(No Model.)

3 Sheets—Sheet 1.

J. H. PENDLETON.

CABLE RAILWAY.

No. 479,919. Patented Aug. 2, 1892.

Fig. 2.

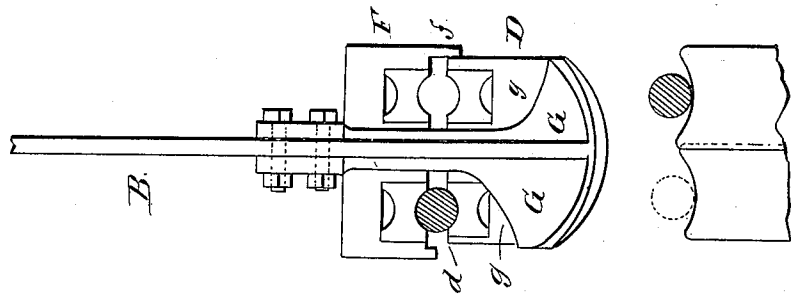
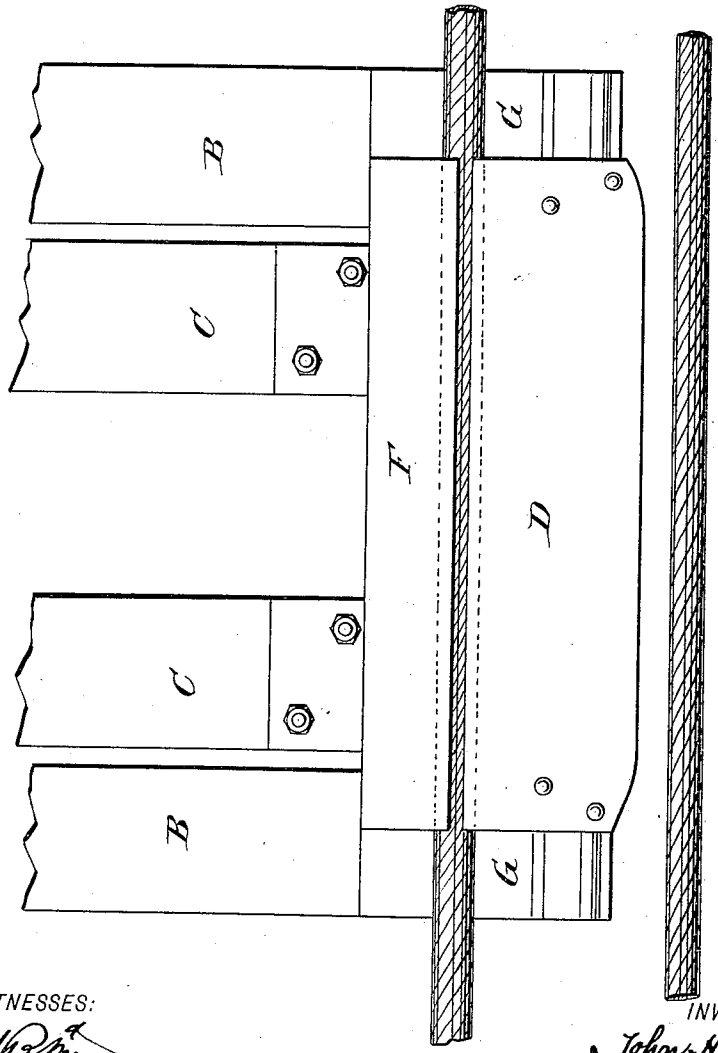


Fig. 1.



WITNESSES:

Harold S. Miller

Cornelius Ellis

INVENTOR:

John H. Pendleton,

BY

ATTORNEYS.

(No Model.) 3 Sheets—Sheet 2.

J. H. PENDLETON.

CABLE RAILWAY.

No. 479,919. Patented Aug. 2, 1892.

