(No Model.) 2 Sheets—Sheet 1.

J. F. APPLEBY.

CABLE RAILWAY GRIP ATTACHMENT.

No. 421,538. Patented Feb. 18, 1890.

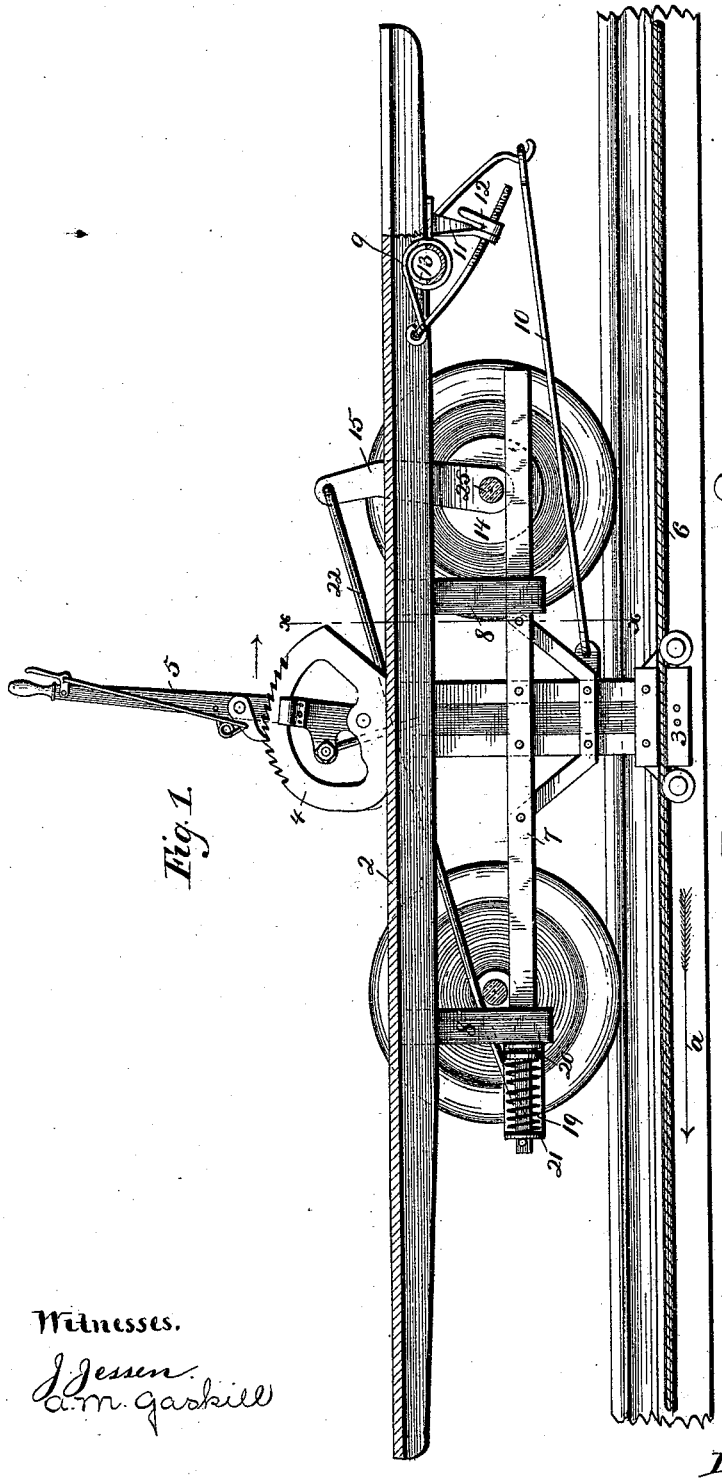


Fig. 1.

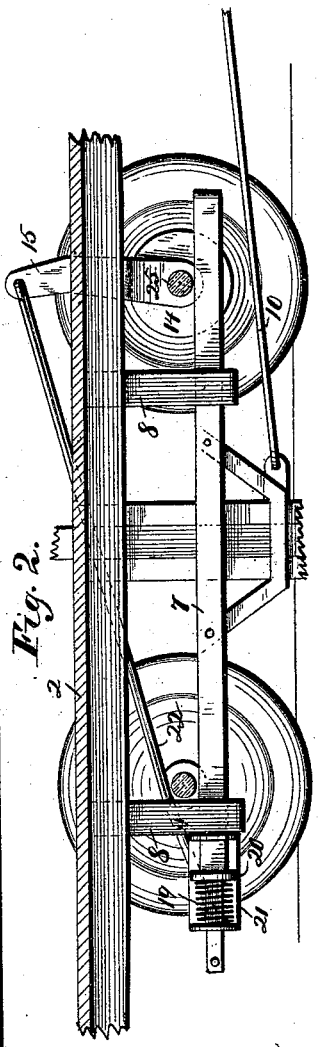


Fig. 2.

