

No. 685,019.

Patented Oct. 22, 1901.

I. H. VENN.
TRAVELING STAIRWAY.
(Application filed Aug. 21, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

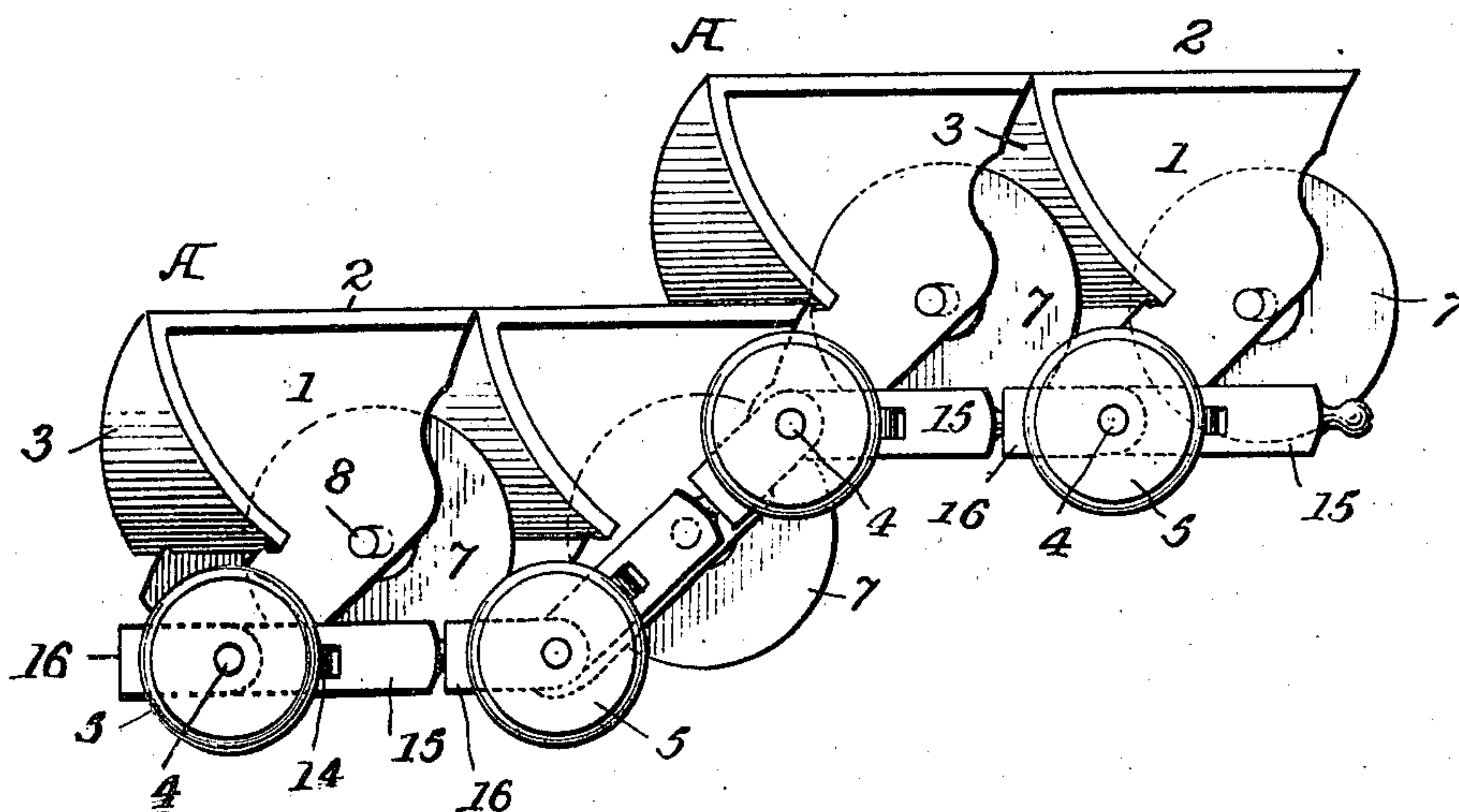
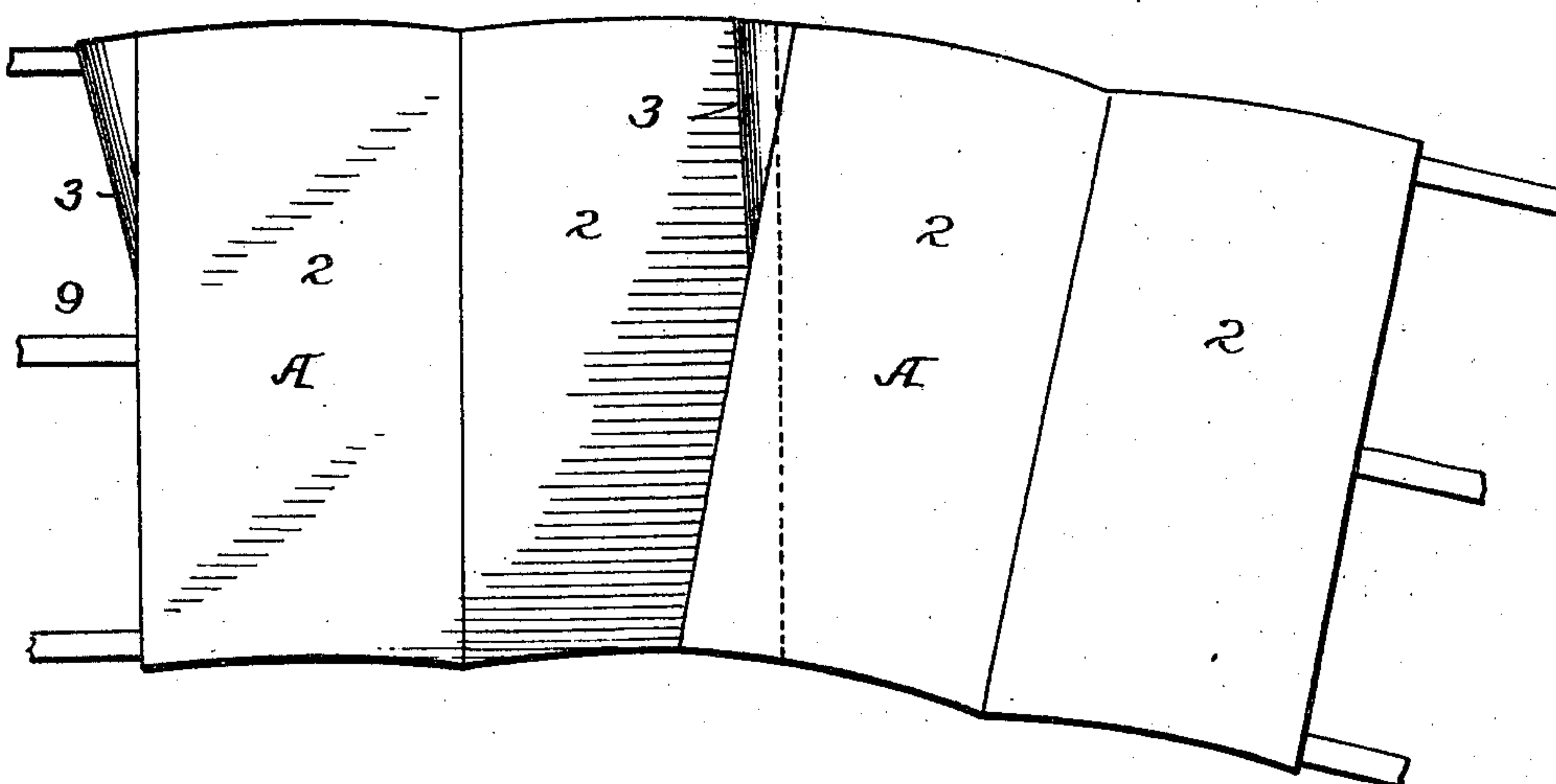


Fig. 2.



