No. 805,464. PATENTED NOV. 28, 1905.

W. HEWITT.

GRIP MECHANISM.

APPLICATION FILED JUNE 23, 1905.

3 SHEETS—SHEET 1.

Fig. 4.

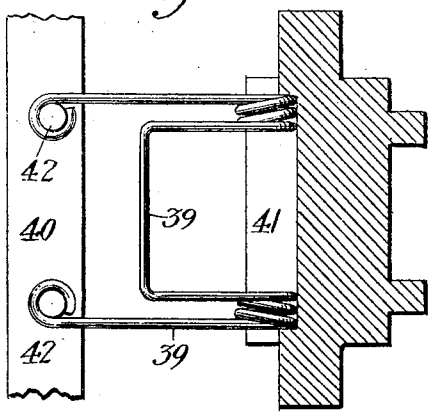


Fig. 9.



Fig. 1.

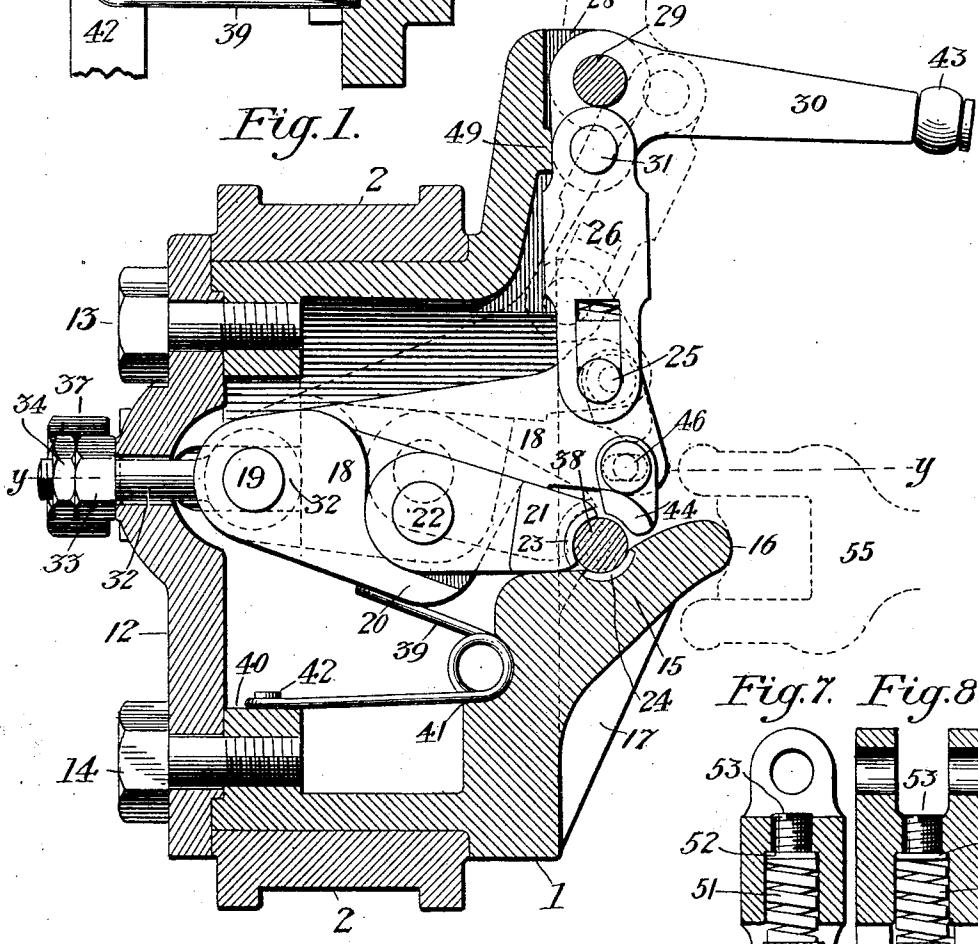


Fig. 7. Fig. 8.

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3 SHEETS—SHEET 2.

Fig. 2.