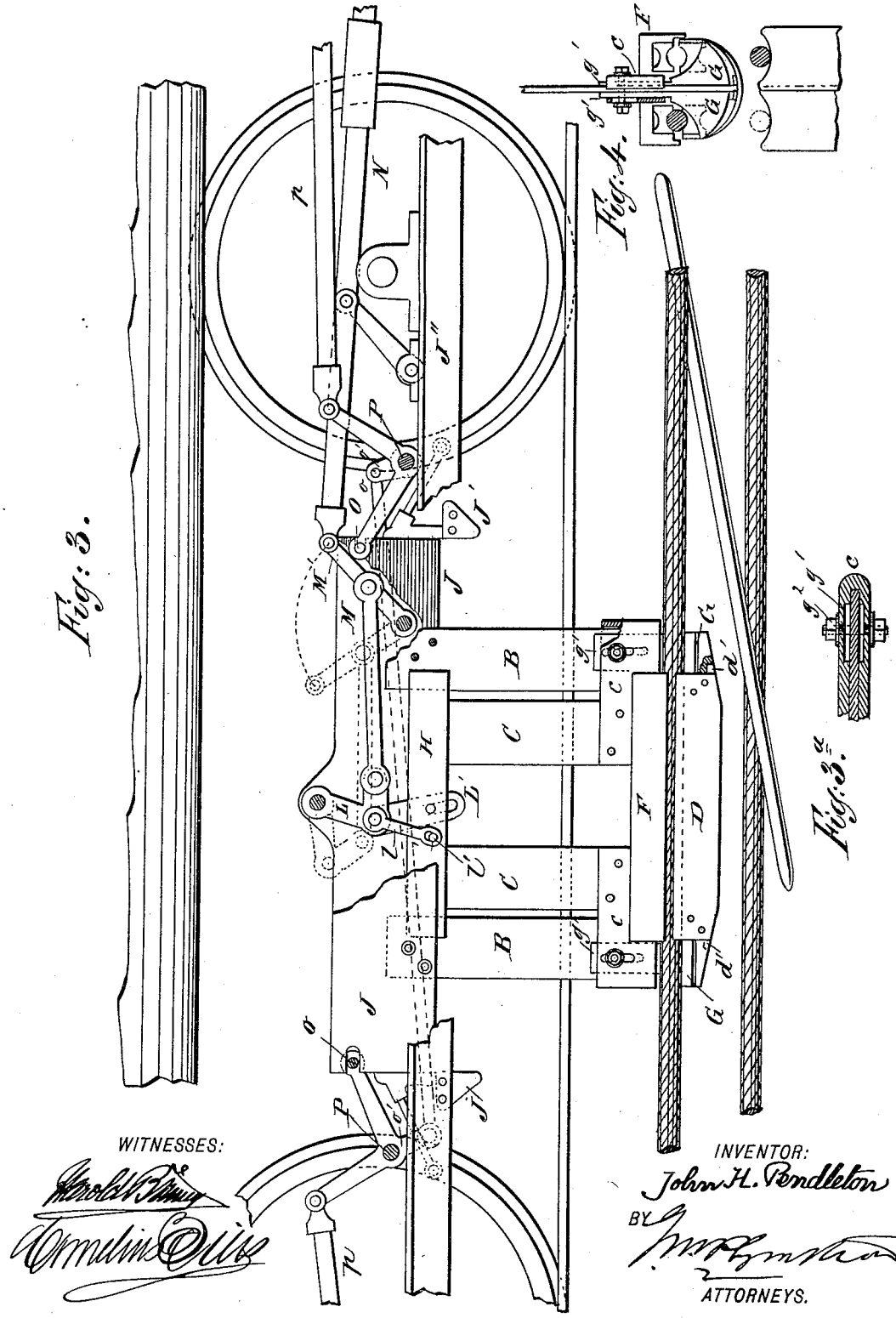


Fig. 3.

Fig. 4.

Fig. 3a.

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(No Model.) 3 Sheets—Sheet 3.

J. H. PENDLETON.

CABLE RAILWAY.

No. 479,919. Patented Aug. 2, 1892.

Fig. 6.

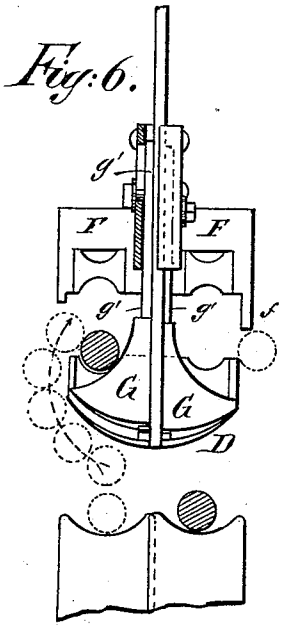


Fig. 7.

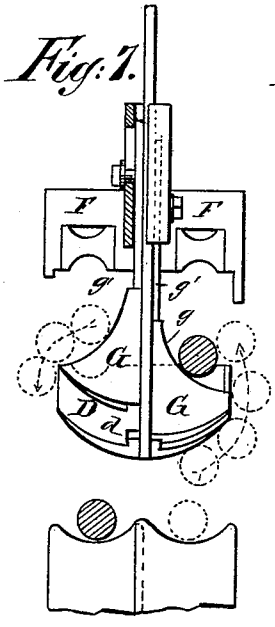


Fig. 8.

