

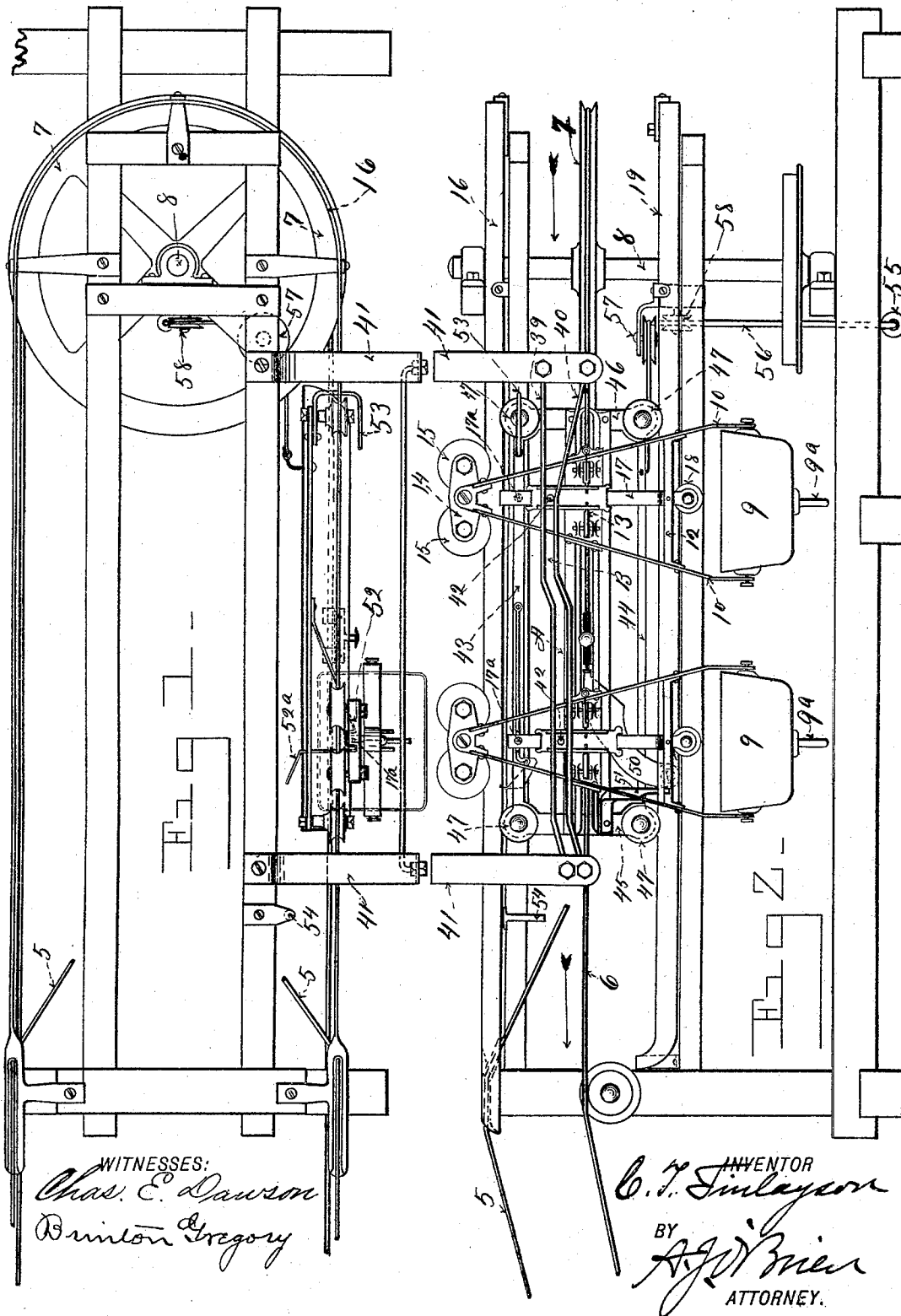
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4 Sheets—Sheet 1.

C. T. FINLAYSON.
WIRE ROPE TRAMWAY.

No. 505,397.

Patented Sept. 19, 1893.