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Fig. 3.

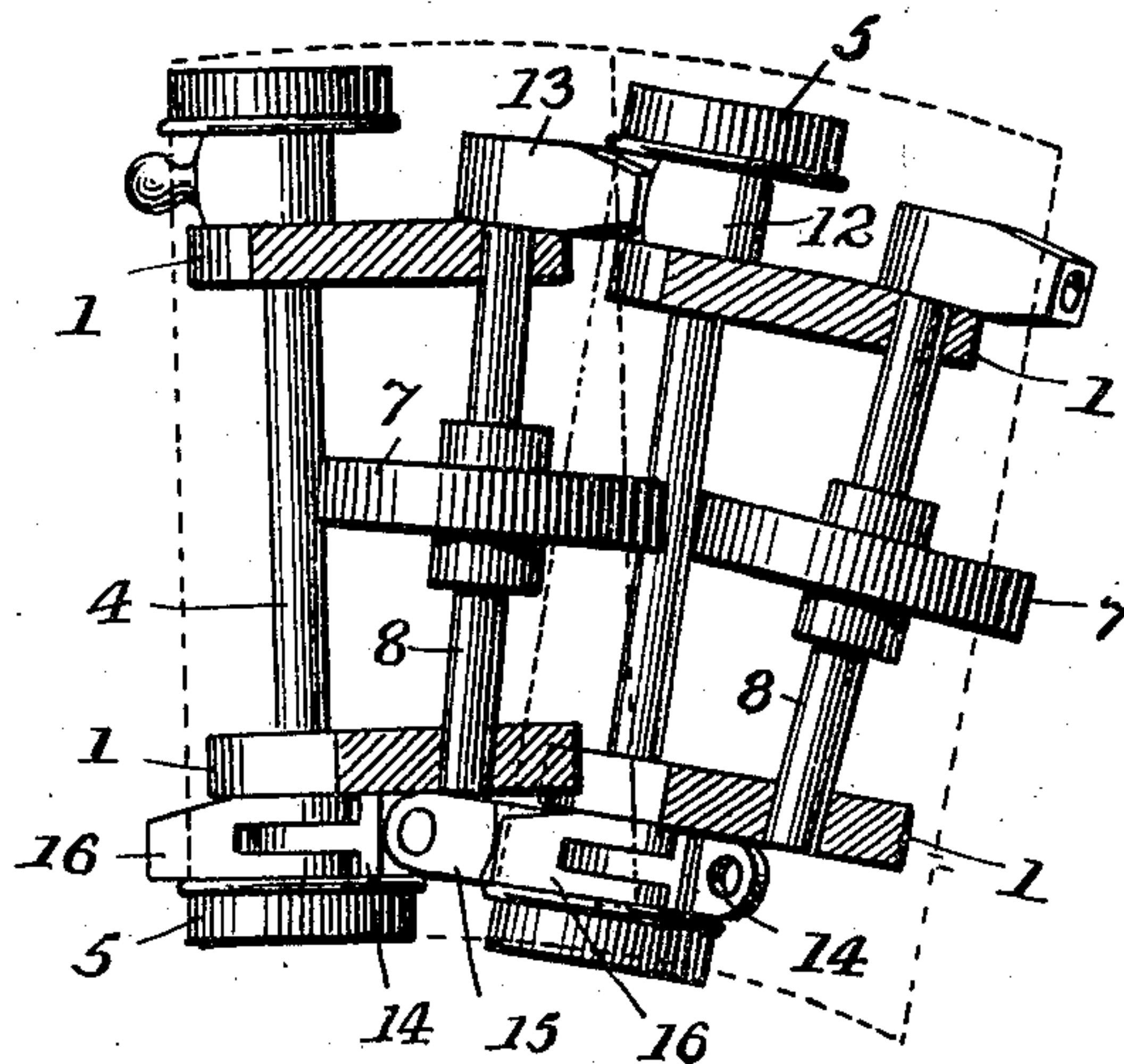
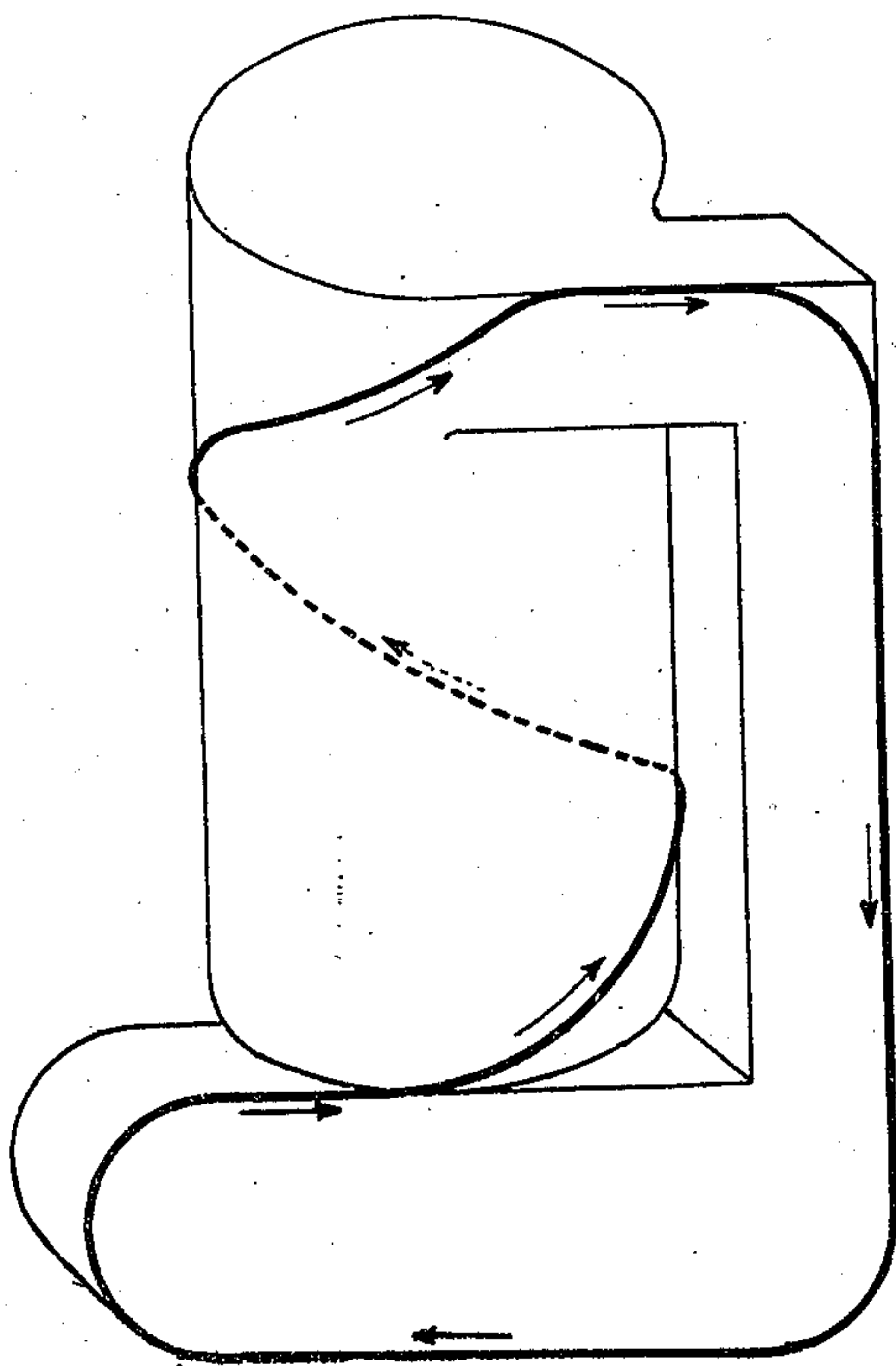


