





No. 654,291.

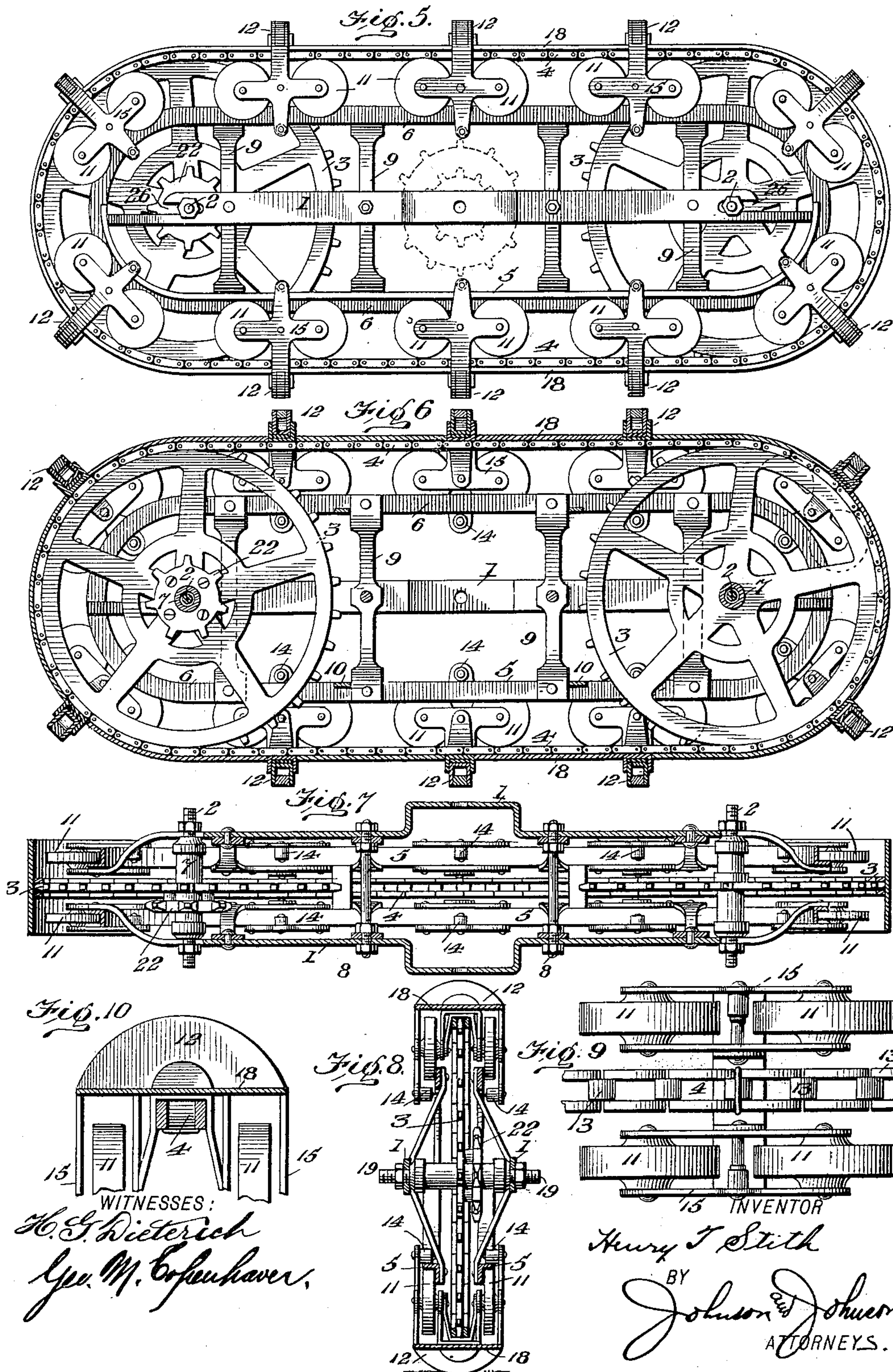
Patented July 24, 1900.

H. T. STITH.  
TRACTION WHEEL.

(Application filed Dec. 28, 1899.)

(No Model.)

2 Sheets—Sheet 2.





# UNITED STATES PATENT OFFICE.

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## TRACTION-WHEEL.

SPECIFICATION forming part of Letters Patent No. 654,291, dated July 24, 1900.

Application filed December 26, 1899. Serial No. 741,588. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY T. STITH, a citizen of the United States, residing at Ottawa, in the county of Franklin and State of Kansas, have invented certain new and useful Improvements in Traction-Wheels, of which the following is a specification.

