

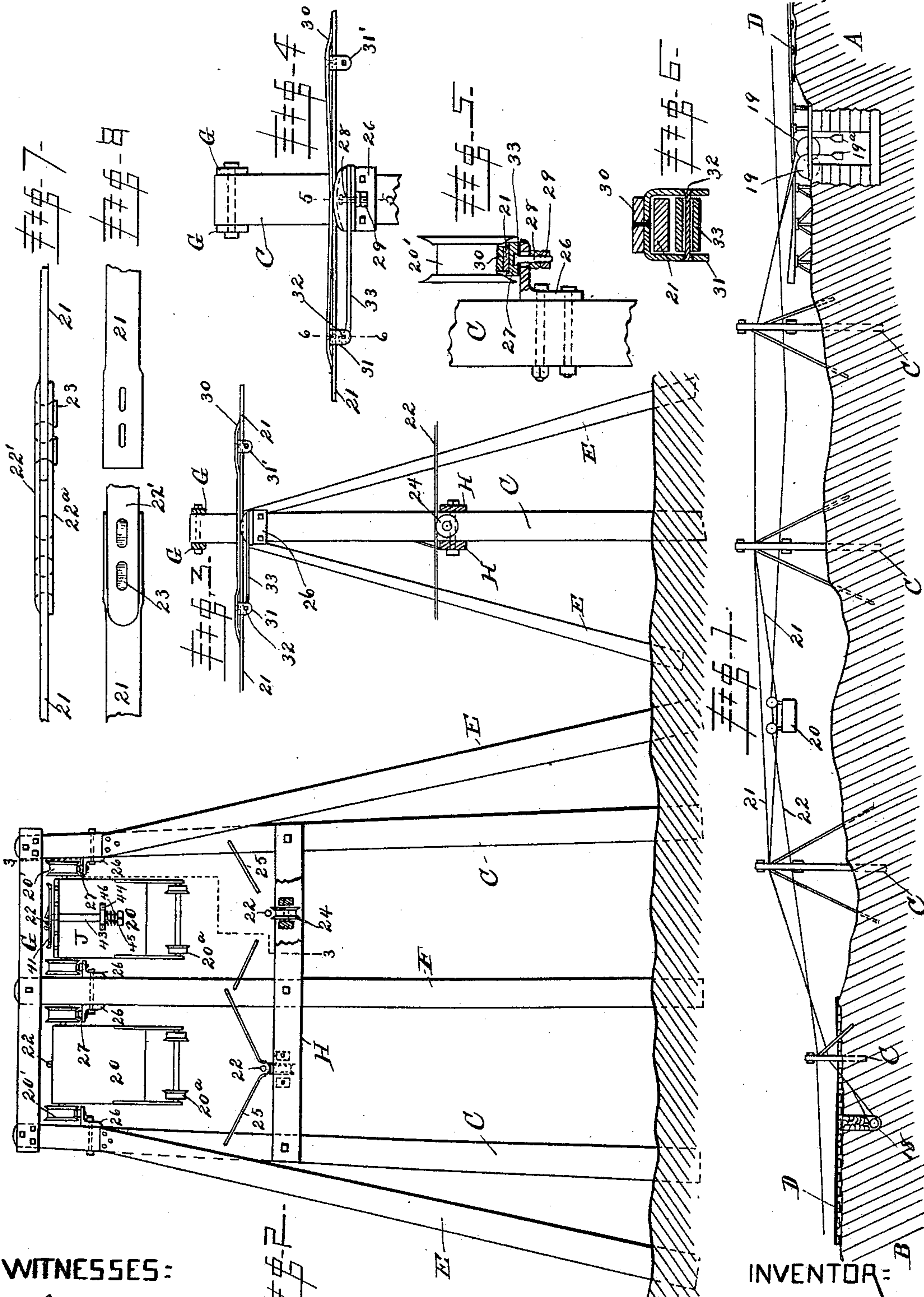
(No Model.)

3 Sheets—Sheet 1.

A. H. DE CAMP.
AERIAL TRAMWAY.

No. 460,567.

Patented Oct. 6, 1891.



WITNESSES:

W. E. Bowen
Benj. Miller

INVENTOR:

Alfred H. De Camp,
By J. H. Bowen
attorney.

