(No Model.) 2 Sheets—Sheet 1.

F. ESPEL.

CABLE CAR STOPPER.

No. 414,304. Patented Nov. 5, 1889.

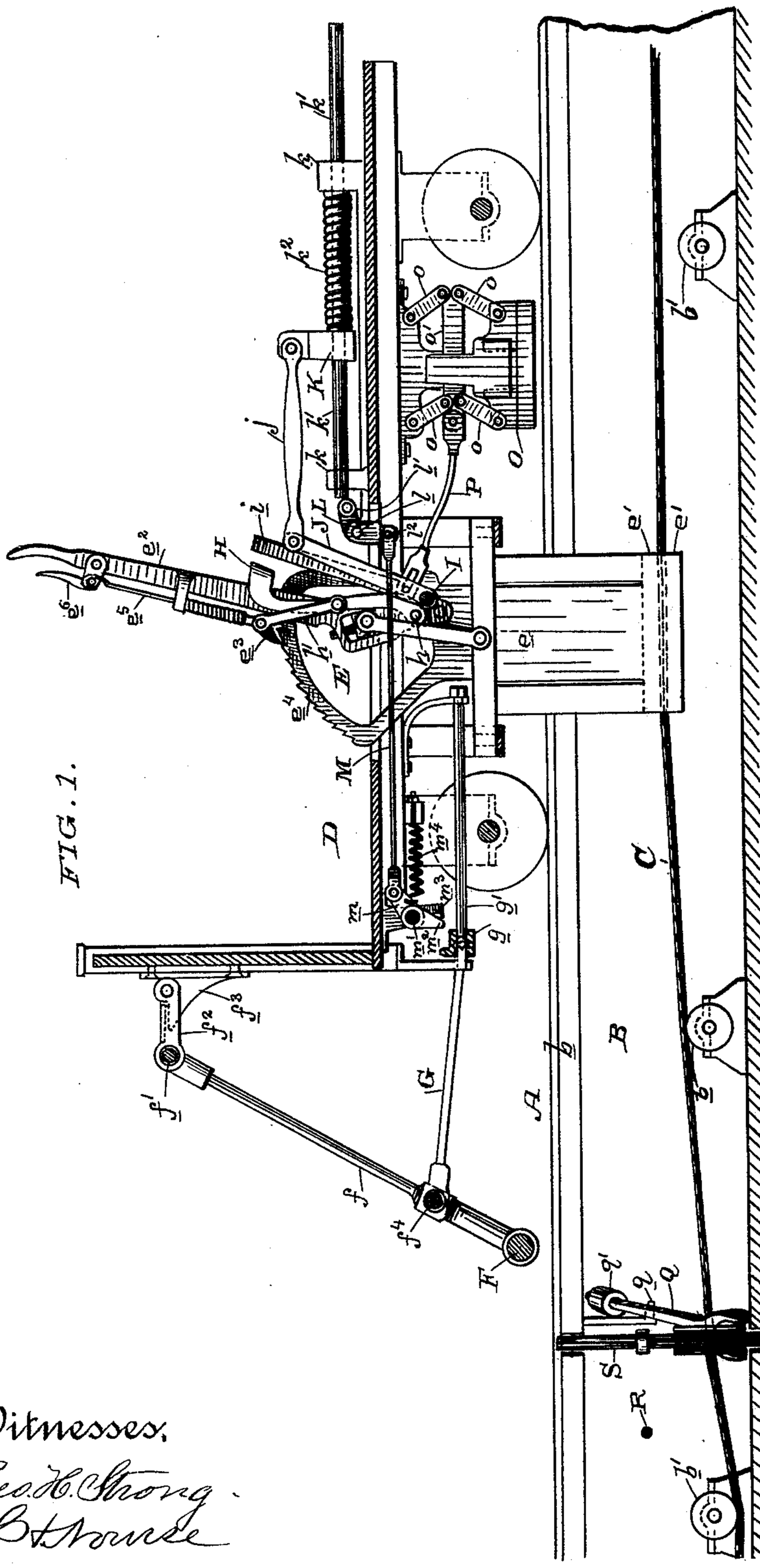

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

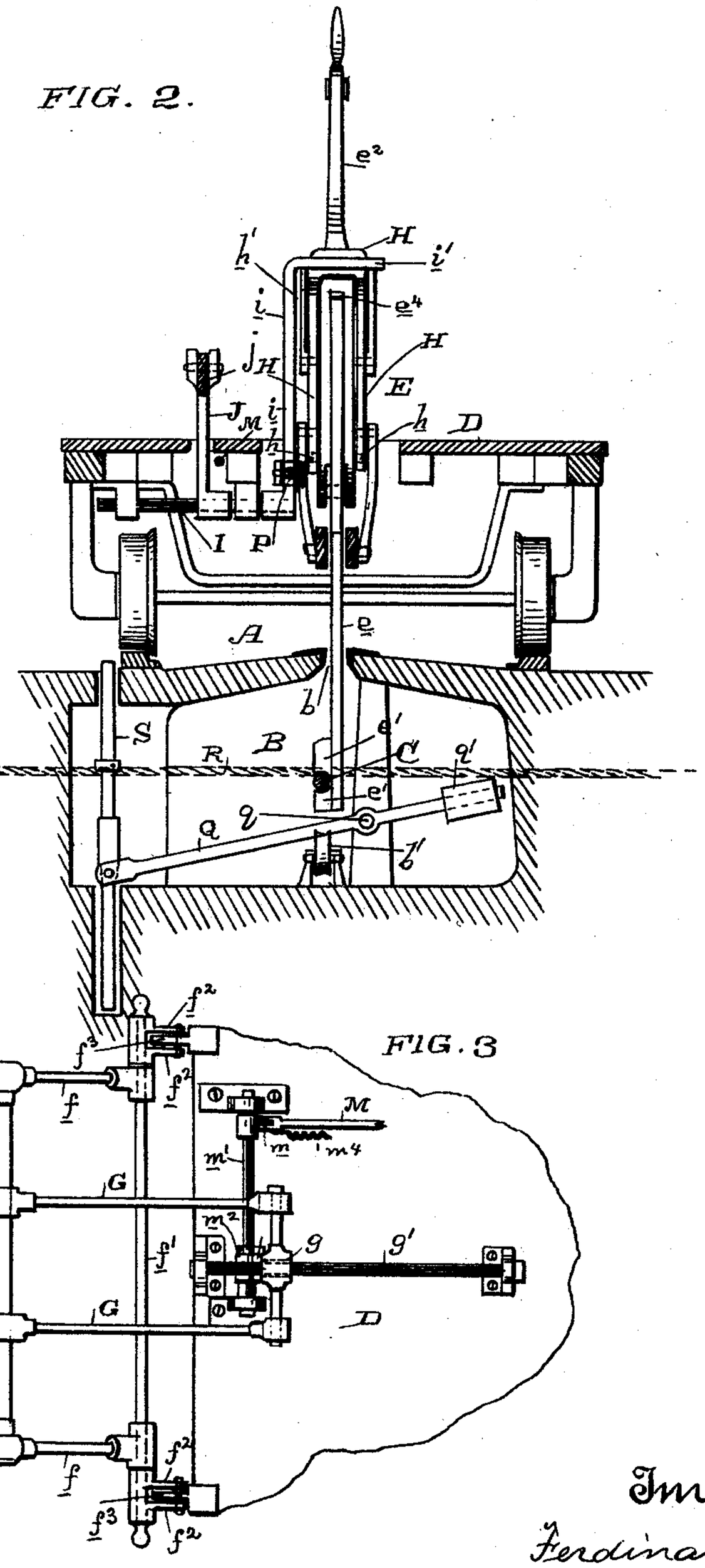

FIG. 3

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UNITED STATES PATENT OFFICE.

FERDINAND ESPEL, OF SAN FRANCISCO, CALIFORNIA.

CABLE-CAR STOPPER.

SPECIFICATION forming part of Letters Patent No. 414,304, dated November 5, 1889.

Application filed July 26, 1889. Serial No. 318,801. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND ESPEL, of the city and county of San Francisco, State of California, have invented an Improvement in Automatic Cable-Car Stoppers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates, generally, to the class of cable railways, and especially to that class of devices in connection with said railways which are adapted to operate automatically to stop the car.

My invention consists in the novel devices, constructions, combinations, and arrangements hereinafter fully described, and specifically pointed out in the claims.

