

(No Model.)

3 Sheets—Sheet 1.

T. O. COOPER.  
CABLE GRIP FOR RAILWAYS.

No. 372,121.

Patented Oct. 25, 1887.

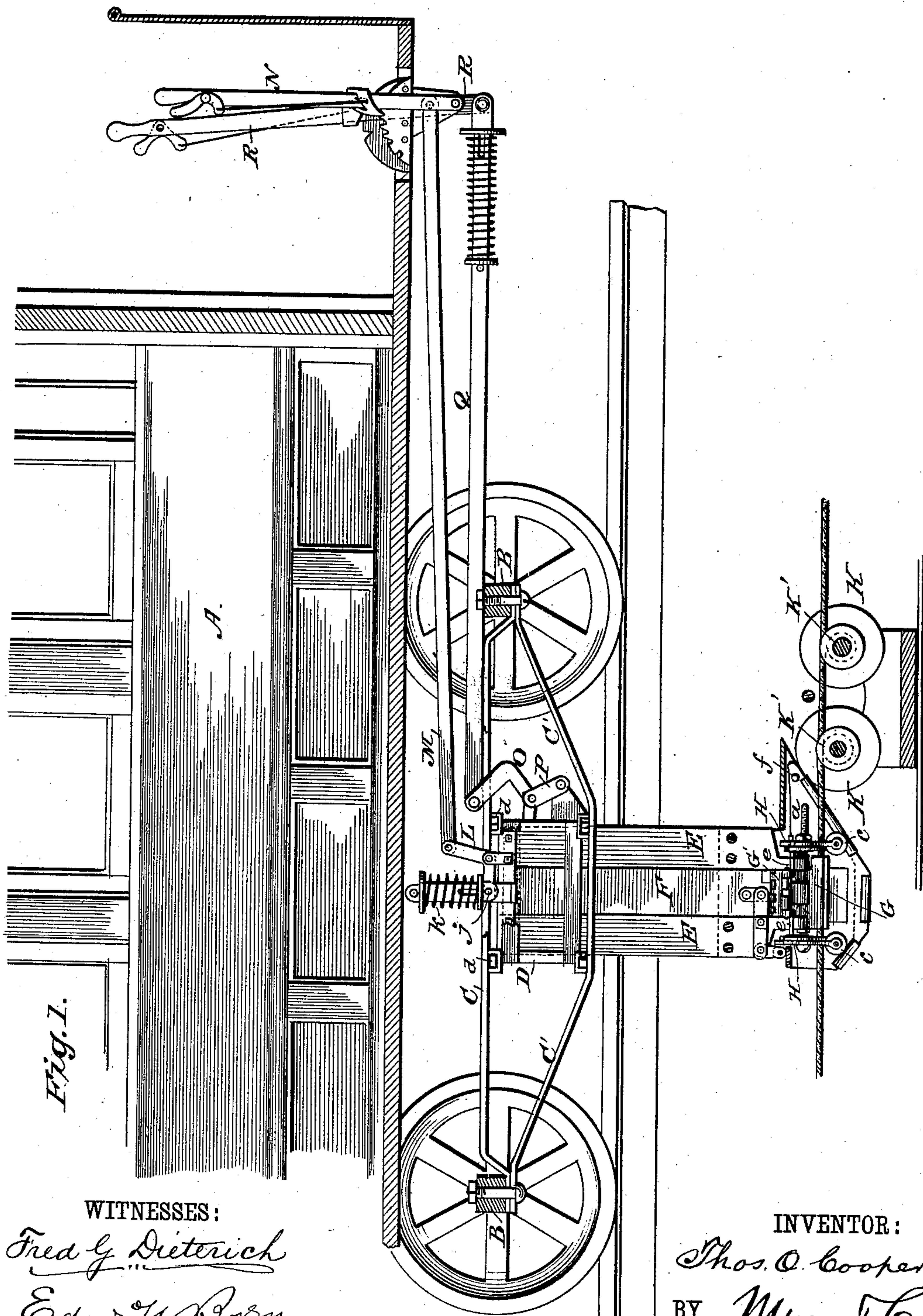


Fig. 1.