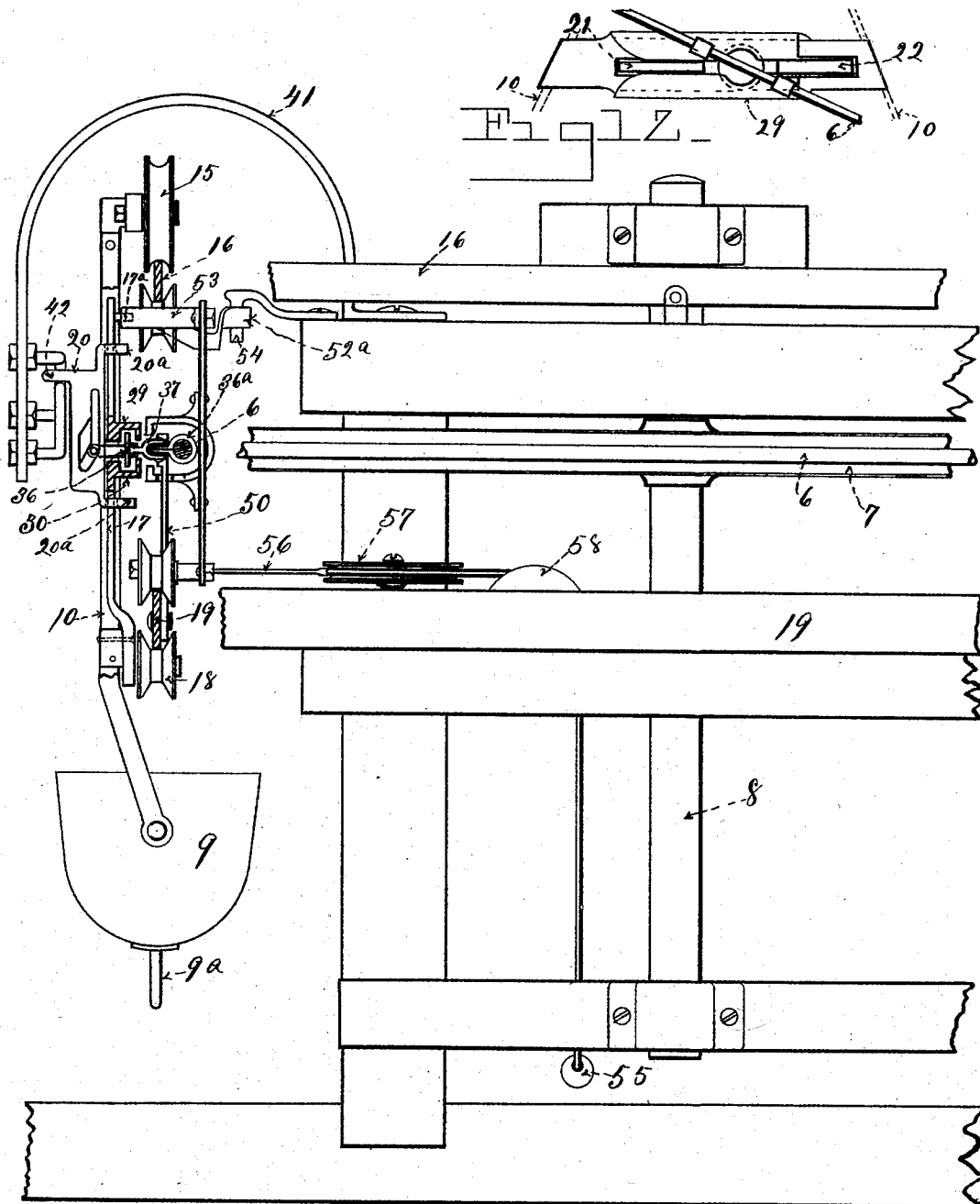
(No Model.)

4 Sheets—Sheet 2.

C. T. FINLAYSON.
WIRE ROPE TRAMWAY.

No. 505,397.

Patented Sept. 19, 1893.



WITNESSES:
Chas. E. Dawson.
Brinton Gregory.

INVENTOR
C. T. Finlayson
BY
A. J. Brier
ATTORNEY.

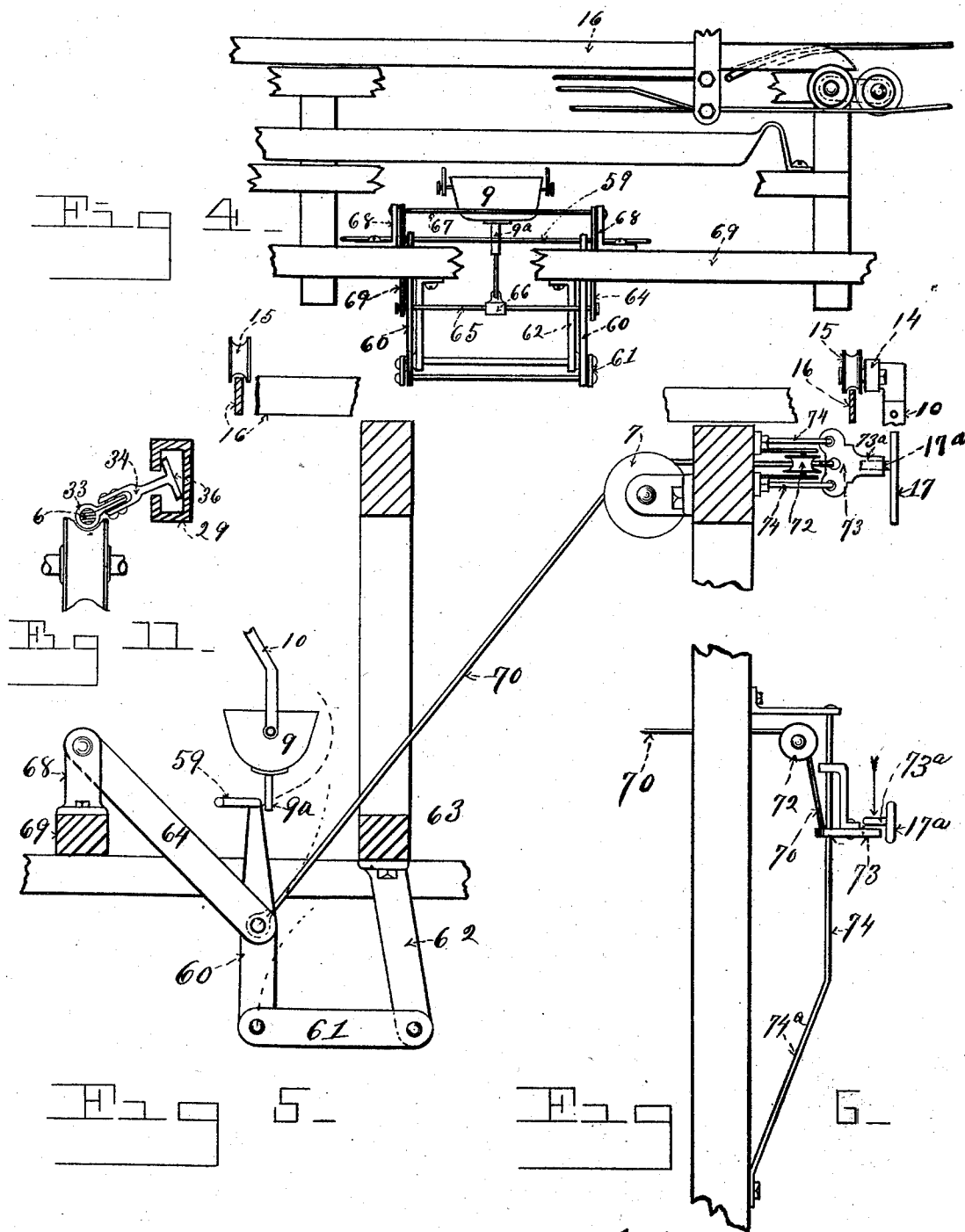
(No Model.)