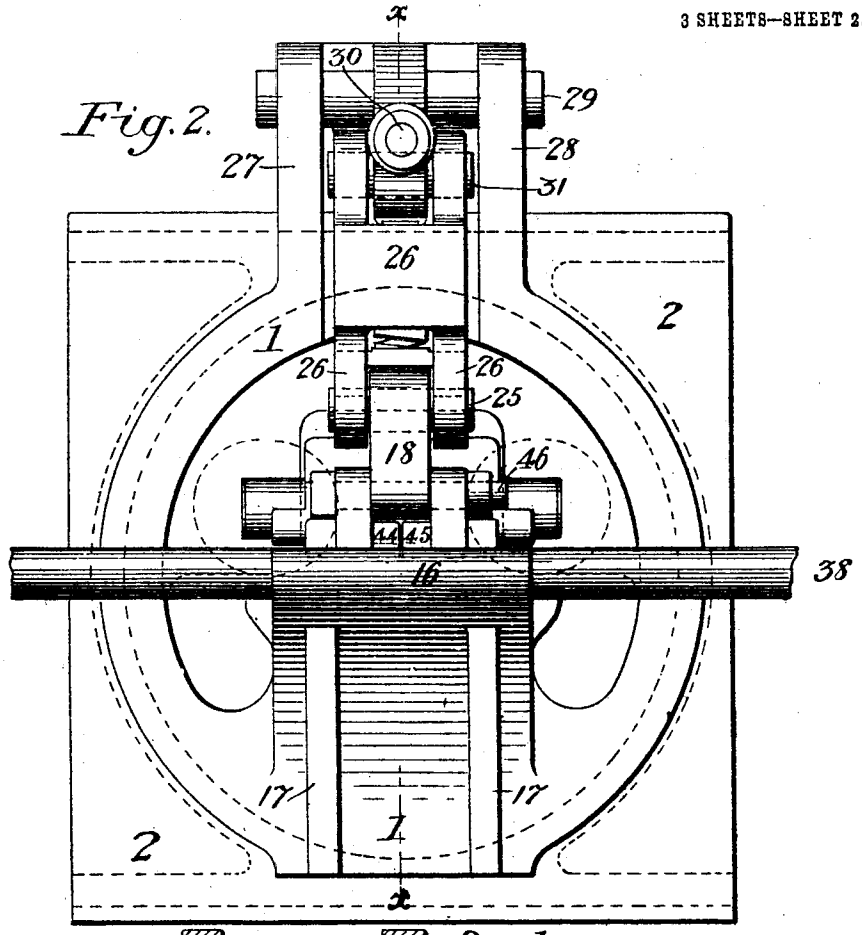
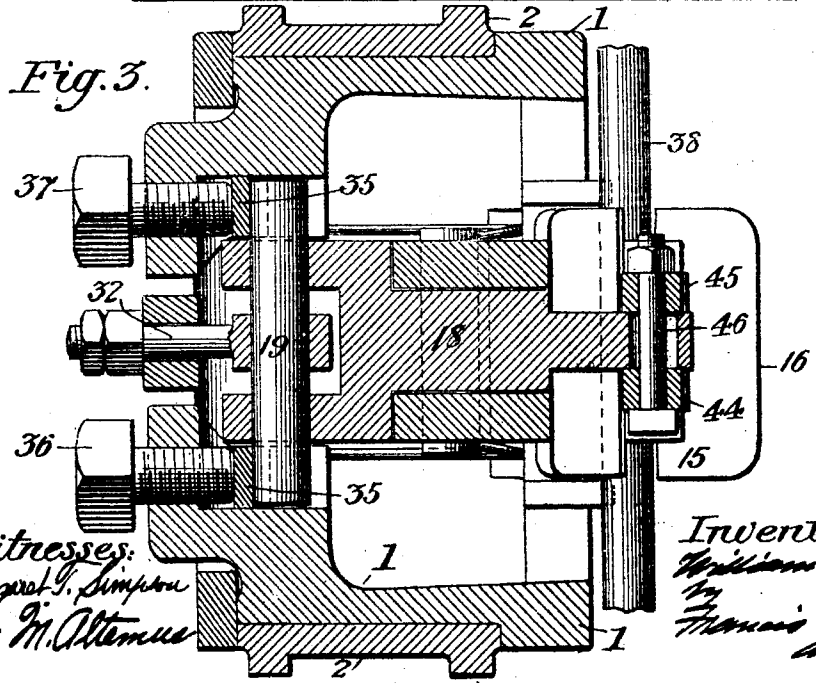


Fig. 3.



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3 SHEETS—SHEET 3.