WITNESSES:

*Fred G. Dieterich*  
*Edw. W. Byrnes*

INVENTOR:

*Thos. O. Cooper*  
BY *Munn & Co.*

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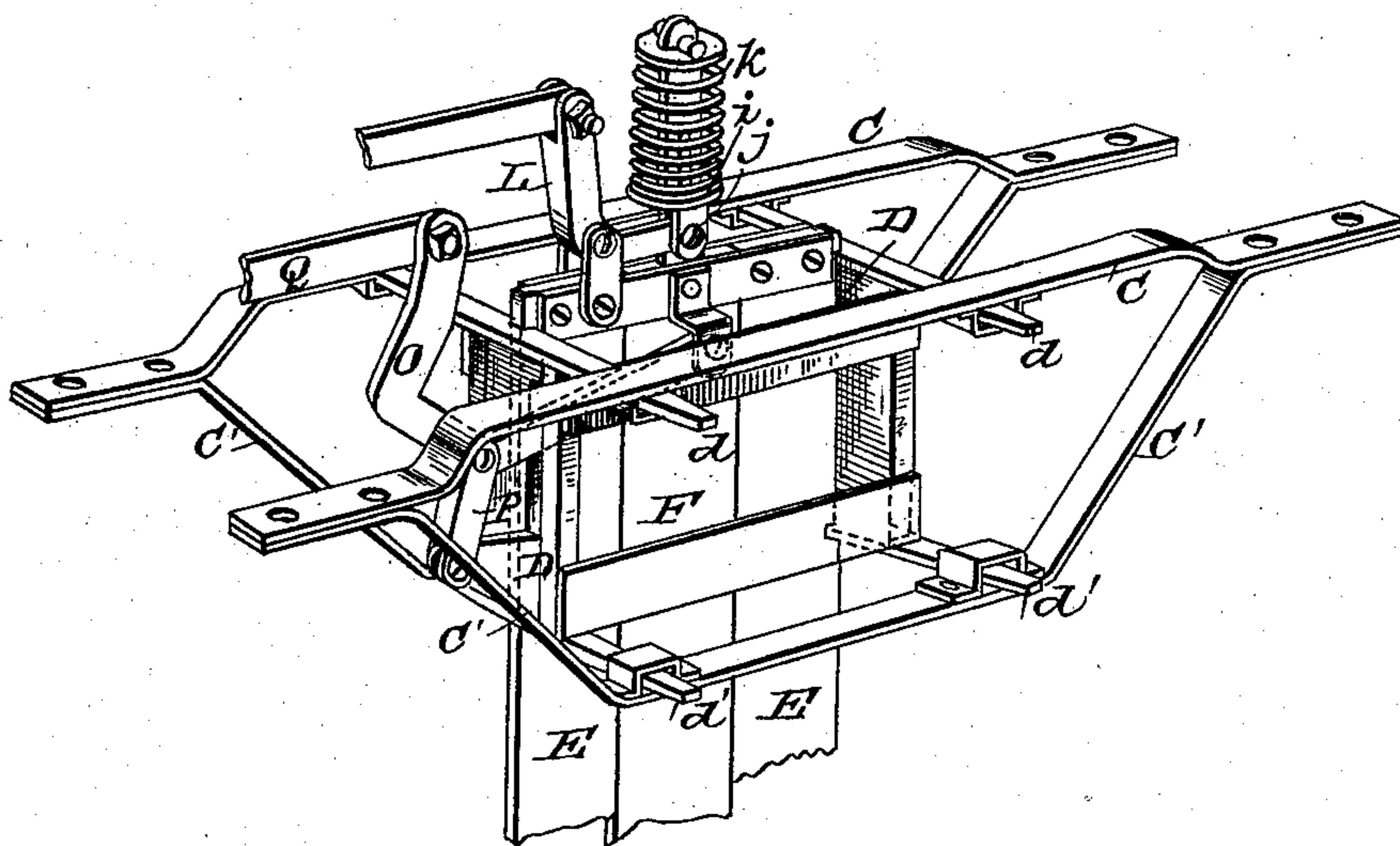