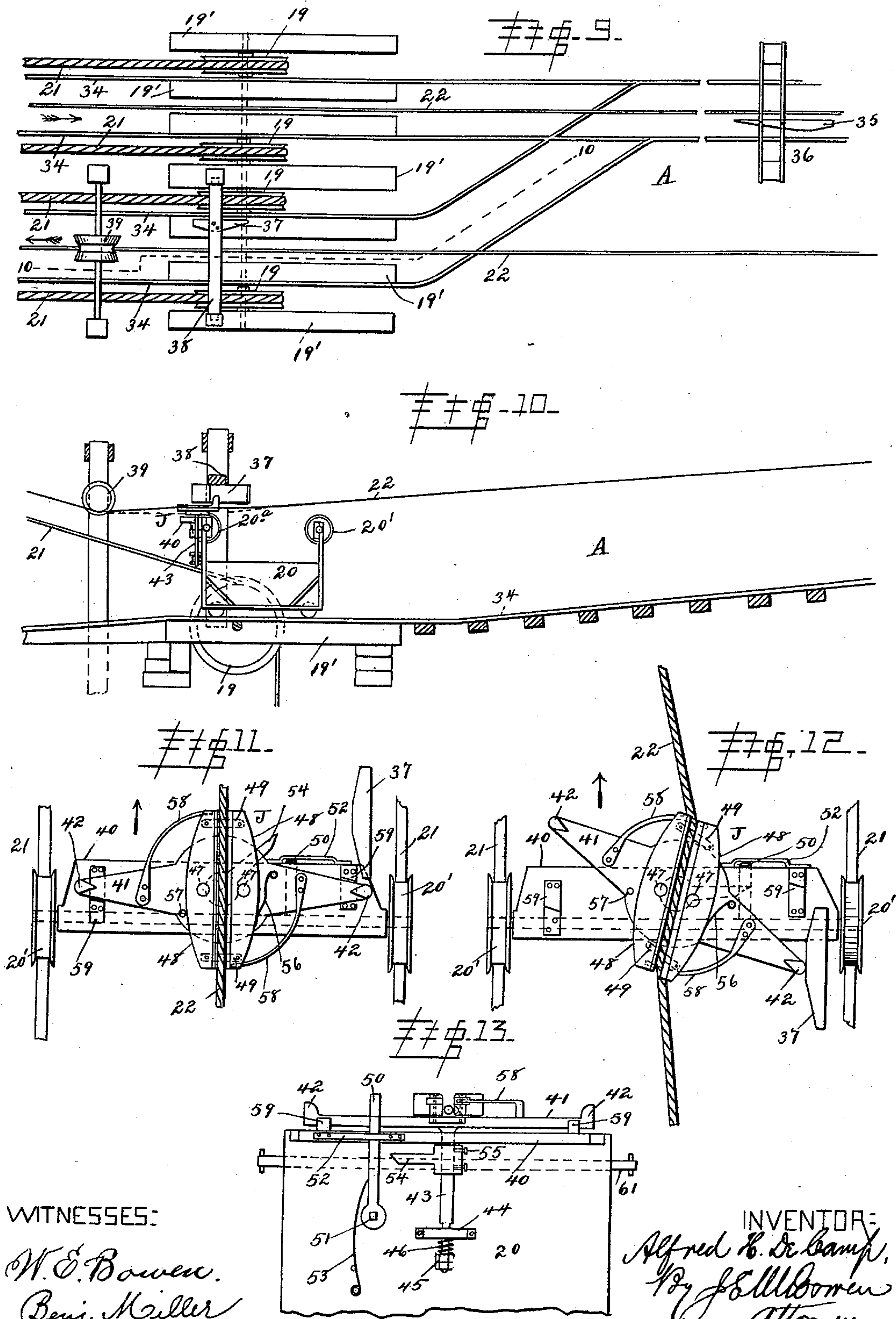
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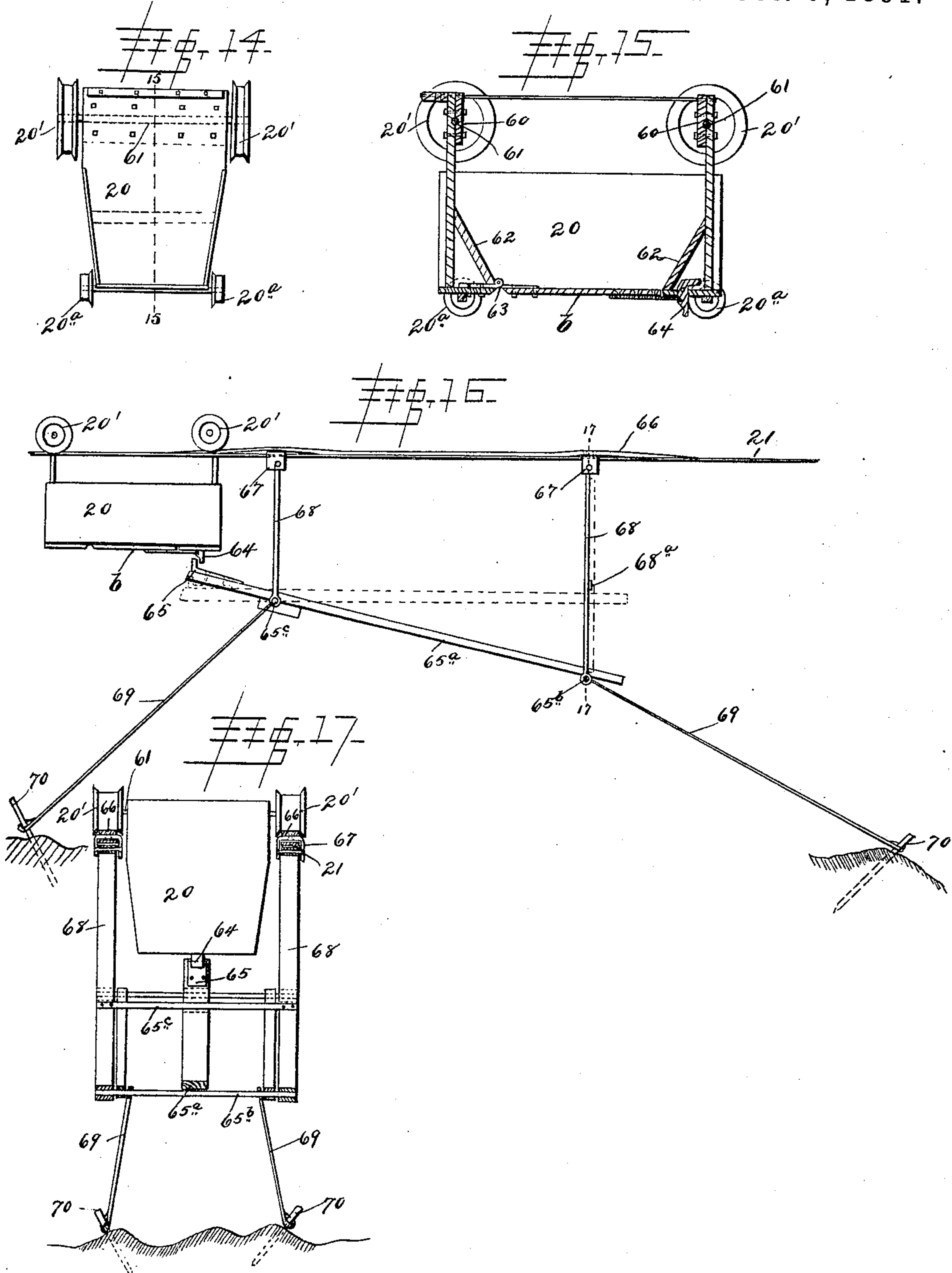
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UNITED STATES PATENT OFFICE.

