No. 653,441. Patented July 10, 1900.

J. CRAIG, JR.

GRIP MECHANISM FOR CABLE RAILWAYS

(Application filed Aug. 4, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 3

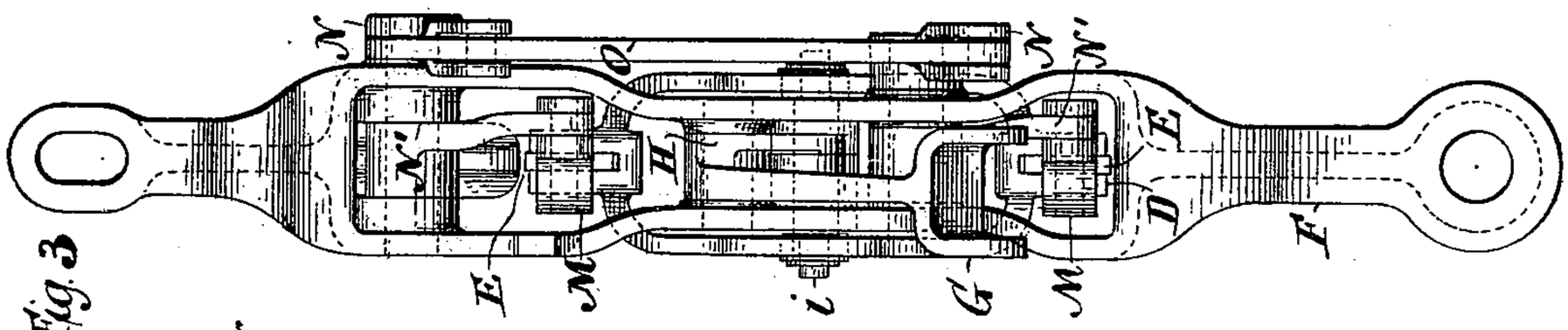

Fig. 2