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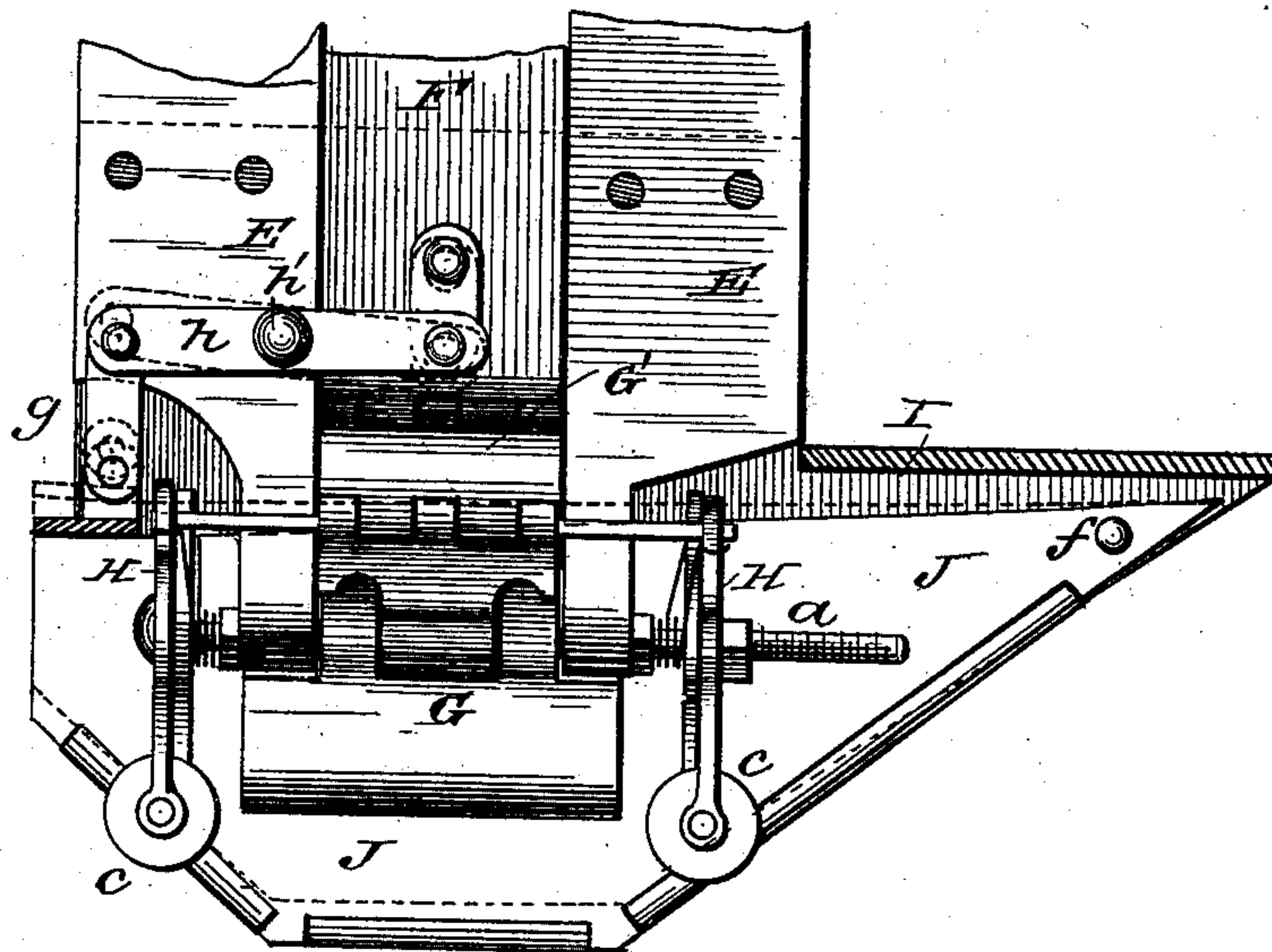
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*Fig. 2.*



