

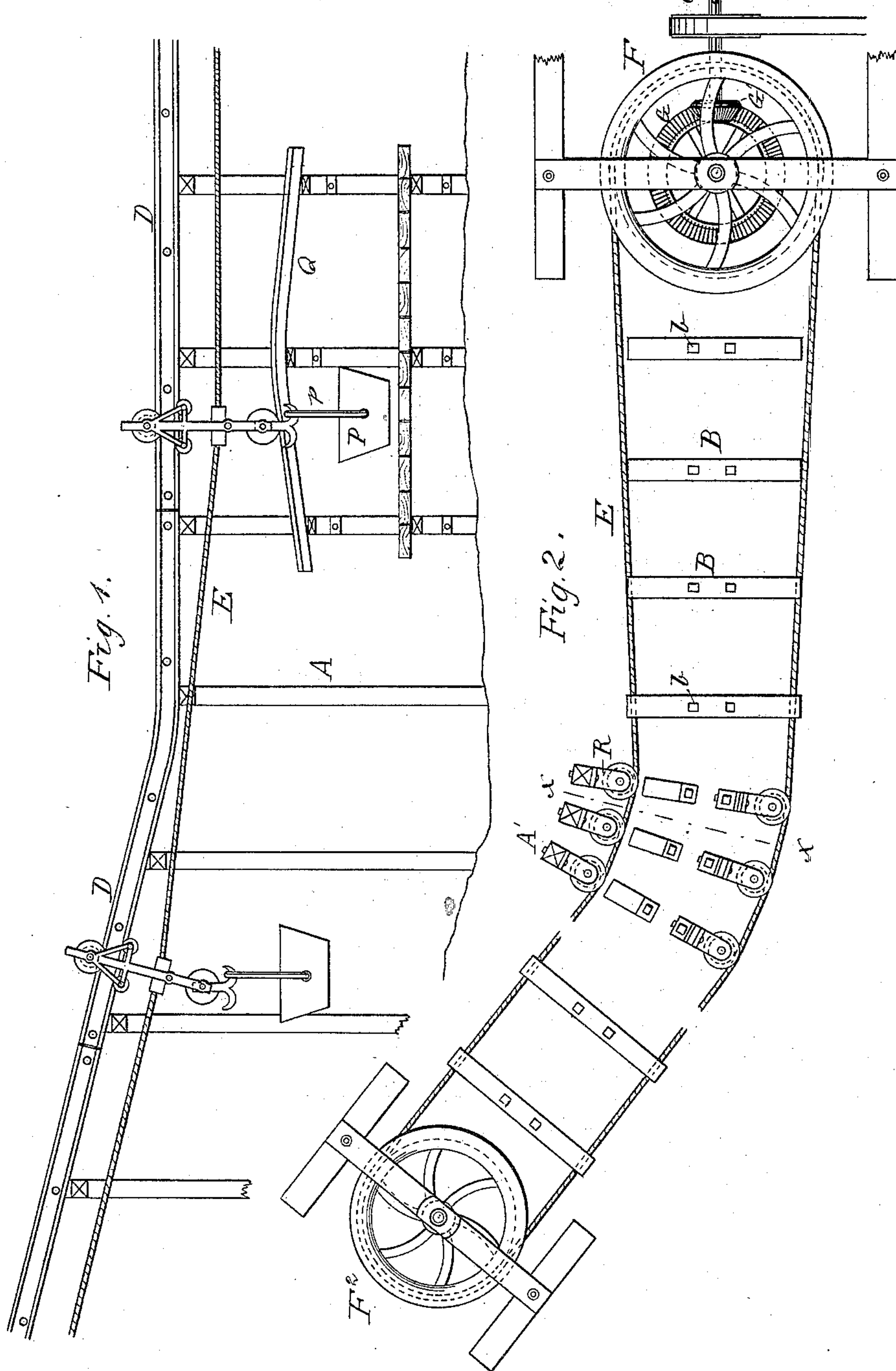
(No Model.)

3 Sheets—Sheet 1.

S. H. JENKINS.  
CABLE TRAMWAY.

No. 299,393.

Patented May 27, 1884.



