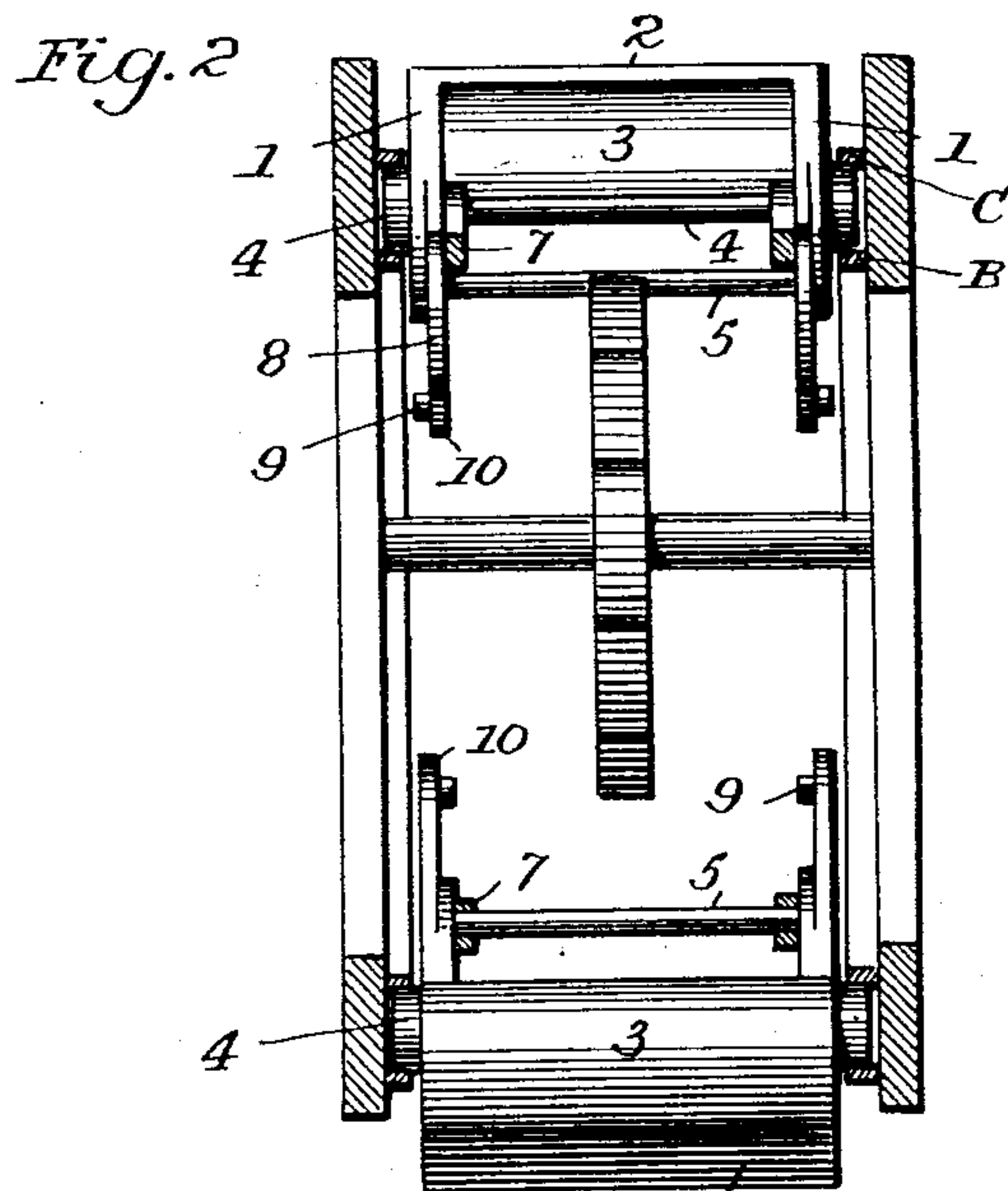
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2 SHEETS—SHEET 2.



Witnesses  
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# UNITED STATES PATENT OFFICE.

ISAAC HAMBLETON VENN, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF EAST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## TRAVELING STAIRWAY.

SPECIFICATION forming part of Letters Patent No. 751,702, dated February 9, 1904.

Application filed August 21, 1901. Serial No. 72,790. (No model.)

*To all whom it may concern:*

Be it known that I, ISAAC HAMBLETON VENN, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Traveling Stairways, of which the following is a specification.

My invention relates to traveling conveyers of that character in which a series of connected steps is carried in a horizontal plane at the base of the apparatus and then upwardly upon an incline and again horizontally; and my invention consists in constructing the parts so that each set is supported at any one time only upon two tracks with the use of only a single roller or wheel at each end, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of sufficient of a traveling stairway to illustrate my improvement; Fig. 2, a transverse section on the line 2 2, Fig. 1; Fig. 3, a perspective view of two of the connected steps of the chain of steps.

Each step A consists of two side pieces 1 1, a tread 2, a riser 3, and the side pieces are connected by cross-bars 4 5. Each end of the cross-bar 4 extends through the side piece and constitutes outside the latter the journal of a supporting wheel or roller 6, which wheel runs upon the rack B, and the latter for at least part of its distance is overhung by a guard-rail C. The track and guard-rail have horizontal and inclined portions at the outgoing part of the structure and are prolonged to form curved sections which unite with the return-sections, as in other structures of this character.

One of the purposes of my present construction is to avoid the necessity of additional tracks or roll-supports and to make use of but a single roller-support at each end of each step, and it therefore becomes necessary to preserve the perpendicularity of each step and maintain the bearing faces or treads horizontal, while permitting the usual vertical movements in passing from the horizontal to the inclined parts of the structure, and, vice versa,

and I therefore provide for a parallel motion by means of curved bearings upon the steps, with bearing-points upon the adjacent steps and a link connection that will permit one step to move vertically independent of the other, while the curved bearing parts and bearing-points maintain the steps in position vertically and prevent them from tilting.