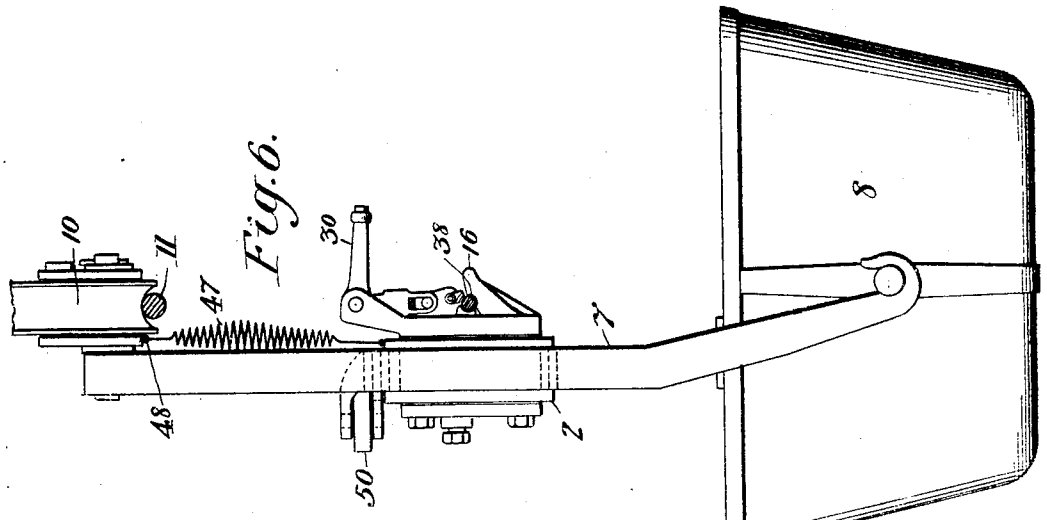


Fig. 6.

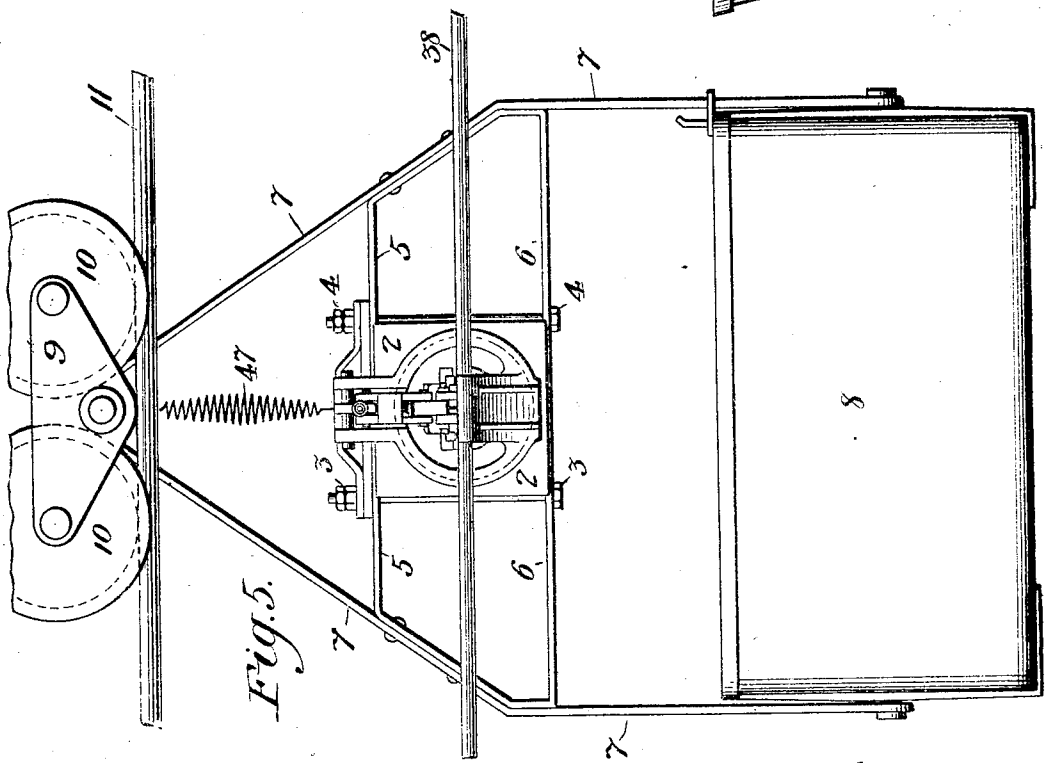


Fig. 5.

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UNITED STATES PATENT OFFICE.

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GRIP MECHANISM.

No. 805,464. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed June 23, 1905. Serial No. 266,675.