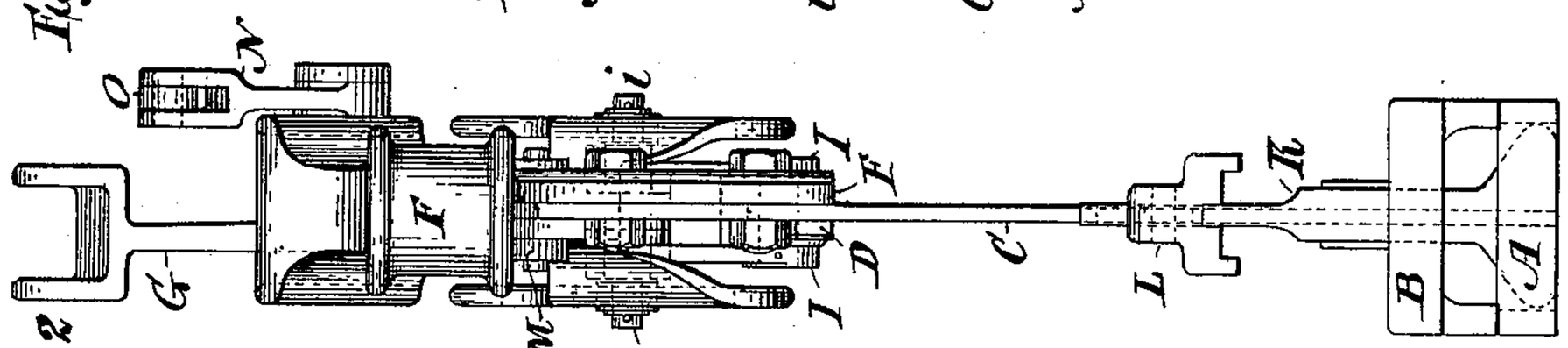

Fig. 1

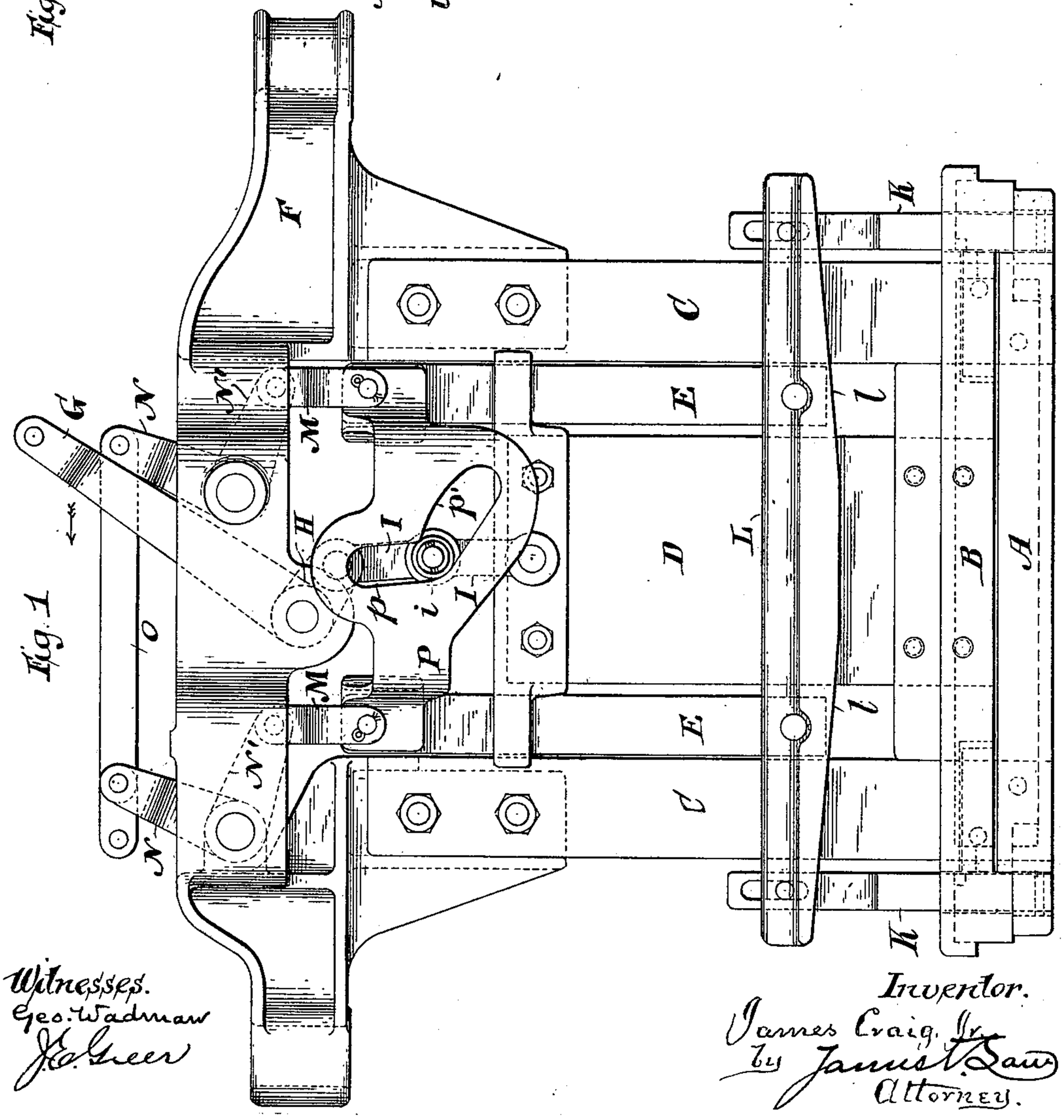

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Fig. 4

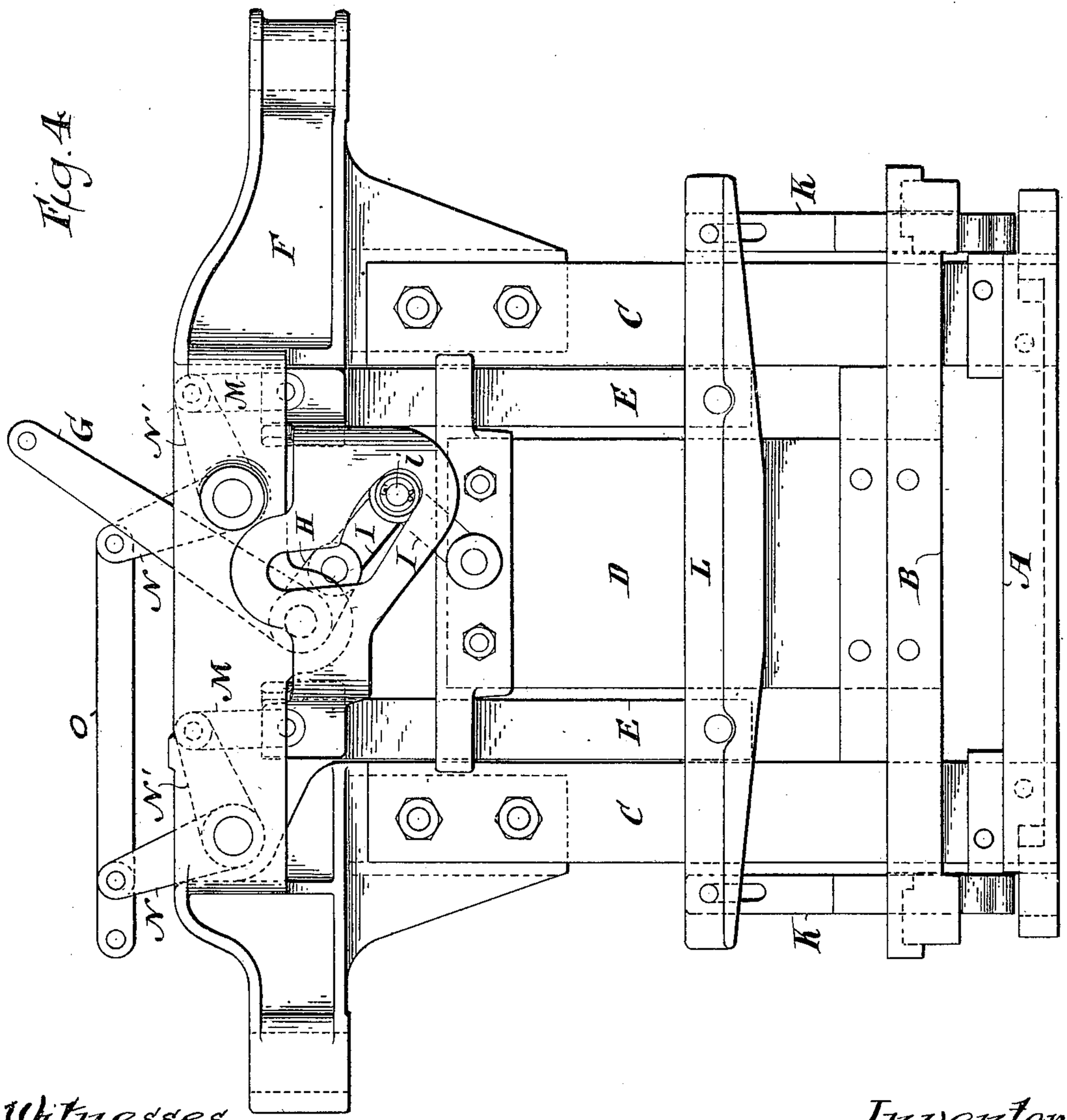

