(No Model.) 2 Sheets—Sheet 1.

W. HADDOCK.

GRIPPING ATTACHMENT FOR CABLE RAILWAYS.

No. 275,379. Patented Apr. 10, 1883.

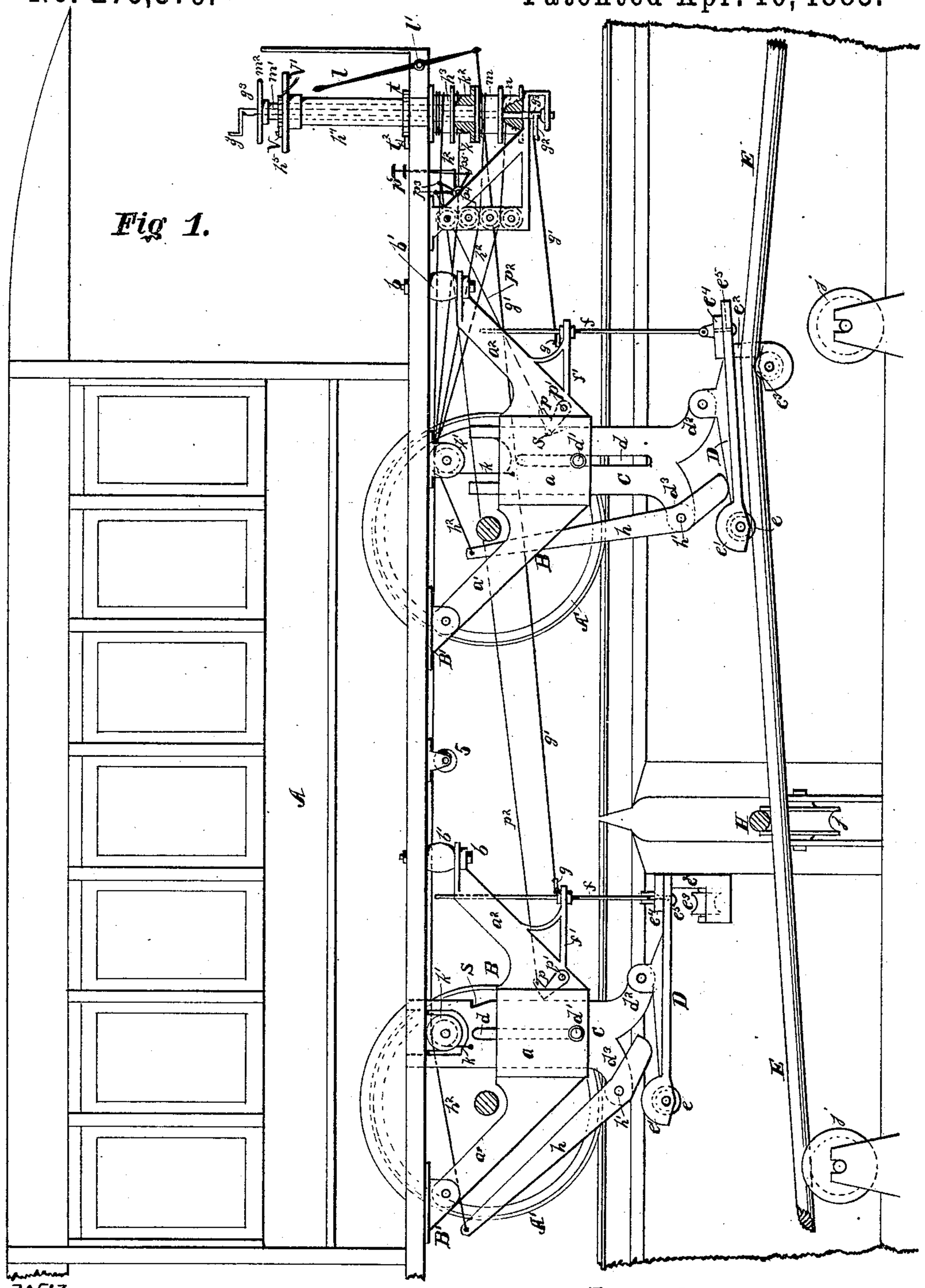

Fig 1.

Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

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GRIPPING ATTACHMENT FOR CABLE RAILWAYS.

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Fig. 2.

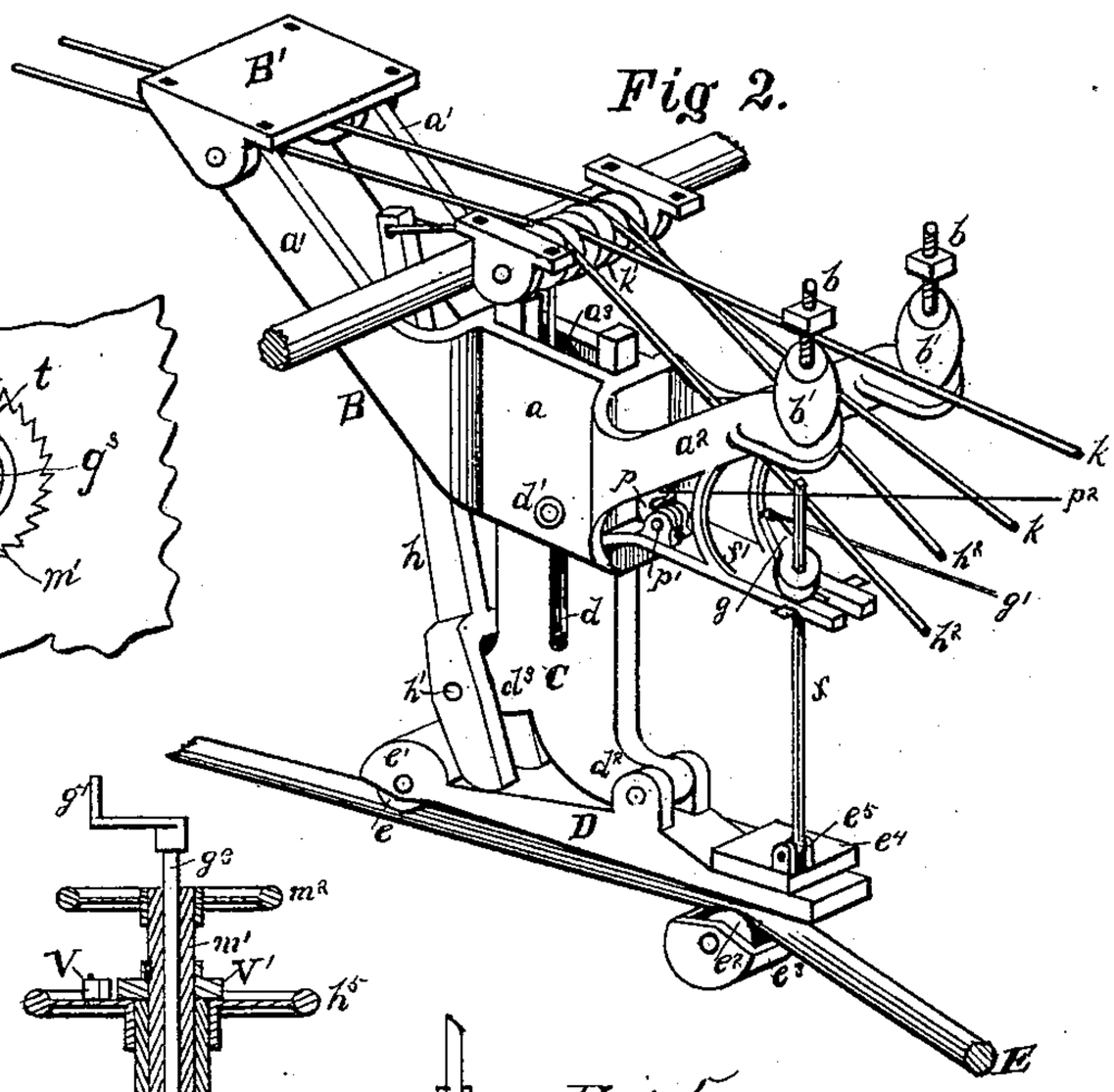

Fig. 7.