Witnesses.
J. Jessen.
A. M. Gaskill

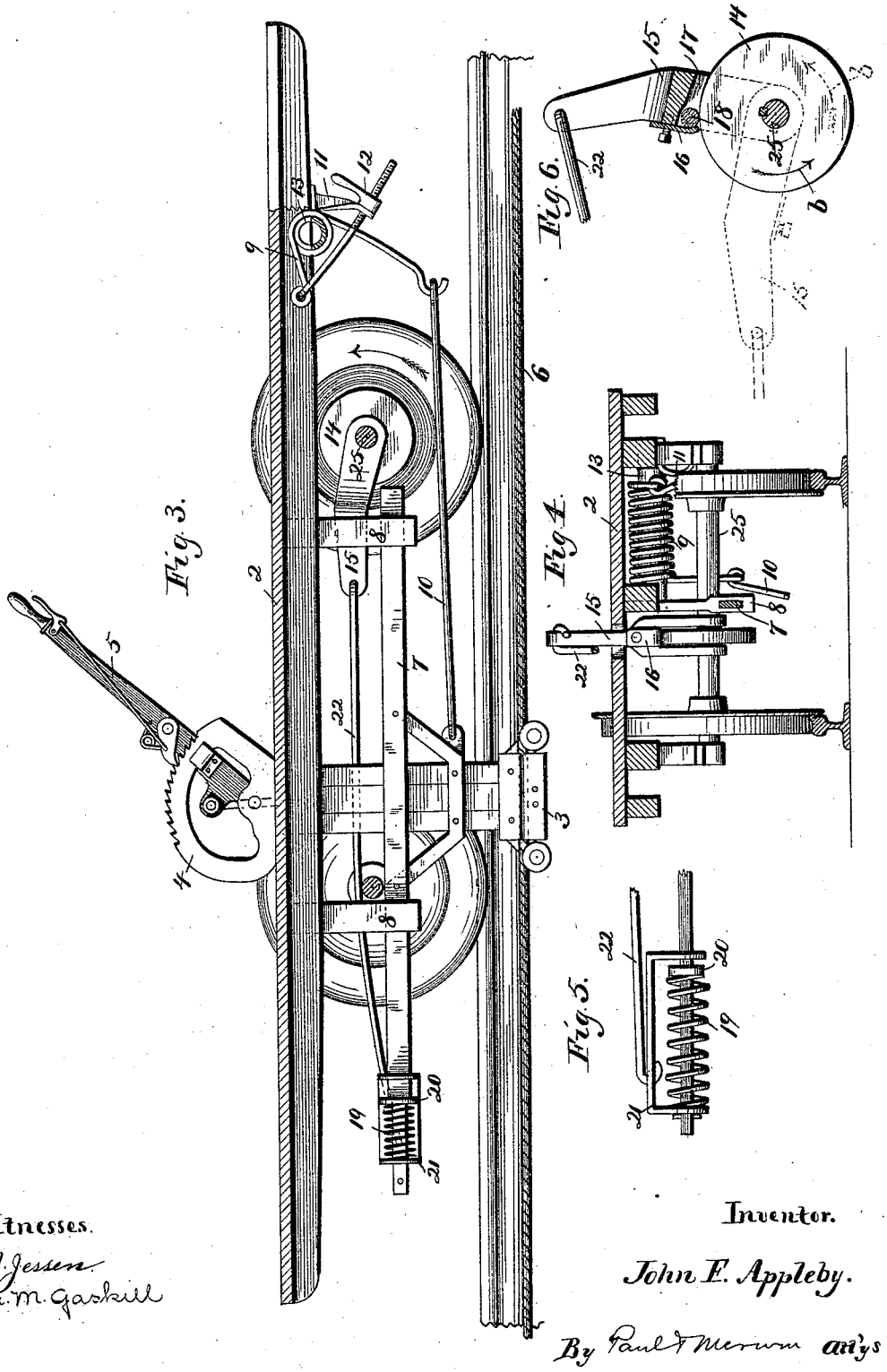
Inventor.
John F. Appleby.
By Paul & Munn attys

(No Model.) 2 Sheets—Sheet 2.