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Fig. 6

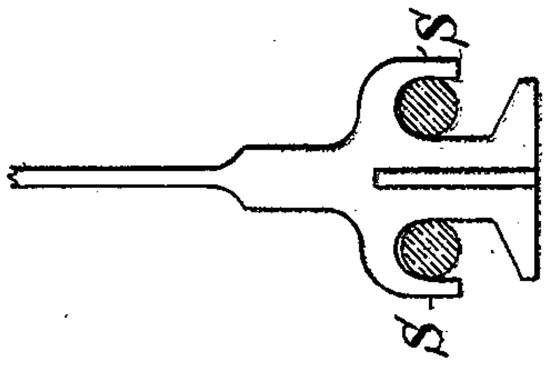
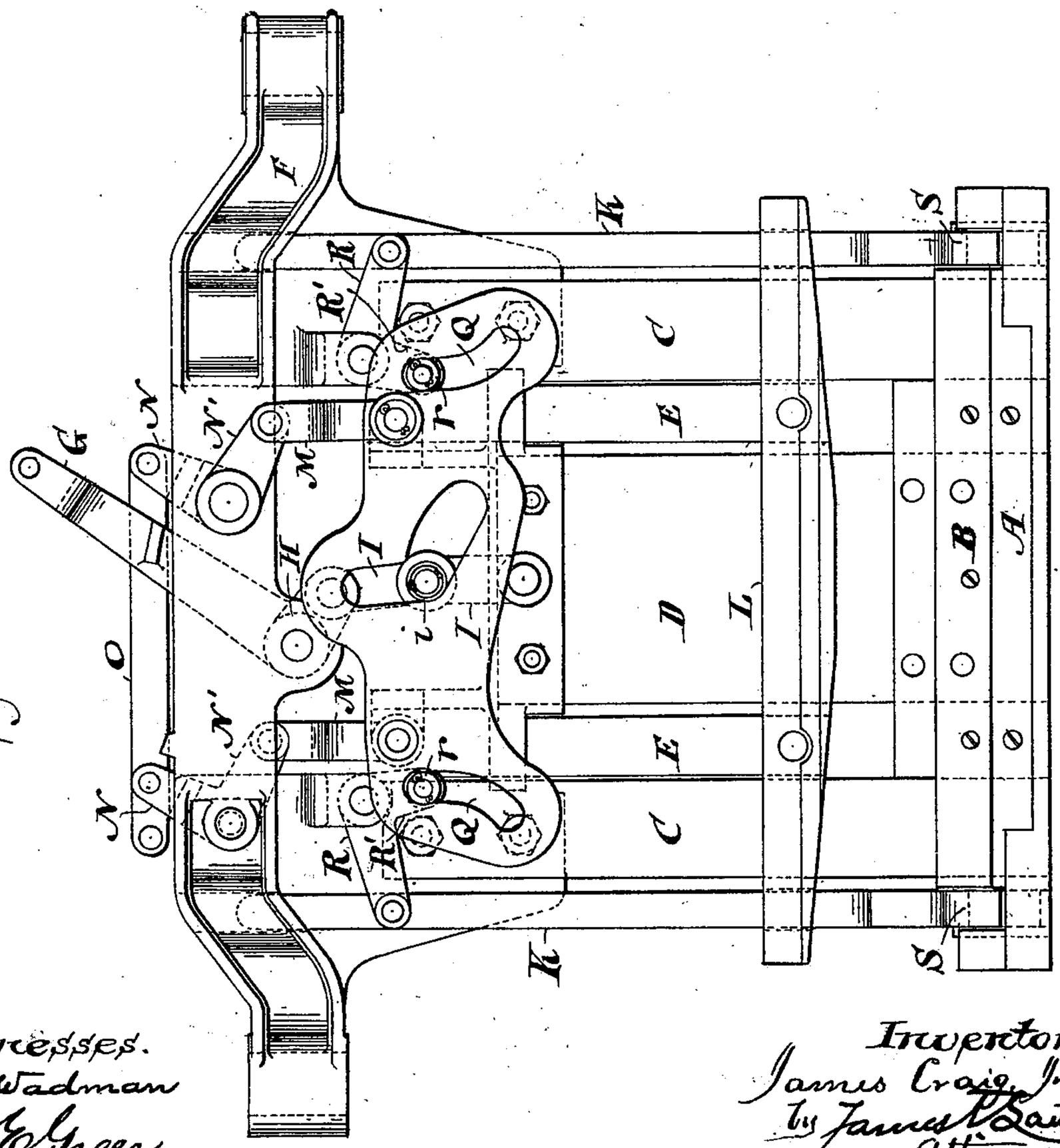


Fig. 5



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UNITED STATES PATENT OFFICE.

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GRIP MECHANISM FOR CABLE-RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 653,441, dated July 10, 1900.

Application filed August 4, 1898. Serial No. 687,669. (No model.)

