R. F. ARNOTT.

CABLE GRIP MECHANISM.

APPLICATION FILED NOV. 1, 1912

**1,066,780.**

Patented July 8, 1913.

3 SHEETS—SHEET 1.

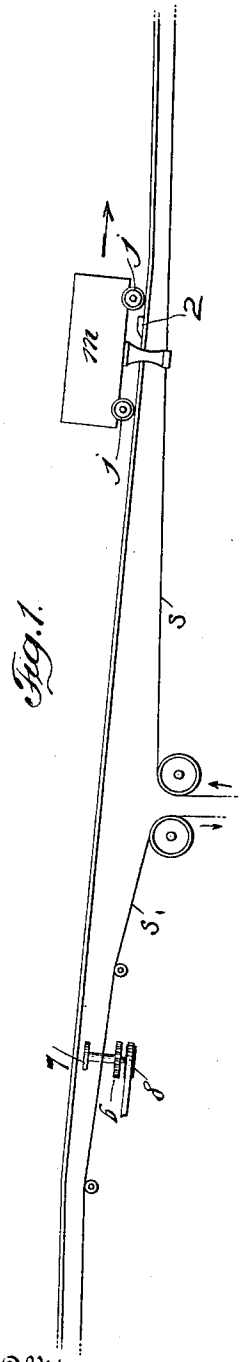


Fig. 1.

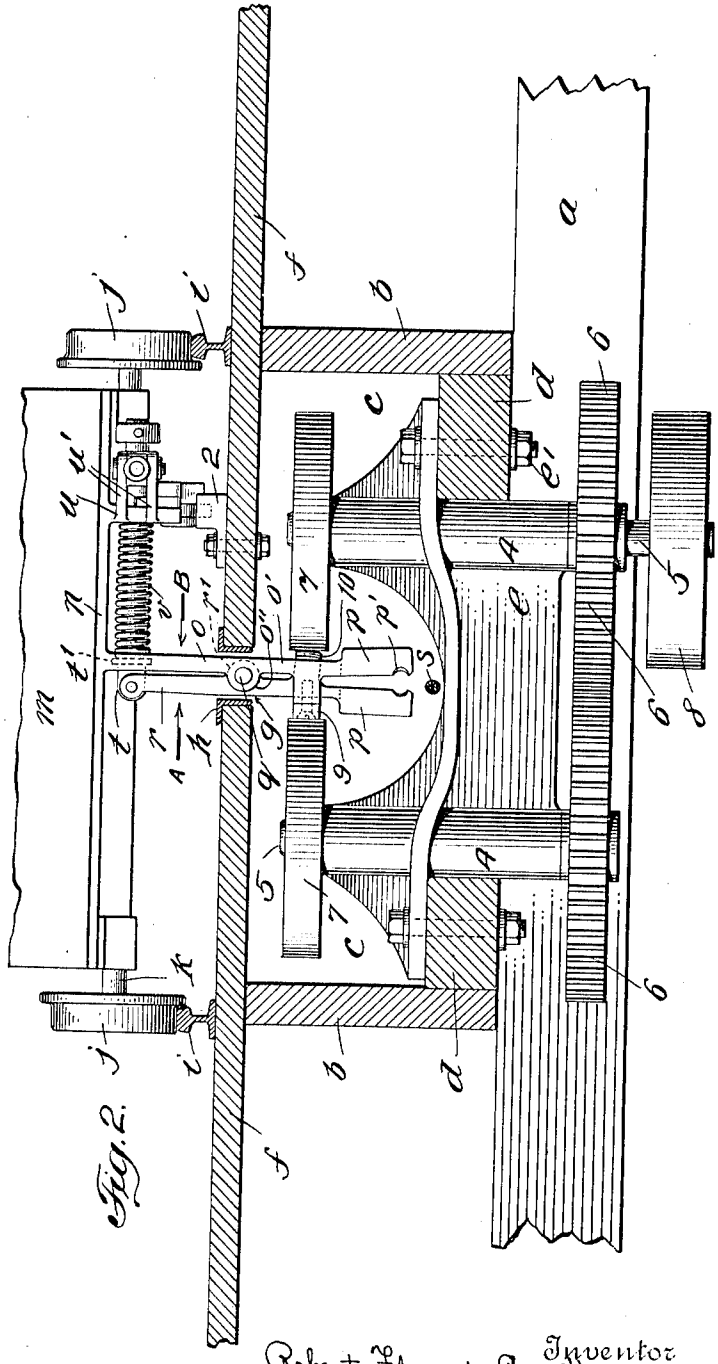


Fig. 2.