ALFRED H. DE CAMP, OF BOONTON, NEW JERSEY.

AERIAL TRAMWAY.

SPECIFICATION forming part of Letters Patent No. 460,567, dated October 6, 1891.

Application filed April 25, 1890. Serial No. 349,468. (No model.)

To all whom it may concern:

Be it known that I, ALFRED H. DE CAMP, a citizen of the United States, and a resident of Boonton, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Aerial Tramways, of which the following is a specification.

My invention relates to aerial tramways of the type shown in my United States Letters Patent No. 411,584; and it has for its object the devising of certain improvements designed to simplify the construction of tramway systems and increase their efficiency in operation.

To enable others interested in this class of inventions to understand and make use of my improvements, I will describe the same in connection with the accompanying drawings, which form part of this specification, and in which like features are indicated by like letters and figures of reference in the several views, and wherein—

Figure 1 is a view in elevation of an aerial-tramway system illustrating in a general way certain features of my invention. Fig. 2 is a front elevation of a tramway. Fig. 3 is a sectional view on the line 3 3 of Fig. 2. Fig. 4 is a side view, on a somewhat enlarged scale, of the upper end of one of the upright posts, showing one of the castings which support the tramway-rails and devices for elevating the car-wheels over said castings. Fig. 5 is a sectional view on the line 5 5 of Fig. 4, showing, also, a fragment of the upright post in elevation and a car-wheel in position on the rail. Fig. 6 is an enlarged sectional view on the line 6 6 of Fig. 4. Fig. 7 is an edge view of the rail at the point where two lengths of rail are joined. Fig. 8 is a plan view of Fig. 7. Fig. 9 is a plan view of the terminal at the right of Fig. 1. Fig. 10 is designed to represent a longitudinal section on the line 10 10 of Fig. 9, but showing a car in position on the surface track, the grip on said car engaging with the hauling-rope. Fig. 11 is a top plan view of the gripping mechanism, mounted at the front of the car, showing the hauling-rope in the grip, but not engaged therewith. Fig. 12 is a similar view showing the grip thrown into the position it assumes when clamping the rope. Fig. 13 is a front view of the top of the car, showing the gripping mechanism

in position thereon. Fig. 14 is a front elevation of a car adapted for use in my system. Fig. 15 is a central longitudinal vertical section on the line 15 15 of Fig. 14. Fig. 16 is a side view showing a car mounted on the rails of the tramway, and mechanism suspended from said rails and suitably anchored, for dumping the car; and Fig. 17 is a sectional view through line 17 17 of Fig. 16.