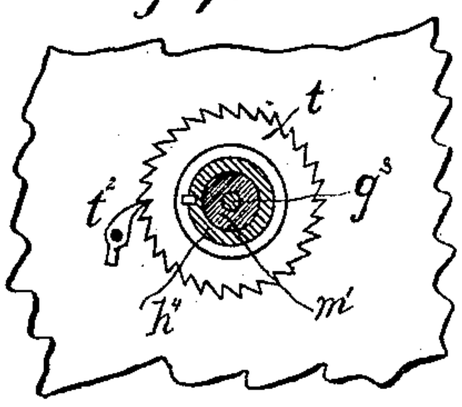

Fig. 5.

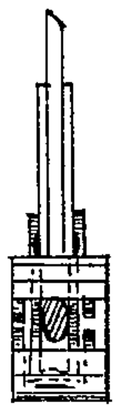

Fig 3.

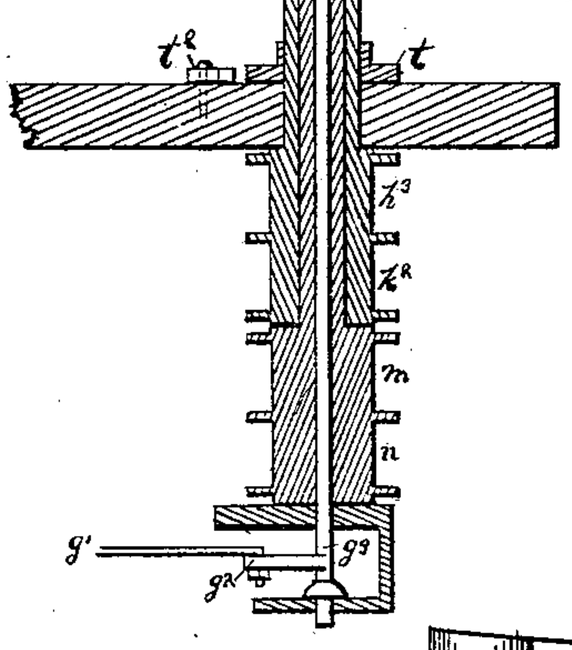

Fig 4.

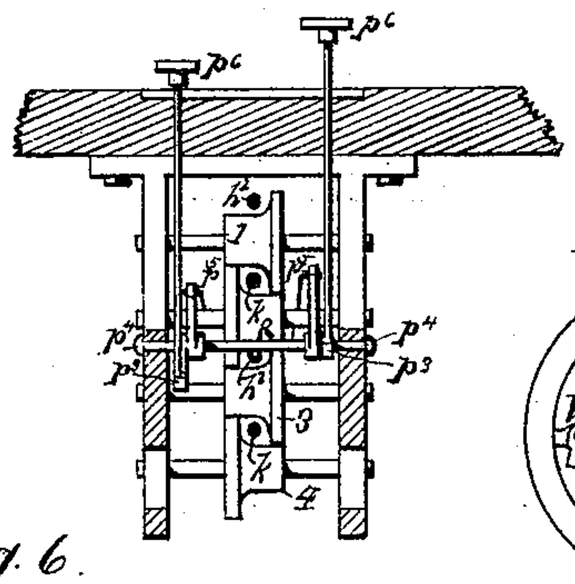

Fig. 8.

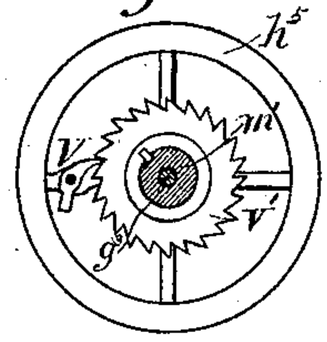

Fig. 6.

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UNITED STATES PATENT OFFICE.

WORCESTER HADDOCK, OF CINCINNATI, OHIO, ASSIGNOR TO THE NATIONAL CABLE POWER COMPANY, OF SAME PLACE.

GRIPPING ATTACHMENT FOR CABLE RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 275,379, dated April 10, 1883.

Application filed November 29, 1881. (No model.)

To all whom it may concern:

Be it known that I, WORCESTER HADDOCK, of Cincinnati, county of Hamilton, and State of Ohio, have invented certain new and useful Improvements in Gripping Attachments for Cable Railways, of which the following is a specification.