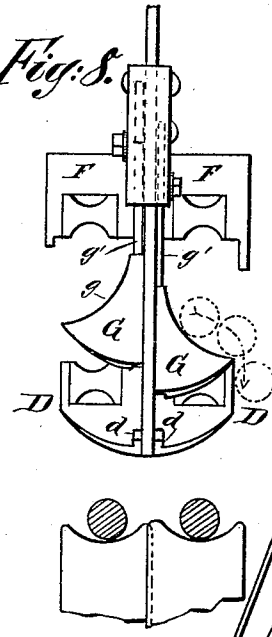
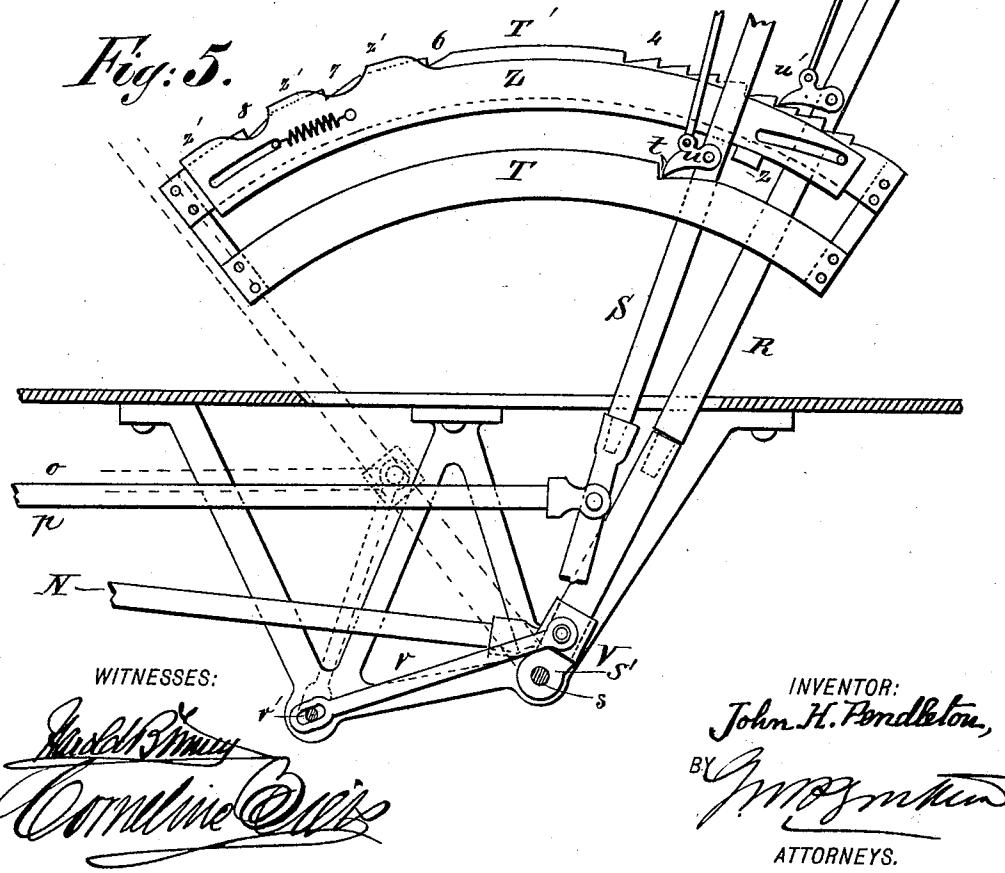


Fig. 5.



WITNESSES:

Harold Sudell

Cornelius Ellis

INVENTOR:

John H. Pendleton,

BY

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN H. PENDLETON, OF BROOKLYN, ASSIGNOR TO THE RAPID TRANSIT CABLE COMPANY, OF NEW YORK, N. Y.

CABLE RAILWAY.

SPECIFICATION forming part of Letters Patent No. 479,919, dated August 2, 1892.

Application filed March 10, 1892. Serial No. 424,375. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. PENDLETON, of Brooklyn, New York, have invented certain new and useful Apparatus for Cable Railways, of which the following is a description, reference being taken to the accompanying drawings, which form a part of this specification.

My invention relates particularly to a double gripper and actuating mechanism therefor for use in cable railways that employ two cables; and its purpose is to enable me to pick up either cable at will, to drop either or both cables when desired, to operate the gripper for these purposes and for gripping the cables from the same point upon the car, and to secure positive operation, together with great simplification of parts.