To all whom it may concern:

Be it known that I, WILLIAM HEWITT, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented certain new and useful Improvements in Grip Mechanism, of which the following is a specification.

My invention relates to cable-operated rail or wire-rope tramways for the transportation of raw material, merchandise, or passengers; and the object of my invention is to provide powerful and reliable automatic grip mechanism for connecting vehicles operated on such ways with the traction-cable used to move them.

In the accompanying drawings, forming a part of this specification, I have illustrated my invention in a form adapted to use in connection with a wire-rope tramway on which travel carriages from which are suspended receptacles for earth, coal, and the like, the grip mechanism being located on the hangers by which the said receptacles are suspended from the carriages, and thus being brought in line with the traction-rope, a form of construction too well understood to require further description.

In the drawings, Figure 1 is a vertical cross-section view of the trunnion and trunnion-box, taken on the line *x x* on Fig. 2, but showing a side view of the grip mechanism proper. Fig. 2 is a front view of the same. Fig. 3 is a horizontal cross-sectional view of the same, taken on the line *y y* on Fig. 1, showing certain parts in full relief. Fig. 4 is a top view of a spring of the apparatus, showing its seat in the trunnion. Fig. 5 is a front view of a carriage, hanger, and bucket with my grip mechanism attached thereto and gripped upon the traction-rope. Fig. 6 is an end view of the construction shown in Fig. 5. Figs. 7, 8, and 9 illustrate details of my grip mechanism.

I shall now proceed to describe my grip mechanism and its operation, referring to said drawings in so doing.

My apparatus consists, primarily, of a trunnion 1, which embodies the grip mechanism and which is fitted to and oscillates within a trunnion-box 2. This trunnion-box is a metal case which is attached by the bolts 3 4 to the cross members 5 6 of the hanger 7, which suspends the bucket 8 from the frame of the carriage 9, which, supported on the grooved wheels 10, travels upon the tram-cable 11. The trunnion is retained within the trunnion-box by the bearings formed on the trunnion and the cover-plate 12, which is held to the trunnion by the bolts 13 14. (See Fig. 1.) On the front portion of the trunnion is formed the projection 15, which forms the stationary jaw of the grip and is prolonged so as to form the lip 16 for a purpose hereinafter to be explained. The jaw 15 is strengthened by the vertical ribs 17 17.

In the movable jaw of the grip mechanism and its adjustable operating connections and its peculiar relation to the stationary jaw resides the principal novelty of my invention. The movable jaw is directly connected with a toggle member 18, constituting a lever of the second class, with which it forms a toggle-joint. This toggle member 18 is a steel casting of peculiar construction. It is a pivot-yoke swiveled or fulcrumed on the pin 19 and is provided on each side with a wing-stop, one of which, 20, is shown in side elevation in Fig. 1. The movable jaw 21 is also a pivot-yoke and swiveled on the pin 22, which passes horizontally through the toggle member 18 (see Fig. 1) and is shown in full and dotted lines in Figs. 2 and 3. The forward concave face of this movable jaw is preferably faced with a wearing-piece 23, and a similar wearing-piece 24 is fixed in the opposing concave jaw 15. Through the forward upper portion of the toggle member 18 is passed the pin 25, to which is connected the lower end of a toggle-link 26. This toggle-link 26 is forked at each end and will be more particularly described hereinafter. The forward upper portion of the trunnion 1 terminates in a channeled projection, through the flanges 27 28 of which is passed the pin 29. On this pin 29 is fulcrumed the operating-lever 30, which has passed through its short arm the pin 31, which also passes through the upper forked end of the toggle-link 26, said link 26 and lever 30 constituting another toggle-joint, operative connection being thus established through a compound toggle-joint between the operating-lever 30 and the movable jaw 31. The pin 19, on which is swiveled the toggle member 18, is held to its desired position by the following-described means: 32 is an eyebolt, the eye of which embraces the pin 19 and the shank of which passes through the middle of the arched portion of the cover-plate 12 (see Figs. 1 and 3) and is held by a nut 33 and lock-nut 34 against a forward draft, and bearing-pieces 35 35 (shown in side elevation in Fig. 9) are held against the ends of the pin 19 by the set-screws 36 37. It will thus be