*Fig. 3.*



WITNESSES:

*Fred G. Dieterich*  
*Edw. W. Byrne*

INVENTOR:

*Thos. O. Cooper*  
BY *Munn & Co.*

ATTORNEYS.



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Fig. 5.

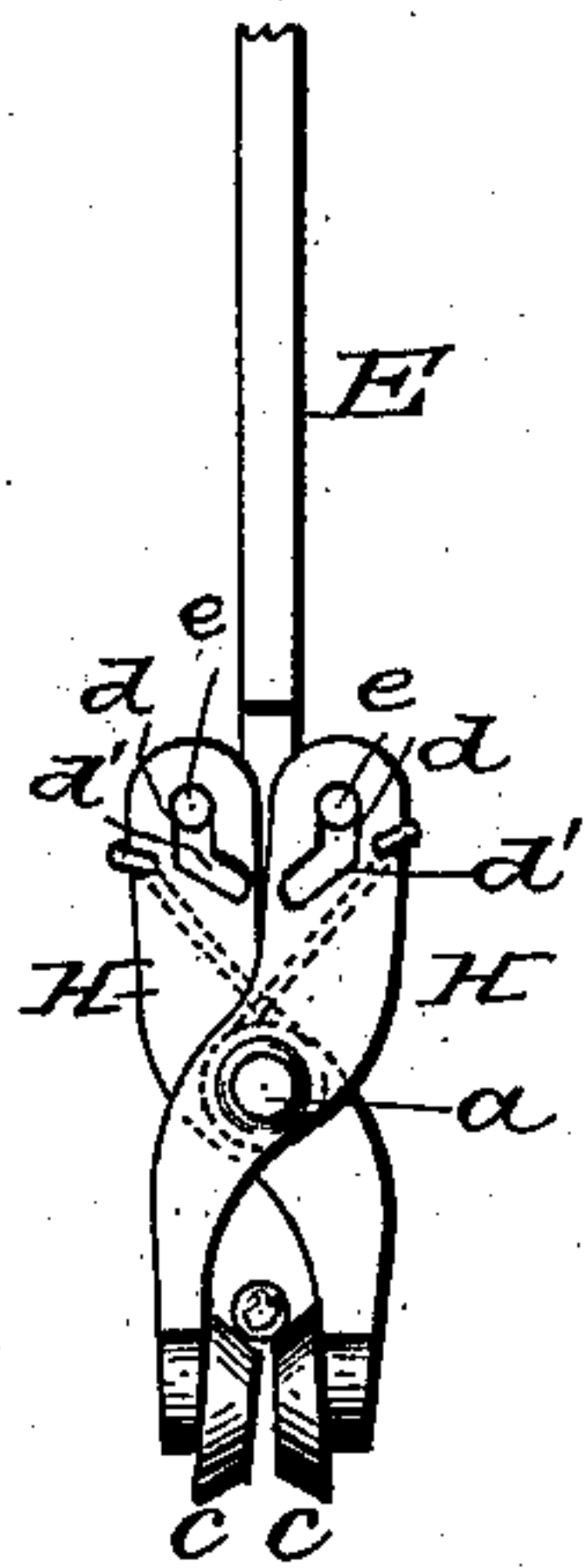


Fig. 4.

