(No Model.) 3 Sheets—Sheet 1.

J. WILLIAMS, Jr.

APPARATUS FOR OPERATING CABLE CARS.

No. 409,622. Patented Aug. 20, 1889.

Fig. 2.

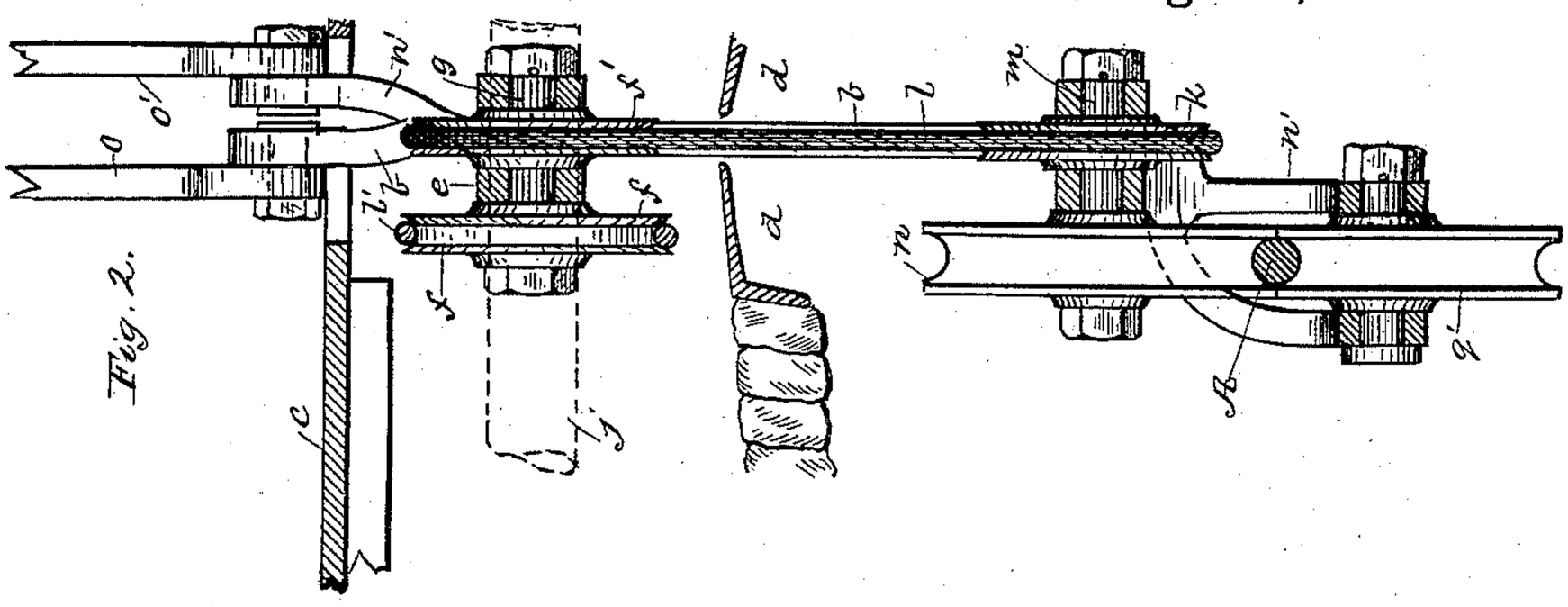
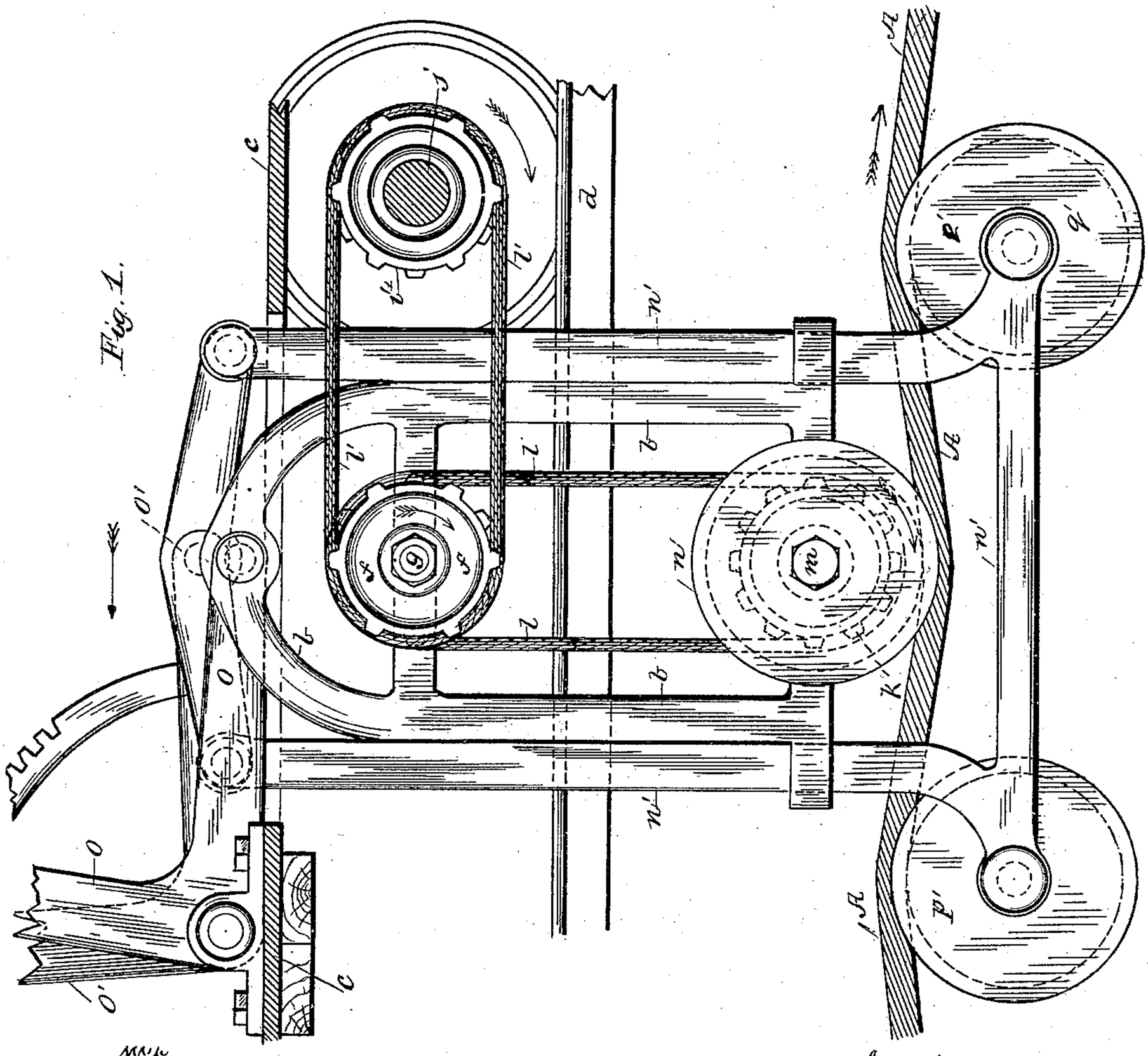