Witnesses:

Julius A. Rossi.

Robt. F. Hamilton

Inventor

Robert Fleming Arnott

By his Attorney

James Hamilton

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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Fig. 3

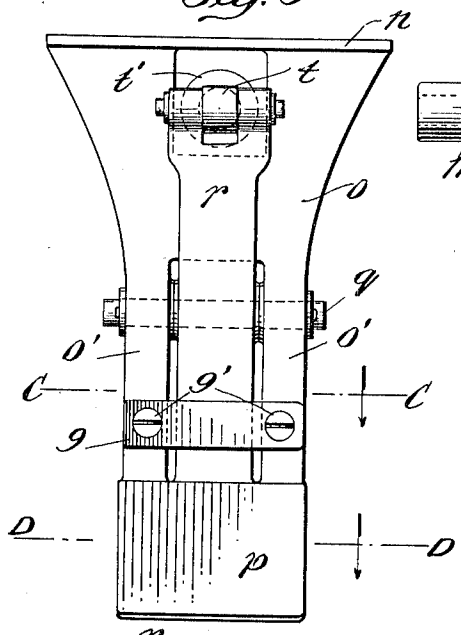
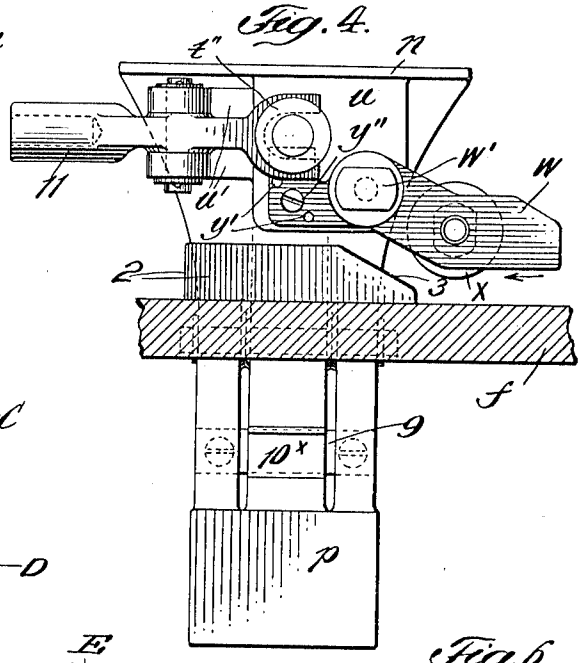



Fig. 4.



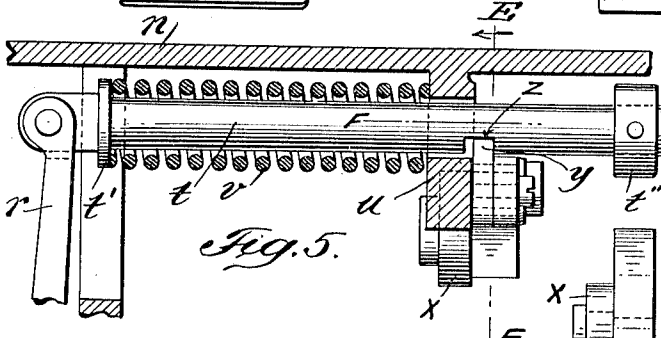
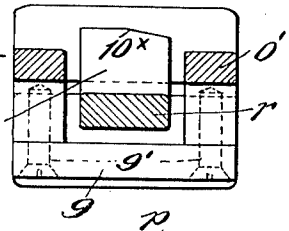




Fig. 5.