Referring to the drawings, A indicates one of the terminals of the tramway, and B the other terminal. At terminal B the tracks of the tramway are anchored in the ground at 18, from which anchorage they pass onto the upright supporting-posts C to the pulleys 19, suitably supported in bearings 19' (see Fig. 9) at terminal A, over which pulleys the tracks or suitable connections thereto—such as chains—pass, and have secured to their ends weights, such as 19^a. The anchorage at terminal B holds that end of the track immovable, while, as will be readily understood, the weights 19^a, suspended from the opposite ends of the tracks at terminal A, stretch them and hold them and their loads at suitable elevations between the supports. The car 20, supposed to be loaded, is shown depressing the tracks upon which it runs, the depression continuing until the loaded car and weights 19^a at terminal A are in equilibrium. The tramway-rails are indicated by 21 and the hauling-rope by 22. At each of the terminals A and B tracks D are so laid on the ground between the rails 21 of the tramway as to lead away from the tramway on an ascending grade. These tracks may of course be extended as far as desired for special requirements, and the grade of those parts of the tracks which lie under the tramway is such that the car is adapted to leave the tramway or move on it without shock.

The character of tramway-rail which I prefer to employ is shown in Figs. 7 and 8, it being less in vertical section than in its other dimensions. This rail is the subject of a claim in my patent hereinbefore mentioned, the joint by which the several lengths of rail are connected being the novel feature in the present instance. The ends of the rail-lengths are preferably, though not necessarily, broadened a little and are slotted longitudinally, as seen in Fig. 8. The joint is formed by

means of top and bottom straps 22' 22^a, laid on the rails and firmly secured in place by rivets 23. The rivet-slots in the straps are made to match the slots in the rails, and the straps may be of any desired length. The top strap 22' has tapered ends, as seen in Fig. 7, to provide a smooth surface, and it is countersunk in order that the rivets 23, which are shaped to conform to the shape of the slots, will not project above its surface. The under strap 22^a may likewise be countersunk, but the heads of the rivets at the bottom of the rail may project beyond the surface of the strap, since this would not be an objection on the bottom of the joint.

The upright posts C are set in the ground, or otherwise suitably supported, and are braced by the inclined posts E, also set in the ground. At their tops the inclined posts E are bolted or otherwise secured at or near the tops of posts C, as shown. There are preferably two inclined posts E secured to each of the upright posts, as seen in Fig. 3. The intermediate upright post F serves as a vertical division between posts C C and is arranged to divide the space between posts C C equally. To further brace posts C and F, I make use of the cross-braces G H. The former are secured to the tops of the upright posts C F and the latter some distance below the tops of said upright posts, as seen in Fig. 2 and in section in Fig. 3. The pulleys 24, which serve to support the endless hauling-rope 22, are mounted on or between the cross-beams H, and to guide the hauling-rope 22 back to the pulleys 24 and deliver it fairly between the flanges of the pulleys is the function performed by the inclined guides 25.

The flexible rails 21 are so supported on the posts C as to permit of the easy play of said rails back and forth. The support for the rails and the means by which the car-wheels are elevated over the supports for the rails, which supports are fixed to the posts C and F, are as follows: At the proper elevation I secure to said posts C and F, by bolts or otherwise, the knees 26, the relative positions of which knees being seen in Fig. 2, it being observed that they are sufficiently below the tops of the posts to permit the car 20 to pass beneath the cross-beam G without contact therewith. The knees 26 support the castings 27, which in turn support the tramway-rails 21. The casting 27 has secured in its bottom the headed screw-bolt 28, which in fixing the casting to the knee is passed through a slot in the knee and then made secure by the jam-nuts 29. The slot in knee 26 is elongated transversely in order that the casting 28, which supports the tramway-rail, may be adjusted laterally to bring the castings on opposite posts toward or away from each other, if such adjustment should be necessary, because of failure to place the posts C F the exact distances apart when erecting them. Casting 27 is flanged on its top, as shown, the rails 21 resting in the depression between the flanges, and is also