My invention is directed to improvements in traction-wheels wherein the rotation causes the wheel to lay its own track by the travel of a horizontal ellipsoidal frame within an endless chain of tread-supports, upon the traction-wheels of which, the frame is caused to travel with the travel of the tread-supports.

In the claims herein I will set out the precise improvements in connection with the accompanying drawings, which illustrate my improved traction-wheel device as applied to the driving-treadles of a bicycle; but the traction device is designed to take the place of the running-wheels of vehicles generally and to be driven by any suitable power connections applied to the middle of the length of the wheel to rotate the endless chain.

In the illustration in Figure 1 the endless traction device is employed as substituting the wheels of a bicycle, being pivotally connected to the frame at the points of the wheel-mountings—that is, to the fork and to the steering-post—the rear traction device constituting the treadle-propelled wheel. Fig. 2 shows in top view the frame-bars and their depending track-rails and the axle to which the driving power is applied. Fig. 3 shows in cross-section one of the tread-frames and its relation to the track-wheels and the sprocket-wheel, and Fig. 4 is a side view of the tread-frame and its track-wheels. Fig. 5 is a side view of the ellipsoidal traction-wheel. Fig. 6 is a vertical longitudinal section of the same, and Fig. 7 is a top view thereof. Fig. 8 is a cross-section of the same, taken on the line of the propelling-axle. Fig. 9 shows the tread-frame and its track-wheels in plan view. Fig. 10 is a detail showing flexible apron or mud-guard for the sprocket-chain. Fig. 11 shows the track-rail and the relation thereto of the track-wheels and the track-roll of the tread-frame. Fig. 11<sup>a</sup> shows this track-roll arranged to act against a vertical flange, and Fig. 12 shows the traveling frame in cross-section.

The traveling frame comprises a pair of horizontal bars 1 1, open at their ends, between

and upon which are mounted the axles 2 2 of the sprocket-wheels 3 3, upon which is mounted an endless chain 4. The ends of these bars are curved toward each other, Fig. 2, but are not connected, for the reason that the sprocket-wheels are mounted in them so as to project and rotate outside of the frame and within and between the bars. Secured to and depending from each end of the traveling frame-bars is a track-rail 5 5, paralleled with the frame-bars and curved upward at each end concentric with the sprocket-wheels. These track-rails I prefer to make of angular cross-section for greater rigidity; but this angular form is only for the depending track-rail, the angle-flange 6, Fig. 5, of which, however, is made continuous above the frame-bars and concentric with the sprocket-wheels for a purpose which I shall presently state.

The frame-bars are connected at their ends by the fixed axles 2, on which the sprocket-wheels 3 are mounted to turn freely by sleeves 7, and the bars are braced by tie-rods 8 between the sprocket-wheels, while the track-frames are supported and braced from the frame-bars by braces 9 and cross-ties 10, Fig. 2, between the sprocket-wheels. This construction gives lightness and strength, with the track-rails hanging from the frame-bars and terminating at their ends.

While the mounting of the sprocket-wheels between the ends of the frame-bars gives them a projection beyond the frame-bars, it also gives them a projection above and below the bars, but particularly below the side track-rails, a distance equal to the diameter of the track-wheels 11, Fig. 1, for the purpose of bringing the propelling-chain beneath the track-wheels, and thereby carrying the tread-frames of the chain upon the ground, so that the traction device resting by its track-rails upon the track-wheels is thereby carried forward by the traveling frame 1 upon the track-wheels.

The tread-frames 12 are secured to the solid links 13, Fig. 3, of the chain at suitable distances apart—about six inches—and each tread-frame has a pair of track-wheels 11 on its opposite sides, arranged to run on the track-rails depending from the opposite side-bars, Fig. 8. The only friction upon the supporting track-wheels is along this track, while a third small roll 14, Figs. 3, 4 and 8, is mounted in the outer hanger-plate 15 of the