Besides this my invention contemplates an automatic safety device for dropping the cables and simple means for deriving the greatest pressure upon the jaws of the grip at the moment of gripping while giving as much motion as may be needed to the movable jaw during the greater part of its travel.

To these and certain other incidental ends my invention is embodied in the apparatus and its several parts constructed, arranged, combined, and operated substantially in the manner described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a side elevation, and Fig. 2 an end elevation, of the simplest form of my grip proper, including both jaws and their supporting-plates. Fig. 3 is a side elevation of a more improved form of my grip combined with the raising and actuating mechanisms. Fig. 3^a is a detail of part of the mechanism for picking up and dropping the cables. Fig. 4 is an end elevation of the form of grip shown in Fig. 3, partly broken away to show details. Fig. 5 shows the hand-levers and their attachments by which the gripping and the raising and lowering mechanisms are actuated. Figs. 6, 7, and 8 show, respectively, the form of grip as in Fig. 3 in its position for receiving one cable, in its position for dropping that cable and for receiving the other cable, and in its position for dropping both cables.

In the several figures like letters and numerals of reference indicate like parts.

In an application filed by me on the 13th day of June, 1892, Serial No. 436,482, and in an application filed by Andrew Bryson conjointly with me on the 28th day of May, 1892, Serial No. 434,754, are described and claimed certain details, modifications, and improvements of apparatus similar to that herein set forth; but the claims are clearly distinguished from those contained in this case.

I have devised very simple means for enabling me to throw out the cables or to pick up either at will. The sole differences required in the gripper proper to effect these ends are somewhat greater opening of the jaws and the addition of shoes provided with inclined surfaces and moving with the upper jaws. These inclined surfaces are so arranged that when drawn up relatively to the lower jaws they shield the lower jaws from the cable and cause it to slip downward and outward clear of the edge of the jaw. By arranging these surfaces in this manner and by placing those upon one side of the gripper about an inch higher than those upon the other I am enabled to bring the higher ones or all into position to shield the jaws, and thus permit the passage of but one cable into the gripper when but one jaw is shielded or exclude both cables when both jaws are shielded. When the grip is opened sufficiently to admit the cables between the jaws, yet not enough to bring the shielding-surfaces into play, both cables might be placed in the jaws; but I prevent this by placing a projecting lip or finger upon one edge of the jaws that co-operate with the lower of the shielding-shoes, and thus I make it only possible in the position just mentioned to admit the cable on the other side. By this arrangement of parts and by providing my grip with deflecting-surfaces upon its bottom I am enabled by lowering the whole grip to force it down between the cables, so that the cables are forced apart and press inward upon its two sides. If the grip-jaws then be opened sufficiently to admit the cable into the jaws that are not provided with the lip or finger, that cable will pass into the jaws, while the finger or lip described will prevent the entrance of the other cable, and when the grip is raised the last-named cable will fall back onto its supporting-wheels,

while the one that has passed into the jaws will be retained therein and carried up with the grip. If the same process be followed with the jaws somewhat more opened and the higher of the deflecting-shoes thereby raised into position to shield the corresponding lower jaw, the other cable will pass freely into the jaws and remain therein as the grip is raised, whereas the first will fall from the deflecting-faces of the shoes back onto the supporting-pulleys. The jaws may be closed and the cable gripped in the usual way; but when the jaws are opened to their full extent it will be seen that both the deflecting-shoes will be brought up into action and the cable within the grip dropped. It is to these capabilities of my gripper that I attach the greatest importance, as it enables me to drop both cables whenever desired and to pick up either one at will at any point upon the line, save only directly above the supporting-wheels and curve devices. I am therefore enabled without special adaptation in the trenches to run my car from one track to the other wherever switching devices are placed and to pick up the cables again. I have also devised a simple way of automatically dropping the cables at necessary points, such as switches and the ends of sections. This I do by causing the whole grip to be slightly raised by coming in contact with an inclined surface within the trench and by the rise of the grip tripping the pawl or other mechanism which holds the gripping-lever in position, and thereby releasing it and allowing the grip-jaws to fly wide open and drop the cable. Where the lower is the movable jaw, the weight of the jaw may effect this opening action; but where the upper jaw is the movable jaw I may provide a spring which will both counterbalance the weight of that jaw and effect its flying open when released.

