

No. 617,788.

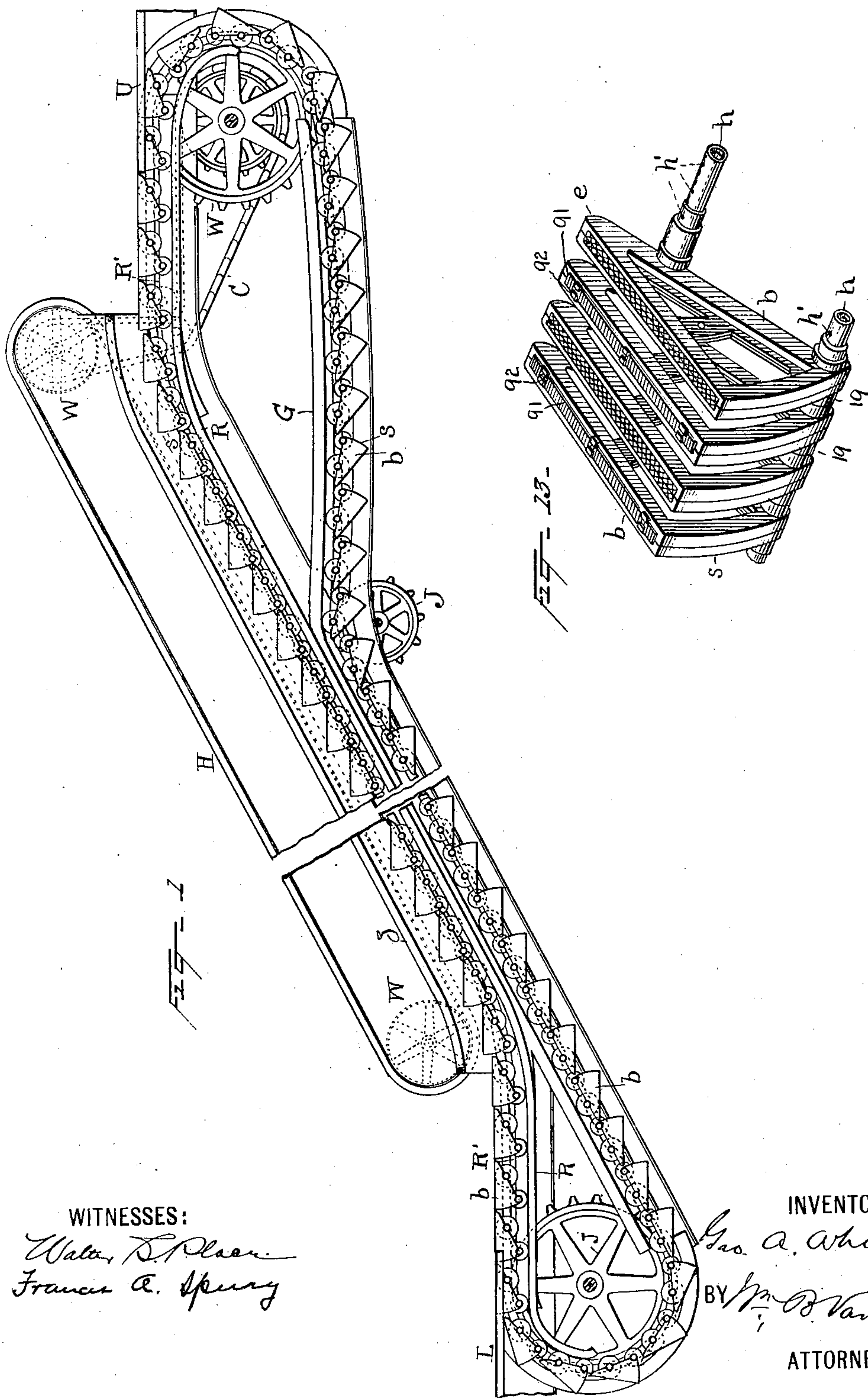
Patented Jan. 17, 1899.