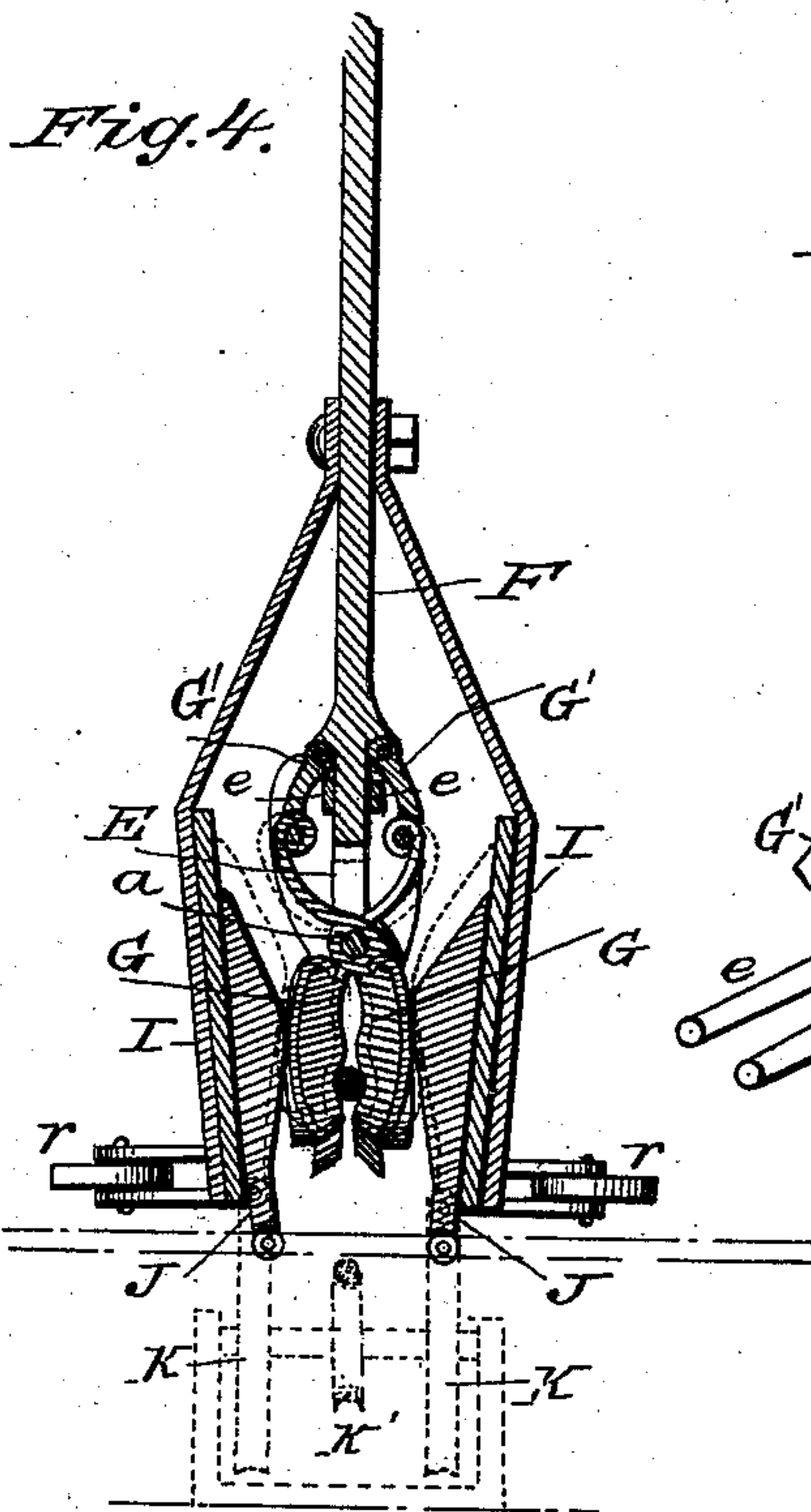


Fig. 6.

