(No Model.)

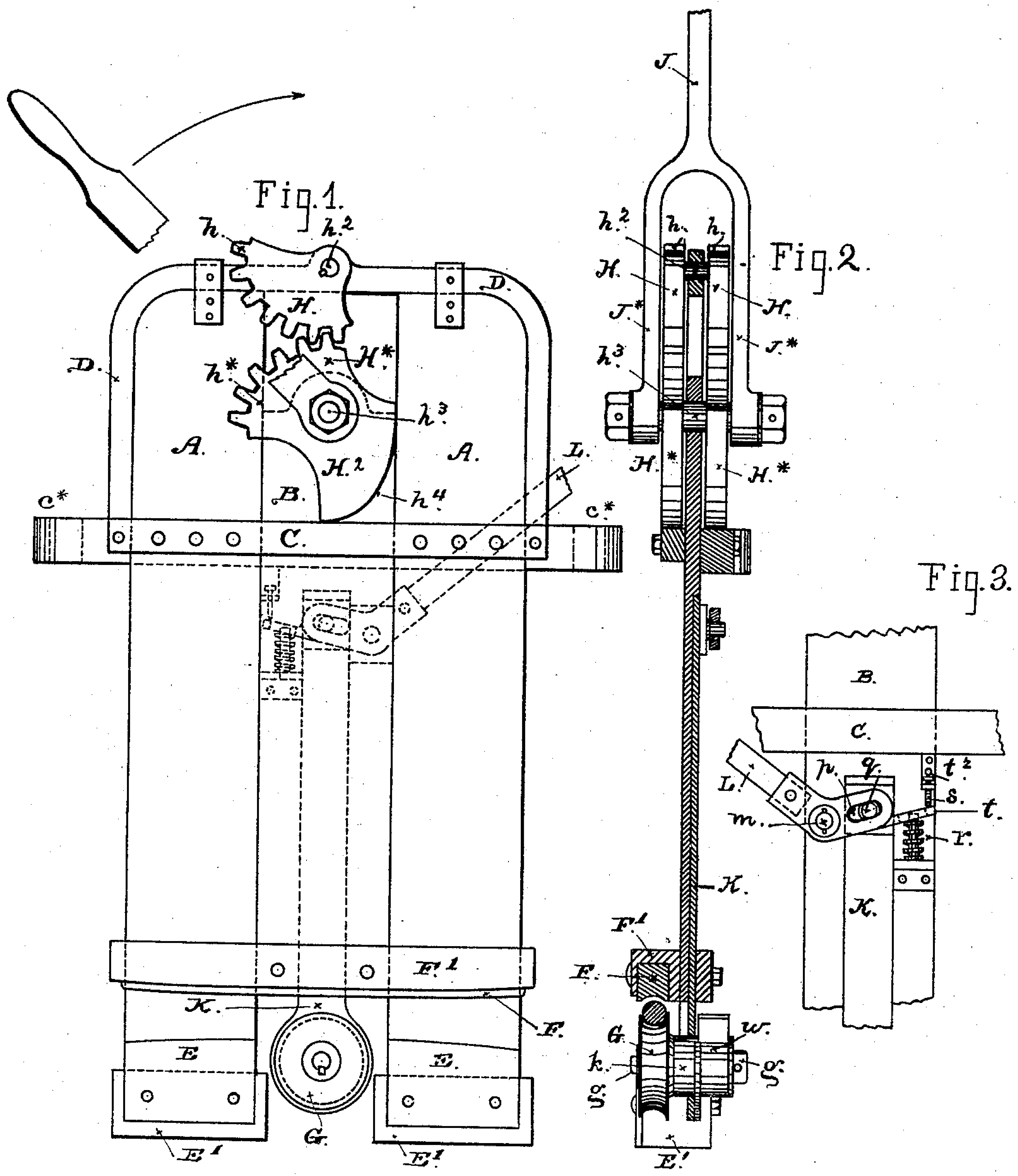
2 Sheets—Sheet 1.

R. SOLANO.

GRIPPING DEVICE FOR CABLE RAILWAYS.

No. 316,670.

Patented Apr. 28, 1885.