J. F. APPLEBY.

CABLE RAILWAY GRIP ATTACHMENT.

No. 421,538. Patented Feb. 18, 1890.



Witnesses.
J. Jessen
A. M. Gaskill

Inventor.
John F. Appleby.
By Paul & Merwin atty's

UNITED STATES PATENT OFFICE.

JOHN F. APPLEBY, OF MINNEAPOLIS, MINNESOTA.

CABLE-RAILWAY-GRIP ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 421,538, dated February 18, 1890.

Application filed May 1, 1889. Serial No. 309,213. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. APPLEBY, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Cable-Railway-Grip Attachments, of which the following is a specification.

My invention relates to the grips of ordinary cable railways, and its object is to so secure and connect said grip to its car as to prevent the cable from slipping through the grip when grasped by it, and also to prevent sudden jerks to the car in starting or from irregular movement of the cable; and it consists, generally, in the construction and combination hereinafter described, and particularly pointed out in the claims.

With the grip secured in a fixed position to the car in the ordinary manner, when the grip seizes the moving cable to start the car from a dead stop, there is inevitably some slip of the cable through the grip and more or less of a jerk given to the car proportioned inversely to the amount of slip of the cable through the grip. This is a severe strain upon the car, disagreeable and sometimes dangerous to passengers, and very injurious to the cable. It is frequently the case, also, when there is an undue amount of "slack" in the cable, that the car is pulled along with violent jerks, although the cable may not slip through the grip. By means of my improvement, however, these serious defects in construction and operation are wholly obviated. Though the cable be firmly and suddenly grasped by the grip, the car is started with a gradual and accelerating movement, the cable meanwhile being held without slipping. I accomplish this by providing a sliding connection of the grip with the car and a suitable clutch on the car-axle connecting with the grip, by means of which a positive impulse is given to the wheels of the car directly from the grip, the grip being held in its normal position by a strong adjustable spring, which counteracts and compensates for all violent and sudden movement of the cable or grip.

In the drawings forming part of this specification, Figure 1 is a longitudinal vertical section of a grip-car, showing the grip and my improvements attached thereto in elevation and the position of the parts while the car is at rest and the cable running loosely in the grip. Fig. 2 is a side elevation of the grip and attachments, showing position of grip and of its compensating spring at the first movement after clutching the cable. Fig. 3 is a similar view to Fig. 1, showing the position of parts after the first forward movement of the car. Fig. 4 is a detail cross-section of the car on line $x\,x$ of Fig. 1, showing the grip-controlling spring. Fig. 5 is a detail of the compensating-grip spring, and Fig. 6 is a detail of the clutch mechanism.

In the drawings, 2 represents the car body or floor, 3 the grip, of ordinary form, having a suitable quadrant 4 and a lever 5, adapted to engage with and lock with the same.

6 is the cable, the direction of its movement being indicated by the arrow *a*, Fig. 1. The grip 3 is preferably provided with the horizontal reciprocating bar 7, slidably supported in suitable depending standards 8, underneath the car-body, whereby the grip has freedom of movement longitudinal of the car between the standards 8, its normal position being next the rear standard, as shown in Fig. 1.

The movement of the grip is governed and partially controlled by the coil-spring 9, which is supported underneath the car-body at the rear of the grip. This spring is coiled about a suitable spindle or axis 13 and has one end connected with the grip by a suitable link 10 and the other end adjustably secured to a suitable support 11 by means of the set-screw 12, whereby the tension of the spring may be increased or diminished. By this means the "pull" of the cable when seized by the grip is transmitted to the spring, which neutralizes all sudden jerks and strains that otherwise would be transmitted directly to the car. This grip moves forward against the tension of the spring, which is preferably adjusted so as to return it to its normal position when the car is under full headway.

In order to transmit a direct and positive impulse to the car-wheels from the grip in order to start the car, I provide a suitable clutch A, secured to the rear axle of the car, having suitable link-connection with the grip.

While any suitable means may be used, I prefer to employ that shown in the drawings, which consists of the disk 14, rigidly secured upon the axle 25 as its axis, the forked clutch-arm 15 embracing said disk and pivoted upon said axle. Resting upon the periphery of the disk, and loosely held by the plate 16 in the recess 17 of the clutch-arm, is the friction-roll 18.