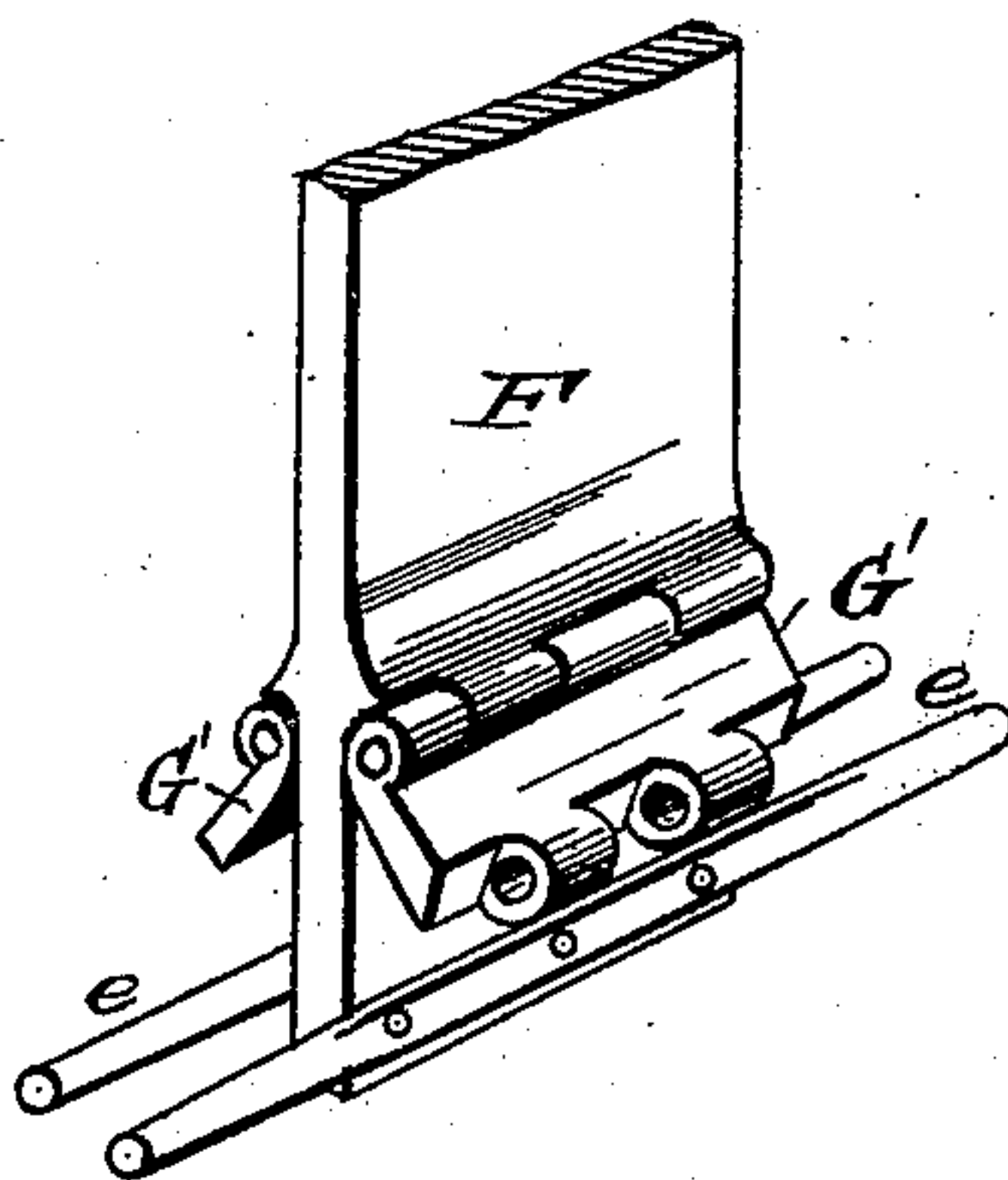
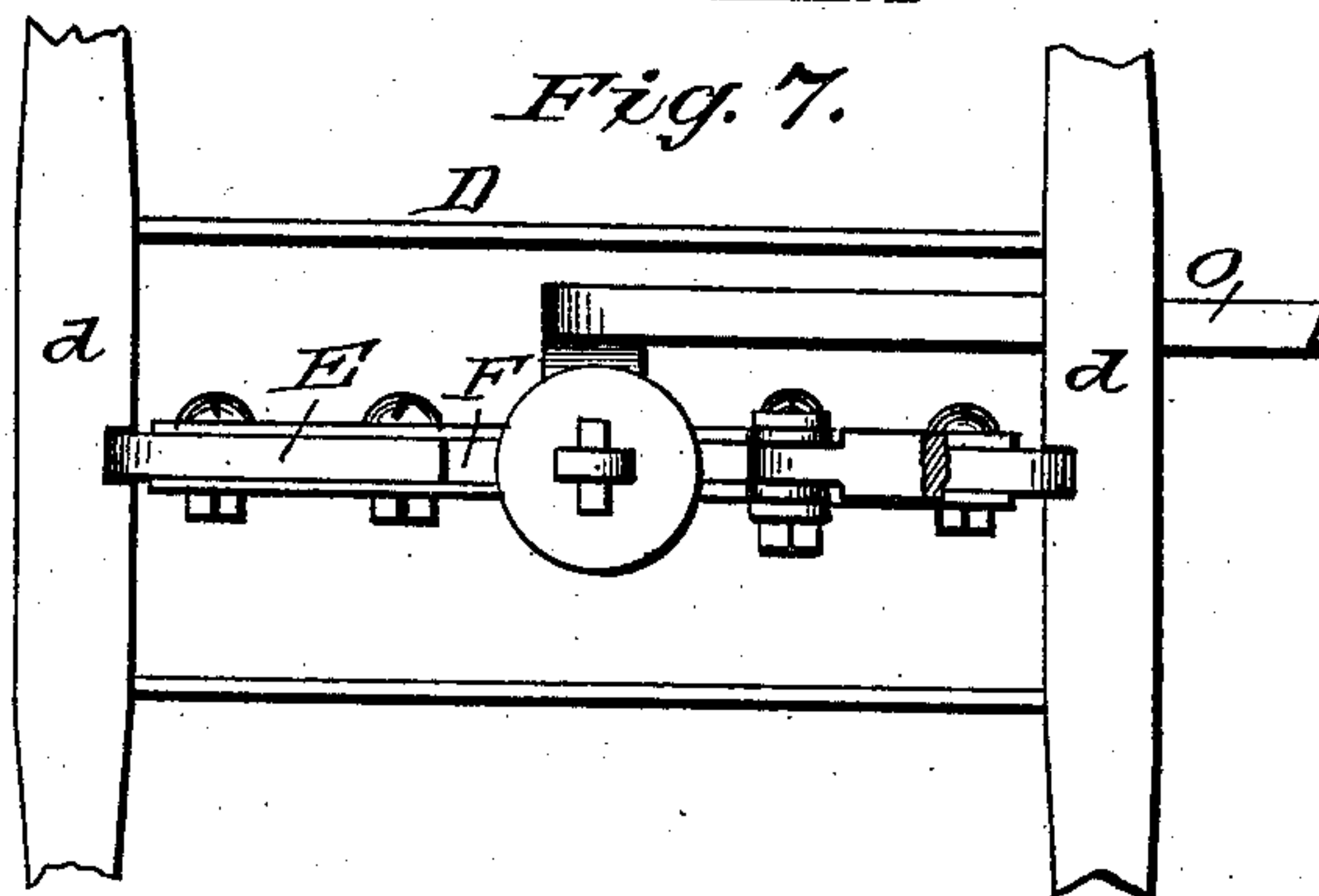


Fig. 7.