C. T. FINLAYSON.
WIRE ROPE TRAMWAY.

4 Sheets—Sheet 3.

No. 505,397.

Patented Sept. 19, 1893.



WITNESSES:

WITNESSES:
Chas. E. Dawson
Brinton Gregory

INVENTOR
C. G. Tuley

BY  ATTORNEY.

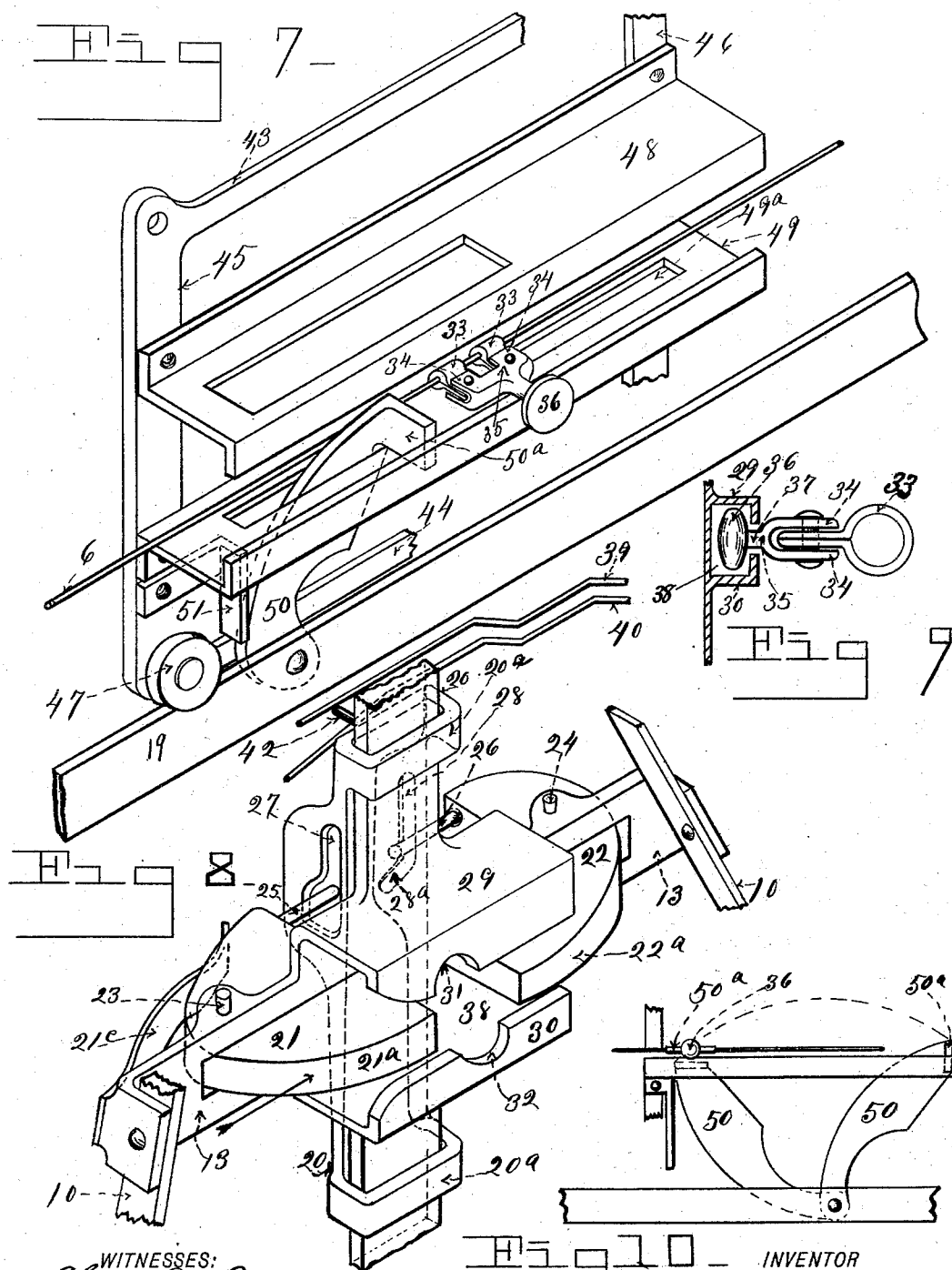
(No Model.)