Fig. 6



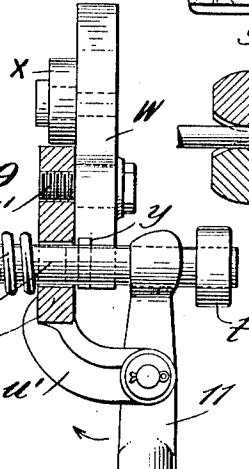




Fig. 9

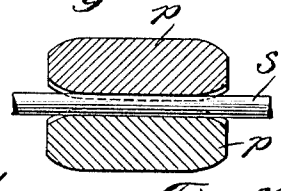



Fig. 7.

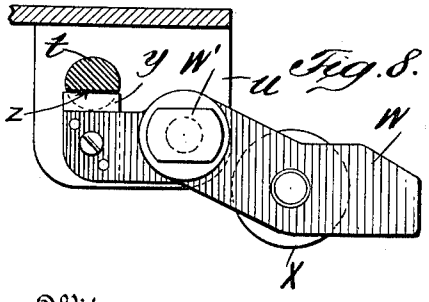



Fig. 8.

Witnesses:

Julian Hamilton.

Albert Hamilton.

Inventor

Robert Fleming Arnott

By his Attorney

James Hamilton

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

R. F. ARNOTT.

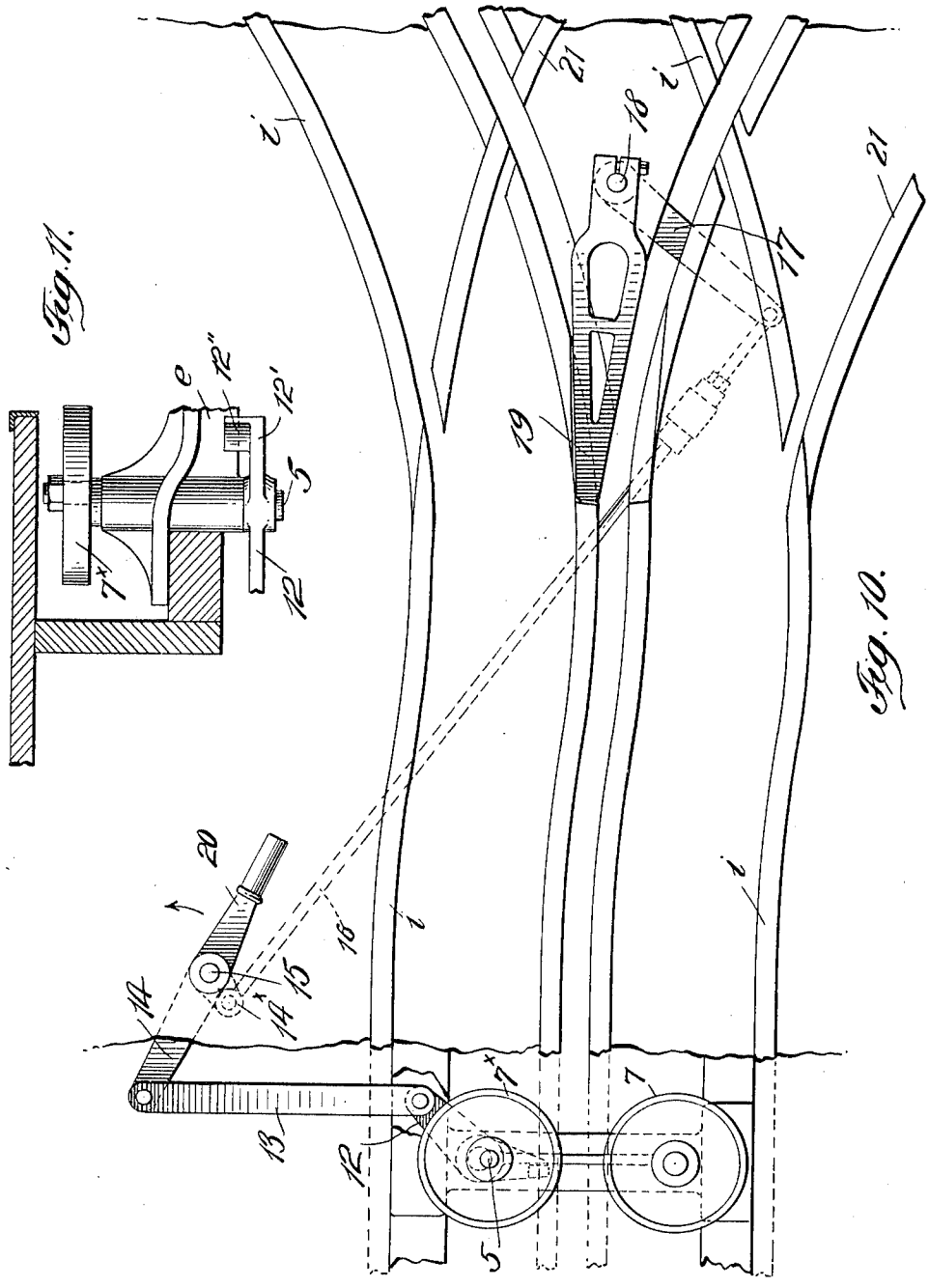
CABLE GRIP MECHANISM.