To all whom it may concern:

Be it known that I, JAMES CRAIG, Jr., a citizen of the United States of America, and a resident of the city of New York, State of New York, have invented certain new and useful Improvements in Grip Mechanism for Cable-Railways, of which the following is a specification.

This invention relates to that class of grips for cable-railways provided with ejectors by which the cable is thrown out of or removed from the jaws of the grip; and the improvements herein consist in the combination recited in the claims.

In the accompanying drawings, illustrating my improvement, Figure 1 is a side elevation of the grip. Fig. 2 is an end view of the same. Fig. 3 is a plan view looking down on the top of the grip. Fig. 4 is the same as Fig. 1, showing the grip-jaw and ejector raised. Fig. 5 is a side elevation of the grip, showing a modified construction of the ejectors; and Fig. 6 is a view of the lower end of one of the ejectors in Fig. 5.

A is the lower fixed jaw, suspended by the frame or plates C C from the grip-head F.

B is the upper movable jaw, attached to and operated by the central plate or shank D. This shank is raised and lowered to operate the jaw B and grip and ungrip the cable by the bell-crank G H, pivoted to the heading F, the shorter arm H of which is connected to one end of the link I, attached to the shank D. To the longer arm G of the bell-crank is connected mechanism extending to the ends of the car and operated by the gripman.

As will be understood from the drawings, when the arm G of the bell-crank is moved by the gripman in the direction of the arrow the short arm H is raised and by means of the link I draws up the shank D and jaw B and opens the grip, and when the arm G is moved in the opposite direction the shank D and jaw B are pushed down and the grip closed.

At each end of the grip are the cable-ejectors K K, hung from the horizontal ejector-bar L. This ejector-bar, which extends across the face of the grip, is supported by the movable shanks E E, arranged on each side of the central jaw-operating shank D. The lower ends of the ejectors, which ordinarily are below the cable in the grip, are of such a shape that when the ejectors are raised to a sufficient height they push or throw out the cable from between the jaws of the grip. The ejectors may be operated by the gripman from the end of the car, and also automatically as the car moves along the track by devices placed in the conduit at those points where it is desired to remove the cable from the grip.

The mechanism for operating the ejectors by the gripman from the car is as follows: To the upper ends of the shanks E E are secured one end of the links M M, the other ends of which are connected to one arm of the bell-cranks N N′. The other arms of these bell-cranks are joined together by the rod O and are connected to suitable mechanism operated by the gripman at the ends of the car. As will be evident, by moving the bell-cranks N N′ in one direction the shanks E E will be drawn upward, thus lifting the ejector-bar L, and with it the ejectors K K, in position to throw out the cable from the grip-jaws. By moving the bell-cranks in the other direction the shanks E E will be slid downward, thus lowering the ejector-bar and ejectors in the position shown in Fig. 1, with their lowered ends below the cable in the grip.

The ejectors are operated automatically by means of the ejector-bar L, which is arranged to strike or come in contact with inclined projections (turned trippers T) placed in the conduit at the desired points. As will be seen from the drawings, the under side *l l* of the ejector-bar is inclined or slopes from the center upward, and when this inclined surface comes in contact with the inclined surface of the trippers the effect is to lift the bar, and with it the ejectors, in position to throw out the cable. The cable is thus automatically ejected at the desired point as the car moves along. Before the cable can be ejected it is evident that it must be ungripped, and when thus automatically ejected it is very desirable that the ungripping of the cable or the opening of the jaws of the grip be also done automatically at the same operation with the movement of the ejectors. This is accomplished as follows: Across the upper ends of the shanks E E and moving with the latter is a plate P, having a slot *p p′*, the upper portion *p* of which is vertical and the lower portion *p′* projecting downward at an