The object of my invention is to automatically stop a car, this result being effected upon contact with an obstructing body of any kind, whereby injury to said body or to the car or to the passengers in a car may be prevented.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a vertical longitudinal section of road-bed and car. Fig. 2 is a cross-section of same. Fig. 3 is a bottom view of the front of the car and the front guard.

A is the road-bed of a cable railway, of which B is the tube or tunnel having in its top the usual continuous grip-slot *b* and within it the carrying-sheaves *b'*, upon which travels the cable C.

D represents a car the wheels of which travel upon the track-rails of the road-bed in the usual manner. This car carries any suitable form of gripping device, here represented generally by E, said gripping device having on the lower portion of its shank *e*, which passes down through and travels in the slot of the road-bed, the jaws *e'*, which grip the traveling cable. This grip is operated by the usual lever e^2, which carries a spring-controlled pawl e^3, engaging a rack e^4, all in the usual manner.

The first object of my invention is to automatically release the grip from the traveling cable when an obstruction is encountered; and to this end I have the following mechanism:

F is a front guard in the shape of a bar extending transversely of and just above the road-bed. This guard is carried by hangers *f*, the upper ends of which are pivoted on a cross-shaft *f'*, the ends of which are carried by links f^2, which are pivoted to brackets f^3 on the top front of the car. This guard may thus have a movement about the pivotal centers of its hangers *f*, and in addition thereto a movement about the pivotal centers of the links f^2, so that said guard may move backwardly and forwardly through an arc of a circle with the hanger-pivots for centers, and may also rise and fall about the pivotal centers of the links.

Connected with a cross-bar f^4, extending between the hangers *f*, are rods G, which extend under the car and have a cross-head *g* on their inner ends, said cross-head being fitted and adapted to slide upon a fixed guide-rod *g'*, secured suitably under the car.

Pivoted at *h* on each side of the lower portion of the grip-frame E is a forked push-lever H, which extends upwardly beside and behind the grip-lever e^2 and lies immediately over the rack e^4. This push-lever has pivoted to it on each side the links *h'*, the upper ends of which are connected with the pawl e^3 of the grip-lever.

Mounted under the car is a short cross-shaft I, from one end of which extends upwardly through the car the arm *i*, having a bent upper end *i'*, adapted to come in contact with the end of the push-lever H. From this rock-shaft also rises a lever-arm J, the upper end of which is connected by a link *j* with a sliding head K, mounted on guides *k* on the car in convenient position, preferably under one of its seats. This head has a slide-rod *k'*, which moves back and forth with it, and around this rod and operating against the head is a strong spring k^2, tending to throw said head and rod forwardly, thereby rocking the shaft I.

Pivoted at *l* in the car-floor is a lock-bar L, the upper end of which is provided with an anti-friction roller *l'*, which is adapted by the movement of said bar to come into position directly in front of the slide-rod *k'* when said rod is forced back, causing its head to compress the spring k^2, and thus holding the rod and spring in this backward or set con-

dition. With a small downwardly-extending arm l^2 of the lock-bar L is connected a rod M, which extends forwardly under the car and is attached at its forward end to a crank-arm m of a rock-shaft m', said shaft carrying on its other end a loosely-swinging gravity-trigger m^2, which has a free movement forwardly, and is limited from moving backwardly and is held in a vertical position by means of a stop m^3 on the shaft m'. This trigger lies in the path of the cross-head g of the guard-rods G. A spring m^4 holds the connecting-rod M backward, thereby causing the lock-bar to rise to position in front of the slide-rod.

This mechanism will be better understood by now describing its operation. When the car is traveling normally, the grip-lever e^2 is drawn back, so as to cause the jaws e' of the grip to engage the traveling cable C, and said lever is held in this position by the pawl e^3, which engages the rack e^4. The front guard F is extended from the front of the car at a considerable angle, so as to project a good distance in front of the car. Now, when an obstructing body is met the front guard F is forced backward, and the cross-head g of its rods G, thereupon coming in contact with the swinging trigger m^2 of the rock-shaft m', moves said shaft; and this movement through the connecting-rod M turns the lock-bar L downward, thereby releasing the slide-rod k', whereupon the spring k^2 immediately throws the sliding head K forward, and this movement through the link j and the lever-arm J rocks the shaft I, the other arm i of which causes its bent end i' to come in contact with the push-lever H and forces said lever forwardly about its pivotal centers h below. This forward movement of the push-lever through the links h' raises the pawl e^3 from engagement with the rack e^4 and allows the grip-lever e^2 to be pushed forwardly, thereby releasing the cable from the jaws of the grip. Now, when the obstructing body is removed the parts are returned to normal position by resetting the slide-rod k' and extending the front guard F again, its cross-head g passing the swinging trigger m^2 in this direction. It will be seen that by this construction the grip-lever cannot be thrown back to cause the jaws to take hold of the cable without setting the parts, for its push-lever H will come in contact with the arm i of the rock-shaft I and turn everything back.