made convex longitudinally, as indicated in dotted lines, Fig. 4, in order to avoid the sharp bending of rail 21 when weighted down by the loaded car. A short flexible metallic piece 30 is placed over the rail 21 where the rail passes over the supports on posts C F and is riveted securely at its ends to the loops comprising inverted-U-shaped pieces 31 31', as best seen in Fig. 4. These U-shaped pieces rest loosely on the rail 21, and the U-shaped piece 31 is pivoted below the rail at 32 to an eye of the vertically-flexible rod or bar 33, (see Fig. 6,) the opposite end of said flexible piece 33 being clamped between the top surface of the knee 26 and the bottom of casting 27 by the bolt 28 passing through the clamped end of 33 and the slot in said knee. It will be seen that as the flexible piece 30 at the top of the rail is secured to the flexible piece 33, fixed to the knee 26, the former is prevented from moving longitudinally, and as the rail 21 is embraced loosely by the inverted-U-shaped pieces 31 31' it easily slips through them. The U-shaped piece 31' has a rivet passing transversely through its bottom, as seen in Figs. 3 and 4. Instead of clamping the piece 33 between the knee 26 and casting 27, it may be hinged or otherwise secured to said knee; and in lieu of the flexible piece 33 there may be used two rigid pieces hinged together, as this would give the required vertical movement.

In Fig. 2 front and rear views of car 20 are shown, the cars being supported in the spaces between posts C F by the wheels 20', resting on the rails 21, supported on the castings fixed to the knees 26. It will be noticed that the car 20 at no point is as wide as the space between the tramway-rails 21, and thus at the terminals where the car descends onto the narrow-gage surface way it may pass freely between the rails of the tramway. At the bottom of car 20 are mounted, within its sides, wheels 20^a, which are adapted to support the car on the surface track at the terminals A and B. The point 22 at the top of car 20, Fig. 2, indicates the endless hauling-rope, to which the car is attached at will. The grip J, hereinafter described, is secured to the front of the car, as indicated in Fig. 2.

Referring now to Fig. 9, which represents the terminal A, Fig. 1, the flexible tramway-rails 21 are shown passing over the pulleys 19, supported in bearings 19', and between these rails are located the rails 34 of the stationary surface track. The car 20 will come in from the tramway on that side indicated by the arrow pointing to the right, and, passing onto the rails 34 of the surface way, (the wheels 20^a at the bottom of the car being adapted to travel on said way,) will travel to the point on the surface way where the wedge-shaped device 35 is mounted over the track in supports 36, as shown. This wedge-shaped device 35 is supported high enough to permit the car to pass under it, but sufficiently low to permit it to operate the lever of the

grip to disconnect the hauling-rope 22 from the gripping mechanism J. When the car is thus released from the hauling-rope, it returns by gravity, the grade of the surface way permitting such movement of the car to take place, (see Fig. 1,) and is automatically switched onto the outgoing surface way, (indicated by the arrow pointing to the left in Fig. 9,) and at the proper position on said outgoing surface way the car passes onto the tramway-track, and through the instrumentality of the wedge-shaped device 37, mounted on cross-beam 38, supported at proper height over the outgoing surface way, the gripping mechanism on the car automatically grips the hauling-rope 22, and the car is thus moved out on its return trip. The roller 39, Figs. 9 and 10, supported centrally above the track at the terminal, just in advance of the wedge-shaped device 37, operates to hold the hauling-rope 22 down to a given elevation to insure the co-operation of the grip therewith. This roller 39 is centrally grooved and has wide flanges, as shown, to maintain the proper line of travel of the hauling-rope. Just in advance of the car seen in Fig. 10 the surface way is shown as sharply depressed to permit the car to pass under roller 39, the relative grades of the tramway and surface-way being such that the upper wheels of the car land on the tramway-rails when the car is fairly started on its journey.

In Fig. 10 the car 20 is shown in the position on the outgoing track where its gripping mechanism (seen in side view at the front of the car) is engaging with the hauling-rope 22. The hauling-rope is shown in full lines elevated by the grip, its normal line of travel at this point being indicated by the dotted lines.

It is of course to be understood that the terminal B will also be provided with the described arrangement for transferring the car from one track to the other and for automatically disconnecting and connecting the car to the hauling-rope.