G. A. WHEELER.
ELEVATOR.

(Application filed Apr. 16, 1897.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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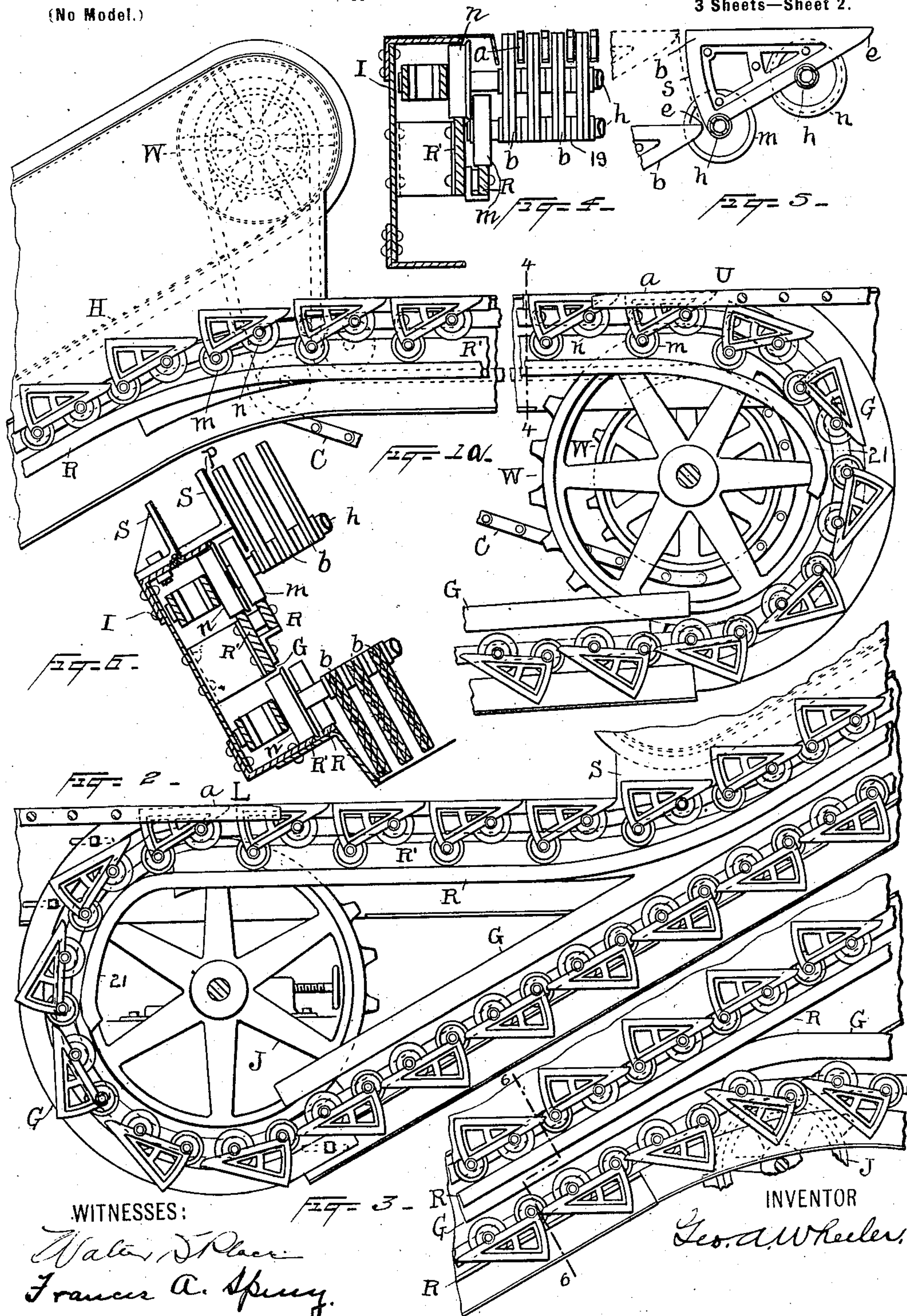
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3 Sheets—Sheet 2.