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3 SHEETS—SHEET 3.




Witnesses:
Albert Hamilton

Robert Fleming Arnott Inventor
By his Attorney
James Hamilton

# UNITED STATES PATENT OFFICE.

ROBERT FLEMING ARNOTT, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO REGINALD H. KEAYS, OF NEW YORK, N. Y.

## CABLE-GRIP MECHANISM.

1,066,780. Specification of Letters Patent. Patented July 8, 1913.

Application filed November 1, 1912. Serial No. 729,030.

*To all whom it may concern:*

Be it known that I, ROBERT FLEMING ARNOTT, a subject of the King of England, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Cable-Grip Mechanism, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in cable-grip mechanism for use in street-car cable-railways and cable railways used in mines, in tunnel construction, pleasure railways and other places; and an object of this invention is to provide a cable-grip mechanism in which the cable will be automatically gripped and released at certain predetermined points along the railway.

Another object of this invention is to combine a cable-grip mechanism of the automatic type with a switch mechanism, so that by throwing the switch controlling the direction which the car shall take, mechanism which controls the cable-grippers will be thrown into and out of operation.

A third object of this invention is to provide a cable-grip mechanism of the automatic type which will be simple in construction, comparatively cheap in manufacture and low in first cost of installation and which will prove durable, reliable, positive and efficient in operation and use.

In the drawings illustrating the principle of this invention and the best mode now known to me of applying that principle, Figure 1 is a diagrammatic view of a cable-railway equipped with my invention; Fig. 2 is a transverse vertical section through the cable conduit, the cable being shown released; Fig. 3 is an elevation of the cable-grippers, looking in the direction of the arrow A of Fig. 2; Fig. 4 is an elevation of the cable grippers, looking in the opposite direction (or in the direction of the arrow B of Fig. 2); Fig. 5 is a fragmentary vertical section through the axis of the spindle which controls the movable grippers, the manually-operated releasing-lever being shown removed; Fig. 6 is a section on the line C—C of Fig. 3; Fig. 7 is a section on the line D—D of Fig. 3; Fig. 8 is a section on the line E—E of Fig. 5; Fig. 9 is a section on the line F—F of Fig. 5; Fig. 10 is a plan view showing the cable-grip mechanism combined with switch mechanism; and Fig. 11 is a detail of the eccentric mounting of one of the gripper-actuating wheels.