Witnesses:

Jno. L. Taggard

N. A. Barenkamp.

Inventor:

Renaldo Solano

By his Atty., W. L. Osborn

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

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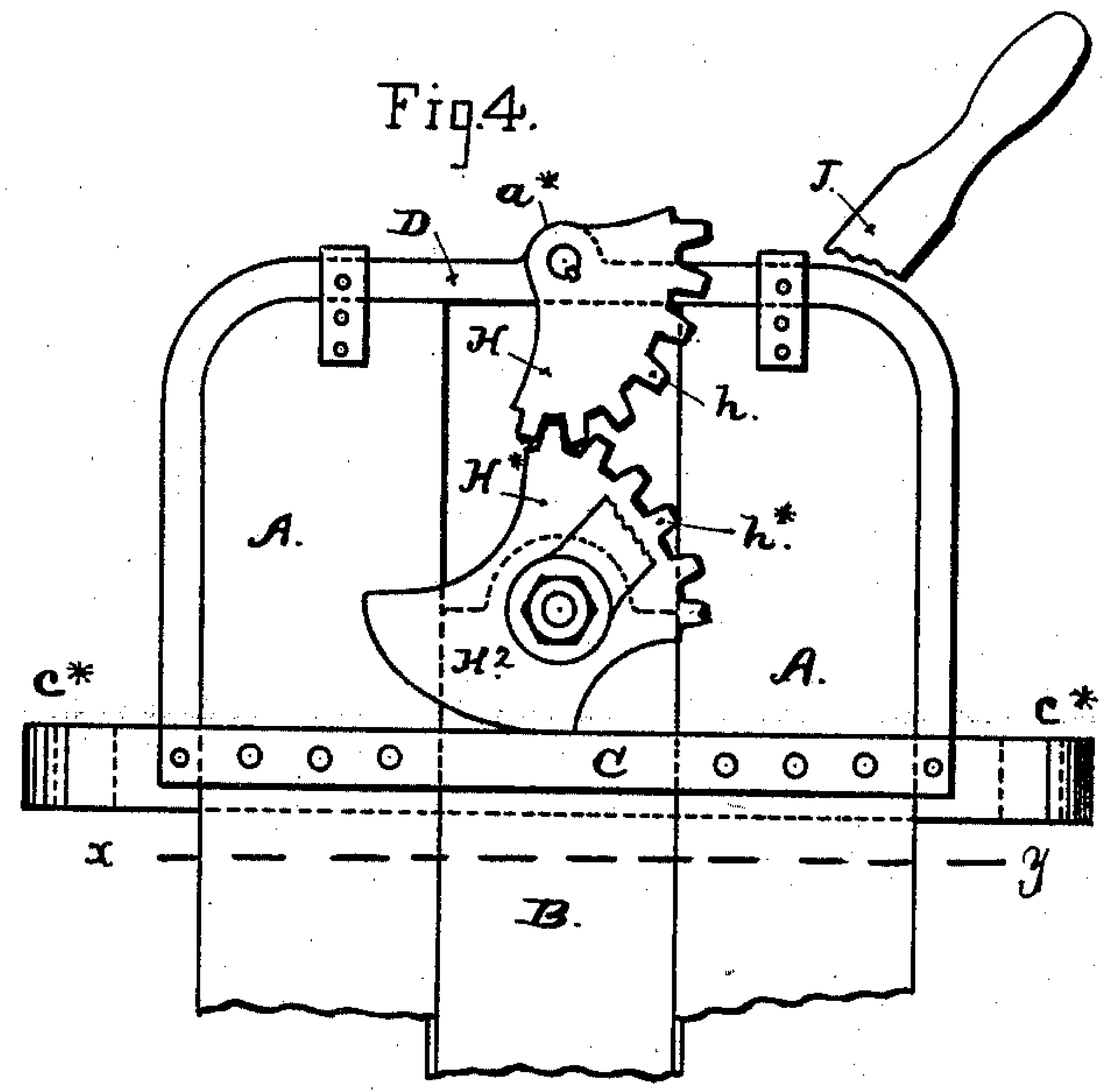
Fig. 4.