Witnesses

*Wm. A. Lowe*

*Edw'd J. Holden Jr.*

Inventor

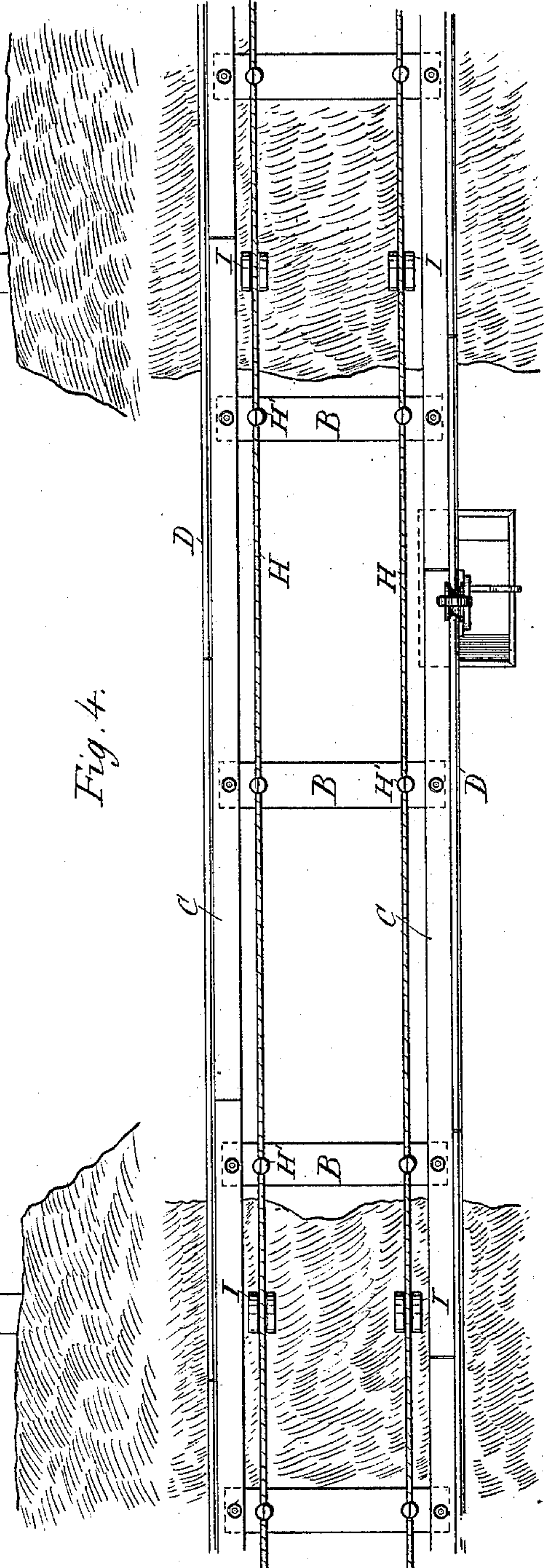
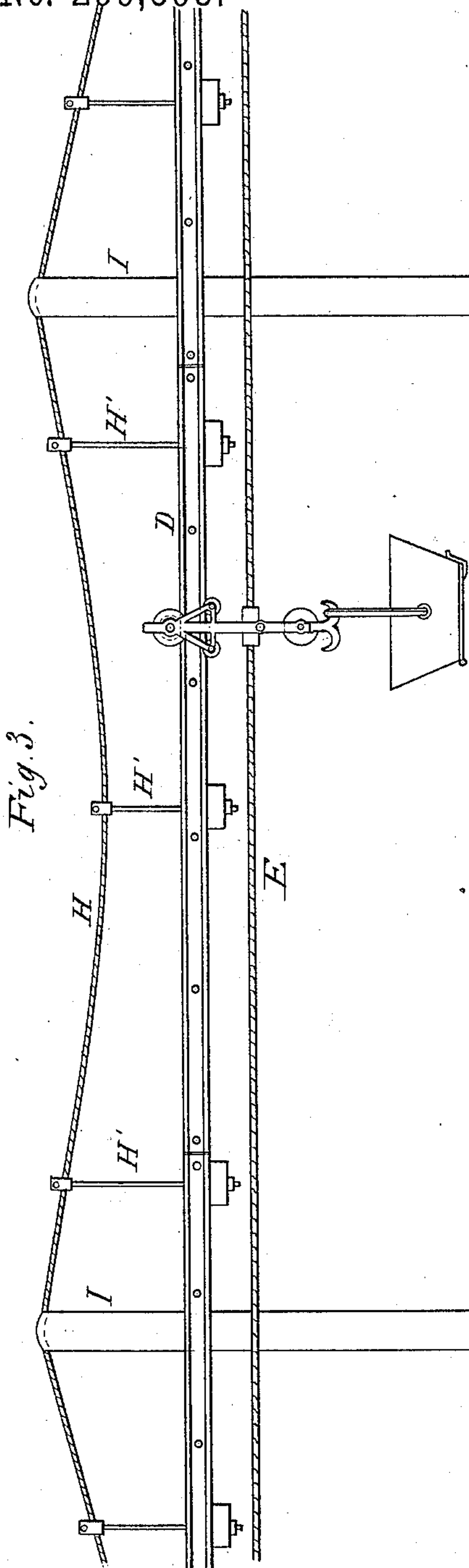
*Samuel H. Jenkins,*  
*By, A. M. Pierce,*  
*att'y.*