The construction of the gripping mechanism J is shown in Figs. 11 to 13. In Fig. 11 the hauling-rope 22 is shown lying in the grip, but not engaged thereby, and in Fig. 12 the mechanism is seen thrown into the position it assumes when clamping the rope. The grip is supported at the front of the car on a projecting shelf 40. It comprises a plate 41, having upwardly-extending ends 42 and a downwardly-projecting shaft 43, secured centrally to its under side. This shaft 43 passes centrally through the projecting supporting-shelf 40 and at its lower end through a second shelf 44, bolted to the front of the car, Fig. 13, and is capable of revolving through both shelves. Between the lower shelf 44 and nuts 45 on the end of shaft 43 there is placed a spring 46, encircling the shaft, and which is compressed by screwing up the nuts 45, thus exerting a downward pressure of the plate 41, the degree of pressure being regu-

lated by means of the nuts 45, as will be readily understood from Figs. 11 to 13. In the top of plate 41 are secured the pins 47, upon which the two cheek-pieces 48 are pivoted, these cheek-pieces resting on plate 41 and prevented from rising by suitable heads on the pins 47. At the bottom of the cheek-pieces 48 they are provided with small oblong plates 49, pivoted at both ends to the respective cheek-pieces transversely thereof, whereby the cheek-pieces are caused to move together as one. The upright arm 50 is pivotally secured to the front of the car at 51, as shown in Fig. 13, and passes through strap 52, fixed to the shelf 40, by which means it may partake of a limited transverse movement only. The arm 50 is kept in its normally vertical position at one end of the strap 52 by means of spring 53. The shaft 43 has adjustably fixed to it below shelf 40, by means of set-screws 55, the horizontal arm 54. When the plate 41 is revolved from left to right, and with it the attached shaft 43, carrying the horizontal arm 54, the end of said arm will come in contact with the pivoted upright arm 50 and push it from its normal position against the resistance of spring 53, and as the described movement of plate 41 is continued the said horizontal arm 54 will clear the upright arm 50, when the spring 53 will restore said arm to its normal position, and the upright arm 50 will then prevent the horizontal arm 54 from swinging back from right to left, thus holding the parts in the positions indicated in Fig. 12. Those portions of arms 50 and 54 which come in contact with each other in the operation just described should be inclined or beveled. It is obvious that if pivoted arm 50 be thrown over to the right when the parts are in the gripping position (shown in Fig. 12) the horizontal arm 54 and the plate 41 will be free to return to the positions indicated in Fig. 11, where the grip is shown released. The office of wedge-shaped device 35, Fig. 9, is to effect this releasing operation as the gripped car passes beneath the support for said device, said device being located at any point over the track where it is desired to release the hauling-rope from the grip.

The small spring 56, which is secured at one end to plate 41, presses with its free end against its adjacent cheek-piece 48, thus holding the other cheek-piece against the stop 57, fixed in the plate 41, when the grip is not in action, thereby maintaining both cheek-pieces 48 in the proper position for receiving the hauling-rope 22. To the top surface of plate 41 is secured one end of each of the curved pieces 58, the opposite or free ends of said pieces entering the slots in the ends of the cheek-pieces 48, as seen in the drawings. Both ends of each of the cheek-pieces are slotted. When the grip is out of action, the free ends of these curved pieces do not pass across the groove between the cheek-pieces, as will be seen in Fig. 11; but as the grip

moves into action the ends of the cheek-pieces travel from left to right a less distance than the ends of the curved pieces 58, and hence the ends of said curved pieces will be projected over the groove between the two cheek-pieces and occupy the slots in the ends of both of the cheek-pieces, and as said slots and the ends of the curved pieces operating therein are sufficiently elevated to permit the rope to lie below them the free ends of the pieces 58 thus serve as guards over the rope in the groove of the grip and prevent the rope from being displaced by any upward movement affecting it.

The surfaces of the cheek-pieces against which the rope rests when the grip is in action are rounded off at the ends to prevent too short a bend in the hauling-rope. To the top of shelf 40 there are secured small plates 59, which are tapered to receive the ends of plate 41 as it returns quickly to position when the grip is released. The plates 59 may have stops fixed in or formed on them, against which the arms of plate 41 will come to rest. When the arms of plate 41 come in contact with the plates 59, there will be slight friction between the parts as the plate 41 moves against the incline of the plates 59, and this will increase the tension of spring 46, thus bringing the arms of said plate 41 gently against the stops provided to determine the proper point of rest for the said plates.

The part of the wedge-shaped device 37 with which the arms 42 of plate 41 of the grip first engages is so shaped that the movement imparted to the grip is first quick and then gradual, the said device being tapered at both ends, as shown, so that the action of the horizontal arm 54 against the upright arm 50 shall be gentle and not violent. It is apparent that if the direction the car travels be the reverse of that indicated by arrows in Figs. 11 and 12 the wedge-shaped device 37 would be changed to the opposite side of the track and turned end for end.