When the arm 15 is in its normal or vertical position, as shown in detail, Fig. 6, and the disk is being rotated by the turning of the axle in the direction indicated by the arrow *b*, the friction-roll is carried forward against the plate 16 and rolls freely upon the periphery of the disk. If, however, the disk is at rest and the arm 15 is drawn forward, the friction-roll is wedged into the narrowed space in the recess and upon the disk, thus clutching it firmly and carrying it forward with the movement of the arm, and thus turns the axle and carries the car forward. This clutch mechanism is designed to assist in giving a first impulse to the car. I prefer, therefore, to make the arm 15 considerably longer than the radius of the car-wheel, whereby greater power and slower speed are obtained for starting the car. At first the motion is much slower than the movement of the cable; but as the lever is progressively fore-shortened its leverage upon the disk is practically shortened, and consequently the motion of the axle is increased until it nearly equals the speed of the cable as the arm approaches the line of the draft between the axle and the connections with the reciprocating bar or grip. In order that the power may be applied to the clutch gradually to prevent severe strain or jerk, I prefer to provide the compensating spiral spring 19, secured to the forward end of the reciprocating bar 7. This rests against a collar or stop 20, rigidly secured to the bar, while its opposite end presses against the forward end of the yoke 21, which is adapted to slide longitudinally on said bar. To this yoke is secured the link 22, which is secured at its opposite end to the clutch-arm 15, so that the first forward movement of the bar when the grip clutches the cable tends to compress the spring before the clutch-arm moves forward at equal speed, thus preventing a jerk and also any slip of the car-wheels on the track. The forward motion of the clutch-arm is quickly accelerated until the spring 19 expands to its limit in the yoke. The tension of the spring 9, adding its strength, quickly impels the car forward till it overtakes the grip by acquiring equal speed, and, being still impelled by the assistance of the tension of the spring 9, acquires more rapid movement than the cable, whereupon the grip is relatively to the car carried back to its normal position, in which position it remains while a regular speed of the cable is maintained. Should the cable, however, be jerked forward, as sometimes occurs by reason of slack, the mechanism above described serves to compensate for such irregular movement, so that it is hardly perceptible in the movement of the car, the parts only partially performing their functions, as described.

The spring 9 may be adjusted to different weights of trains or for ascending grades, so as to hold the grip in its normal position, except in starting and when sudden irregular movements of the cable take place.

I claim as my invention—

1. The combination, with a cable car, of a grip arranged to slide longitudinally in said car and provided with mechanism automatically controlling the position of said grip relative to the starting and moving position of the car, and a clutch mechanism connecting said grip with the axle of the car.

2. The combination, with a cable car, of a clutch connected with the car-axle and provided with an operating-arm connected to a member of the moving grip-frame, and a movable grip arranged upon the car and adapted to slide thereon and connected with said arm, whereby as said grip is moved the arm is turned and is progressively foreshortened and the car is started with a progressively-increasing speed.

3. The combination, with a cable car, of a grip arranged to reciprocate longitudinally of said car, a spring-controlled connection between said grip and said car, and a clutch connected with said grip and adapted to engage an axle of the car.

4. The combination, with a cable-railway grip-car, of a suitable grip supported underneath said car and adapted to reciprocate longitudinally of the same, suitable spring-controlled link-connection between said grip and said car, a suitable clutch connected with said grip adapted to engage an axle of the car, and a suitable compensating spring interposed between said clutch and said grip, substantially as and for the purpose set forth.

5. The combination, with a cable-railway car, of a suitable cable-grip adapted to be reciprocated longitudinally of said car and having a suitable spring adapted to hold its normal position, and a suitable clutch having suitable elastic connection with said grip and adapted, when operated by the forward movement of said grip, to engage with and rotate an axle of said car, substantially as and for the purpose set forth.

6. In a cable-railway car having a spring-controlled slidable grip, means for starting the car by a positive rotating of the car-wheels, comprising, essentially, a suitable disk rigidly secured to an axle of the car, a suitable clutch engaging said disk, suitable link-connections between said clutch and said grip, whereby the movement of the grip operates said clutch, substantially as and for the purpose set forth.

7. In a cable-railway car, the combination, with the grip 3, having the reciprocating bar 7,

of the adjustable coil-spring 9, secured to the car and connected with said grip by the link 10, the clutch A, secured to the axle 25, the link 22, connecting said clutch to the reciprocating bar 7, and the compensating spring 19, interposed between said link and said bar, combined and operating substantially as described.

In testimony whereof I have hereunto set my hand this 25th day of April, 1889.

JOHN F. APPLEBY.

In presence of—
T. D. MERWIN,
A. M. GASKILL.