4 Sheets—Sheet 4.

C. T. FINLAYSON.
WIRE ROPE TRAMWAY.

No. 505,397.

Patented Sept. 19, 1893.



WITNESSES:
Chas. E. Dawson
Brenton Gregory

INVENTOR
C. T. Finlayson
BY
A. J. D. Men
ATTORNEY.

UNITED STATES PATENT OFFICE.

CHRISTOPHER T. FINLAYSON, OF DENVER, COLORADO.

WIRE-ROPE TRAMWAY.

SPECIFICATION forming part of Letters Patent No. 505,397, dated September 19, 1893.

Application filed March 20, 1893. Serial No. 466,919. (No model.)

To all whom it may concern:

Be it known that I, CHRISTOPHER T. FINLAYSON, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Wire-Rope Tramways; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in wire rope tramway systems of the class having two ropes, one stationary rope forming the supporting track along which the buckets move, and the other the traction or hauling rope, to which the buckets are made fast.

My present invention embraces several salient features, namely, a clip made fast to the traction rope, mechanism for automatically gripping the bucket upon and releasing it from this clip, a carriage located at each terminal, or at any intermediate point for automatically and gradually starting each bucket which has been stopped for loading or unloading purposes, and means for automatically dumping the buckets. These are the main or central features which, taken in connection with those details of lesser importance, constitute a new, complete and thoroughly practicable tramway system.

Hence my invention consists of the features, arrangements and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a top or plan view of the loading terminal, showing one bucket in position. Fig. 2 is a side elevation of the same, showing two buckets in place. Fig. 3 is an end view, the frame-work being partly broken away, while parts of the gripping mechanism are shown in section. Fig. 4 is a front elevation of the dumping mechanism, the frame-work at the terminal or dumping station, being partly broken away. Fig. 5 is an end view of the dumping mechanism,

the frame-work being shown partly in section. Fig. 6 is a fragmentary top view of the construction shown at the right in Fig. 5. Fig. 7 is a fragmentary perspective view of the carriage, and mechanism for automatically and gradually starting the bucket. Fig. 8 is an enlarged fragmentary view in perspective of the automatic gripping mechanism carried by the bucket. Fig. 9 is an end view of the clip carried by the traction rope, a fragment of the gripping mechanism being shown in vertical section. Fig. 10 is a side view of the crescent shaped oscillating arm, shown in two positions and in connection with the traction rope, clip and carriage frame. Figs. 11 and 12 illustrate two of the positions which the clip may assume.

Similar reference characters indicating corresponding parts or elements of the mechanism in the several views, let the numeral 5 designate the stationary rope anchored in a frame-work of suitable construction located at the terminals of the line. The traction rope 6 is endless and supported at the line terminals on wheels 7 mounted on and made fast to shafts 8 journaled in the frame-work. The necessary power for imparting motion to the hauling rope may be applied to these shafts in any suitable manner and from any desired source.

Each bucket 9 is pivoted between a pair of arms 10 which are united at the top, and intermediately connected and braced by two cross-bars 12 and 13. These arms 10 constitute the bucket pendant, to the top of which is centrally pivoted a bar 14 carrying two pivoted sheaves 15, forming a trolley which engages the stationary rope, except at the terminals, where said rope is substituted by curved metal tracks 16 to which the trolley passes as it leaves the supporting rope. The two cross-bars 12 and 13 of the bucket pendant, are connected by an upright bar 17 which carries a guide sheave 18 at its lower extremity. This guide sheave engages the lower edge of another metal track 19 at the terminals and maintains the trolley securely in place upon the upper track in rounding the curves at these points. Upon the upright bar 17 is supported the vertically movable slide 20, the points of attachment being above and below the bar 13, the slide being provided