The construction of car 20 will preferably be that shown in Figs. 14 and 15. The axle upon which the upper wheels 20' are mounted extends through the car, as shown in dotted lines in Figs. 13 and 14, the said axle being held in position by the pieces 60, bolted to the upwardly-extended ends of the car and furnishing in part the bearings for the axles. This arrangement serves to brace and strengthen the car at its top, besides supplying a stable support for the wheels. The ends of the car are shown extended up above the loading-line, and it is through these extended ends that the axle passes, Figs. 14 and 15. This brings the center of gravity low. To strengthen the car it is provided on its inside at the ends with the inclined braces 62. The bottom is narrowed transversely by sloping the sides of the car inward from the loading-line to the bottom, as shown in Fig. 14. The bottom *b* is hinged at 63 and supported at its opposite

end on the pivoted latch 64. This latch is pivoted to the bottom of the car and engages with a tongue-piece fixed to bottom *b*. The hinged bottom, when thrown up, automatically engages with the latch and is held in place till released from engagement with the latch.

For automatically dumping the car at any point on the line of the tramway, I have devised the means shown in Figs. 16 and 17, which comprises the hanger 68, pivoted to inverted-U-shaped devices or loops 67, (similar to the device shown in Fig. 6,) which devices are riveted to the flexible metallic piece 66, which lies upon the rail, the latter being loosely embraced by said U-shaped devices. The function of the piece 66 is to elevate the flanges of the car-wheels above the U-shaped devices and also to hold the front and rear hangers in proper relative positions to each other. The metallic piece 66 is moved, with the suspended tripping mechanism, along the track in placing the tripping mechanism at any desired point on the line of the way. The lever 65^a is pivoted at 65^c to the forward set of hangers 68 and carries at its projecting point an unlatching-finger 65. The length of the forward hangers is such that when the rear end of the lever 65^a rests normally on the cross-brace 65^b its finger 65 will occupy a plane in the line of travel of the latch, holding the bottom of the car closed, so that as the car moves over the way the latch 64 will be brought in contact with the unlatching-finger 65 and draw back the latch, and thus permit the bottom of the car to swing down. The rear end of the lever 65^a is secured to the cross-beam 65^b when the tripping mechanism is set for operation and is secured to cross-beam 68^a when not desired to operate, the two positions of said lever being shown in full and dotted lines, respectively, in Fig. 16. The ropes 69, attached to the cross-beams 65^b and 65^c, are suitably anchored at 70, as seen, which prevents undue vibration of the suspended structure. As already stated, this tripping mechanism may be moved on the way from place to place at will, it only being necessary to take up the anchorage, when the suspended hangers may be easily slid along on the rails to a new place of anchorage.

The manner in which my tramway system and its several features operate will be understood from the foregoing description. The plan of embodying in a single organization both ways of the tram is economical and enables the building of a strong and easy-riding structure. The combining with the tramway of surface ways at the terminals of the tram and cars so constructed as to be adapted to co-operate with both ways has obvious advantages. The joining of the lengths of rail by longitudinally slotting the ends of the rails and the binding-plates and employing rivets that conform to the longitudinal character of the slots has the advantage of obtaining the

strength due to riveting without weakening the rails by removing any considerable amount of metal transversely therefrom.

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

1. In an aerial-tramway system, the combination, with suitably-supported flexible rails secured at the terminals in a manner to permit of the flexing of the rails in the passage of the loaded car thereover, of ground or surface tracks laid at the terminals between the aerial rails and a car having wheels at top and bottom, which co-operate, respectively, with the flexible aerial rails and the surface rails, substantially as and for the purpose set forth.

2. In an aerial-tramway system, the combination, with tramway-rails suitably supported between terminals and at one terminal immovably anchored while at the other they pass over pulleys and have weights suspended from their ends, of a car traveling on the tramway-rails, and surface rails laid at the terminals between the tramway-rails to receive the car from the tramway, substantially as set forth.

3. In an aerial-tramway system, the combination, with suitably-supported flexible rails secured at the terminals in a manner to permit of the flexing of the rails in the passage of the loaded car thereover, of ground or surface tracks laid at the terminals between the aerial rails and on an ascending grade, and a car having wheels at top and bottom and provided with a gripping mechanism, an endless hauling-rope co-operating with said gripping mechanism, and a pulley supported at the terminal to assist the clutching of the hauling-rope by the grip on the car as the latter descends to the outgoing aerial way, substantially as set forth.

4. The combination, with the tramway-rails and surface rails laid at the tramway-terminals between the tramway-rails, of a car provided with wheels at top and bottom, which co-operate, respectively, with the tramway and surface way, and also provided with a gripping mechanism, an endless hauling-rope co-operating with the grip on the car, and a device supported over the surface way at the terminal and co-operating with the grip mechanism on the car to detach the hauling-rope from the grip, a similar device supported over the outgoing surface way to throw the grip into position for clutching the hauling-rope, and a pulley supported over the way in front of said last-mentioned device for depressing the hauling-rope to be embraced by the grip, substantially as set forth.