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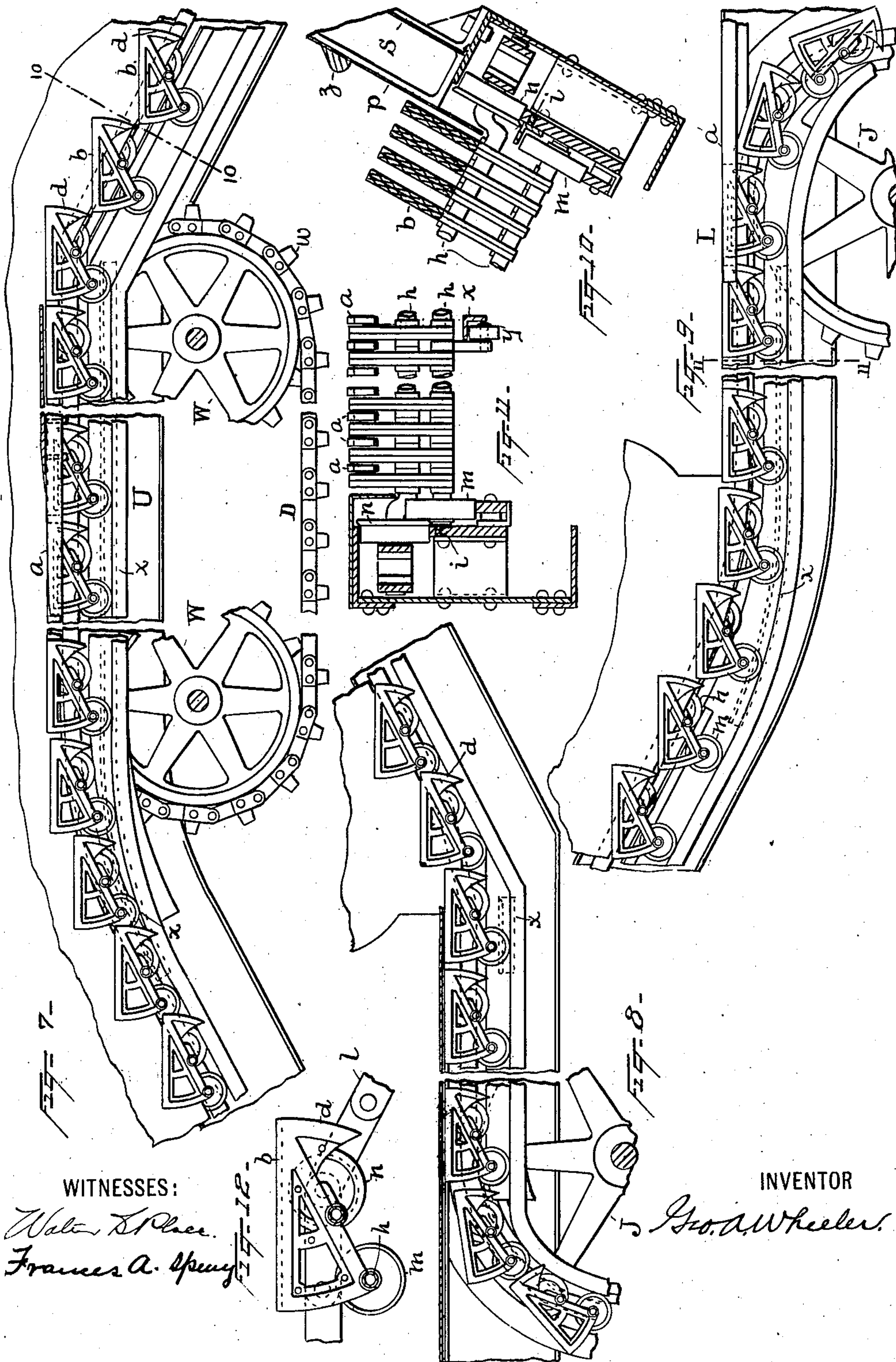
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3 Sheets—Sheet 3.