with apertured projections or sleeves 20^a at those points, through which the bar 17 passes. The cross-bar 13 is slotted to receive two dogs 21 and 22 which are pivoted to the bar at their outer extremities as shown at 23 and 24, while their inner extremities carry pins 25 and 26 which enter slots 27 and 28 respectively formed in the sides of slide 20. The upper portion of slot 27 is narrow, while it is enlarged below. When the pin 25 is in the narrow part of this slot, the dog is locked from movement since this part of the slot is only large enough to receive the pin; while the pin is in the lower or enlarged part of the slot, the dog may be moved outward or in the direction of the slot's engagement, by pressure upon its edge 21^a, the opposite edge being engaged by a leaf spring 21^b supported upon the bar 13. Slot 28 is of uniform width but its lower part is deflected outwardly as shown at 28^a. When pin 26 is in the upper portion of slot 28, the dog 22 is locked from movement since the slot is only large enough to receive the pin. When, however, the pin passes into the lower or outwardly deflected part of the slot, the dog has a positive outward movement. Bar 13 is provided with stationary jaws 29 and 30 located respectively above and below the dogs 21 and 22. As shown in the drawings, these jaws are formed integral with the bar and are slightly recessed as shown at 31 and 32. These recesses indicate the position of the neck of the clip when the bucket is locked on the traction rope. This clip is composed of two clasps 33 which grasp the traction rope 6 and are riveted in slots formed in the arms or shouldered projections 34 of the forked body 35 of the clip. The clasps are loosely pivoted to the body part to allow the traction rope a certain upward and downward movement required in passing over the supports located between the terminals. These intermediate supports are not shown in the drawings as nothing is claimed thereon. The outer or free extremity of the clip is enlarged, forming a head 36 which is connected with the body part by a neck or reduced part 37. This head 36 is fashioned to enter the socket 38 formed by the upper and lower stationary jaws 29 and 30 and the movable dogs 21 and 22 which control the openings at the ends of the jaws. The head of the clip is of circular shape and fits loosely in the socket to allow perfect freedom of movement. This is necessary since the bucket will always hang plumb, or in a line approximately perpendicular to the plane of the horizon whatever may be the inclination of the traction rope; and as this inclination is continually changing, the necessity for this movement of the head of the clip in the socket of the gripping mechanism, will be readily understood. The recesses 31 and 32 in the jaws 29 and 30 allow the neck of the clip to enter as the height of the traction rope varies with reference to the position of the stationary rope. These movements of the clip are illustrated in Figs. 11 and 12.

From the description heretofore given of the construction of the slide 20 and its action on the movable dogs, it will be understood that when the pins 25 and 26 of the dogs 21 and 22, are both in the upper part of their respective slots 27 and 28, the dogs will both be locked and the clip of the traction rope cannot escape from the socket 38 in either direction. Hence if the tramway is in operation the bucket is carried along by the rope 6.

It will be readily understood that tramway systems of this character must be constructed with reference to stopping for loading and unloading, while the traction rope is in motion. Provision must also be made for starting these buckets after each act of loading or unloading, and while the hauling rope is in motion. The buckets are usually loaded at one terminal and unloaded at the other terminal of the line. The drawings illustrate these stopping points or stations as located at the line terminals, though it is evident that it is practicable to have these stations at intermediate points. The loading station or terminal is illustrated in Fig. 2. At each of these stations, provision is made for raising and lowering the slide 20 automatically for the purpose of allowing the clip of the traction rope to enter the socket 38 for the purpose of picking up a bucket, or to escape from said socket when it is desired to release or drop a bucket. This automatic slide-controlling mechanism consists of a stationary pair of guide rods 39 and 40 which are supported upon the depending extremities of two arch-bars 41, which bars are made fast to the terminal framework at their opposite extremities. These arch-bars pass upward and over the track 16, leaving ample space above said track to allow the buckets to pass, while they extend downward a sufficient distance to support the rods 39 and 40 in the path of a pin 42 made fast to slide 20 and projecting outwardly therefrom. Assuming that the traction rope is traveling in the direction indicated by the arrows in Fig. 2, as a bucket is carried around, the pin 42 passes between the guide rods 39 and 40 which are farthest apart at this point of entrance. As soon as the pin enters the mouth of the way formed by these rods, it begins to move upwardly, being guided by the upward inclination of rod 40. This upward movement continues until the pin 26 of the dog 22 passes into the lower part 28^a of slot 28. This movement of the pin 26 carries the dog outward until its inner edge 22 lies in the same plane with the inner surface of the cross-bar 13 in which the dog is pivoted. This action of the dog opens the door, so to speak, of socket 38. As there is now nothing to retain the clip in place within the socket, it will pass out leaving the bucket at rest, and about in the position of the one shown farther to the right in Fig. 2. The bucket at the left, which I will term the first bucket, is loaded and ready to start on its route. As it is not desirable, for obvious reasons that the bucket

should start or begin its movement with the same speed as the traction rope, provision is made whereby the starting of the bucket is accomplished by a movement gradually accelerated, until the speed of the traction rope is attained.