seen that the movable jaw 21 is adjustable relatively to the stationary jaw by turning the nut on the eyebolt 32 and turning the set-screws 36 37, thus adapting the grip to the traction-rope 38 or a traction-rope of larger or smaller diameter and enabling the grip mechanism to continue its effective action as the traction-rope is gradually reduced in thickness by the wear incident to its use. Means for automatic adjustment of the jaws of the grip mechanism to varying diameters of different parts of the traction-rope in use reside in the toggle-link 26 and will be explained after the operation of the mechanism shall have been described. Impinging against the lower face of the toggle member 18 is the spring 39. (Shown in side view in Fig. 1 and in top view in Fig. 4.) It bears upon the two seats 40 41, formed in the lower part of the trunnion, and is retained in its place by the studs 42 42. Its function will be later described, as will that of the roller 43 on the outer end of the operating-lever 30. From the forward end of the toggle member 18 depend guards 44 45, which are sustained by the pin 46, passing through a horizontal slot formed in the forward portion of the toggle member 18 and shown in Fig. 3 and indicated in dotted lines in Fig. 1.

While the grip mechanism is disengaged from the traction-rope it should be maintained in a vertical position, so that the jaws of the grip may remain parallel to the traction-rope and readily grasp the same without manual adjustment for that purpose. To this end I have provided the following means: On the top of the trunnion 1 is attached the lower end of the helical spring 47, the upper end of said spring being attached to the lower part of the carriage 9 at the point 48. This spring is sufficiently resilient to retain the trunnion in its upright position when the traction-rope is released from the grip mechanism, while yielding freely to all enforced oscillation of the trunnion when connected with the traction-rope by the jaws of the grip mechanism.

I shall now describe the operation of my improved mechanism.

When the jaws of the grip mechanism are open and disengaged from the traction-rope, the movable parts of the apparatus are in the positions indicated in dotted lines in Fig. 1. It being desired to close the grip on the traction-rope and set the carriage in motion, the carriage is moved by hand along the terminal or intermediate station-rail of the tramway at which it may be located at a speed corresponding as nearly as may be to the movement of the traction-rope (thus avoiding objectionable shock when the jaws grip the traction-rope) until the roller 43 on the lever 30 contacts with the under side of a fixed bar or deflector, such as is commonly used for the purpose, which deflector forces the lever 30 down into the position indicated in the full lines in Fig. 1. While the lever 30 is being thus forced into its lower position, the vehicle is kept from swinging back from the deflector by the roller 50 (see Fig. 6) contacting with and rolling against a rail or bar fixed parallel to the line of the tramway at the opposite side of the hanger in the usual manner. In this operation the lever 30 is forced down until the center of the pin 31 passes a straight line connecting the centers of the pins 25 and 29, when the direction of least resistance is toward the stop-shoulder 49 on the trunnion, against which the short arm of the lever 30 impinges, the traction-rope 38 being simultaneously gripped and firmly held between the stationary and movable jaws 15 21 and the grip mechanism becoming locked. As will be readily understood, the lever 30 may be forced down by hand, if that method be preferred. The carriage then traverses the requisite distance on the tramway and may be stopped by the release of the traction-rope from the grip mechanism either manually or automatically by throwing up the lever 30 until the center of the pin 31 passes outwardly beyond the line between the centers of the pins 25 29, when the mechanism becomes unlocked and the spring 39 comes into action and forces the toggle members and other movable connections with the lever 30 up into the positions indicated by dotted lines in Fig. 1. As will be readily understood, an automatic release of the grip is effected by the lever 30 contacting with the upper side of a deflector of the ordinary form fixed on the line of the tramway.

It will be observed that by swiveling the movable jaw upon the toggle member 18 I obtain a double toggle connection between the movable jaw and the operating-lever and a very powerful grip with slight motion of the movable jaw; that the movable jaw when retracted from the traction-rope is raised by the wing-stop 20 sufficiently to permit the rope to clear the jaws, while the movable jaw is not sufficiently raised above the stationary jaw to permit the traction-rope to move back of the jaws; that when the movable jaw is gripped upon the traction-rope it is held from any upward movement due to sudden shocks to the rope by the contact of the under side of the nose or forward part of the toggle member 18 with the upper face of the movable jaw, and it will be further observed that while not actually contacting with the traction-rope the guards 44 44 absolutely prevent its escape from between the jaws gripping it, whatever shocks may occur, said guards 44 44 being adjustable by the pin 46, which may be moved and fixed (by turning the nut on its end) at any desired point in the slot in the nose of the toggle member 18 to preserve the same relation between the guards 44 44 and the movable jaw 21 when the toggle member 18 is adjusted to any new position by the eyebolt 32 and set-screws 36 37.