UNITED STATES PATENT OFFICE.

GEORGE A. WHEELER, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
CHARLES D. SEEBERGER, OF CHICAGO, ILLINOIS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 617,788, dated January 17, 1899.

Application filed April 16, 1897. Serial No. 632,428. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. WHEELER, a citizen of the United States, and a resident of New York, in the county and State of New York, have invented a new and useful Elevator, of which the following is a specification.

My invention is an improvement in that class of elevators which are used by a continuous procession of foot-passengers, as in the case of the approach to a bridge or elevated viaduct.

The object of my improvement is to increase the safety and efficiency and to decrease the power necessary to successfully operate such a structure.

The elevator described in United States Letters Patent No. 479,864, dated August 2, 1892, issued upon my application, forms the basis for the improvements hereinafter described.

As shown by the above-mentioned patent, my invention relates to a traveling structure composed of a series of moving steps connected or located so as to move together and preferably pivoted together through the medium of endless chains or belts, in combination with a course, way, or track in which the steps move; and in my present invention I so construct the track that each step describes a gradual curve as it passes from its landing-point or substantially level portion to its inclined portion, leading to a different level. The employment of this curve, to which the two sections of the track are tangent, serves to prevent any sudden jar in passing from a horizontal to an inclined section, and also in case the tread-surfaces are always maintained in horizontal position causes the steps to pass gradually from forming a continuous landing-surface to the stair-like construction on the inclined portions. The employment of these curves, further, enables me to avoid friction, and I am enabled to maintain the chain or jointed structure at the proper tension, as with this arrangement of track there is no possible position of the chain in which its length can be caused to vary materially as compared with the length of the track.

Another feature of my present invention is the employment, in connection with a station-

ary grating or landing composed of parallel bars and spaces extending in the same direction that the elevator is moving, of steps composed of a series of parallel brackets suitably spaced apart, so as to form a tread-surface which shall properly interweave with the stationary grating or landing. These gratings or landings are preferably inclined downwardly, and as a step arrives at or near either extreme position the tread of the step interweaving with the structure of the grating or platform involuntary deposits the passenger upon the landing.

Another feature of my invention consists in the employment, in addition to the rails upon which the wheels at each end of the step are carried, of a companion rail located in the same vertical plane and separated therefrom by about the diameter of a wheel or a little more, the object being to maintain the wheels or rollers under such control that should the steps be separated by the breaking of the chain or other connection employed the released and moving steps cannot buckle and pile up, but will simply block themselves in a normal position.

Another feature of my invention consists in the employment for the purpose of guarding against catching and entangling the drapery of foot-passengers, in addition to the usual arrangement of sheathing or inclosure for the moving hand-rail, of a continuous overhanging rail or projection arranged on the interior surface of the sheathing at a short distance above the line of the moving steps. In addition to the employment of this rail I mount the wheels or rollers bearing the steps so that they shall be at a slight distance from the ends thereof and extend the sheathing or inclosure into the steps as far as the axle of the roller or wheel. By the employment of these constructions I prevent all possible contact between the drapery of passengers and the wheels or rollers.

The accompanying drawings illustrate my invention.

Figure 1 is a longitudinal sectional view of the series of connected steps, part of the belt or chain and the cooperating rollers, the rails upon which the wheels or rollers travel, and the stationary grating or landing at the ele-