To give as rapid a movement as possible to the opening and closing mechanism without disturbing the great power of the toggle-motion for closing the grip, I have devised a special link-motion, which enables me to greatly reduce the throw of the operating-lever without altering the power of the grip, and still further to reduce the necessary motion of the hand-lever I have devised a sliding fulcrum controlled by link and sliding guide mechanism, by which the leverage is enormously increased at the position for gripping, while at other points the lesser leverage gives lesser travel of the hand-lever and greater travel of the grip-jaws.

These features mainly constitute my present invention, and, being subject to considerable modification in detail without alteration of the principles involved, I have set them forth in the foregoing without reference to any embodiment of them.

Referring now to the drawings, I have shown in Figs. 1 and 2 what is perhaps the simplest form of my gripper dissociated from all operating mechanism, and in the remaining figures I have shown one embodiment of my complete device, the grip being an improved form by which the necessary rise and fall of the grip in the action of picking up the cable is decreased and the required depth of trench reduced by means of lost motions for the deflecting-shoes.

At B are shown the supporting-plates for the lower jaw of my grip, D indicating the lower jaw. At C are shown the supporting-plates of the upper jaw F. At each end of the jaw F are secured or formed integrally therewith the deflecting or shielding shoes G, there being one shoe upon each side of the plates B at each end of the grip, as indicated in Fig. 2. Upon one side of the grip the deflecting-surfaces *g* of the shoes are higher by, say, one inch than upon the other side for the reasons heretofore explained. I have shown, Figs. 1 and 2, one cable gripped between the jaws having the higher deflecting-shoes, and in such position the higher shoes will be about an inch beneath the cable, allowing the jaws to be opened to receive that cable without interference from the shoes.

At *f* is shown the lip or finger upon the upper jaw on the opposite side of the grip, which prevents when the grip is in the opened position just mentioned the entrance of the cable upon that side of the grip. To more surely prevent the cable accidentally leaving the jaws of the grip when pressure upon it is released, I may also provide a short lip upon the other upper jaw of the grip, which must, however, be too short to interfere with the entrance of the cable when the jaws are opened, as just described. With this arrangement of the jaws and shoes it will be seen that when the jaws are opened either by the descent of the lower or the rise of the upper until the tips of the higher or left-hand shoes, as seen in Fig. 2, reach the tip or edge *d* of the lower jaw the left-hand cable cannot remain in the jaw, but will fall outward and downward if the grip be in its raised position. When the grip is further opened till the tips of the lower or right-hand shoes reach the edge of the right-hand jaw, both cables will be thrown out. The bottom of the grip is curved upward at each side, so that when the grip is depressed and comes in contact with the cables the cables are pressed outward and slide up the sides of the grip into the jaw or jaws, which are at that time open to receive them.

In Figs. 3 to 8, inclusive, I have shown the shoes G of my grip made separate from the upper jaw F and secured thereto by slot-and-pin connections, enabling me to provide a stop to limit their downward travel and thereby reduce the vertical dimensions of the gripper without in any way altering its operation. In Figs. 3 and 4 is shown the gripper in its closed position, the two jaws and their two supports being similarly arranged to those already described. Fig. 3ª shows the details of the guides for the sliding shoes. The up-

per jaw F is provided with plates *c*, which pass around and inclose the supporting or shank plates B of the lower jaw. The shoes G are provided with slide-plates *g'*, which extend upward within channels in the plates *c* and carry pins g^2, which project through and run in slots in the plates *c*. Stops *d'* upon the jaws D or upon their supporting-plates B limit the downward travel of the shoes to a position in which their deflecting-surfaces lie just below the wearing-surface of the lower jaw, sufficient clearance being allowed for the wearing away of the dies in that jaw. The slots in the plates *c* are of such length that on one side the shoes begin to move upward with the upper jaw when the grip has reached the open position shown in Fig. 6, while on the other side the shoes still rest upon their stops. In this position, as indicated by a dotted line, the left-hand cable may be picked up by the depression of the grip as a whole, while the right-hand cable is prevented by the lip *f* from entering the grip on that side. In Fig. 7 is shown a third position of the grip, which is that for picking up the right-hand cable. The slots for the right-hand shoes are of such length that the shoes will be just coming into contact with the cable in the right-hand jaws when opened to this extent. Here it will be seen both cables come between the jaws of the grip when the grip is depressed; but when the grip is raised the left-hand cable will slide downward and outward along the deflecting-surfaces of the left-hand shoes and fall back onto its supporting-wheels. In Fig. 8 is shown the position for dropping both cables, in which position both shoes form deflecting-shields from off of which the cables slide onto their respective pulleys.