angle. The link I, connecting the short arm H of the bell-crank and the shank D, is jointed in the center, and at the joint is a roller *i*, which slides in this slot *p p'* as the link is moved up and down by the bell-crank in raising or lowering the grip-jaw or as the plate P is raised and lowered with the shanks E E. As will be understood from the drawings, so long as the roller *i* continues in the vertical portion *p* of the slot the link I remains straight, as shown in Fig. 1; but when the plate P is moved so that the roller is made to slide in the portion *p'* of the slot the roller *i* is moved to one side and the link thus doubled up, as in Fig. 4, and thereby shortened. As the bell-crank G H remains stationary in this operation the effect of shortening the link is to draw up or raise the shank D, and with it the grip-jaw, and open the grip. The link I thus forms a toggle-joint in the operation of opening and closing the grip-jaw by the plate. It therefore follows that whenever the plate P is moved upward so as to cause the roller on the link to slide in the inclined slot *p'* the grip is opened, and as the plate P is attached to the shanks E E, connected to the ejector-bar L, it will be seen that as the latter bar is lifted by the trippers in the conduit the plate P will be raised and the grip thereby opened. The operation of the ejector mechanism in ejecting the cable thus acts on the link of the jaw-operating mechanism and lifts the jaw, ungripping the cable. The cable is therefore automatically ungripped by the same operation that raises the ejectors to throw out the cable, and the arrangement of the parts is such that the plate is raised so as to ungrip the cable before the lower ends of the ejectors come in contact with the latter.

The length of the vertical part *p* of the slot is such that when the ejectors are down and the plate P is in its lowest position, as in Fig. 1, the roller can freely slide up and down in the slot as the link is raised and lowered in opening and closing the grip without affecting the link, and, moreover, when the grip-jaw is opened or raised, and hence the roller drawn by the bell-crank to the upper end of this vertical part of the slot, the plate P can move upward as the ejector mechanism is operated without changing the position of the link. The plate P has therefore no effect on the jaw-operating mechanism in the ordinary operation of opening and closing the grip by the bell-crank or when the grip is opened and the ejectors are operated to eject the cable. When, however, the jaw is down or closed in the position shown in Fig. 1, with the roller *i* at the bottom of the vertical part of the slot and the ejectors are then raised either by the gripman by the bell-cranks N N' or automatically by the trippers in the conduit, the plate P in moving upward forces the roller *i* at the link-joint to slide in the inclined portion *p'* of the slot, thus doubling up the link and raising the shank D and opening the grip. It will thus be seen that so long as the roller on the link I is in the vertical part of the slot the link remains straight and the movements of the jaw and of the ejector are entirely separate from and have no effect on each other and the jaw can be raised and lowered without affecting the ejector mechanism, or when the jaw is raised the ejector mechanism can be operated without in any manner affecting or operating the link or the jaw mechanism; but as soon as the roller is made to move in the inclined portion *p'* of the slot the ejector mechanism and the movable jaw are at once connected and the operation of the former raises the jaw, as will be seen, by a direct positive movement and at the same time without in any manner disconnecting the movable jaw from the jaw mechanism or affecting their relations to each other. While the jaw is thus raised by the ejector mechanism, the bell-crank G H can be thrown back by the gripman and the link straightened and the roller brought within the vertical slot *p*, thus at once disconnecting the jaw from the ejector mechanism and bringing the former under the control of its regular operating mechanism. In this improved grip construction, therefore, the jaw and the jaw-actuating mechanism are never disconnected or their relation to each other in any way disturbed, and in the usual operation of the grip in opening and closing the grip-jaws the jaw-operating mechanism is not disturbed or acted upon by the ejector mechanism. The only time or circumstance when the ejectors or their mechanism act upon or operate the jaw mechanism is when the ejectors themselves raise or open the jaw to ungrip the cable.

In the modified structure shown in Fig. 5 the ejectors K K, instead of being suspended from the ejector-bar L, are hung from the long arms of bell-cranks R R', pivoted to each end of the head F of the grip-frame. On the short arms R' of these bell-cranks are rollers *r*, which fit and slide in curved slots Q in the ends of the plate P, which in this construction extends across the front of the grip. The slots Q, as is seen in the drawings, curve outward or away from the center of the plate, and when the plate is raised by the ejector-bar or by the bell-crank N N', as before described, the short arms of the bell-cranks sliding in the slots are thus moved outward in such manner as to raise the long arms of the cranks and lift the ejectors hung from the latter. The length and curve of the slots are such that when the plate is in its uppermost position the ejectors will be raised sufficiently to throw out the cable. As the plate is moved or slides downward, the inner ends of the bell-cranks sliding in the slots are swung inward, thus lowering the arms R of the cranks and pushing down the ejectors. The ejectors in this modified construction are thus pushed down or lowered after ejecting the cable by a positive