vated end of the structure. Fig. 1^a is a section of the same at the upper end. Fig. 2 is a similar view of the same at the lower end. Fig. 3 is a similar intermediate section. Fig. 4 is a transverse sectional view on the line 4-4, Fig. 1^a. Fig. 5 is a sectional view of one of the moving steps, designed to show the convex form of the riser and the arc described by the succeeding step at a certain point in its movement. Fig. 6 is a transverse section on the line 6-6, Fig. 3. Fig. 7 is a longitudinal sectional view of my invention at the elevated terminal as applied to a double elevator for transportation in opposite directions simultaneously. Fig. 8 is a similar view of the lower landing on the ascending side thereof. Fig. 9 is a similar view at the lower landing on the descending side thereof. Fig. 10 is a transverse section on the line 10-10, Fig. 7. Fig. 11 is a transverse section on the line 11-11, Fig. 9. Fig. 12 is a detail view showing one of the brackets modified and forming part of a step; and Fig. 13 shows a step composed of brackets separated by spaces, the treads being of rubber strips and serrated.

W in all the figures of the drawings represents power-driven wheels. I prefer to apply the power at or near the upper landing. S indicates the sheathing or inclosure for a moving hand-rail H, arranged as well understood.

C indicates a chain, through the medium of which the wheel W to propel the moving hand-rail is driven.

I provide two parallel fixed angle-iron channels, constituting the frame of the elevator. These channels are located in parallel planes, and I prefer to construct them of sections riveted together, as shown in Fig. 4. Each of the moving steps is composed of a series of brackets *b*, preferably of sheet metal, as steel, having hubs 19. The two stamped sheets of which a bracket is composed, having hubs projecting in opposite directions, are riveted together, adjacent brackets *b* being separated by a space substantially equal to their thickness. The series of brackets constituting a step are arranged upon hollow axles *h*, having wheels or rollers *m* and *n*. The tread of the step is preferably serrated, and the riser upon its outward surface *s* is convex, the arc of convexity being substantially the same as the arc described by the advance point *e* of a succeeding step as it swings or turns at a point in its course where it is changed in use from a step to a component part of a landing, as next described, or the arc is one struck on a radial line in length equal to the length of chain connecting two successive adjacent steps.

At the upper landing U and at the lower landing L there is a stationary grating at one end thereof having bars arranged parallel with their longitudinal extension in the direction of movement of the elevator, the forward ends being preferably tapered and slightly

depressed. The space between adjacent bars *a* is slightly greater than the thickness of a bracket *b*, so as to receive such bracket between the bars *a*, the advance point of each bracket *b* being slightly tapered, so as to insure the passage of the bracket between the bars *a* without interference. Each step in its movement interleaves with the grating of the landing, but each step at its maximum elevation occupies a position substantially level with the landing, which position it maintains for a more or less extended space, according to the space available. Each step in its turn sinks out of engagement with the stationary grating, leaving the foot-passenger in position thereon.

R and R' indicate the rails, upon which the wheels *m* and *n* travel, and G indicates a guard-rail on the upper side of the lower run or track way. This guard-rail is fixed in position above the rail R'. The function of this rail G is to maintain the moving structure under control in case of a break occurring in the continuity of the successive steps at any point on the lower or return run. The course or track of a step, as shown and as usually constructed, is first horizontal for a section, then an inclined section, and again horizontal for a section or distance upon an elevated plane. In my prior patented structure and in all existing structures, so far as I know, the junction of the horizontal tracks with the inclined tracks has presented an angle, and the steps in passing from one section or direction of movement to another have heretofore changed their direction abruptly and in a manner tending to jolt passengers. My improvements provide horizontal tracks joined to inclined tracks by a gradual curve, resulting in a gradual movement in a curved line in passing from one section to another, as from a landing to the stairs and again from the stairs to the landing.

The sectional view Fig. 6 shows the hollow axle *h*, upon which steps are supported, with the wheel *m* slightly removed from the end of the step, so as to permit of carrying the wall *p*, constituting part of the sheathing or inclosure S for the moving hand-rail, down as far as the axle *h*, the object being to prevent the drapery of passengers from coming in contact with the wheels. In Fig. 10 I have shown this described improvement, together with an overhanging continuous rail *z*, which is fixed to the surface of the sheathing or inclosure S and which acts to hold the drapery out of the plane of the space or opening between the interior end of the step and the wall *p*.