For the operations just set forth but two motions are required. There must be mechanism for opening and closing the jaws relatively to each other and mechanism for raising and lowering the grip as a whole without disturbing the position of the jaws relatively to each other. The first of these mechanisms may be arranged to operate either the upper or the lower jaw, since their adjustment is purely relative; but I find it far more convenient to move the upper jaw. In Fig. 3 is shown the apparatus for effecting this.

H is the head to which the upper-jaw-supporting plates or shanks C are secured. This head H slides between and is guided upon the lower-jaw-supporting plates or shanks B, which in turn are secured to the gripper-head or frame J.

The gripping pressure is effected by means of the toggles L L', which are operated by the link M, lever M', and connecting-rod N, which last connects with and is actuated by a hand-lever, which will hereinafter be described. To cause the upper jaw of the grip to rise more quickly and with a more even motion than would be possible by the toggles, I provide a lifting-link *l*, pivotally secured at one end to the same axis as the elbow of the toggles and at its other end by the slot and pin *l'* to the head H. The lost motion attained by the slot and pin *l'* is essential to the proper working of the toggles at the moment of gripping, as without this the parts would lock when the toggles began to act. To prevent any lifting action of the toggles, the lower link L' of the toggles is also provided with a slot, as shown, which permits it to travel upward without lifting the head H.

I do not claim in this application the toggles *per se*, as I have already set them forth in prior patents. I will not, therefore, go further into the description of the action or construction of these parts, but will proceed to describe the raising and lowering mechanism by which the gripper-head J is raised and lowered with the grip, its operating-toggles, and its other attachments without in any way disturbing the relative position of the jaws of the grip. The head J is movably supported upon the transverse rods O, which lie in horizontal channels, as indicated, in the head J. Upon these rods the head J is free to travel transversely, but is prevented from traveling in a direction parallel with the track by means of the butting-heads J', secured to the side bars J''. The rods O are carried by and form the crank-pins of double cranks turning on rock-shafts P, pivoted upon the side bars J''. Each of these rock-shafts is provided with another crank pinned to the connecting or operating rods *p*, which run to the controlling hand-levers on the car-platforms.

To insure the proper unison of rotation of the rock-shafts P, I connect them together by one or more equalizer bars or rods *o*, pinned to the short cranks *o'* of the rock-shafts. By these means I am enabled to raise and lower the gripper-head J, with the gripper and its attachments, without disturbing the adjustment of the jaws of the grip, for the connecting-rod *p* is of such length that the rise and fall of the head J does not appreciably affect the position of the lever M'.

To operate the rods N and *p*, I provide hand-levers R S, operated from the platform of the car. (See Fig. 5.) The hand-lever S, which operates the rod *p*, is fulcrumed at a point *s* below the platform of the car and the rod *p* secured to it at a point a few inches above the fulcrum, as shown in Fig. 5, wherein the lever is broken away to show more clearly the parts lying behind it. The lever S is preferably made in two parts jointed, as shown, below the platform of the car. By this construction I am enabled to detach the upper part of the lever and transfer it to the other end of the car when the car is to be run in the opposite direction. For the lever S, I provide quadrant-plates T, having a notch *t* for retaining pawl or dog carried upon the lever. By this notch and pawl the grip-head, with its several attachments, is held in its elevated position. The lever R, which operates the jaws of the grip, is fulcrumed to the same axis as the rais-

ing-lever S and is similarly provided with guides T′, which form a rack for the retaining-pawl u'. This rack is provided with a series of teeth 4 to hold the lever in place when the jaws are closed, as in Fig. 4, and farther along the rack, at points corresponding to the more open positions of the jaws, as in Figs. 6, 7, and 8, are the single notches 6 7 8. These notches serve to indicate the several positions for the lever; but, being individual features not being broadly new, I will not further describe their details.

To further increase the travel of the jaws at the beginning of the action of closing and the power at the position of gripping the cable, I have devised a sliding pivotal connection for the rod N upon the lever R and a controlling-link therefor, which draws the slide toward the center s as the jaws close and pushes it outward away from the center as the jaws open. In Fig. 5 the sliding connection between the rod N and the lever R is shown at V and its controlling-link at v. This link is so centered, as at the point v', that as the lever travels to the right it draws the slide V toward the center s, thereby increasing the leverage exerted by the lever. I have found that I may by providing the link v with a slot, allowing it some lost motion at its center v', cause the slide V to be drawn toward the center s by the tension in the rod N after the lever has passed the position at which it is perpendicular to the rod N, and in such case I provide a stop s' upon the lever R to limit its travel toward the center s. By this sudden sliding of the slide V the power exerted by the lever is greatly increased and then remains approximately constant as the slide V rests against the stop at the end of its travel.