To prevent pinching the gripman's hand when the pawl is raised automatically, the connection of the usual lifting-rod e^5 with the handle e^6 is a sliding one, allowing the rod to move up without affecting the handle.

It is the intention also to assist in stopping the car by braking it instantly and automatically. Under the car is a brake O, consisting of a bar adapted to enter and bind in the slotway of the road-bed. This bar is vertically movable by being swung on toggle-levers o, connected by a moving bar o', the whole of this device forming a known style of brake. To cause it to operate automatically, I connect the forward end of the moving bar o' of the brake by means of a rod P with the upwardly-extending arm i of the rock-shaft I, so that when said arm is thrown forward, as heretofore described, in order to release the grip, it also effects through the rod P the movement of the bar o' and puts on the brake.

The connection of rod P with the arm i is a sliding one, to permit the brake to operate by the usual hand-lever. I do not confine myself to this form of brake, as others may be used. The obstructing body, which is liable to cause this automatic action of the mechanism, may be animate or inanimate, because it is the object of my invention not only to protect persons falling in front of the car from injury, but also to protect persons in the car itself and to avoid damage to the car. These latter objects are effected by avoiding a common danger, which I will now explain. Where one cable crosses another in a higher plane, it is necessary to release the underlying cable before reaching the cross-cable, so that the grip will not come in contact with and cut said cross-cable. It is the common practice for the upper cable, which has the right of way, to be protected from this injury by what is known as a "bumper," located in the tube or tunnel and operating in such a manner as that the approaching grip, which for any reason has not been released from the cable, will come in contact with the bumper, and thereby stop the car; but this stoppage is a violent one, and when through any neglect of the gripman the bumper is encountered it almost alway happens that injury to the passengers or to the car results. These bumpers are usually pivoted bars extending across the cable-tunnel and adapted to be lifted into the path of the grip by the traveling cable under it, the plane of which is raised if the grip is not released from it soon enough, so as to allow it to drop. In my construction I have shown a bar Q, which is located transversely of the tunnel at a little distance in front of the cross-cable R. This bar is pivoted at q and has on its end an adjustable weight q'. The other end of the bar, I provide with an upwardly-extending spindle S, which passes up through the roadway, and when in a normal position has its top just about flush therewith, so as not to be in the way. Now, if the gripman neglects to release the cable in time, the cable will be lifted, and, gradually bearing up under the bar Q, will turn said bar about its pivotal center q, thereby raising the spindle S at its end and causing it to project above the road-bed. Then when the car gets near enough the front guard F, heretofore described, comes in contact with the spindle, said spindle serving as an obstructing body, and the operation of the mechanism takes place as heretofore described, whereby the

cable is instantly released and the brakes put on. The car is therefore stopped before it can reach the cross-cable. The weight on the end of the bumper is for assisting the cable in raising the obstructing spindle. The vertical movemement which the front guard can have will prevent an obstructing body from wedging under it, and its position so far in front of the car provides for sufficient space in which the car can be stopped after encountering the obstructing body.

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

1. In a cable-car-stopping mechanism, and in combination with the cable-grip of the car having an operating-lever and a pawl and rack for controlling the position of the lever, a swinging guard carried by the front of the car, a swinging push-lever carried by the grip and connected with the pawl for raising it from its engagement with the rack, a rock-shaft under the car having an arm adapted to come in contact with the push-lever of the grip, a slide-rod, and a spring for throwing said rod forward, connections between said rod and the rock-shaft, whereby, when the rod is released, the shaft is rocked, the pivoted lock-bar for holding said slide-rod, and connections between the lock-bar and the swinging guard of the car, whereby the bar is tripped, substantially as herein described.