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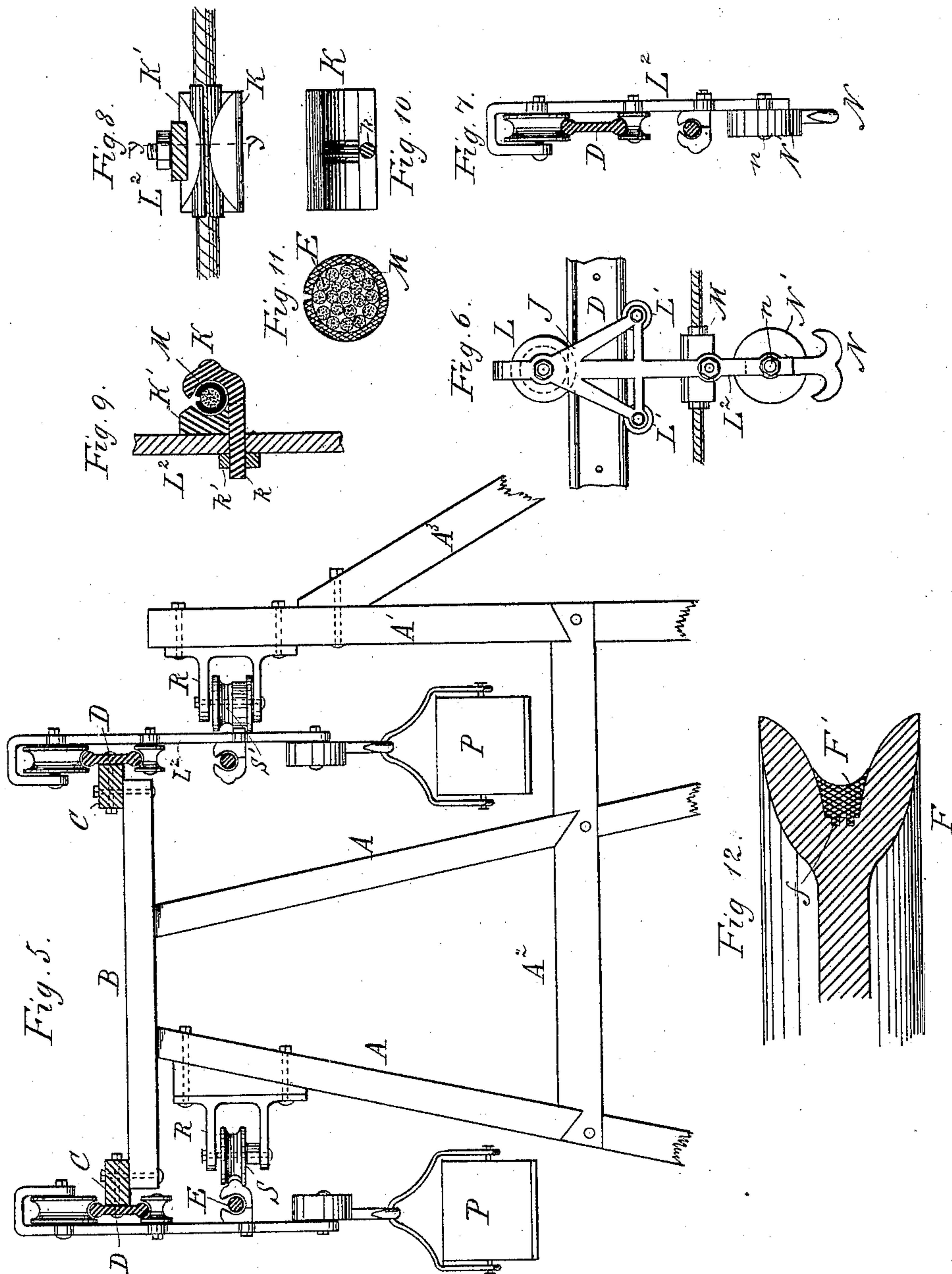
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# UNITED STATES PATENT OFFICE.