The joists or cross-beams *a* (only one of which is shown in Fig. 2) support the side-walls *b* of the cable conduit *c* and also the stringers *d* to which are suitably fastened, as by bolts *e'*, the transversely-disposed metal castings or frames *e*, which serve as shaft hangers or supports, as will be hereinafter particularly described. The covering *f* of the cable conduit *c* serves as a track-floor or road-bed and is formed with a central longitudinal slot *g* for the passage of the cable grippers, the side walls of the slot being faced with angle-irons *h*, which serve as wear-plates. Upon the top of the conduit covering *f* are laid the rails *i* of the cable railway; and on these rails *i* roll the car-wheels *j* which through the axles *k* support the car-body *m*. To the bottom of the car-body *m* there is suitably fastened a transversely-disposed plate *n* from which depends the stationary gripper *o* formed at its lower end with the jaw *p*. As is best shown in Figs. 3 and 4, the body portion of this stationary gripper *o* is branched or bifurcated and each of the legs *o'* is formed with an ear *o''* (Fig. 2) through which passes a pivot-pin *q*. This pin passes also through an ear *r'* formed on the body portion of the movable gripper *r* and thereby pivotally fastens the latter to the legs *o'* of the stationary gripper *o* so that the movable gripper *r* may rock thereon back and forth. The movable gripper *r* is formed at its lower end with a jaw *p*, which is similar to the jaw *p* of the stationary gripper *o;* and the opposed working faces of these jaws *p* are formed with grooves or recesses *p'* adapted to receive the cable *s*. The upper end of the movable gripper *r* is bifurcated and is pivotally fastened to the inner end of the transversely-disposed spindle or rod *t* the other or outer end of which passes through a supporting bracket *u*, which depends from the transverse plate *n* and is formed with a pair of horizontally-disposed bracket-arms *u'*. The spindle *t* passes through a coil-spring *v* one end of which presses against an annular flange or collar *t'* formed upon the spindle *t* and the other end of which presses against the bracket *u* (Figs. 2 and 5).

Pivotally mounted on the stud-shaft *w'*

screwed into the bracket plate $u$ is a tripper-lever $w$ one end of which carries a cam-roller $x$ and to the other end of which is attached by dowel-pins $y'$ and the screw $y''$, a lip or detent $y$, which is adapted and arranged to engage in a recess $z$ formed in the outer end of the spindle $t$. It will be understood that, when the detent $y$ is thrown out of the recess $z$, the spindle $t$ is released, and, under the influence of the coil-spring $v$, the spindle $t$ will be then thrown to the left in Figs. 2 and 5, whereby the cable $s$ is firmly gripped by and between the jaws $p$. In order that the tripper-lever $w$ may be automatically operated, there are arranged, at suitable points along the cable-railway, tripper-blocks 2 having an inclined or cam face 3 up which the cam-roller $x$ rides, whereby the tripper-lever $w$ is rocked and the detent $y$ is withdrawn from the recess $z$ in the spindle $t$.

Cast integral with the shaft-supporting frame $e$ is a pair of journal boxes 4 in each of which is mounted a vertically-disposed shaft 5 on the lower end of which is fastened a spur-gear 6 and on the upper end of which is fastened a disk or wheel 7. On the lower end of one of these shafts 5 there is mounted a driving pulley 8. To each leg $o'$ of the stationary gripper $o$ there is fastened, as by the screw 9', one end of the bridge-piece or yoke-bar 9. Between the legs $o'$ there projects from the movable gripper $r$ a lug 10 the outer face of which is formed with a cam surface $10^{\times}$ (Fig. 6). The disks 7 are arranged at such a height that the lug 10 will rub against one of the disks, while the bridge-piece or yoke-bar 9 will rub against the other thereof, as the grippers $r$, $o$, pass between the disks. The space between the latter is so narrow that the lower end of the movable gripper $r$ will be forced by the pressure to yield and will throw the spindle $t$ to the right in Figs. 2 and 5, against the tension of the coil-spring $v$, whereby the recess $z$ will be brought over the detent $y$, which will then engage the wall of the recess $z$. As the gripping jaws $p$ are thus forced apart, the cable $s$ will, of course, be released. Provision is made as follows for the manual release of the cable: Upon the outer end of the spindle $t$ there is fastened a collar $t''$, against which there is adapted to be pressed the inner bifurcated end of a lever 11 which is fulcrumed between the bracket-arms $u'$ (Figs. 2 and 9). When it is desired to release the cable manually it is only necessary to swing the outer end of the lever 11 in the direction of the arrow in Fig. 9, whereby the bifurcated inner end of the lever is pressed against the collar $t''$ and the spindle $t$ is forced to the right in Figs. 2 and 5.