2. In a cable-car-stopping mechanism, and in combination with the cable-grip having an operating-lever and a pawl and rack for controlling the position of said lever, a swinging guard carried by the front of the car, a swinging push-lever carried by the grip and connected with its pawl for raising it out of its rack, a rock-shaft having an arm adapted to come in contact with the push-lever of the grip, a sliding spring-actuated rod connected with the rock-shaft for operating it, a pivoted lock-bar for holding the sliding rod, a rock-shaft under the car, carrying a trigger operated by contact with the swinging front guard, and spring-controlled connections between said rock-shaft and the lock-bar of the sliding rod, substantially as described.

3. In a cable-car-stopping mechanism, and in combination with the cable-grip having the operating-lever and the pawl and rack for defining the position of the lever, the push-lever pivoted to the grip, and the links connecting the push-lever with the pawl, whereby, when said lever is forced forward, the pawl is raised from its engagement, substantially as described.

4. In a cable-car-stopping mechanism, and in combination with the cable-grip having the operating-lever and the pawl and rack for defining the position of the lever, the push-lever pivoted to the grip, and the links connecting the push-lever with the pawl for raising said pawl, a swinging guard at the front of the car, and intervening connections whereby the movement of the guard is transmitted to operate the push-lever, substantially as described.

5. In combination with the front of a car, the transverse guard, the hangers pivoted at their upper ends and suspending the guard, the shaft on which the hangers are pivoted, and the swinging links carrying the shaft, substantially as described.

6. In a cable-car-stopping mechanism, and in combination with the cable-grip having an operating-lever, and pawl and rack for defining the lever's position, the transverse guard at the front of the car, the hangers suspending it, the cross-shaft on which the upper ends of the hangers are pivoted, the swinging links carrying the cross-shaft, the inwardly-extending rods G, carried by the guard and having a sliding cross-head g, and connections between said cross-head and grip, whereby its pawl is released from the rack, substantially as described.

7. In a cable-car-stopping mechanism, and in combination with its cable-grip having an operating-lever, and pawl and rack for defining the position of the lever, the swinging guard on the front of the car, having backwardly-extending rods G, with the cross-head g, the fixed guide-rod on which said cross-head moves, the rock-shaft m', with the gravity-trigger m^2, into contact with which the cross-head comes for rocking the shaft, the pivoted lock-bar L, and the spring-controlled connecting-rod M, joining the said bar and rock-shaft, the slide-rod k' and head K, the spring k^2 of said head and rod, the rock-shaft I, having the upwardly-extending lever-arm J, and link j, connecting it with the sliding head, the bent arm i of said rock-shaft, the pivoted push-lever of the grip-frame, and links connecting it with the pawl of the grip-lever, all arranged and adapted to operate substantially as described.

8. In a cable-car-stopping mechanism, and in combination with its cable-grip having an operating-lever, and pawl and rack for controlling the position of the lever, the swinging guard carried by the front of the car, the rock-shaft I under the car, having an operating-arm for releasing the pawl from the rack, the spring-controlled slide-rod k' and connections for rocking the shaft, the pivoted lock-bar and connections for holding it in place, the trigger operated by the front guard for releasing the lock-bar, the vertically-movable brake, and the rod P, connecting the operating mechanism of the brake with the arm of the rock-shaft, substantially as described.

9. In a cable-car-stopping mechanism, the swinging guard in front of the car, and connections by which the movement of said guard operates to stop the car, in combination with the pivoted bar Q in the tunnel of the cable railway and above the cable therein, and the vertically-movable spindle on the end of said bar and adapted to be projected up through the roadway in front of the guard, substantially as described.

10. In a cable-car-stopping mechanism, the pivoted bar Q, mounted transversely in the cable-tunnel and above the cable therein, and the spindle S on the end of said bar passing up through and adapted to be projected above the road-bed by the uprising cable, in combination with a swinging guard on the front of the traveling car, and connections between said guard and the grip-lever of the car, whereby said grip-lever is released by the action of the guard when coming in contact with the spindle, substantially as described.

In witness whereof I have hereunto set my hand.

FERDINAND ESPEL.

Witnesses:
C. D. COLE,
J. H. BLOOD.