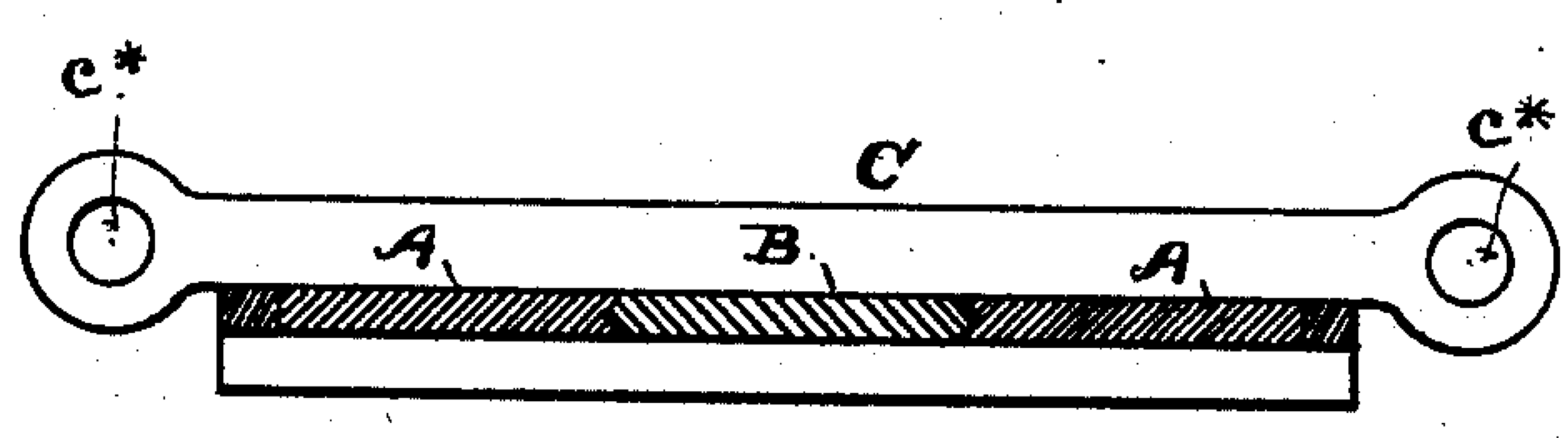


Fig. 5.

Witnesses:

Jno. L. Taggard

N. A. Barenkamp.

Inventor:

Renato Solano

By his Atty.,

[illegible]

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

RENALDO SOLANO, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF TWO-THIRDS TO FREDERICK BODE AND GEORGE E. COX, OF SAME PLACE.

GRIPPING DEVICE FOR CABLE RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 316,670, dated April 28, 1885.

Application filed September 5, 1884. (No model.)

To all whom it may concern:

Be it known that I, RENALDO SOLANO, a citizen of the United States, residing in the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Gripping Devices for Cable Railways; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the drawings that accompany and form part of this specification.

My invention relates to improvements in gripping devices to connect railway-vehicles with propelling-cables in that system of propulsion now employed in street-railways, and generally known as the "endless-cable" system.

These improvements consist, first, in a novel construction of grip-frame; secondly, in the combination, with the movable jaw of such gripping devices, of a cable-carrying sheave and means for moving it along with and also independently of the movable jaw; and, thirdly, in a novel construction of jaw-operating mechanism for moving the shank or bar that carries the movable jaw.

The object and purpose of these improvements and the manner in which I proceed to produce, construct, apply, and use them are fully set forth in the following description.

Referring to said drawings, Figure 1 is a side elevation of my improved grip, showing the position of the parts when the jaws are open and the cable loosened. Fig. 2 is a vertical section taken transversely. Fig. 3 shows details of the device for working the cable-carrying sheave. Fig. 4 shows the position of the parts when the jaws are closed upon the cable. Fig. 5 is a cross-section at *x y*, Fig. 4.

That part which I term the "grip-frame" carries the fixed jaw of the grip, and gives a support and guide for the shank or slide-bar of the movable jaw. It also presents bearings and attachments for the grip-operating mechanism, and in that style of grip known as the "lever-grip" this frame is carried upon short upright pins or bolts that project above the truck of the car or dummy in front of and behind the well or opening in the floor. I make this grip-frame in separate parts, that are separable and detachable one from another, so that as one part is broken or becomes worn and reduced in strength it can be taken out and a new part inserted in its place. The jaws and dies and the side bars, against which the edges of the slot in the roadway are constantly rubbing and chafing, can be renewed as often as required, while the remainder of the frame and parts is utilized and made serviceable. The side bars, A A, are set upright and parallel, and are held in this position, with a slot or space between them extending from top to bottom for the movable bar or slide B, by means of the cross-bars C C and the arched frame or piece D, that surrounds the top part and is bolted at the lower part to the hanger-bar. In this bar are the eyes C*, to take the bolts on the truck. This gives a frame in which the side bars, A, are readily replaced, as circumstances require. The lower jaw is composed of two dies, E E, that set into boxes or sockets E′ E′ on the lower ends of the bars A, and each one is in length about equal to the width of the bar, or so that a space between the two dies in the center of the grip is afforded for a sheave, G; but the upper jaw consists of a single die, F, or a single continuous gripping-surface of the full width of the frame. This die is set into a socket in a slotted bar, F′, through the slots of which the stationary bars and the slide-bar are inserted, this part F′ being bolted to the end of the slide-bar B, and being also fitted closely to the stationary bars, but capable of sliding smoothly upon them as the jaw is moved. This construction keeps the movable jaw true, and insures an even movement and an equal pressure of the jaw upon the cable. The edges of the slide-bar B may be finished square to fit the inner edges of the side bars; or they may be chamfered to take into grooves in the edges of the bars. To the upper part of this slide is connected the mechanism by which it is moved up and down to work the movable jaw. This feature of my improvement is shown in Figs. 1, 2, and 4. It consists of two irregularly-shaped segments, H H*, set in line one against the other, with the contiguous edges provided with