SAMUEL H. JENKINS, OF NEW YORK, N. Y.

## CABLE TRAMWAY.

SPECIFICATION forming part of Letters Patent No. 299,393, dated May 27, 1884.

Application filed January 9, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL H. JENKINS, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Cable Tramways, of which the following is a specification.

My invention relates especially to elevated endless-cable tramways employed for transporting ore, &c., in broken, hilly, or mountainous country, where surface roads cannot be built or would be too expensive to construct.

The object of my invention is to provide a tramway of great strength and durability, simple in construction, one by which deep gulches, cañons, or depressions may be readily spanned, steep grades mounted, and short curves made with little friction, expenditure of power, and wear of parts; to provide simple and effective means for securing the driving-cable to the carriers for the load, and simple automatic means for releasing the bucket or car at any point.

To attain the desired ends my invention consists, essentially, in a superstructure the supporting-piers whereof are constructed with two uprights or posts slightly inclined toward each other, their upper extremities being united by a cross piece or beam, said beam engaging with string-pieces, to the outer faces whereof are secured double-headed rails. My improved carrier consists of a triangular frame, a double-flanged wheel, designed to carry the load, being journaled in the upper portion of the frame and traveling upon the top head of the rail. In the lower side of said frame are journaled two double-flanged wheels, which engage with the bottom head of the rail, and only come in play when the carrier is ascending or descending a grade in the tramway. A vertical arm extends downward from the carrier-frame. At its lower extremity is pivoted a double hook for engaging with a bucket or car. To this hook is secured a wheel adapted and arranged to be turned while the carrier is in motion by coming in contact with a rail, automatically disengaging the hook from the bucket at any desired point. Between the hook and the carrier-frame upon the vertical arm is located the mechanism for gripping the driving-cable. This grip is made in

two parts, the inner surfaces whereof are roughened or ribbed. In placing the grip upon the cable a rubber thimble or cushion is first placed therearound, and then the grip is secured thereupon by a bolt and nut adapted and arranged to compress the parts. In turning curves two or more brackets bearing horizontal sheaves are affixed to the supports of the cross-beams at the outside of the curve, and similar brackets bearing sheave-wheels are secured to suitable supports upon the inside of the curve, outside of the cable, these sheaves engaging with the driving-cable and grips, guiding the same in a proper position below the track.

For the purpose of crossing gulches, cañons, or depressions, I have devised a simple rigidly-suspended structure, the same consisting of two or more cables of suitable strength stretched over piers upon each side of the depression to be spanned. At suitable intervals vertical rods or cables are affixed to the above-mentioned cables, their lower extremities supporting cross-beams, to which the stringers are affixed which bear the double-headed rails, as before described. The cable is put in motion by a large horizontal wheel, around which it partially passes at one terminus of the tramway. This wheel is grooved upon its periphery, said groove being lined with rubber or similar material held in place by a tongue at the bottom of the groove. This lining prevents the slipping and wearing of the cable; and my invention also involves certain other novel and useful combinations or arrangements of parts and peculiarities of construction and operation, all of which will be hereinafter first fully described, and then pointed out in the claims.

In the drawings, Figure 1 is a side elevation of a portion of my improved tramway, showing the same upon a level and an incline. Fig. 2 is a plan view of the same with the string-pieces removed, illustrating my method of turning a curve. Fig. 3 is a side elevation of my tramway where a depression is to be crossed, and Fig. 4 is a plan view of the same. Fig. 5 is a cross-sectional view, on an enlarged scale, at line *xx* of Fig. 2, showing the cable and buckets thereon. Fig. 6 is an enlarged front elevation of my carrier, and Fig. 7 is a side view thereof. Fig. 8 is a plan view of



the grip, and Fig. 9 is a vertical sectional view thereof at line *yy* of Fig. 8. Fig. 10 is a view of the inner surface of one of the parts of the grip. Fig. 11 is an enlarged cross-sectional view of the cable with the rubber thimble or cushion thereon. Fig. 12 is an enlarged cross-sectional view of a fragment of the rim of the driving-wheel.

Like letters of reference, wherever they occur, indicate corresponding parts.

A are the supporting-posts of the superstructure, said posts having their lower extremities firmly planted, and inclining toward each other at the top, as indicated in Fig. 5. By this construction no braces are required unless used at the curves, as each post serves as a brace to its fellow. B are cross-timbers mortised for the reception of posts A.