My invention relates to devices for grasping the cable for propelling the car, where the cable is above or below ground; and the principal object of my invention is to provide an economical, convenient, and efficient means for propelling the car or allowing it to remain at rest, at the will of the operator.

The nature of the various features of my invention will be apparent from the following description and drawings.

For the purposes of illustration I will describe my invention as applied to a railway where the vehicles are drawn by means of a cable placed within the ground.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a street-car with my invention attached, showing the grippers in position in the tube surrounding the cable, one of the grippers grasping the propelling-cable. Fig. 2 is a perspective view of one of the grippers and its supporting-brackets detached from the car. Fig. 3 is an enlarged view, representing a central longitudinal section through the winding-drums and their operating mechanism. Fig. 4 is an enlarged section, showing the guide-sheaves and their support for guiding the various operating cords or chains onto their respective drums. Fig. 5 is a view of the front edge of the shank of the gripper, and also the shoe. Fig. 6 is a view of the upper face of the shoe of the gripper, showing its preferred shape. Figs. 7 and 8 represent the ratchet-and-pawl mechanism for controlling the rotation of the operating-drums.

My invention is applicable either to continuous tracks not interrupted by cross-tracks or to tracks which cross one another. Where there are no cross-tracks it will only be necessary to use one gripper. In Fig. 1 of the drawings two grippers are shown attached to the car, as in this figure the track upon which the car is placed is shown as crossing another track, and I preferably employ two grippers in such cases, and when two grippers are so employed one is preferably a duplicate of the other, so that a description of one will suffice for both.

To the under side of the car is secured the compound bracket B, which consists of a body, a, and the wings or arms a' a^2. The manner of connecting the brackets B to the car is as follows: The arms a' are hinged to the plate B′, as shown, and this plate is in turn bolted to the under side of the car. The arms a^2 are bolted to the under side of the car by the bolts b. A spring, b', of rubber or other material, surrounds each bolt b, and thus a certain amount of elasticity of movement is imparted to the bracket and to the devices it supports. Any other desired modes of imparting elasticity of movement to the bracket and its devices may be employed instead of the one specified. When preferred, the bracket may be rigidly attached to the car.

The body a of the bracket B is provided with an opening, a^3, in which is placed the shank C of the gripper, which is provided with a longitudinal slot, d. Through this slot d and through the body a of the bracket passes a bolt, d', thus retaining the shank in the opening in the body, but permitting it to be raised or lowered in said opening. The lower end of the shank C terminates in two arms or prongs, d^2 d^3.

To the arm d^2 of the shank is pivoted the shoe D, one end of which is provided with the grooved pulley e, which is preferably covered over with the hood e', formed on the end of the shoe D. To the other end of the shoe D is connected the stirrup e^2, in the lower part of which is journaled a grooved pulley, e^3. This stirrup is suspended from the end of the shoe D by the plate e^4, which rests on top of the shoe D, and is retained in position by a bolt, e^5, but is permitted to turn on the shoe, so that the pulley e^3 shall be directly under the shoe D, as shown in Fig. 2, or turned aside, as shown at the left-hand side of Fig. 1. The means of turning this stirrup consist of a rod, f, connected at bottom to the stirrup and higher up journaled in a brace, f', fixed to the bracket B. To rod f is fixed lever g, which is worked by a rod, g', through the agency of a suitable crank, as g^2, connected to a crank-rod, g^3, op-

erated by a wheel or crank-lever, g^4, located, as here shown, at the platform or other suitable point on the car.

When the driving-cable E is between the pulley e^3 of stirrup e^2 and the pulley e of the shoe D the preferred means for causing the cable to be gripped between said pulleys consist in the lever h, fulcrumed at h' to arm d^3 of shank C, and arranged so that when its upper end is drawn forward through the agency of cord h^2 and drum h^3, turned by shaft h^4 and hand-wheel or hand-lever h^5, the lower end of the said lever h will depress the rear end of the shoe D. Thus forcing pulley e against the cable and elevating the forward end of the shoe will cause the pulley e^3 to press up the cable E, the latter being thus firmly gripped between the said pulleys by their opposing and simultaneous pressure. The cord h^2 is suitably connected to drum h^3. When desired, pulleys e and e^3 may be omitted, and rubber or other suitable non-frictional device be substituted for said pulleys. Where the cable of this track does not cross other cables the foregoing devices are all that are necessary to be employed. The reason for this statement will become apparent from the following description of the manner of starting, running, and stopping the car.