In Fig. 7 I have shown an upper landing where the elevator is arranged for continuous operation in both directions. The brackets *b*, of which the steps are composed, are arranged and constructed substantially as heretofore described, but are provided with an additional depending riser *d*, which in its downward movement performs the same functions

performed by the companion riser in its upward movement. As the steps approach the landing where the passengers are stepping on and off it sometimes occurs that weight is unevenly distributed upon a step and there is a tendency to tilt or tip. To obviate this, I provide an additional rail x , (shown in dotted lines in Figs. 7 and 9 and in cross-section in Fig. 11,) and I attach an additional dependent wheel or roller, as y , to each step at a point intermediate the carrying rollers or wheels and in position to engage the rail x . In this manner I prevent the tipping or tilting of the step at or near the landings.

In Fig. 7 I have shown two wheels W at or near the elevator-landing, and it is my intention to apply power at one or both of these wheels. The described wheels W are united at this point by means of a sprocket-chain D , having teeth or projections w , which extend outwardly and into a plane where they engage with the links connecting successive steps of the moving structure. The wheels W and chain D are duplicated to engage with the links uniting the successive steps at the opposite side of the moving structure.

In Figs. 11 and 13 I have shown hollow axles h , which are supported in journals to which a suitable lubricant may be conducted through perforations arranged to connect the interior of the hollow shaft with the surface of the shaft and journal. In operation I fill the hollow shaft with a lubricant and conduct it to the journals through the described perforations.

In Figs. 10 and 13 I have shown the surface of the tread as serrated or checkered in a manner well understood in the art. This surface may consist of a strip of molded rubber set into the surface of the step, or it may be the result of cutting or stamping the surface of the metal. When this surface is of molded rubber 91, I insert the strip in the surface of the bracket, which is dished for the purpose and provided with lugs 92, stamped from the metal and bent down after the strip is in position to hold it against displacement.

In constructing the elevator I prefer to employ idler-sprockets J , Fig. 2, at the lower end, loop, or turn, and I omit the inner tracks for the forward wheels, allowing the chain-belts with the steps attached, to ride upon the wheels J , supporting only the rear wheels m , which roll upon guard-rail G until they swing by gravity over onto elliptical segmental rail 21, and similarly in Fig. 1 the wheel W performs the same function, and the result is the same.

I provide for a sag in the chain by supporting the rear wheels of the steps only, allowing the chain and steps attached to sag where they leave the driving-sprockets W , Fig. 1^a, to better free the chain and to produce proper tension in the chain, which for this purpose runs over the idlers J , Fig. 3, placed at the intersection of the horizontal return track or rails with the inclined return track or rails.

I prefer that the return-steps shall descend in a straight line, Fig. 2, meeting the bottom idlers J at tangency to better counterbalance the horizontal portion of the belt, and I prefer to arrange the length of the lower landing accordingly; but where longer or shorter landings are required modifications in the return-tracks may be made. I also prefer to interpose between the face and body of the tracks, Figs. 10 and 11, a strip of suitable material, as rubber or gum-cloth, to reduce as far as possible the noise and vibration of the moving belt of steps. The grating at U may be fixed in position at any point desired with respect to the moving steps provided said steps interleave before changing from a substantially horizontal position.

What I claim, and desire to secure by Letters Patent, is—

1. The combination in an elevator of the class described, of a moving structure composed of a series of steps forming in their operation an endless chain, with a supporting structure for tracks for said steps, said tracks being arranged in two or more sections at different angles to a horizontal plane, said sections being connected by a curve to which said sections are tangent, whereby the change of steps from one angle of movement to another may be made gradual, substantially as and for the purpose described.