tread-frame to travel on the upper side of the rail to hold the supporting track-wheel 11 to the rails in turning curves or at times when the device may be tilted to one side. This third roll 15 is intermediate between the supporting track-wheels. This third roll, however, instead of being arranged to run upon the upper side of the rail may be arranged to run against a vertical flange 16, as seen in Fig. 11<sup>a</sup>, for a purpose which I will presently state. The tread-frame has a shoe or bearing part, Fig. 3, convex crosswise of the chain, and it is these bearing parts that travel upon the ground beneath the track-rails and support the machine while the traveling frame, by its track-rails, is being propelled forward upon these tread-frames. In practice I prefer that three of these tread-frames shall always be upon the ground, and as the machine goes forward these tread-frames will leave the sprocket-wheel smoothly in their contact with the ground and rise smoothly in passing off the track-rails at the other sprocket-wheel. It is an important consideration that the chain is secured to the tread-frames medially of their width, as seen in Fig. 3, and between the tread parts and the peripheries of the track-wheels, and for this purpose the tread-frames are made open between the track-wheels, whereby to allow the tread-frames to pass over the sprocket-wheels and carry the track-wheels on each side of them upon the track-rails, as seen in Fig. 7. This is important in connection with the open-ended traveling frame, which permits the projection of the sprocket-wheels beyond the frame-bars, as stated. Referring to this open-hanger construction of the tread-frames, it is also important in providing for contracting this opening, which may be by a U-shaped hanger-plate 17, as in Fig. 3, whereby while the sprocket-wheels freely enter between the hanger-plates the latter are caused to hug the sides of the sprocket-wheels at their chain connection and thereby keep the tread-frames in true lines in passing on and leaving the sprocket-wheels. This is particularly important at the end of the traction device at which the track-wheels pass upon the track-rails. The tread-frames form sort of pillar-blocks for the track-wheels, and I prefer to make the convex tread or shoe part hollow, so that if deemed desirable it may be provided with a cushion-tread, as in Fig. 3, of any suitable kind, or the tread may be solidly formed with the hanger-plates.

By mounting the chain of connected tread-frames upon sprocket-wheels in an open-ended frame I am enabled to use the lower half part only of the endless track-rails usual in traction-wheels of this class; but to keep the tread-frames as they pass over between the sprocket-wheels steady and in true lines with the sprocket-wheels, and to cause the track-wheels on both sides of the tread-frame to engage without abrupt contact the upward standing ends of the track-rails, I make the

angle-flange 6 of the track-rails continuous, as in Figs. 5 and 6, over the frame-bars, so that the track-wheels may run lightly against their outer vertical walls, as in Fig. 3.

Instead of the third small rolls 14 running on the track-rails, as in Fig. 11, I may provide the track-rails with the upward-projecting flange 16 and mount the third roll 14 so as to engage the vertical wall of this flange, as in Fig. 11<sup>a</sup>, whereby this third roll has the function of keeping the track-wheels from contact with the lower-rail flange 6, and thus prevent the friction which would otherwise result from such contact. This construction also allows the flat side of this third roll to be brought into engagement with the upper side of the track-rail to prevent the lower track-wheels from leaving the track in turning curves or when the device is tilted to one side.

As a means of protecting the drive chain or belt, the track-rails, the track-wheels, and the sprocket-wheels from mud or dirt I provide an apron 18, of some suitable fabric or other flexible material, fastened to the chain between the tread-hanger parts and wide enough to extend beyond the track-wheels and form a cover for them and for the sprocket-wheels, as seen in Fig. 10. So, also, a fabric cover may be fastened to the frame-bars to protect the interior of the structure from mud or dirt.

A feature of my invention is the pivotal mounting of the endless traction device medially of the length of the traveling frame and by pivotal connections at the opposite sides of said frame and applying the propelling power at such mounting, whereby the traction device is free to have a longitudinal rocking or undulatory movement to allow it to pass smoothly over obstructions and give it an easy travel without interfering with the driving power. In the drawings this pivotal connection 19 is made with the fork and with the steering-standard of a bicycle-frame; but it will be understood that such connection is made with the frame part of whatever kind of vehicle it may be used with. The shaft 19 forms this pivotal connection and has a sprocket-gear 20, Fig. 2, from which a sprocket-chain 21, Fig. 1, passes to a small sprocket-gear 22, Figs. 5 and 6, while a small sprocket-gear 23, Figs. 1 and 2, is engaged and driven from a sprocket-chain 24, and sprocket-gear 25, which is driven by the treadle-power.

The slotted or forked ends 26 of the frame-bars render it easy to mount the sprocket-wheels and to adjust them to maintain the proper tension of the propelling-chain. This adjustment is made by nuts on fixed shafts clamping the frame-bars against shoulders on the shafts, while the sprocket-wheels are mounted to turn loosely upon the fixed axles.

The construction whereby the chain is arranged between the pairs of track-wheels gives a central balancing force of the drive-chain upon the tread-frames in respect to the



track-rails on both sides of the traveling frame.