I will now describe the means by which at certain points in the road-bed I am enabled to drop the cables automatically from the grip. At such points, as shown in Fig. 3, I provide an incline in the cable-trench. Upon this the gripper strikes and is elevated out of its normal position, raising the head J, thrusting back upon the raising-rods p, and throwing the lever S farther to the right, as viewed in Fig. 5. By this movement I cause the lever S to throw out the retaining-pawl u', and thereby release the jaws of the grip. To cause them to fly open and to thereby drop the cable, I provide a spring or other resilient device for the opening and closing mechanism, tending to throw open the jaws of the grip. In Fig. 3 I have illustrated this feature, showing it as a tension-spring X, tending to throw the lever M toward the toggles. Many forms of releasing mechanism might be used to throw out the pawl u', and I have therefore in Fig. 5 merely illustrated one simple means of accomplishing this purpose. This means consists of the slide-plate Z, provided with guide-slots traveling on stationary pins carried by the rack T′. The plate Z is normally in a position which does not interfere with the operation of the pawl u', and is retained in such position by means of a spring, as shown. When, however, the lever S is thrown to the right by the gripper striking upon the incline described, the lever S strikes a projecting ear or lug z upon the slide-plate Z and drives it to the right, causing it to interfere with the pawl u' and to free it from the rack T′, releasing the lever R. To prevent the pawl u' engaging with any of the other teeth or notches of the rack T′ during its travel thereon, the plate Z is provided with the shielding-surfaces z', which effectively shield the notches 6, 7, and 8, while the raising of the other end of the plate Z by means of the inclination of its guide-slot at that end causes the edge of the plate to be raised above the teeth 4 and to withhold the pawl therefrom.

To insure the proper adjustment of the gripping mechanism, I provide a turnbuckle upon the rod N, as shown in Fig. 3, and such other adjusting devices as may be found desirable. These and many other attachments and additions—such, for instance, as connections, whereby the grip may be operated from the other end of the car—I have omitted from this specification for the sake of clearness. So, also, many modifications of several parts which have occurred to me and which will readily occur to others I have purposely omitted, because they do not differ in principle from my invention and do not, therefore, form a departure therefrom.

Besides the advantages already set forth it will be clear from the foregoing description that if the cable be gripped as shown in Figs. 3 and 4 the cable in the grip may be exchanged for the right-hand cable by the mere operation that is needed to pick up that cable without giving any attention to the dropping of the left-hand cable. To do this, it is only necessary to throw the lever R to its notch 7, corresponding to the opening of the gripper, as in Fig. 7, to lower and raise the gripper and to close its jaws upon the right-hand cable, which will have been brought up with the grip, while the other will have fallen back onto its supporting-wheels during the rise of the grip.

I have now fully set forth one embodiment of my invention and the way in which each feature of it operates, and I therefore claim, broadly, as my own, and desire to secure by these Letters Patent, the following:

1. In combination, in a gripper apparatus for cable railways, jaws and jaw-supports for the cable or cables, mechanism for raising and lowering the said jaws, mechanism for opening and closing the said jaws relatively to each other, deflecting-shoes operated by the relative movement of the jaws to throw out the cable or cables from the said jaws, an actuating hand-lever for the said mechanism for opening and closing the said jaws, a connecting-rod therefor secured to the said lever

by a sliding connection, and a controlling-link for the said sliding connection, substantially as and for the purposes set forth.

2. In combination, in a gripper apparatus for cable railways, jaws and jaw-supports for the cable or cables, mechanism for raising and lowering the said jaws, mechanism for gripping the said jaws upon the cable or cables, and a supplemental link pivotally secured to the last said mechanism and operated thereby to open the said jaws, and deflecting-shoes operated by the relative movement of the said jaws to throw the cables therefrom, substantially as and for the purposes set forth.

3. In combination, in a gripper apparatus for cable railways, jaws and jaw-supports for the cable or cables, mechanism for gripping the said jaws upon the cable or cables, a supplemental link pivotally secured to and operating with the said mechanism to open the said jaws, and deflecting-shoes operated by the relative movement of the said jaws to throw out the cable or cables therefrom, substantially as and for the purposes set forth.