WITNESSES:

*Fred G. Dietrich*

*Edw. W. Byrne*

INVENTOR:

*Thos. O. Cooper*

BY *Munn & Co.*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

THOMAS OLIVER COOPER, OF WILMINGTON, DELAWARE.

## CABLE-GRIP FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 372,121, dated October 25, 1887.

Application filed May 4, 1887. Serial No. 237,155. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS OLIVER COOPER, of Wilmington, in the county of New Castle and State of Delaware, have invented a new and useful Improvement in Cable-Grips for Railways, of which the following is a specification.

My invention is in the nature of certain improvements upon the cable-grip for which Letters Patent No. 350,813 were granted me October 12, 1886; and it consists in the peculiar construction and arrangement of parts, which I will now proceed to describe with reference to the drawings, in which—

Figure 1 is a vertical longitudinal sectional elevation. Fig. 2 is a detail perspective view of the grip-frame. Fig. 3 is an enlarged sectional side view of the lower portion of the grip. Fig. 4 is a cross section of the lower portion of the grip. Fig. 5 is a detail edge view of the grip. Fig. 6 is a perspective view of the lower portion of the middle grip-bar, and Fig. 7 is a plan view of the grip-frame.

In the drawings, A represents the car-body, and B B its axles, between which is supported a metal frame-work consisting of four bars, C C' C', Fig. 2. Within this frame C C' is another laterally-adjustable frame, D, having four laterally-projecting arms,  $d d' d'$ , on each side, which pass through guide-slots or keepers in the bars of the frame C C', so as to allow frame D to move sidewise, as is sometimes required in turning curves. In the ends of frame D are formed vertical grooves, in which rise and fall the vertically-adjustable grip-bars E E, which are fastened together at the top and bottom and have between them the sliding middle bar, F, whose vertical motion serves to open and close the grip.

G G represent the grips, which are in the nature of crossed levers hinged upon a long bolt,  $a$ , that connects the lower parts of the grip-bars E, which grips are faced to correspond to and bite the cable and have their upper ends hinged to leaves or plates G' G', which in turn are hinged to the middle grip-bar, F, so that as the middle bar, F, is forced down the grips G G are opened, and as the bar F is raised the grip is closed. Just here is to be noted a departure from my previous patent, in which the grips are closed by the downward thrust. By making the grip to be opened by

the downward thrust and closed by the upward movement the closing (or greatest) strain is transmitted by a pull or tension on the middle bar, instead of a thrust, which is apt to bend said bar.

In order to permit the grips to be partially opened to slow up and stop the car, but without dropping the cable, I provide at each end of the grip a pair of levers, H H, Fig. 5, fulcrumed upon the fixed axis afforded by the long bolt  $a$ , and bearing at their lower ends twin pulleys  $c c$ , which close beneath the cable and form a support for the same. These levers have in their crossed arms, above their fulcrum, cam-slots  $d d'$ , of an angular shape, in which play projecting stems  $e$ , rigidly attached to the movable middle bar, F. Now, when the bar F descends, these stems move downwardly in the vertical portions  $d$  of the slots in these arms, and the result is to partially open the gripping-jaws, without, however, separating these supporting-pulleys. On a continuation of the descent of the bar F, however, the stems  $e$  enter the angular sections  $d'$  of the cam-slots, and the ends of the levers bearing the supporting-pulleys  $c c$  are separated and the cable is dropped.

To the bottom ends of bars E E is rigidly fastened, by bolts, the hood or outer casing, I, having friction-rollers  $r$  on the sides; and to the forward end of this hood is pivoted at  $f$  the vertically-adjustable runner-shaped shoes J J, which rest within the hood I, one upon each side of the grip. These shoes correspond to a similar device in my former patent, and are used to automatically release the grip when passing over a cross-cable. In the present instance these shoes have a link-connection,  $g$ , with a lever,  $h$ , Fig. 3, fulcrumed at  $h'$  to one of the bars E, and having its other end connected to the middle bar, F, so that when these shoes are raised about their forward pivots, by contact of their runner-shaped bottoms with some opposing surface below, the rear ends are raised and the lever  $h$  is made to force the middle bar, F, down and open the grip. The opposing surface in my former patent was the cross-cable itself; but in the present instance I use (see Figs. 1 and 4) a pair of pulleys, K K, parallel with the bottom cable and on each side of the upper cross-cable, the pulleys K K being on the same



shaft with the supporting-pulleys K' K' of the lower cable, but of much larger diameter, so that when the grip which is connected to the lower cable approaches the upper cross-cable the shoes J J of said grip ride up on the pulleys K K, and this upward movement of said shoes causes (as before described) the grip to open and drop the cable until the grip has passed over the upper cross-cable.