To obviate injury to the grip mechanism likely to arise from the undue strain caused by inequalities in the traction-rope, I have provided a strain-compensating device in the toggle-link 26. As stated before, this toggle-link is forked at each end, and in Figs. 7 and 8 I have shown cross-sectional views of this link taken at right angles to each other and through the axis of the link. The link is cored centrally and a steel spring 51 is placed therein. This spring at its upper end bears against a washer 52, which is adjustable against the spring by a set-screw 53. The lower end of the link is slotted transversely of its fork, and in such slot is placed the bearing 54, upon which the spring 51 is seated. The pin 25 is held between the bearing 54 and the lower turn or end of the link. The spring 51 is so tempered and adjusted that if the traction-rope be gripped by the jaws of the mechanism at some unusually thick part and the strain upon the gripping mechanism approach the breaking-point the spring will yield sufficiently to ease the strain to the safety-point while forcing the jaws to maintain a sufficient grip upon the traction-rope.

By extending the jaw 15 outwardly into the lip 16 I enable the said lip to bear in the groove of a terminal sheave 55, (indicated in dotted lines in Fig. 1,) so that the grip mechanism will not touch the flanges of such sheave. A carrier can thus be taken around such a sheave without detaching it from the traction-rope, which is a very great advantage when self-dumping buckets are used which discharge automatically at different points on the line of the tramway and also at the terminal stations in passing around the sheave. Heretofore in such cases it has been necessary to use grips attached to the upper part of the carriages or so constructed as to form an integral part of the carriage in order to carry the traction-rope above the overhead rail and permit of the jaws opening at the top. In order to prevent the swinging of the bucket and derailing of the carriage, guard-rails are used to steady it in passing around the sheave; but such means are objectionable on account of the friction, and the effect of this in throwing the empty carriers out of plumb. With the lip formed on my grip mechanism guard-rails are not necessary, as the contact of the traction-rope with the sheave is at a point far enough below the overhead-rail to hold the carriage steady.

Having thus described my invention, what I claim is—

1. In a grip mechanism, the combination of a stationary jaw, a movable jaw, an operating-lever, and a toggle connection between said operating-lever and said movable jaw, said movable jaw being pivotally mounted on one member of said toggle connection.

2. In a grip mechanism, the combination of a stationary jaw, a movable jaw, an operating-lever, and a toggle connection between said operating-lever and said movable jaw, said movable jaw being pivotally mounted on one member of said toggle connection and having its motion limited by a stop on said toggle member.

3. In a grip mechanism, the combination of a stationary jaw, a movable jaw, an operating-lever, and a toggle connection between said operating-lever and said movable jaw, said movable jaw being pivotally mounted on one member of said toggle connection, and held to its position, when said grip mechanism is closed, by the contact of said toggle member with said jaw.

4. In a grip mechanism, the combination of a stationary jaw, a movable jaw, an operating-lever, and a compound toggle-joint connecting and embodying said operating-lever and said movable jaw.

5. In a grip mechanism, the combination of a stationary jaw, a movable jaw, an operating-lever, a compound toggle-joint connecting and embodying said operating-lever and said movable jaw, and a spring contacting with a member of said toggle-joint, whereby the jaws of the mechanism may be opened when the toggle-joint is unlocked.

6. In a grip mechanism, the combination of a stationary jaw, a movable jaw, an operating-lever, and a toggle connection between said operating-lever and said movable jaw, one member of said toggle connection containing a spring-supported bearing, whereby the grip mechanism may automatically accommodate itself to variant diameters of the traction-rope.

7. In a grip mechanism, the combination of a stationary jaw, a movable jaw, an operating-lever, and a compound toggle-joint connecting and embodying said operating-lever and said movable jaw, the members of said compound toggle-joint having a spring-regulated connection with each other, whereby substantially uniform gripping power may be automatically exerted upon all parts of a traction-rope of variant diameters.

8. The combination of a conveying device, an oscillating grip mechanism, and a spring connection between said conveying device and said grip mechanism, whereby the jaws of said grip mechanism will be maintained in a position parallel to the traction-rope when disengaged therefrom.

9. In a cable-operated rail or wire-rope tramway, a gripping mechanism having a projection formed thereon adapted to contact with the end sheaves of said tramway, whereby the conveyer to which said gripping mechanism is attached may be carried around said end sheaves of the tramway without undue deflection, substantially as described.

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