Let us suppose the cable E to be moving and the lever h to be thrown back in the position shown in the rear gripping device of Fig. 1, and the pulley e to be raised from off the cable, and the pulley e^3 to be lowered down away from the cable. The car is now stationary. To start the car, the drum h^3 is rotated, the cord h^2 wound thereon, and the upper end of the lever h brought forward, causing the lower end of said lever to tilt the shoe, as aforementioned and the pulleys e e^3 to grip the cable, whereupon the car will be moved forward by the cable. When it is desired to stop the car the cord h^2 is unwound from the drum h^3, and the lever h will from the upward pressure of the shoe upon its lower end be moved, its upper end moving rearward and its lower end moving forward, thereby releasing the shoe from pressure and releasing the pulleys from gripping contact with the cable. The car will now be in a condition to be stopped, and for the purpose of stopping it as quickly as desired it should be provided with a brake or brakes of any desired form and construction, and operated by any preferred mechanism. When the cord h^2 is unwound, should the lever h not readily move so as to release the shoe from pressure, it can be made to do so in a variety of ways. One convenient means for causing it to properly release the shoe is a weight or spring suitably located. For example, a spring might be placed between the upper part of the lever and the edge of the shank C. Should the shoe D not readily tilt when the pressure of lever h is removed, it can be made to do so by a weight or spring suitably located.

The afore-described operations to grip and release the operating-cable E are repeated during the trip of the car as often as necessary. When for any reason it is desirable to remove the gripping device altogether from the cable for the purpose of lifting the car from the track or removing the cable, the shoe being first released from the pressure of lever h, the pivoted stirrup e^2 is turned to one side through the agency of the rod f, lever g, rod g', crank g^2, crank-rod g^3, and lever g^4, and the gripping device is now altogether free from the cable.

In all these operations and in those to be hereinafter described it is preferred that the cable E be suitably suspended or supported in the tube or non-frictional supports—as, for example, on the pulleys j—so that when the shoe is released from the pressure of lever h and pulley e^3 is depressed the cable will not continue to hug the pulley e^3, but, resting upon said non-frictional supports, will leave pulley e^3 free to be turned at will.

It now remains to describe that portion of the devices by which the gripping devices are enabled to be operated effectively when the cable-track is crossed by one or more cable-tracks. In such event the shank C should be adjustable vertically and be raised or lowered by suitable mechanism—as, for instance, a cord, k, passing over the sheave k', and wound upon drum k^2, rotated by a suitable mechanism (here shown as hollow shaft h^4) turned by hand lever or wheel h^5. The other or rear gripping attachments are constructed in the same manner and operated by similar means, excepting that in the present instance the rod g', operating the crank-lever g, is worked by the hand-lever l, pivoted at l', the cords h^2 and k of said gripper being wound upon their respective drums m and n. Both of which drums are operated by shaft m' and hand wheel or lever m^2.

It will be observed that in the rear gripping device the cord h^2 is wound a greater number of turns upon its drum m than the cord k is wound upon its drum n. Likewise, the cord h^2 of forward gripper is wound a greater number of turns upon its drum h^3 than the cord k is wound upon its drum k^2.

In each gripping device respectively the cord that elevates the shank C is wound upon its drum in a direction opposite to that in which the cord that operates lever h is wound upon its drum. The purpose of thus winding the cords on their respective drums will be apparent from the following description of the mode of operation as the car crosses a track whose cable crosses the cable operating the car, which is the subject of the present specification.