toothed segments h h^*, that gear with each other. The center of each segment is a bolt or pin, h^2 h^3, of which the one, h^2, carrying the upper segment, H, has a bearing in the frame at a^*, (see Fig. 4,) but the other, h^3, takes through the slide B. The segment H* on this pin therefore can move up and down in addition to its movement of rotation upon this center. The segment-gears H H* are eccentric in character, having each a longer and a shorter side, that are regularly brought into line by the rotation of the one or the other of the segments on its center. The effect of this rotation is to produce rectilinear movement of the center h^3 toward and away from the fixed center h^2, according to the direction of rotation. Vertical movement of the slide B then results from rotation of the segments against each other, and the movable jaw of the grip is raised or lowered.

To keep the two gears in working contact, I form a curved portion, H^2, on the segment H* below the center h^3, with a curve of such shape with respect to the length of the vertical movements of the center h^3 that its plain untoothed edge h^4 shall keep always in contact with the top surface presented by the stationary cross-bar C of the frame. This cam-shaped portion of the lower segment, H*, therefore, has its shorter radius opposed to the longer radius of the gears and its longer side against their shorter sides, while the character of the curves given to the gears and this cam-shaped segment regulates the movement of the center h^3, so that by varying the curves and changing the relative lengths of the longer and shorter sides the movement imparted or produced in the slide can be made more or less abrupt or increased at any point, as required. This construction of grip-operating mechanism enables the power to be applied to the moving jaw with a gradual increase, and to give the greatest pressure at the end of the movement, and also as abruptly as may be desired.

To apply the power directly in line with the slide-bar and to insure a true vertical movement, I employ two sets of the toothed segments and place them on opposite sides of the frame, and to work them simultaneously I use a single lever, J, with a fork or two branches, J* J*, at the end of which one is fixed to one toothed segment, and the other one to the corresponding segment on the opposite side of the frame.

In the construction shown in the drawings, the pin h^3 carries the two segments, and the ends J* J* of the lever are fixed on the outer ends of the pin. The sheave G is carried by an auxiliary slide-bar, K, on the lower end of which is a long bearing, k, to take the spindle g of the sheave, and to the upper end of the slide is connected a lever, L, for moving it up and down independently of the principal slide. These parts hold the sheave up to the movable jaw, and at such distance from the face of the die that when the jaw is raised the cable is carried by the sheave, and when the jaw is depressed and the cable is clamped between the two dies the sheave is below the line of the face of the lower dies.

In this position of the sheave the space under the center of the upper die between it and the bottom of the groove in the sheave is greater than the thickness of the cable, while the space between the two at the edge of the sheave is less than this thickness. When the movable jaw is raised, therefore, the cable is confined within the grip and cannot slip out from between the jaws. This position of sheave and movable jaw together is preserved during the ordinary operation of the grip—as when starting and stopping the car—and the cable is kept in such close position or relation to the movable gripping-surface that a short vertical movement of the jaw serves to clamp or to release the cable. The slide that carries the sheave is set into a slot or groove in the back of the principal slide, and the lever by which the sheave is separately raised and lowered is fixed upon the principal slide as well, so that in moving the upper jaw by means of its operating-lever the sheave follows and is kept at the same distance from the jaw. The independent movement of the sheave is necessary in unshipping the cable, or throwing it out of the grip and in the taking it in again.