C are string-pieces firmly bolted to cross-timbers B at their extremities.

D are double-headed rails bolted upon the outer sides of the string-pieces in such a manner as to leave the heads projecting thereabove and below, as plainly shown.

E is the endless driving-cable, constructed of wire in the usual manner, passing partially around the driving-wheel F, supported horizontally at one terminus of the tramway. This wheel may be made as large as desired to increase its power, and the width of the tramway lessened after leaving said wheel, as indicated in Fig. 2. The rim of wheel F is grooved for the reception of cable E, and is lined with rubber, F'. This rubber lining conforms to the inequalities of the surface of the cable and grips, and prevents slipping or abrading of the parts. *f* is a tongue around which the rubber embeds itself, holding it securely in place. Wheel F is put in motion by means of the gear-wheels G G' and the driving-pulley G<sup>2</sup>, connected to the motive power.

F<sup>2</sup> is a horizontal wheel similar to wheel F, mounted at the opposite extremity of the tramway, around which the cable E passes. Said wheel F<sup>2</sup> may be provided with means for regulating the tension of the cable in the well-known manner.

Figs. 3 and 4 illustrate my mode of crossing a cañon or depression in the surface of the ground, being a continuation of the structure already described.

H are cables supported upon piers or posts I, the extremities of said cables being secured to any suitable anchorage. H' are vertical rods or cables secured to cables H, and bearing at their lower extremities the cross-beams B, to which the stringers C, bearing the double-headed rails D, are affixed. By this construction cañons of any depth and of considerable width may be easily spanned, and as the string-pieces and rails may be placed horizontally or in a sloping position and held rigidly, the tramway is just as firm and serviceable as when supported upon timbers embedded in the ground, and consequently this construction may be employed in localities where the expense precludes all other modes of convey-

ing ore, &c., from one side of a cañon or valley to the other.

To insure rigidity, guys may be affixed to the cross-beams B and secured at the bottom or sides of the cañon therebeneath.

J is the frame of the carrier, constructed of malleable iron, cast-steel, or other suitable material. The upper arm of the frame is bent over in such a manner as to receive a double-flanged wheel, L, which is designed to travel upon the upper head of the rail D.

L' L' are also double-flanged wheels located at the lower side of frame J, adapted and arranged to travel upon the lower head of the rail D when ascending or descending a grade in the tramway, preventing the lifting of the carrier from the track.

Heretofore carriers employed upon tramways of the class to which my invention relates, running upon a rail having a head at the top only, would easily lift from the track, and could only be used upon a level. Again, a wheel has been arranged below the carrier to engage with the bottom of the driving-piece below the rail. Said wheel, having no flanges, was liable to slip from place, or the device would bind upon the bottom of the stringer, causing the cable to break or cease to move. Carriers have also been made with two wheels above and one below. This construction has disadvantages. It increases the friction, and as the load hangs between the two wheels it gives the frame a lateral strain, which does not occur in my construction. With such a carrier the tramway could have no curves excepting of great radius, for the reason that the upper wheels, being held rigid, would run off the track except while traveling in a substantially straight line. By my construction all these difficulties are overcome, the friction is reduced to the lowest possible point, and the load is carried directly under the single wheel traveling upon the top of the rail. The two lower wheels are provided with wide flanges, and only engage with the rail in ascending or descending grades, and in turning a curve upon a substantial level touch the rail only with the edges of the flanges, thus permitting as sharp curves to be turned as may be found necessary.

Directly beneath the wheel L the gripping mechanism for engaging with the driving-cable is attached to the bar L<sup>2</sup> of the frame. This grip is made of malleable iron or cast-steel in two parts, K K'. Part K' fits around bar L<sup>2</sup>, as plainly indicated in Fig. 8. Part K is provided with a screw-threaded projection, *k*, which passes through a perforation in L<sup>2</sup>, and is provided with a nut, *k'*, for securing the parts in place. The inner surfaces of K and K' are ribbed or roughened, as shown in Fig. 10, and are of such a shape as to conform to cable E.

In securing the cable in the grip a thimble or cushion, M, of rubber, divided longitudinally for convenience in placing in position, is lapped around the cable at the point where



the grip is to be applied, and, after placing it within the grip, the nut  $k'$  is tightened, firmly securing the carrier to the cable. By my peculiar construction of the grip the life of the cable is materially increased, as the strands composing the same will not be abraded or broken by the compression of the grip, the rubber cushion yielding to the inequalities of both the cable and the ribbed portion of the grip, effectually preventing breaking or slipping.