2. The combination in an elevator of the class described, of a moving structure composed of a series of steps forming in their operation an endless chain; with a supporting structure having tracks for said steps, said tracks being arranged in two or more sections at different angles to a horizontal plane, said sections being connected by a curve to which they are tangent; and bearing connections between said steps and tracks arranged so as to maintain the tread-surfaces always horizontal, so that on the horizontal portions of the tracks the steps will form a continuous horizontal landing-surface, and on the inclined sections a stairway having the risers of the steps of a uniform depth, and on the curved portions a stairway having the risers of gradually-increasing depth, substantially as and for the purpose described.

3. The combination in a passenger-elevator of the character described of a moving structure composed of a series of steps united at each end by a series of pivoted links into an endless chain, wheels or rollers at each end of each step, a supporting structure, and rails for the wheels arranged in two sections, one section being horizontal and one section inclined, said rail-sections being united by a curve to which the said sections are tangent, substantially as described.

4. In an elevating apparatus of the class described, the combination of a moving structure composed of a series of steps forming in their operation an endless chain and having their tread-surfaces longitudinally grooved in the direction of their movement; with a

supporting structure forming ways for said steps, said ways being arranged in horizontal and inclined sections to form landings and stairs respectively, and so constructed as to maintain the tread-surfaces of the steps horizontal upon the operative portions of said landings and stairs; and a grated landing composed of substantially horizontal parallel bars separated by spaces with which the grooved tread-surfaces of the steps interleave, each tread-surface at the beginning or ending of the interleaving action occupying a maximum elevation at least flush with the upper surface of the grated landing and subsequently sinking or previously having risen through said landing so as to deposit the load thereon or take it therefrom and remaining horizontal until the interleaving action has ceased.

5. In an elevating apparatus of the class described, the combination of a moving structure composed of a series of steps forming in their operation an endless chain, each step being composed of a series of parallel brackets separated so as to form a tread-surface grooved longitudinally in the direction of its movement; with a supporting structure forming ways for said steps, said ways being arranged in horizontal and inclined sections to form landings and stairs respectively, and so constructed as to maintain the tread-surfaces of the steps horizontal upon the operative portions of said landings and stairs; and a grated landing composed of substantially horizontal parallel bars separated by steps with which the grooved tread-surfaces of the steps interleave, each tread-surface at the beginning or ending of the interleaving action occupying a maximum elevation at least flush with the upper surface of the grated landing and subsequently sinking or previously having risen through said landing so as to deposit the load thereon or take it therefrom and remaining horizontal until the interleaving action has ceased.

6. In an elevator of the class described, the combination of a landing composed of parallel bars and spaces, located at a slight angle with respect to the horizontal; a series of

moving steps forming in their operation an endless chain, each step having a tread-surface composed of parallel bars and spaces which are kept horizontal throughout their operative movement; wheels for the steps; and rails for the wheels extending below said landing in a line such that the steps when in a horizontal plane interleave with the grating of the landing, each tread-surface at the beginning or ending of the interleaving action occupying a maximum elevation at least flush with the upper surface of the grated landing and subsequently sinking or previously having risen through said landing so as to deposit the load thereon or take it therefrom and remaining horizontal until the interleaving action has ceased.

7. In an elevator of the character described the combination of a series of steps united at opposite ends into an endless jointed chain or structure, wheels or rollers at the ends of each step and a pair of rails at each end of the steps on the lower or return run, one rail above and one rail below each wheel to maintain control in case of separation of said chain, substantially as described.

8. In an elevator, a series of steps united at opposite ends into a jointed structure or chain, wheels or rollers at each end of each step, rails upon which said wheels travel, a moving hand-rail located at one side and a sheathing for the interior exposed side of said hand-rail extending down between the ends of the steps and said supporting-rollers to the axles of said rollers, substantially as described.

9. In an elevator, a series of steps united at opposite ends into a jointed structure or chain, wheels or rollers at each end of each step, rails upon which the wheels travel, a moving hand-rail located at one side thereof, a sheathing for the interior exposed side of said hand-rail and a continuous rail or projection upon said sheathing, substantially as and for the purpose described.

GEORGE A. WHEELER.

Witnesses:

FRANCES A. SPERRY,
WALTER S. PLACE.