It is obvious that instead of the sprocket drive-chain I may substitute a drive-belt with suitable mounting-wheels.

I claim—

1. In an ellipsoidal traction-wheel and in combination with the connected frame-bars each having a depending side rail terminating in upward curves connecting the ends of the bars, sprocket-wheels upon and between the ends of said bars and projecting beyond them, an endless chain upon the sprocket-wheels, tread-frames secured to and straddling the chain and carrying a track-wheel on each side thereof for travel on each side of the sprocket-wheels and under each track-rail the connection of the tread-frames with the chain being between their tread ends and the track-wheels, and means for rotating the sprocket-wheels.

2. In an ellipsoidal traction-wheel and in combination with the connected frame-bars each having a depending track-rail on its outer side terminating in upward curves at their connection with the ends of the frame-bars, each rail having a flange extended as a bar and made continuous above the frame-bars, sprocket-wheels upon and between the ends of the said bars and projecting beyond them, an endless chain upon the sprocket-wheels, tread-frames secured to and straddling the chain and carrying a track-wheel on each side of the sprocket-wheels, in contact with each side rail and on the outer side of the continuous flange-bars, and means for rotating one of the sprocket-wheels.

3. In an ellipsoidal traction-wheel and in combination with the frame each having a depending rail on its outer side terminating in upward-curved ends connected to the ends of the frame-bars, sprocket-wheels mounted upon and between the ends of the frame-bars and projecting beyond them, an endless chain upon the sprocket-wheels, tread-frames secured to and straddling the chain and carrying a track-wheel on each side of the chain adapted to engage the track-rails, and flexible mud-guards secured to the outer sides of the chain between the tread-frames and means for rotating one of the sprocket-wheels.

4. In an ellipsoidal traction-wheel and in combination with the frame-bars each having a depending rail on its outer side terminating in upward-curved ends connected at the ends of the frame-bars, sprocket-wheels mounted upon and between the ends of the frame-bars and projecting beyond them, an endless chain upon the sprocket-wheels, and tread-frames secured to and straddling the chain, each straddling part having a track-wheel adapted to engage the sides of the track-rails and contracted at the chain connection for travel on each side of the sprocket-wheels and upon the rails, and means for rotating one of the sprocket-wheels.

5. In an ellipsoidal traction-wheel and in

combination with the connected frame-bars each having a depending track-rail terminating in upward curves at their connection with the ends of said bars and a vertical flange on its upper side, sprocket-wheels upon and between the ends of said bars and projecting beyond them, an endless chain upon the sprocket-wheels, tread-frames secured to and straddling the chain and carrying on each side thereof a track-wheel for travel upon the under side of each track-rail, and also having a roll arranged to travel against the vertical flange on the upper side of the rail, and means for rotating one of the sprocket-wheels.

6. In an ellipsoidal traction-wheel and in combination with the frame-bars each having a depending side rail terminating in upward curves connecting the ends of the bars, sprocket-wheels upon and between the ends of the bars and projecting beyond them, an endless chain upon the sprocket-wheels, tread-frames secured to and straddling the chain and carrying a track-wheel on each side thereof for travel on each side of the sprocket-wheels and upon the under side of each track-rail, a shaft supported in the frame-bars between the sprocket-wheels, a pair of sprocket-gear upon said shaft, a chain connecting one of said sprocket-gear with a small sprocket-gear on the front driving sprocket-wheel shaft, a sprocket-gear treadle-power and a chain connecting it with the other sprocket-gear on the intermediate shaft whereby to rotate the front driving sprocket-wheel.

7. In an ellipsoidal traction-wheel and in combination with the frame-bars each having a depending side rail terminating in upward curves connecting the ends of the bars, sprocket-wheels upon and between the ends of said bars and projecting beyond them, an endless chain upon the sprocket-wheels, tread-frames secured to and straddling the chain and carrying a track-wheel on each side thereof, having a cushion at the tread end of each and connected to the chain below the track-wheels, and means for rotating the driving sprocket device.

8. In an ellipsoidal traction-wheel and in combination with a frame having depending rails on each side, propelling-wheels mounted upon and between the ends of the frame, and an endless chain or belt upon the wheels, of tread-frames having arms straddling the chain, each arm having a group of three rolls for travel upon the side rails, the chain secured to the tread-frame between its arms and between the rolls and the treading ends of said frames, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY T. STITH.

Witnesses:

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A. ROLAND JOHNSON.