The mechanism employed for gradually starting the bucket will now be described, special reference being made to Figs. 2, 7, and 10. Between the metal tracks 16 and 19 of the terminals, I place a carriage, the frame of which is composed of the upper and lower longitudinal bars 43 and 44, and vertical end connecting bars 45 and 46. This rectangular frame-work is provided at each of its four corners with a small sheave wheel or pulley 47. The peripheries of the pulleys are grooved to engage the metal tracks. The two upper pulleys engage the lower edge of the track 16, while the lower ones engage the upper edge of the lower track 19, the edges of the pulleys being grooved to a sufficient depth to retain the carriage securely in place. To the central portion of the carriage frame, are attached two angle plates 48 and 49 forming a longitudinal guideway for the traction rope, and through which the body of the clip passes. Projecting into this way through a slot 49^a formed in the lower angle plate, is a curved or crescent-shaped arm 50 having its lower extremity pivoted on the track 19. The curved edge of the arm is adapted to engage a lug or projection 51 made fast to the carriage frame, while the upper extremity of the arm is normally supported in the guide way composed of the angle plates, by a projection 50^a which rests upon the lower plate. This upper extremity of the crescent-shaped arm lies in the path of the clip as the latter is passing through the angle-plate guideway. When the bucket is in the position of rest at either terminal, it is locked on the carriage by a spring catch 52, which engages a pin or projection 17^a made fast to the vertical bar 17 of the bucket frame. Hence as the clip is passing through the guideway of the carriage after it leaves the second bucket or that shown at the right in Fig. 2, it will engage the upper extremity of the arm 50 and move the carriage forward. This initial movement, however, is very slow, since the lug 51 engages the arm 50 near the pivoted point of the latter, where the arc of oscillation is small as compared with the arc described by its outer extremity where it moves, of course, at the same rate of speed as the traction rope, since it is engaged by the clip. As the movement of the carriage continues, the point on arm 50 which engages the lug 51, recedes from the pivoted point of the arm; hence the speed of the carriage increases from the moment of starting until the outer extremity of arm 50 engages the carriage as shown in Fig. 10. The speed of the carriage and consequently of the bucket, is now the same as that of the traction rope. The arm 50 has therefore performed its function and is now in such a position that the clip passes over it and en-

ters socket 38 of the bucket. It must be observed that at the time the clip leaves the arm 50, the pin 42 of the first bucket, shown in Fig. 2, occupies part A of the guideway formed by rods 39 and 40, having left part B of the highest part of the way. The slide 20 has then moved downward sufficiently to lock the dog 22. The dog 21, however, is still free to move outwardly, which is necessary in order that the clip may enter the socket. This position of the sliding frame with reference to the pins 25 and 26 of the dogs is illustrated in Fig. 8. It will be observed from a careful inspection of this figure that pin 26 has entered the upper part of slot 28, thus moving the dog 22 to the locking position, whereby the clip is retained in the slot, while pin 25 of dog 21 is still in the enlarged part of slot 27. Hence as dog 21 is engaged by the clip, it moves outward, allowing the head of the clip to enter socket 38. After leaving arm 50 and entering the socket 38 as before stated, the carriage continues to move with the first bucket since the bucket is still fast thereon, while the second bucket is also moved by the carriage which is provided with a spring catch 53, which engages the pin 17^a. This movement of the carriage, and both buckets, continues until the second bucket or that at the right in Fig. 2 has reached the position of the first bucket or that shown at the left of the same figure, when an arm 52^a of the spring catch engages a depending pin 54 forming a stop, and draws the arm inward sufficiently to release the carriage from the first bucket, when the carriage is withdrawn to its original position by a weight 55 suspended from a rope 56 which is connected with the carriage and passes over pulleys 57 and 58 on the frame. When stop 54 is reached, the pin 42 of the slide 20 has passed out of the guideway formed by rods 39 and 40, and the slide has dropped to its normal position, locking both the dogs 21 and 22 and maintaining the head of the clip securely in place within the socket 38, when the bucket is ready to leave one terminal and pass out upon the main line. It will be observed that when the carriage returns under the influence of the weight, the second bucket remains stationary and the spring catch of the carriage engages the pin 17^a of this bucket just as the carriage reaches its backward limit of movement, thus locking the same upon the carriage in the same manner as the first bucket. I will now assume that the loaded bucket has passed from the loading station, shown in Fig. 2, to the dumping station. I will pass over the intermediate steps, which are the same in every respect, as those which I have just described. In other words, the bucket passes through precisely the same movements to reach its position of rest, whether it is at the loading or dumping terminal. Hence the bucket having assumed the position of rest as shown in Figs. 4 and 5, a pin 9^a projecting from the bottom of the bucket occupies a po-

sition in close proximity to a longitudinal bar 59 of the dumping mechanism. This bar is made fast to the upper extremities of two arms 60 whose lower extremities are pivoted to two other arms 61. These last named arms are pivoted to the lower extremities of the depending stationary bars 62 made fast to one of the stationary bars 63 of the terminal frame. Arms 60 are supported in suitable operative relation by two arms 64 normally inclined and respectively pivoted to the arms 60 at points about midway between their extremities. The connection between the two pairs of arms 64 and 60 is formed by a horizontal rod 65 carrying a clasp 66 centrally located thereon. Arms 64 are made fast at their upper extremities to a rod 67, whose extremities are pivoted in the upright stationary arms 68 supported upon a bar 69 of the frame-work. To an eye formed on the clasp 66 is attached one extremity of a rope 70 which passes over a vertical pulley 71 and engages a horizontal pulley 72, both attached to the side of the terminal frame opposite from the dumping mechanism just described, the opposite extremity of the rope being secured to a sliding plate 73, supported upon two stationary rods 74 attached to the frame, one above the other, as shown at the right in Fig. 5. The plate 73 is provided with an arm 73^a which projects into the path of the pin 17^a secured to the pendant frame supporting the bucket proper, and hereinbefore described. Now, assuming that the bucket is at rest and in the position shown at the left in Fig. 5, as soon as the moving bucket next in front reaches the plate 73 on the opposite side of the frame, the pin 17^a engages said plate and moves it along on its supporting rods. As the sliding plate is thus actuated, the rope 70 is of course carried along therewith and the dumping mechanism actuated as indicated by dotted lines at the left in Fig. 5. As bar 59 moves upward it engages the pin 9^a of the bucket and tips the latter sufficiently to dump its contents. As soon as this occurs the plate 73 is guided inward by its supporting rods, which are deflected sufficiently to carry the plate out of the path of the pin 17^a. This deflection of the rods is shown at 74^a in Fig. 6. The plate being thus released from its engaging pin, it moves backward to its normal position under the influence of the gravity of the parts with which the rope 70 is connected. It will thus be seen that each bucket in its turn is automatically dumped by the one immediately preceding it, while each bucket is automatically started from its position of rest as soon as the one next in the rear reaches the carriage, the mechanism being so arranged at the dumping station, that each bucket is dumped before it is started, and at the loading station that each bucket is filled before it is started on its course toward the one or the other terminal as the case may be.