5. A supporting structure for the tracks of aerial tramways, consisting of upright posts C and inclined bracing-posts E, in combination with the central division-post F and transverse braces G H, substantially as set forth.

6. The supporting structure for the tracks of aerial tramways, consisting of the upright posts C and inclined bracing-posts E, in combination with the central vertical post F, dividing the space between posts C into equal parts, transverse braces G H, and knees for carrying the tramway-rails secured to the upright posts, substantially as set forth.

7. In a support for the rails of a double aerial tramway, the combination, with upright posts C, inclined bracing-posts E, and transverse bars G H, of upright post F, dividing the space between the posts C equally, knees attached to the posts C and F for supporting the tramway-rails, and cars provided at the top with wheels co-operating with the rails of the tramway, substantially as set forth.

8. As a means for elevating the car-wheels over the supports for the tramway-rails, the combination, with a knee or bracket furnishing the support in question and the rail, of a flexible metallic piece, as 30, placed over the rail where the rail passes over its support, loops embracing the rail and riveted to said flexible piece, and a rod or bar capable of vertical movement supported at one end on said knee or bracket and at its outer end pivoted to one of said loops embracing the rail, substantially as set forth.

9. The rail-supporting knee or bracket bolted to the upright post and slotted transversely, as shown, in combination with a casting having a screw-bolt fitted in its under surface and adapted to co-operate with the slot in the knee, for the purpose explained, and flanged on its upper surface to provide a depressed seat for the tramway-rail, which seat is convex longitudinally, substantially as set forth.

10. The knee or bracket bolted to the upright post, as explained, in combination with a casting adjustably secured to said knee or bracket and furnishing on its upper surface a rest or seat within which the tramway-rail may easily play back and forth, a short flexible metallic piece placed over the rail where the latter rests upon said casting and looped to the rail to permit of longitudinal movement of the rail, and a horizontal rod or bar capable of vertical movement pivoted at one end to one of the loops of said flexible piece and fixed to said knee at its other end, substantially as set forth.

11. The combination, with the knee or bracket bolted to the upright post and slotted transversely, of casting 27, flanged on its upper surface and provided in its under surface with screw-bolt 28, jam-nuts 29 for fixing the casting in position when adjusted on the knee, flexible metallic piece 30, resting over the rail and having inverted-U-shaped pieces 31 31' riveted thereto and which embrace the rail, and vertically-flexible piece 33, clamped at one end between the casting 27 and knee 26 and pivoted at its opposite end to the inverted-U-shaped piece 31, substantially as set forth.

12. A tramway-car provided with ends extended above the loading-line, and wheels fixed to said extended ends, and independent wheels secured to the bottom of the car, substantially as set forth.

13. A car for tramways provided with ends extended above the loading-line and with axles passing through the car and sustained by said extended portions of the car and provided with wheels from which the car is suspended on the rails of the tramway, substantially as set forth.

14. A car for tramways having extensions above the loading-line contracted transverse-ly below the loading-line and provided with inclined bracing-pieces, substantially as set forth.

15. A tramway-car provided with inclined pieces 62 and having a bottom hinged at 63 to swing downward and provided with a pivoted latch co-operating with the said hinged bottom, substantially as set forth.

16. The combination, with the tramway-rails, of a car-dumping mechanism consisting of hangers, as 68, secured to loops, as 67, which loosely embrace the tramway-rails, and flexible metallic pieces resting on the rails and riveted to the loops to which the hangers are secured, and a lever pivoted to the forward set of hangers and provided at its projecting

end with a tripping-finger, substantially as set forth.

17. The movable tripping mechanism for automatically dumping tramway-cars, consisting of hangers 68, flexible metallic pieces 66, loops, as 67, riveted to flexible pieces 66 and secured to the upper ends of the hangers, cross-braces, as 65^b and 65^c, and an operating-lever pivoted to brace 65^c and carrying at its forward end a tripping-finger 65 and suitable anchorage-ropes, substantially as set forth.

18. The combination, with the tramway-rails and a car moving on said rails and provided with a bottom hinged to swing downwardly and with a catch sustaining the door in a closed position, of a tripping mechanism suspended from the tramway-rails and including a pivoted lever carrying at its forward end a finger which when set for operation occupies a plane in the line of travel of the catch which holds the hinged bottom of the car closed, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 23d day of April, A. D. 1890.

ALFRED H. DE CAMP.

Witnesses:

J. E. M. BOWEN,

T. H. PALMER.