To provide for those cases in which it is desirable to release the cable-grip mechanism automatically and at the same time to switch the car to a shunt or branch track, the following mechanism is provided: One of the disks (which one is marked $7^{\times}$ in Figs. 10 and 11) is eccentrically mounted upon its shaft 5 to the lower end of which is fastened a rocker-arm 12 connected by the link 13 with the rocker-arm 14 fast upon the lower end of the vertical rock-shaft 15. The lower end of the latter carries a second rocker-arm $14^{\times}$ which is by means of the link-rod 16 connected with the rocker-arm 17 fastened to the lower end of the rock shaft 18 the upper end of which carries the switch-tongue 19. To the upper end of the vertical rock-shaft 15 there is fastened a switch-operating arm 20. When it is desired to release the car from the cable and simultaneously shunt it upon a branch track 21, the switch-arm 20 is thrown into the position shown in Fig. 10, whereby the vertical shaft 15 is turned so as to move the eccentrically-mounted disk $7^{\times}$ toward its co-operating disk 7 such a distance that the interval between these two disks 7, $7^{\times}$ is made so narrow that the lug 10 and the yoke-bar 9 cannot pass between them without the movable gripper $r$ being rocked to release the cable $s$ as hereinbefore described (see full line position of the disk $7^{\times}$ and switch-needle 19 in Fig. 10.) When, however, it is desired that the cable shall remain gripped and the car shall, therefore, remain upon the main line $i$, the switch-arm 20 is thrown in the opposite direction (that of the arrow in Fig. 10), whereupon the disk $7^{\times}$ will be moved away from its coöperating disk 7 such a distance that, as the grippers $o$, $r$ pass between the disks 7, $7^{\times}$ the interval therebetween will be so wide (or great) that the bridge-piece 9 and the lug 10 will not engage the disks $7^{\times}$ and 7, and the cable will remain gripped. At the same time the switch-tongue is thrown into such a position that the car is made to continue along the main track $i$. The rocker-arm 12 is formed integral with the stop-arm 12' the free end of which has a flange 12'' and is arranged to bear against the shaft-supporting frame $e$, which thus limits its travel or swing in one direction.

The devices which control the cable-grip mechanism are located at the most advantageous positions along the cable-railway; thus, for example, as shown in Fig. 1, the releasing disks 7 are located at the top of an incline down which the car may coast, after the cable is released; while the tripper-block 2 which serves to bring about the automatic gripping of the cable, is located near the bottom of that incline (or it may be positioned near the beginning of the next upward incline).

The operation of my new cable-grip mechanism will now be readily understood and

is substantially as follows: Assuming the cable *s* to be gripped by the jaws *p*, and the car to be approaching the disks 7, (Fig. 1) the interval between the latter will be found too narrow to admit of the free passage of the lug 10 on the movable gripper *r* and the yoke-bar 9 on the stationary gripper *o*; that is, when the cable *s* is gripped by the jaws *p*, the distance from the outer face of the yoke-bar 9 to the cam-face $10^x$ of the lug 10 is greater than the interval between the disks 7. Therefore, as the grippers *o*, *r* pass between these two disks 7, the yoke-bar 9 of the gripper *o* rubs against one of the disks (the left-hand one in Fig. 2) while the cam-face $10^x$ of the lug 10 of the movable gripper *r* bears against the other disk, whereby the movable gripper *r* is swung upon its pivot-pin *q*, the jaws *p* are separated and the cable *s* is released. At the same time the notch *z* in the spindle *t* is brought into register with the detent *y* and the tripper-lever *w* acts like a counterweighted latch so that the detent *y* moves upwardly into the notch *z* and locks the spindle *t* with the jaws *p* apart or in cable-releasing position. The car now coasts down the incline (shown in Fig. 1) under the influence of gravity and momentum and meets the tripper-block 2, which is located at the bottom of that incline. The cam-roller *x* now rides up the cam face 3 of the tripper-block 2, whereby that end of the tripper-lever *w* is raised and the other end thereof is simultaneously thrown down so as to withdraw the detent *y* from the notch *z* in the spindle *t*. When the latter is released, the coil-spring *v* is free to act and throws the upper end of the movable gripper *r* to the left in Fig. 2 and thereby brings the movable jaw *p* of the same against the coöperating jaw of the stationary gripper *o* so that the cable *s* is again gripped. The cable *s* is led so that it will lie substantially on a level with the grooves *p'* at the point where it is to be gripped by the grippers *o*, *r*. If at any point of the railway the car is to be shunted to a branch track 21, the switch-arm 20 is brought into the position shown in Fig. 10, in which the eccentrically-mounted wheel or disk $7^x$ is thrown toward its coöperating disk 7 so far that the lug 10 of the movable gripper *r* is pressed against one of these disks, the jaw of the movable gripper *r* is swung away from the coöperating jaw *p* of the stationary gripper *o* and the cable *s* is released as hereinbefore described. If, however, the car is to continue on the main track *i* and the cable *s* is, therefore, not to be released, the switch-arm 20 is thrown in the direction of the arrow in Fig. 10, whereby the ecentrically-mounted disk $7^x$ is moved away from its coöperating disk 7 so far that the grippers *o*, *r* pass freely through the interval between the two disks $7^x$, 7 without engaging the same. Hence, the jaw *p* of the movable gripper *r* is in this case not forced away from the coöperating jaw *p* of the stationary gripper *o* and the cable *s* consequently remains held firmly by and between these jaws.