It will be observed that the space of contact and pressure of the grip upon the cable is limited in lateral direction, and that the parts K K' form a small segment of a circle, the rubber M extending beyond the grip in each direction. By this construction I am enabled to turn short curves, and all danger of fracture of the cable by bending at an angle is obviated.

At the lower extremity of bar  $L^2$  is pivoted a double hook, N, for engaging with a bucket or car, P.

N' is a wheel affixed to hook N, the pivot  $n$  passing therethrough.

Wherever upon the line it is desired to drop the buckets automatically from the hook, a rail, Q, is placed in position, as illustrated in Fig. 1. In its progress the wheel N' comes in contact with said rail, causing the hook to turn at right angles, dropping the point and freeing the bucket. In taking up the loaded buckets, they may be placed upon a suitable support beneath the moving cable in such a position as to engage with a carrier-hook as it passes.

Bucket or car P may be made of any approved style, and, if desired, provided with a trap-bottom for discharging its contents.

My method of turning curves is plainly illustrated by Figs. 2 and 5.

R represents brackets affixed to uprights A upon the outside of the curve, and to supports A' upon the inside of the curve. Said supports may be tied to posts A by a cross-piece,  $A^2$ , and further strengthened by means of a brace,  $A^3$ .

S is a sheave horizontally mounted in bracket R upon the upright A, adapted to receive and guide the cable while passing around the curve upon the outside, the grips passing freely thereover in their progress.

S' is a sheave mounted in a bracket upon support A'. This sheave is so arranged as to guide the cable and at the same time accommodate the bolt and nut securing the grip in place, as plainly shown in Fig. 5.

My tramway may be easily carried around cliffs or vertical walls of rock by supporting the superstructure upon brackets secured to the face of the rock, as it is not necessary to run the line without deviation to the right or left or upward or downward, as in previous constructions.

The advantages of the double hook shown by me is in the fact that the bucket or car may be hooked upon either side of the carrier

without reversing the hook, and when the cable is moving in either direction.

My suspended structure is a continuation of the structure supported directly from the ground, and no transfer of the buckets or material is required, as has heretofore been necessary in all devices of the character to which my invention relates.

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a tramway of the character herein specified, the cross-beams held in place by vertical rods or cables engaging with supporting-cables, as set forth, in combination with string-pieces affixed to the extremities of said cross-beams, and double-headed rails secured to the outer faces of the string-pieces, substantially as and for the uses and purposes shown and described.

2. Suspending-cables H, piers I, vertical rods or cables H', cross-beams B, string-pieces C, and double-headed rails D, the whole combined and arranged substantially as shown and described.

3. In a tramway of the character herein specified, the cross-beams B, rigidly supported by uprights A, and bearing upon their extremities string-pieces C, in combination with the double-headed rail D, the heads of said rail projecting above and below the string-piece in close proximity thereto, substantially as shown and described.

4. The carrier consisting of a frame having a single double-flanged wheel at top and two double-flanged wheels at bottom, in combination with a continuous double-headed rail located between the top and bottom wheels, said rail being secured to string-pieces midway between the heads, substantially as shown and described.

5. The combination, with cable E and the grips secured thereto, of the horizontal sheave-wheels S and S', supported in brackets R, the sheaves S' being provided with a flat surface below the groove, substantially as and for the uses and purposes shown and described.

6. A carrier of the character herein specified, having a single wheel at top and guide-wheels below, in combination with a double hook, pivoted as set forth, said hook being adapted and arranged to turn upon a pivot, substantially as and for the uses and purposes shown and described.

7. The combination, with the carrier herein shown and described, of a hook for supporting the buckets or cars to be moved, said hook being adapted and arranged to automatically release the buckets, substantially as shown and described.

8. The combination, with a carrier having a double hook, pivoted as set forth, of wheel N and rail Q, substantially as shown and described.

9. The combination, with the grip formed of parts K and K', of the rubber thimble M, extending beyond the grip, as set forth, and



the cable E, the whole arranged substantially as shown and described.

10. The grip consisting of two parts, K and K', the inner face of each part forming a segment of a circle, and curving in contrary directions to each other, substantially as shown and described.

Signed at New York, in the county of New York and State of New York, this 7th day of January, A. D. 1884.

SAMUEL H. JENKINS.

Witnesses:

A. M. PIERCE,

EDWD. J. HOLDEN, Jr.