4. In combination, in a double gripper for cable railways, jaws and jaw-supports for the cables, mechanism for gripping the said jaws, a supplemental link pivotally secured to and operating with the said mechanism to open the said jaws, and means operated by the relative motion of the jaws to throw out the cable or cables therefrom, substantially as and for the purposes set forth.

5. In combination, in a gripper for cable railways, jaws for gripping the cable or cables and one or more shoes for throwing out the cable or cables, operated by the movement of the said jaws, into or out of operative position to the jaws on one side alone or on both sides, substantially as and for the purposes set forth.

6. In combination with a gripper for cable railways, one or more vertically-adjustable deflecting-shoes for throwing the cable or cables from the said gripper and means for raising and lowering the said shoes into or out of operative relation to the said gripper upon one side alone or upon both sides, substantially as and for the purposes set forth.

7. In combination with a double gripper for cable railways, one or more deflecting-shoes G upon each side of the said gripper and means for bringing the said shoes at will either upon one or upon both sides of the said gripper into operative relation thereto, substantially as and for the purposes set forth.

8. In combination with a double gripper provided with two pairs of co-operating jaws, one or more deflecting-shoes G for each of said pairs of jaws, adjustable into and out of operative relation to one or to both the said pairs of jaws, and a lip *f* for preventing the entrance of the cable into one pair of jaws while the other pair are in position to receive the cable, substantially as and for the purposes set forth.

9. In combination with a double gripper provided with two pairs of co-operating jaws, one or more deflecting-shoes G for each of said pairs of jaws, vertically adjustable by the opening and closing of the said jaws into and out of operative relation to one or to both the said pairs of jaws, and a lip *f* for preventing the entrance of the cable into one pair of jaws while the other pair are in position to receive the cable, substantially as and for the purposes set forth.

10. In combination, in a double gripper for cable railways, a pair of co-operating jaws upon each side of the said gripper, one or more deflecting-shoes G, secured to the upper jaw of each pair by a slot and pin, stops for the said shoes upon the lower jaws, the said slots and pins being so arranged that the shoe or shoes of one pair of jaws come into action by the opening of the jaws before those of the other pair, and a lip upon the latter pair preventing the entrance of the cable thereinto while the other jaws are in position to receive the cable, substantially as and for the purposes set forth.

11. In combination with the co-operating jaws of a cable-grip, a cable-deflecting shoe carried by one jaw thereof and sliding thereon and stops for each of the said jaws to limit its travel thereon, substantially as and for the purposes set forth.

12. In combination with the mechanism for closing a cable-gripper, a link-motion arranged to independently open the same, substantially as and for the purposes set forth.

13. In combination with the toggles or other mechanism for closing the jaws of a cable-gripper, one or more links *l* for opening the said jaws, substantially as and for the purposes set forth.

14. In combination, in a cable-gripper, toggles for closing the gripper and a link *l* for opening the said gripper, secured to and operating by the said toggles, the said toggles and the said link being arranged to permit the independent action of the toggles in closing and the link in opening the said gripper, substantially as and for the purposes set forth.

15. In combination, in a cable-gripper, toggles for closing the gripper and a link *l*, pivotally secured at one end to the said toggles and at its other end connected by a pin and slot with the movable jaw of the said gripper, whereby the said toggles may be utilized in closing and the said link in opening the said gripper, substantially as and for the purposes set forth.

16. A mechanism for exerting varying power upon the operating parts of a cable-gripper, consisting of a hand-lever R, a connecting-rod N, secured to the said lever by a sliding pivotal connection, and a controlling device *v* for altering the position of the said sliding connection as the said lever is moved, substantially as and for the purposes set forth.

17. In combination with the other parts of a cable-gripper, a connecting-rod for operating the same, a hand-lever, a frame to which the said lever is fulcrumed, a sliding pivotal

connection between the said rod and the said lever, and a link v, fulcrumed in the said frame and pivotally secured to the said sliding connection, substantially as and for the purposes set forth.

18. In combination with the mechanism for gripping and for dropping the cable of a cable railway, a pawl and rack for securing the mechanism in position, mechanism for raising and lowering the said gripper, and a slide-plate or segment for detaching the said pawl from the said rack, actuated by the movement of the said raising and lowering mechanism, substantially as and for the purposes set forth.

19. In combination with the mechanism for gripping and for dropping the cable of a cable railway, a pawl and rack for securing the mechanism in position and a slide-plate or segment for detaching the said pawl from the said rack, actuated by the rise and fall of the gripper, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand this 8th day of March, 1892.

JOHN H. PENDLETON.

Witnesses:

HAROLD BINNEY,

CHAS. M. BEAM.