H indicates the cable crossing cable E above the latter. As the car nears the cross-cable H, and before the forward gripping device reaches the cross-cable H, the shaft h^4 is rotated so as to slacken the cord h^2, whereupon the lever h will release the grip of the pulleys e e^3 upon the cable E. The crank g^4 is now operated so as to turn the stirrup e^2 till it occupies the po-

sition with relation to the shoe shown in the rear gripping device of Fig. 1. The shaft h^4 is now rotated so as to hoist the shank C and the attachments connected thereto. The forward gripping device is now in position to pass over the cross-cable H. The rear gripping device which has heretofore been elevated, as shown in Fig. 1, is now lowered by rotating the shaft m' until the pulley e rests upon the cable E, when lever l is operated and the stirrup e^2 turned beneath the cable, and the pulleys e e^3 are made to grip the cable E, through the agency of lever h and cord h^2, by the rotation of shaft m'. The cable E now moves the car forward until the forward gripping device has crossed the cable H. The forward gripping device is now lowered, and the stirrup e^2 being turned beneath the cable, the pulleys e e^3 are caused to engage the cable E, when the car will move forward. Then the rear gripping device is detached by releasing the pulleys e e^3 and turning the stirrup away from cable E. The rear gripping devices are then elevated.

When preferred, both forward and rear gripping devices may be used in drawing the car, in which event, when approaching a cross-cable, as H, the forward gripper is detached and lifted until it has crossed cable H, and then said forward gripper is caused to grip the cable E, and the rear gripper is detached from the cable E and lifted, and when the rear gripper has crossed over the cable H it is again attached to the cable E.

When the rear gripper is for the most part employed alone to propel the car, then, when nearing a crossing, it is left attached to the cable till the forward gripper has crossed cable H and been attached to the cable E, and when the rear gripper has crossed cable H the latter gripper is attached to the cable and the forward gripper detached.

For the purpose of taking the strain from cord k and holding the shank without its being supported by said cord, I preferably employ a catch, p, pivoted at p' to the bracket B, and operated by a rod; p^2, attached to a crank, p^3, worked by a shaft, p^4, which latter in turn is operated by suitable mechanism—as, for example, a crank, p^5, operated by the treadle p^6. For convenience, the one shaft p^4 suffices to work both catches, as the cranks p^3 are so placed thereon that when one catch p is in use, engaging a notch, S, in the shank of one gripping device, the other catch p is disengaged from the notch S of the shank of the other gripping device. Both cranks p^5 are attached, as shown, to shaft p^4, and are so attached as to allow of one or the other of said catches engaging its respective gripping device. When the shank C is lowered the catch p enters notch S of the shank, as shown, in the forward gripper of Fig. 1. All strain upon cord k is thus removed. The drum carrying the cord k may now be turned and the cord k be slackened, and the drum carrying the cord which operates the lever h be wound up, and the pulleys e and e^3 be caused to grip the cable E. A ratchet, t, on the shaft h^4, and a double pawl, t^2, control the rotation of the said shaft, while a pawl, V, on the top of shaft h^4 engages a ratchet, V', on the shafts m' and controls the rotation of the latter. Thus the shank C and its attachments can be held suspended at any desired height above or with the cable.

It may be here remarked that for the purpose of enabling the cable and stirrup e^2 to clear the pulleys j the shank C should be somewhat elevated from the point where it was when the pulleys first engaged the cable E. This elevation is accomplished by means of cord k and its drum, &c., and the notch S is preferably placed in the shank at that point where the said shank is to be when the cable with stirrup are sufficiently elevated to pass pulleys j, in order that said catch and notch may hold the shank and its devices in the latter position. Except when crossing a cable that passes over cable E, the latter will always run between the pulleys e and e^3 and play upon the pulley e^3, and all necessity of moving the shank C up and down will be avoided. In going around a curve it will be advantageous to use both rear and forward grippers, as the use of both enables both ends of the car to be equally drawn or subjected to an equal strain, and prevents any tendency of one end of the car to swing away from the center of the curve more than the other, and therefore less liable to jump the track. The sides of the shoe D are preferably concave, as shown in Fig. 6, in order that as the car goes around a curve the shoe will move smoothly in the tube as it comes in contact with the vertical rollers on the sides of the tube.

It may be remarked that the several cords are suitably supported, as shown, on rollers or pulleys, as 1, 2, 3, and 4. The rollers k' and the rollers at 5 aid, as shown, in supporting the cords. Where the shank is vertically adjustable the rod f slides vertically within bracket f'.