movement in place of merely dropping down, as in the construction shown in Figs. 1 to 5, thereby avoiding the trouble that sometimes occurs of having the ejectors catch in their descent and not come to their proper place below the cable in time. Furthermore, in this construction the ejectors are forcibly held down, and if their lower ends are formed with downwardly-projecting hooks S, as shown in Fig. 6, arranged to bear down upon and against the side of the cable, the ejectors will hold the cable in place in the grip and prevent it being pulled out sidewise from between the grip-jaws as the cable-car goes around a curve. The ejectors in this modified construction can thus be made to perform the office of cable-retainers and hold the cable while in the grip from any side pull or strain.

What I claim is—

1. In a grip mechanism having a shank attached to the movable jaw, in combination, a link, secured to the movable shank; jaw-operating mechanism connected to the link, whereby the shank and jaw are raised and lowered; and ejector mechanism, adapted to engage with and operate the jaw-operating mechanism only when the jaw is closed and raise the shank by means of the link, substantially as described.

2. In a grip mechanism, the combination with a jaw-operating mechanism having a toggle-joint; of an ejector mechanism; and means connecting the toggle-joint with the ejector mechanism, whereby the latter engages with the jaw-operating mechanism to raise the jaw only when the jaw is closed, substantially as described.

3. In a grip for cable-railways, in combination, a movable jaw; mechanism for operating the same; cable-ejectors; an ejector mechanism; and means connecting the ejector mechanism and the jaw mechanism, whereby the ejector mechanism engages with and operates the jaw mechanism only when the jaw is closed, and moves independently of the jaw mechanism when the jaw is open, substantially as described.

4. In a grip for cable-railways, in combination, a movable jaw; mechanism for operating the same a toggle-joint connecting the jaw mechanism and the jaw; cable-ejectors; an ejector mechanism; and means connected with the ejector mechanism whereby the latter engages with and operates the toggle-joint when the jaw is closed, and moves independently of the same when the jaw is open, substantially as described.

5. In a grip mechanism, in combination, a movable jaw; a toggle-joint connected to the movable jaw and to mechanism operated from the end of the car, whereby the jaw is raised and lowered; cable-ejectors; ejector mechanism arranged to operate the latter; and a slotted plate connected with the ejector mechanism and with the toggle-joint, whereby the plate engages with and operates the latter when the jaw is closed to open the grip and moves independently of the same when the jaw is open, substantially as described.

6. In a grip mechanism, in combination, a movable jaw; a toggle-joint I connected to the movable jaw and to mechanism operated from the end of the car, whereby the jaw is raised and lowered; cable-ejectors; ejector mechanism arranged to operate the latter; and a plate P connected to the ejector mechanism and having the slots p p' adapted to engage the joint of the toggle I, substantially as described.

7. In a grip for cable-railways, in combination, cable-ejectors provided with means for holding the cable in the grip; and ejector mechanism, adapted to raise the ejectors to eject the cable, and to exert a vertical downward pressure through the ejectors on the cable, whereby the cable is confined in the grip, substantially as described.

8. In a grip for cable-railways, in combination with the jaw-operating mechanism; an ejector mechanism, whereby the ejectors are elevated to throw out the cable from the grip and are held down on the cable when the latter is in the grip; and means connecting the ejector mechanism and the jaw-operating mechanism whereby the ejector mechanism engages with and operates the grip-operating mechanism when the jaw is closed to open the grip and moves independently of the latter, when the jaw is open, substantially as described.

9. In a grip mechanism, in combination, a movable jaw; a toggle-joint I connected to the movable jaw and to mechanism operated from the end of the car, whereby the jaw is raised and lowered; cable-ejectors provided with downwardly-projecting hooks S; a plate P adapted to engage with and elevate and push down the ejectors, and having the slots p p' arranged to engage with the joint of the toggle I; and mechanism whereby the plate is raised by devices in the conduit; and other mechanism whereby the plate is raised and lowered from the car, substantially as described.

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