Fig. 4.



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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. 685,019, dated October 22, 1901.

Application filed August 21, 1901. Serial No. 72,792. (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 that class of traveling stairways in which a series of steps are linked together in a continuous chain; and my invention consists of means whereby the steps may be carried either in a horizontal plane or in a spiral course while making use of steps having treads of uniform width and while maintaining the contact of the rear edges of the treads with the risers, as fully set forth hereinafter, and as illustrated in the accompanying drawings, in which—

Figure 1 illustrates in section four of the steps of the chain of steps, two traveling on a horizontal plane at one level and two raised to travel around a short curve onto a horizontal plane at another level. Fig. 2 is a plan of Fig. 1. Fig. 3 is a sectional plan showing two of the steps, the risers and treads removed, in the positions which they occupy when traveling in a spiral course and illustrating the link connection. Fig. 4 is a perspective diagrammatic view illustrating different courses which may be taken by a series of steps constituting my improved traveling stairway.

Each step A has two side pieces 1 1, a tread 2, and a riser 3, and the side pieces extend below the riser and are provided with shafts or studs 4 for supporting a flanged wheel 5 at each end of the step, the treads and risers extending beyond the side pieces, so that the wheels may not project beyond the treads. Intermediate the supporting-wheels 5 are wheels 7 upon shafts 8, which are at an angle to the shafts 4, so that the wheels 7 will occupy proper positions to rest upon a central rail 9 whether the traveling chain of steps is upon the straight or the curved section of the track.

When the steps are upon a straight portion of the track, the treads will be flush with each other; but as any step is carried onto a curved portion of the track it must swing in relation to the adjacent step upon the straight

portion, and in order to permit this elevation and swinging of the steps I employ flexible end connections in the form of links, each consisting of a plurality of parts or sections connected by a universal joint. The links at the outer ends are in two sections 12 13, the section 12 upon the shaft or stud of the wheel 5 and the section 13 upon the shaft 8. The inner links consist each of three sections 14 15 16, the section 16 upon the shaft or stud supporting the wheel 5 and the section 14 on the shaft or stud supporting the wheel 5 of the next step, while the section 15 is jointed between the sections 14 16, so as to permit of the twisting action which results from both elevating and swinging the step. Any other suitable character of linkage that will secure the same result may be employed.

As any step is lifted and at the same time swung, as described, the edge of the tread nearest the next lower step is carried away from the latter at the outer end and is carried over the tread of the lower step at the inner end, and therefore to maintain the contact of the edge of the lower step with the riser of that which is elevated the said riser is curved outward away from the tread at the outer end and gradually increased in curvature and carried back toward the opposite end, as shown.

By the described difference in flexible connections at the outer ends of the steps from that at the inner ends and by the use of the curved and twisted risers described I am enabled to provide the steps with treads of uniform width which lie flush with each other when the steps are horizontal and the center lines of which coincide with radii having the same center when the steps are upon an incline, while the risers and the treads are always in contact. A series of steps thus connected may be employed effectively in a traveling stairway where the steps are carried in a spiral course, as well as in a straight course as indicated in Fig. 4, where a portion of the stairway is shown as traveling in a spiral course to the highest point and then in a straight course and downward and forward and in a curved course back to the bottom of the spiral portion.

Any suitable means may be employed for

imparting motion to the chain of steps, and as such means are well known I have not shown the same.

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

1. In a traveling stairway, a series of flexibly-connected steps, each having a tread of uniform width and a curved riser, said curve increasing and extending farther inward below the tread toward the inner end of the step, substantially as set forth.

2. In a traveling stairway, a series of steps each having a tread of uniform width and a curved riser, said curve increasing and extending farther inward below the tread toward the inner end of the step, and flexible connections at each end of the steps, those at the inner ends of the steps being longer than

those at the outer ends, substantially as set forth.

3. In a traveling stairway, a series of steps each having a tread of uniform width and a curved riser, said curve increasing and extending farther inward below the tread toward the inner end of the step, and universal jointed link connections at each end of the steps, those at the inner ends of the steps being longer than those at the outer ends, substantially as set forth.

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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