If so desired, the gears 6 and driving pulley 8 may be dispensed with so that the disks 7 will not be positively driven but will then act as idlers in the same manner as do the disks $7^x$, 7 shown in Figs. 10 and 11.

In ordinary contractors' cable railways and in cable railways used in coal handling and in mines, tunnels and other underground work, the rails *i* may be mounted upon a flooring laid upon the joists *a*, and in this case the length of the depending portions *o*, *r*, of the cable-grip mechanism may be shortened considerably. Inasmuch as cable railways having the construction just referred to are extremely common, it is believed that no illustration and no further description of the same need be given.

I claim:

1. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other; automatically-operating means for throwing one of said jaws toward the other to grip the cable; and an automatically-operating device for pressing said movable jaw away from the other jaw to release the cable; said device and means being separate from and independent of each other.

2. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other; a spring for throwing one of said jaws toward the other jaw to grip the cable; means for pressing said movable jaw away from the other to release the cable; and a detent for locking siad movable jaw in cable-releasing position.

3. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other; automatically-operating means for throwing one of said jaws toward the other to grip the cable; automatically-operating means for pressing said movable jaw away from the other jaw to release the cable; and manually-operated means for pressing said movable jaw away from the other jaw to release the cable.

4. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other; automatically-operating means for throwing one of said jaws toward the other to grip the cable; and a disk which is arranged to press against said movable jaw and thereby force the same into cable-releasing position.

5. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other and is formed with a lug; a spindle connected with said movable

jaw and formed with a recess; a detent arranged to engage in said recess; a spring mounted on said spindle and arranged to throw said movable jaw into cable-gripping position, when said detent is withdrawn from said recess; and a disk arranged to press against said lug and thereby force said movable jaw into cable-releasing position.

6. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other; automatically-operating means for throwing said movable jaw toward the other to grip the cable; and a pair of disks between which said jaws pass and against which said jaws press for throwing said movable jaw into cable-releasing position.

7. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other; automatically-operating means for throwing one of said jaws toward the other to grip the cable; automatically-operating means for pressing said movable jaw away from the other to release the cable; and mechanism for throwing the last-named means into operative position.

8. A cable-grip mechanism comprising a pair of jaws one of which is movable with respect to the other; automatically-operating means for throwing one of said jaws toward the other to grip the cable; automatically-operating means for pressing said movable jaw away from the other to release the cable; and switch-operating mechanism for throwing the last-named means into operative position.

Signed in the borough of Manhattan, city, county and State of New York, this 29th day of October, A. D., 1912, in the presence of the two undersigned witnesses.

ROBERT FLEMING ARNOTT.

Witnesses:

HUGH H. RAINEY,

CLARENCE HENNE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."