The loading of the buckets may be accomplished in any suitable manner most conven-

ient. The material may be shoveled directly thereinto or it may be discharged from a hopper, or any other source, according to the circumstances or necessities of the case.

Having thus described my invention, what I claim is—

1. The combination with the bucket pendant or frame, of the vertically movable slide supported thereon, and the dogs pivoted thereto, and having pins projecting into slots formed in the slide, the shape of the slots being such that the action of the dogs is controlled by the movement of the slide, substantially as described.

2. The combination of the bucket pendant or frame provided with stationary upper and lower jaws, the pivoted dogs and the vertically movable slide controlling the action of the dogs, substantially as described.

3. The combination of the bucket pendant or frame having the stationary jaws suitably separated, the movable dogs controlling the passage way between the jaws, and the vertically movable slide provided with slots or openings to receive pins or projections carried by the dogs, substantially as described.

4. In a wire rope tramway, the combination with the bucket pendant or frame, of the movable dogs supported thereon, the vertically movable slide engaging the dogs, and suitable means attached to stations on the line and lying in the path of a projection on the slide, whereby the latter is actuated for the purpose of controlling the action of the dogs, substantially as described.

5. In a wire rope tramway, the combination with the traction rope carrying a clip, of the bucket pendant provided with the stationary jaws, and means for locking the clip between these jaws, consisting of two dogs located respectively at the entrance and exit of the passage, substantially as described.

6. In a wire rope tramway, the combination with the traction rope carrying the clip, of the bucket pendant provided with the gripping mechanism, consisting of the stationary jaws, the movable dogs and the slide controlling the dogs, substantially as described.

7. In a wire rope tramway, the combination with the traction rope and clip, of the bucket pendant having the gripping mechanism composed of the stationary jaws, the pivoted dogs, and the vertically movable slide carrying slots adapted to receive pins carried by the dogs and projecting into the slots, substantially as described.

8. In a wire rope tramway, the combination of the traction rope and clip, of the bucket pendant carrying the gripping mechanism consisting of the stationary jaws, the pivoted dogs, and the vertically movable slide, and means located at the stations for engaging the slide and actuating the same as the bucket passes, substantially as described.

9. In a wire rope tramway, the clip composed of the clasp, the shouldered projection, the enlarged head and the neck connecting

the head with the shouldered part, substantially as described.

10. In a wire rope tramway, the combination of the clasp, the shouldered projection, the reduced neck and the circular head, substantially as described.

11. In a wire rope tramway, the combination with the stationary frame, the traction rope and the clip, of the pendant frame having the trolley at its upper extremity, the bucket at its lower extremity, and the intermediate gripping mechanism consisting of the stationary jaws, the pivoted dogs and the vertically movable slide controlling the dogs, substantially as described.

12. In a wire rope tramway, the combination with the bucket pendant, the traction rope and clip, of the terminal frame provided with two track plates, one above the other, the carriage mounted on pulleys grooved to engage the track plates, means for attaching the bucket pendant to the carriage, and the curved oscillating arm pivoted on the stationary frame at one extremity, while the other extremity projects into the path of the clip, said arm normally engaging the carriage near its pivoted extremity, whereby as the clip engages the opposite extremity, the carriage is actuated by a gradually accelerated movement, substantially as described.

13. In a wire rope tramway, the combination with the bucket pendant, the traction rope and clip, of the stationary frame provided with the track plates, the carriage mounted between the track plates, means for attaching the bucket pendant to the carriage, a curved oscillating arm pivoted on the stationary frame and engaging the carriage near its pivoted point, its free extremity projecting into the path of the clip, whereby the clip starts the bucket by a gradually accelerated movement, and means for automatically releasing the bucket from the carriage, substantially as described.

14. In a wire rope tramway, the combination with the stationary frame, the traction rope, the clip and the bucket pendant, of the carriage mounted on the stationary frame and provided with longitudinal guide plates forming a way for the traction rope and clip, means for attaching the bucket pendant to the carriage, a curved or crescent-shaped arm pivoted on the stationary frame, its free extremity projecting into the guide way for the traction rope while it engages the carriage near its pivoted point, whereby as the clip of the moving rope engages the upper extremity, a gradually accelerated movement is imparted to the carriage and bucket, and means for automatically releasing the bucket from the carriage, substantially as described.