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

1. In cable railways, the combination of one cable and the car and two gripping devices, one located at the forward portion of the car, the other being located in the rear of the forward one, substantially as and for the purposes specified.

2. In combination with suitable supporting devices, the shoe D, provided with pulleys e e^3, and a device for causing the cable to be gripped between them or released therefrom, substantially as and for the purposes specified.

3. In combination with suitable supporting devices, the shoe D, provided with suitable frictional devices, and the lever h, substantially as and for the purposes specified.

4. In combination with suitable supporting devices, the shoe D, provided with pulleys e e^3, and the lever h, substantially as and for the purposes specified.

5. In combination, the shank C, provided with slot d, and supporting-bracket, provided with bolt d', and suitable devices for gripping the cable, substantially as described.

6. The combination of the bracket B and shank C and devices for gripping the cable, substantially as described.

7. The combination of the bracket B, hinged at one end, and provided with bolt b and spring b', for supporting a cable-gripping device, substantially as and for the purposes specified.

8. The combination of the bracket B, shank C, adjustable therein, shoe D, and lever h, said lever being provided with means for causing it to depress the rear end of the shoe, substantially as and for the purposes specified.

9. The shoe D, provided with stirrup e^2, and suitable non-frictional devices for gripping the cable, substantially as described.

10. The combination of the shoe D, pulleys e e^3, and stirrup e^2, substantially as and for the purposes specified.

11. The combination of the shoe D, stirrup e^2, and rod f, substantially as described.

12. The combination of shoe D, stirrup e^2, rod f, lever g, rod g', lever g^2, rod g^3, and hand-lever g^4, substantially as and for the purposes specified.

13. The combination of the bracket B, provided with brace f', shank C, shoe D, stirrup e, and rod f, substantially as described.

14. The combination of shank C, vertically-adjustable, and catch p, substantially as and for the purposes specified.

15. The combination of the vertically-adjustable shank C, and catch p and rod p^2, crank p^3, shaft p^4, lever p^5, and treadle p^6, substantially as and for the purposes specified.

16. The combination of the shoe D, non-frictional devices, as pulleys e e^3, lever h, cord h^2, drum h^3, shaft h^4, and hand-wheel h^5, substantially as described.

17. The combination of the shoe D, non-frictional devices, as pulleys e e^3, lever h, cord h^2, shank C, cord k, drums h^3 and k^2, shaft h^4, and device for turning the latter, substantially as described.

18. In combination with shoe D, the stirrup e^2, rod f, lever g, rod g', and lever l, substantially as and for the purposes set forth.

19. In combination with shoe D, non-frictional devices, as pulleys e e^3, lever h, cord h^2, shank C, cord k, pulley k', drums h^3 and k^2, shaft h^4, ratchet t, and pawl t', substantially as and for the purposes specified.

20. In combination with shoe D, non-frictional devices, as pulleys e e^3, lever h, cord h^2, shank C, cord k, pulley k', drums m and n, and devices for turning the latter, substantially as and for the purposes set forth.

21. In combination with two separate and independent sets of gripping attachments, substantially as set forth, the rods g', cords h^2, cords k, pulleys k', drums h^3 and k^2, and shaft h^3, drums m and n, and shaft m', shaft or rod g^3, and devices for turning said shafts and supporting devices, substantially as and for the purposes set forth.

22. In combination with the two independent and separate sets of gripping attachments, substantially as set forth, the rods g', cords h^2, cords k, pulleys k', drums h^3 and k^2, and shaft h^3, and devices for turning said shafts, and catches p, rods p^2, levers p^3, shaft p^4, levers p^5, and treadles p^6, substantially as and for the purposes set forth.

23. The bracket B, provided with the several arms or wings, a' a^2, affording a broad light bearing, and the slotted center piece, a, for receiving shank C, supporting the devices for immediately gripping the cable, substantially as and for the purposes specified.

24. The bracket B, provided with wings or arms a a^2, and the slotted center piece, a, for receiving the shank C, and made with closed sides for keeping out the dirt, substantially as and for the purposes specified.

WORCESTER HADDOCK.

Witnesses:
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