10 For operating the middle bar, F, to apply or release the grip, an elbow-lever, L, is fulcrumed to the relatively stationary bars E, and its vertical arm is connected to the horizontal bar M, running to the end of the car, where it connects with a hand-lever, N, provided with a locking dog engaging with a ratcheted or notched plate for adjustment. The horizontal arm of the elbow-lever L is connected to a bolt, j, that passes through a slot in the upper extension of middle bar, F, to which bolt is also fastened a cap, i, upon which rests a spiral spring, k, wound about the end of the middle bar and bearing at the top against a head attached to the same. Now it will be seen that when the middle bar is raised to apply the grip it is done by a pull on horizontal bar M, and the strain is applied through the tension of spiral spring k. The object of this spring is, however, to allow the grip to be automatically opened, even when the grip is locked to the cable by the lever N. It is obvious that if the bar F were rigidly locked by lever N the grip could not be automatically released; but when locked through the tension of spring k it will be seen that the bar F can still be forced down to release the grip whenever the shoes J ride up on the pulleys K in crossing a cable.

For raising and lowering the whole grip bodily in the grooves in frame D, a peculiar double-bent elbow-lever, O, is fulcrumed upon a tilting link, P, jointed to an offset from frame D. The upper arm of this lever is connected with a horizontal bar, Q, which extends to the end of the car and is connected to an operating-lever, R. By moving this lever it will be seen that the entire grip may be raised or lowered in the frame D.

Having thus described my invention, what I claim as new is—

1. The combination, with the car-axles, of the four bars C C C' C', having guide slots or keepers in the same, the laterally-adjustable frame D, having horizontal projecting arms d d' d', fitting into said slots or keepers, and vertical guides on the inner side, the vertically-adjustable grip moving in said guides, and means for raising and lowering the grip, substantially as shown and described.

2. The combination of the grip-bars F and

E E, the latter having axial bolt a at their lower ends, the grips G G, fulcrumed upon said axial bolt and connected by hinge-plates to bar F, the levers H H, also fulcrumed upon the axial bolt and having twin supporting-pulleys at their lower ends and cam-slots d d in their upper ends, and stems e e, attached to the bar F and working in the cam-slots to open the supporting-pulleys at the latter portion of their downward movement, as described.

3. The combination, with the bars E E and F, of the hood I, the shoes J J, pivoted at their forward ends to the hood, the link g, and lever h, fulcrumed on bars E and connecting the rear end of shoes to the middle bar, F, as described, whereby an elevation of the shoe effects a depression of the middle bar and a release of the grip, as set forth.

4. The combination of bars E E, middle grip-bar, F, having a slotted upward extension, the elbow-lever L, fulcrumed to bars E and having one arm connected to the operating mechanism and the other to a cap, i, and bolt j, working in a slot in the extension of the middle bar, and a spiral spring, k, wound about the upper extremity of the bar F and interposed between cap i and a bearing at the upper end of the bar, substantially as shown and described.

5. The combination, with the frame C C' and the laterally-adjustable frame D, of the elbow-lever O, tilting link P, forming a fulcrum for said lever and jointed to and supported upon an offset from the frame, the horizontal bar Q, and operating-lever R, substantially as and for the purpose described.

6. The combination of one or more wheels or pulleys arranged at the crossing of two cables, parallel with the lower cable, a grip device having a movable shoe adapted to strike the said pulleys, and mechanism connecting the grip-operating devices with the shoe, whereby the contact of the latter with the pulley or pulleys is made to release the grip from the cable, substantially as and for the purpose described.

7. The combination, with two cross-cables, of a supporting-pulley for the lower cable having on its axis beside it larger pulleys rising above the level of the upper cable, and a grip device arranged to ride upon the larger pulleys and pass over the cross-cable, substantially as and for the purpose described.

The above specification of my invention signed by me in the presence of two subscribing witnesses.

THOMAS OLIVER COOPER.

Witnesses:

EDWD. W. BYRN,  
 SOLON C. KEMON.