15. In a wire rope tramway, the combination with the stationary frame, the traction rope and the clip, of the carriage mounted on the stationary frame and provided with the guide way for the traction rope and clip,

means for attaching the bucket to the carriage, a curved or crescent shaped oscillating arm attached to the stationary frame, and having its free extremity projecting into the path of the clip carried by the traction rope, said arm normally engaging the carriage near the pivoted point of the arm, whereby as the clip of the moving rope engages the arm, a gradually accelerated movement is imparted to the carriage and attached bucket, until the bucket has attained approximately the speed of the traction rope when the clip leaves the oscillating arm and engages the bucket pendant, means for releasing the bucket from the carriage and means for returning the carriage to its normal position, substantially as described.

16. In a wire rope tramway, the combination with the stationary frame, the traction rope and the clip, of the carriage mounted on the frame and provided with means for engaging the bucket pendants, one in front and the other in the rear, the oscillating arm attached to the stationary frame and projecting into the path of the clip on the moving traction rope, the arm engaging the carriage near its point of attachment to the frame, whereby as the clip engages the free extremity of the arm, the carriage is started by a movement gradually accelerated until the speed of the traction rope is attained, when the clip leaves the oscillating arm and engages the bucket, means for releasing the bucket from the carriage and means for returning the carriage to its normal position, and whereby the rear bucket is left in the position originally occupied by the forward bucket, substantially as described.

17. In a wire rope tramway, the combination with the stationary frame, the carriage, the traction rope and clip, of means for gradually starting the carriage, consisting of an oscillating arm attached to the stationary frame and projecting into the path of the clip, substantially as described.

18. In a wire rope tramway, the combination with the stationary frame, the traction rope and clip, of the carriage mounted thereon, and provided with a guide-way for the traction rope and clip, means for starting the carriage by a gradually accelerated movement, said means consisting of an oscillating arm attached to the stationary frame and projecting into the path of the clip, substantially as described.

19. In a wire rope tramway, the combination with the stationary frame, the traction rope, the clip and the carriage mounted in the frame, of starting mechanism for imparting to the carriage a movement gradually accelerated from a position of rest until the speed of the traction is attained, and means for automatically returning the carriage to its position of rest after each forward movement, substantially as described.

20. In a wire rope tramway, the combination with the stationary frame, the carriage

mounted thereon, the traction rope and the clip, of the bucket pendant attached to the carriage and provided with the gripping mechanism, and a vertically movable slide for controlling the same, means actuated by the clip for starting the carriage, and means attached to the stationary frame for actuating the slide controlling the gripping mechanism, substantially as described.

21. In a wire rope tramway, the combination with the stationary frame, the traction rope and the clip, of the bucket pendant provided with the gripping mechanism, and a vertically movable plate for controlling said mechanism, and a differential guideway supported upon the stationary frame and actuating the grip-controlling slide which it engages, substantially as described.

22. In a wire rope tramway, the combination with the traction rope and clip of the terminal frame having two curved tracks one above the other, and a wheel for supporting the traction rope, of the bucket pendant provided with a trolley engaging one edge of one track, a guide sheave engaging the opposite edge of the other track, and intermediate mechanism for gripping the traction rope, the terminal frame being further provided with suitable mechanism for dumping the bucket, said mechanism being actuated by the clip of the traction rope, substantially as described.

23. In a wire rope tramway system, the combination of the terminal frames, the stationary rope having its extremities anchored at said frames, tracks attached to said frames and forming with the stationary rope, an endless way, the moving traction rope carrying suitable clips, said rope engaging wheels mounted on the terminal frames, the buckets and the pendant frames therefor, said frames being provided with a trolley engaging the stationary rope, and gripping mechanism for engaging the traction rope, a vertically mov-

able slide for controlling the gripping mechanism, and differential ways attached to the stationary frames for actuating said slide, substantially as described.

24. In a wire rope tramway, the combination with the traction rope of the terminal frames each having two tracks one above the other and provided with wheels for supporting the traction rope, the bucket pendant provided with a trolley at its upper extremity engaging one track, and a guide sheave attached to its lower portion engaging the other track, whereby the trolley is locked on the track in making the turn, and intermediate mechanism for gripping the traction rope, substantially as described.

25. In a wire rope tramway, the combination with the traction rope, the terminal frames having two tracks one above the other, and wheels for supporting the traction rope, of the bucket pendant having a trolley engaging the upper edge of one track, and a guide sheave engaging the lower edge of the other track, and intermediate mechanism for gripping the traction rope, substantially as described.

26. In a wire rope tramway, the combination with the traction rope and clip, the terminal frames having curved tracks one above the other and wheels for supporting the traction rope, of the bucket pendant provided with a trolley engaging one edge of one track, a guide sheave engaging the opposite edge of the other track, and intermediate mechanism for gripping the clip of the traction rope, substantially as described.

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

CHRISTOPHER T. FINLAYSON.

Witnesses:

BRINTON GREGORY,
CHAS. E. DAWSON.