Fig. 1.



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Atty.

(No Model.) 3 Sheets—Sheet 2.

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Fig. 4.

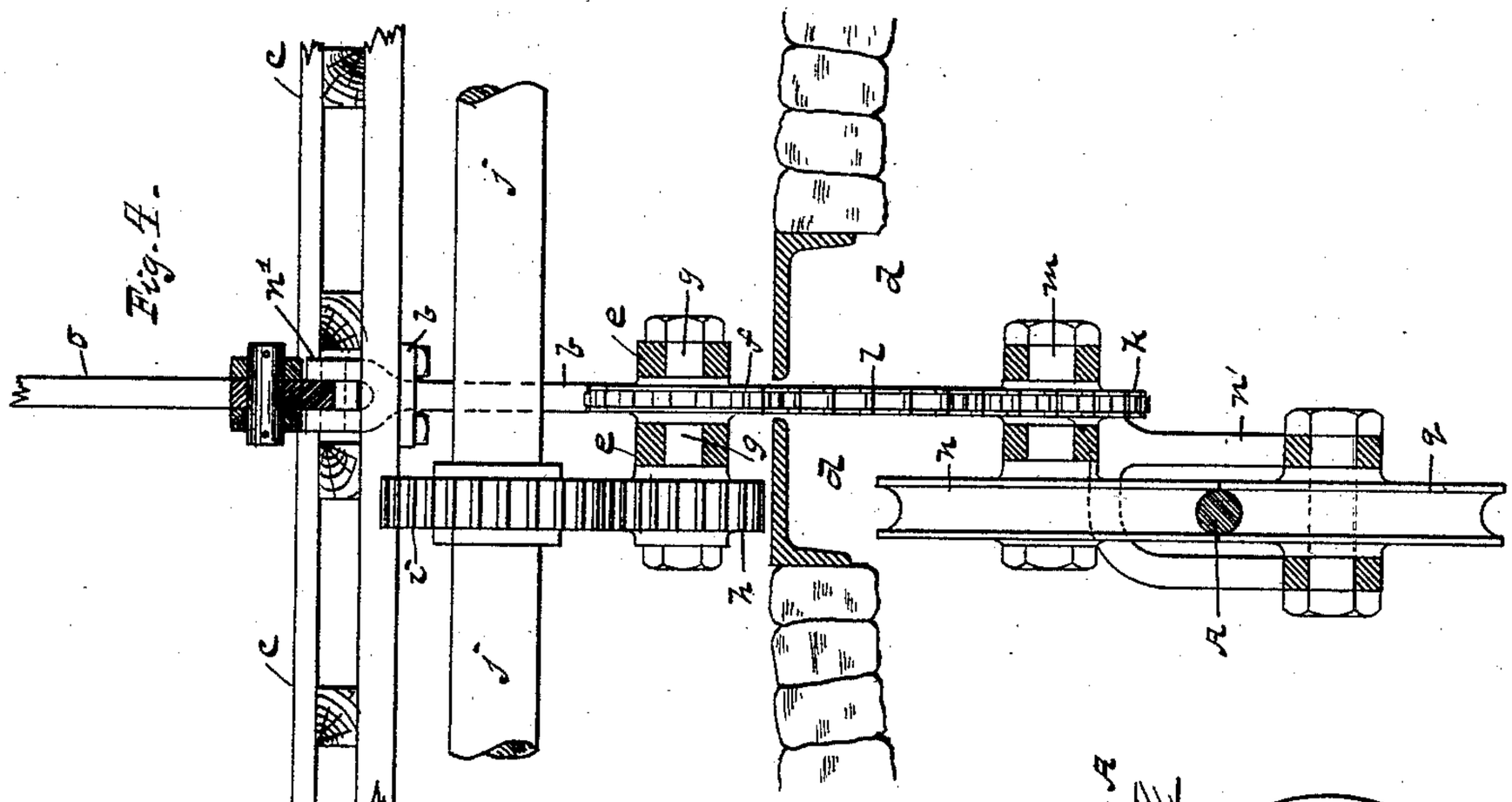
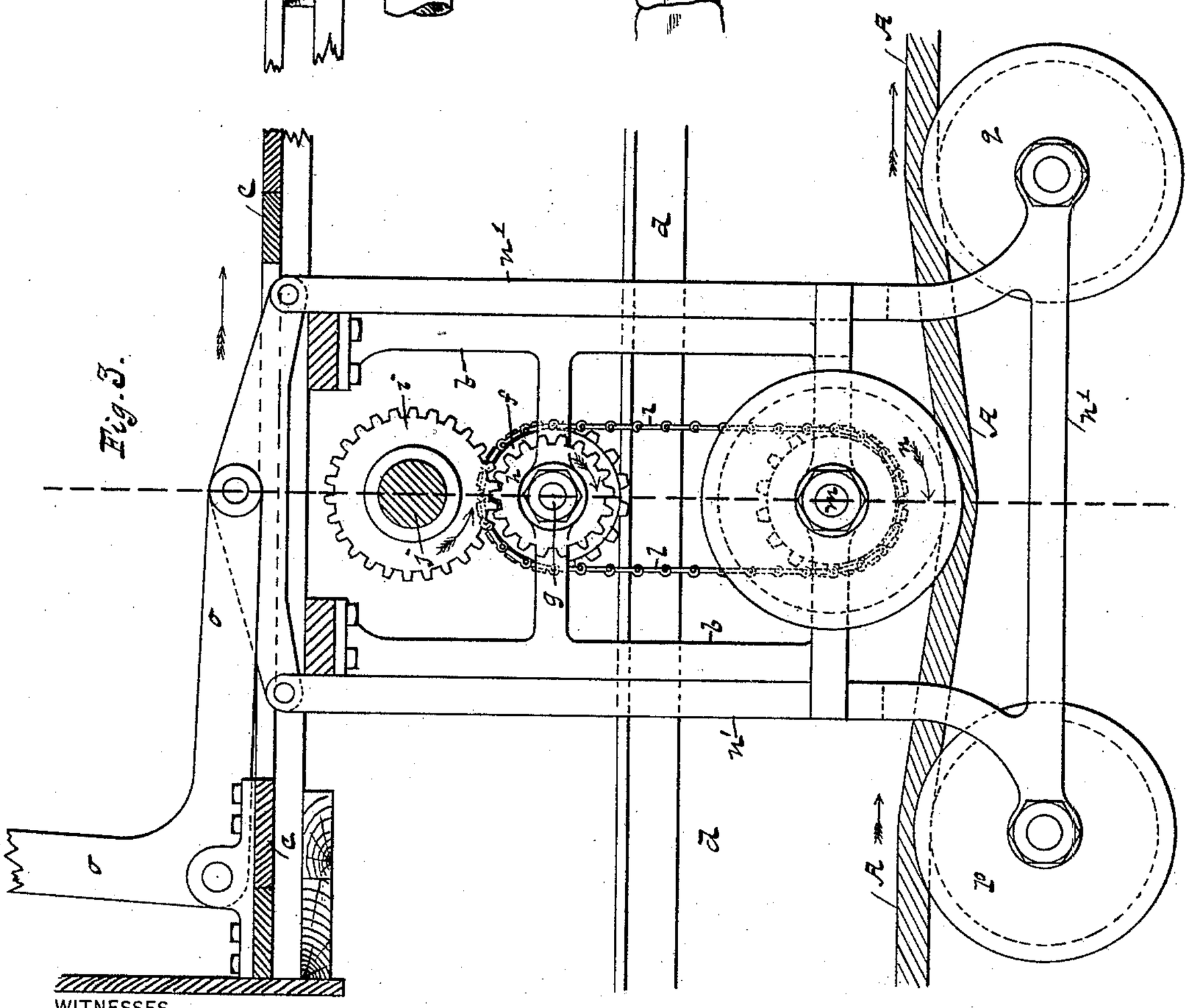