In the construction shown a link 7 is hung upon the cross-bar 4, adjacent to each side piece, and is jointedly connected to a stud upon the side piece of the adjacent step, which stud may be the end of the cross-bar 5 if the link is on the outside of the step or it may be a part of the said cross-bar if, as shown, the link is adjacent to the inner face of the side piece. The cross-bars 4 5 are so arranged that all the cross-bars will be upon the same inclined plane and will be the same distance apart when the steps are upon the inclined portions of the structure.

The curved bearing parts may be differently arranged; but, as shown, the rear bearing-face  $x$  is the curved face of the riser 3 and the bearing part  $y$ , which moves upon the face  $x$ , is the forward edge of the opposite tread 2. The other bearing-faces of each step are the forward curved edges of downward extensions or limbs 8 of the side pieces, and the bearing part of the adjacent step which makes contact with each edge  $w$  is a lug 9, extending from the limb 10, projecting downward as part of the side piece of the adjacent step. Preferably the parts of the side pieces constituting limbs 8 10 are one-half the thickness of the other parts of the side pieces, and the limb of one side piece is arranged so as to overlap that of the adjacent side piece, so that the upper parts of the side pieces will be flush with each other both inside and out. As a consequence of this arrangement as either step is carried outward or downward in respect to the other to the extent permitted by the links 7 the bearing parts  $y$  9 bearing on the curved faces  $x$   $w$  will insure the parallel motion of the steps and will prevent either step at any point between the extreme limits of movement from tilting or changing its vertical position. The limbs 8, however, are of such length and the



bearings 9 so arranged that when the tread of one step in advance of another is carried down below that of the preceding step the bearing 9 will pass below the point of the limb 8, thus permitting the forward step to swing upon the cross-piece or lug 5, as is necessary in passing around the curve at the forward end of the structure. When the steps are upon a horizontal portion of the track, a draft upon the chain of steps would tend to carry the forward step away from the preceding step, and the links 7 would be permitted to rise were it not that I make use of an upper guard-rail C, preventing such movement. As the chain of steps is brought from below up toward the stationary platform D it must be carried completely from below the latter and at once raised as its rises passes the edge of the platform, and the supporting track B is therefore provided with a sudden incline *b*, upon which the roller 6 moves upward, carrying the entire step vertically upward to the extent of the thickness of the platform D. So, also, in approaching the edge of the upper platform E the step must quickly descend, and this movement is secured by providing an abrupt shoulder *u* in the supporting-track B.

The supporting tracks and rails need not be continued the entire distance at the ends of the structure, although in some instances this may be preferable.

I do not here claim the linking of the steps to impart different speeds to different parts of the chain, as set forth in my application, Serial No. 52,022, filed March 20, 1901.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. The combination in a traveling stairway of a series of steps and connecting-links with two curved bearings on each step adapted to bearing-points on the next step to preserve them parallel, substantially as set forth.

2. The combination in a traveling stairway of a series of steps and connecting-links with a roller-support at each end and two curved bearings on each step adapted to bearing-points on the next step to preserve them parallel, substantially as set forth.

3. The combination of the series of steps and connecting-links, each step with a curved riser, adapted to receive the edge of the tread of the next step, and with a bearing-point below the tread, and with a rear curved bearing part adapted to receive the bearing-point of the next step, substantially as set forth.

4. The combination of the link-connected steps, each with a curved riser, lower bearing-point below the riser, curved back bearing below the tread, and reversely-curved bearing part below the back bearing, substantially as set forth.

5. A traveling stairway provided with steps connected by links, the steps having curved

risers and curved extensions insuring in connection with the links a parallel motion permitting the steps to move vertically while preserving the horizontal position of the treads, substantially as set forth.

6. The combination in a traveling stairway of the series of steps and connecting-links, each step with a single supporting-roller at each end and with a curved riser and a curved bearing contacting with bearing-points of the adjacent step to preserve the horizontal positions of the treads while permitting one step to move vertically independently of the other, substantially as set forth.

7. The combination with the link-connected steps of a traveling stairway, of upper and lower curved parts of each step adapted to bearing parts on the adjacent step, to prevent the steps from tilting, while permitting vertical movements, substantially as set forth.

8. The combination with the link-connected steps of a traveling stairway, of a supporting-roller at each end of each step, and upper and lower curved parts of each step adapted to bearing parts on the adjacent step, to prevent the steps from tilting, while permitting vertical movements, substantially as set forth.

9. In a traveling stairway, supporting-rails with overhanging guards, a series of steps and connecting-links, each step with a single bearing-roller at each end, and upper and lower bearing parts on each step adapted to bearing-points on the adjacent step, substantially as set forth.

10. The combination in a traveling stairway, of link-connected steps one having curved bearing parts and the other bearing-points adapted thereto, with shoulders limiting the upward movement of one step in respect to the other, and a supporting-roller at the end of each step and guide-rails and guard-rails arranged to receive the rollers between them, substantially as set forth.

11. A traveling stairway in which each step has a curved riser affording a bearing for the edge of the tread of the adjacent step, and a bearing part below the riser adapted to a curved extension of the other step, and links connecting the steps to permit independent vertical movements without change from horizontal positions by the treads, substantially as set forth.

12. The combination of the steps, connecting-links, bearings and end rollers, lower and upper platforms D E and supporting-rails with inclines *b u*, substantially as described.

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

ISAAC HAMBLETON VENN.

Witnesses:

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ROLAND R. DENNIS.