The means of moving the sheave separately from the jaw consists of the lever fixed on a stud, m, that forms a fulcrum on the slide-bar B. The end of this lever is slotted at p, and a pin, q, projecting from the back of the slide takes into this slot. The weight of the lever is counterbalanced, and the position of the sheave with respect to the jaw on the slide is controlled and regulated by the spring r and an adjustable stop, s—the one applied beneath the toe or extension t of this lever, and the other placed above it. The adjustable stop is a screw having a bearing in an ear, t^2, on the back of the slide-bar B. Figs. 1 and 3 show these parts. At the back of the slide-bar on the spindle-bearing of sheave G is an oiler-chamber, through which the spindle runs. The great speed at which the sheave G revolves when the grip is open and the cable running through it requires the spindle to be kept well lubricated. This chamber is on an extension of the hub. The dies E E are separate blocks with concave faces to grasp the cable. They are fixed in their sockets by bolts, and are preferably formed on a curve that gives the greatest projection at the center and thereabout in the length of the jaws. Their ends are therefore depressed and space afforded for the cable to run clear of the ends of the dies when the jaws are open and the cable is carried by the sheave alone.

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

1. In a cable-gripping device, the combina-

tion of a suitable frame, fixed gripping-surfaces E E, movable gripping-surface F, and a cable-carrying sheave, G, located between the fixed gripping-surfaces and mounted on a slide, by which it is raised and lowered at the same time with as well as independently of the movable gripping-surface, substantially as herein described.

2. The combination, with a set of gripping jaws or surfaces in a cable-gripping device, of which one surface is composed of two separate jaws, or a jaw divided transversely by a center space, of the movable cable-carrying sheave G, located between said jaws or in said space, and connected to or with the mechanism that operates the other jaw of the grip to follow said jaw in its movements, and means connected with said sheave to move it independently of said jaw as well, substantially as herein described, for the purpose set forth.

3. In a cable-gripping device, the combination of a two-part gripping-surface, stationary, a gripping-surface movable toward and away from this opposite stationary surface, a cable-carrying sheave, G, located between the two parts of the fixed gripping-surface, a slide or carrier, K, for moving it up and down with relation to the fixed gripping-surface, a slide or carrier, B, having the movable jaw secured to it, and by which the jaw is operated, and connection of the sheave-carrier and the movable jaw-carrier in such manner that while the sheave can be locked to the movable jaw-carrier to preserve a certain position with respect thereto and move with it, an independent movement of the sheave is also allowed, for the purpose of raising and depressing it alone, substantially as herein described, for the purpose set forth.

4. In a cable-gripping device, a frame composed of separable and removable parts A A C C D, the sliding carrier F′, to hold a gripping-surface, and the boxes or sockets E′ E′ on the plates A A, to hold the gripping-jaws E, substantially as hereinbefore described.

5. In a cable-gripping device, the combination of the toothed segment H, movable on a fixed center, the similarly-formed segment H*, having an eccentric or cam-shaped portion, *h**, and movable on a center which is fixed to the slide B, a fixed bearing-surface, as C, in line with said cam-shaped portion, and a lever, J, connected with one of said segments, substantially as hereinbefore described, to operate as set forth.

6. The combination, with the slide B, of the toothed segments H H*, one of which is mounted on a fixed center, and the other of which is fixed to the slide and has an eccentric or cam-shaped extension, and the fixed bearing-surface, against which the eccentric portion of said segment is held in working contact, and the lever J, as a means for rotating said segments, substantially as hereinbefore described.

7. In a cable-gripping device, the combination of the principal slide B, to operate the movable jaw, an auxiliary slide, K, carrying a sheave, G, and mechanism, connecting the two slides together, by which the operating mechanism of the principal slide is caused to move the two slides together and preserve the relative positions of the gripping-jaw and the sheave, said mechanism being adapted also to move the auxiliary slide independently, substantially as hereinbefore described.

8. The combination, with the auxiliary slide K, carried by the principal slide B, of the lever L, with slotted end *p*, the stud *q*, foot *t*, spring *r*, and stop *s*, substantially as hereinbefore described.

9. The combination, with the fixed grip-frame and movable bar or slide B, of the toothed segments H H, mounted on the frame, the segments H* H*, centered on the stud h^3, to which the slide B is attached, the stationary bearing-surfaces C on the frame, and the forked lever J, substantially as hereinbefore described, to operate as set forth.

10. A cable-gripping device comprising the following parts or elements: a fixed frame, a movable plate or slide carrying a gripping-jaw on the lower end and connected at the upper end to a lever or other equivalent operating device, a two-part or divided stationary gripping-surface mounted on the frame, and a cable-carrying sheave located in the space between the parts comprising its fixed gripping-surface, and connected by suitable mechanism with a lifting device above, to raise and depress the said sheave simultaneously with the said movable gripping-surface, as well as to enable the said sheave to be raised and depressed independently of the gripping-surface, substantially as hereinbefore described.

RENALDO SOLANO. [L. S.]

Witnesses:
EDWARD E. OSBORN,
JNO. L. TAGGARD.