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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APPARATUS FOR OPERATING CABLE CARS.

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Fig. 6.

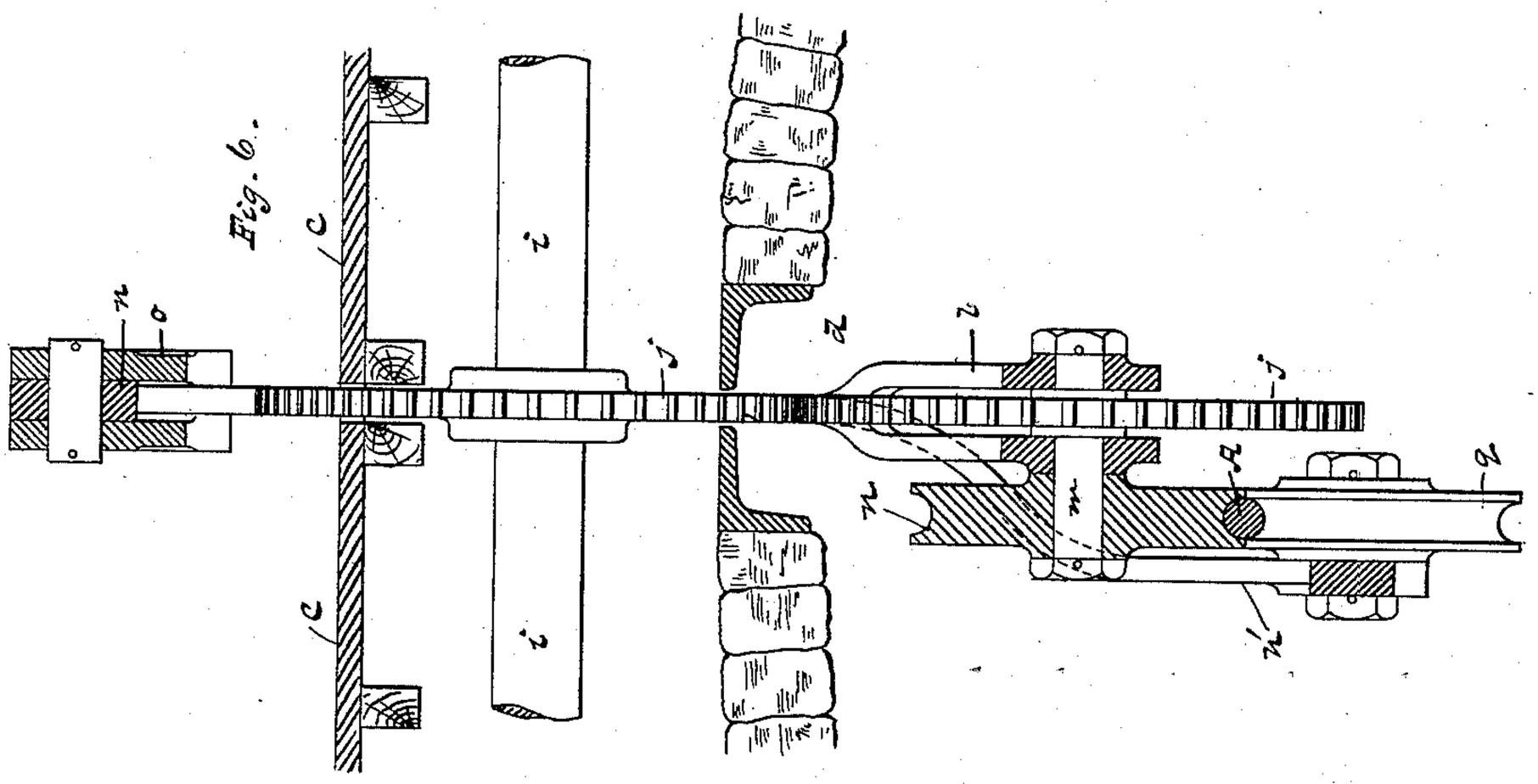


Fig. 7.

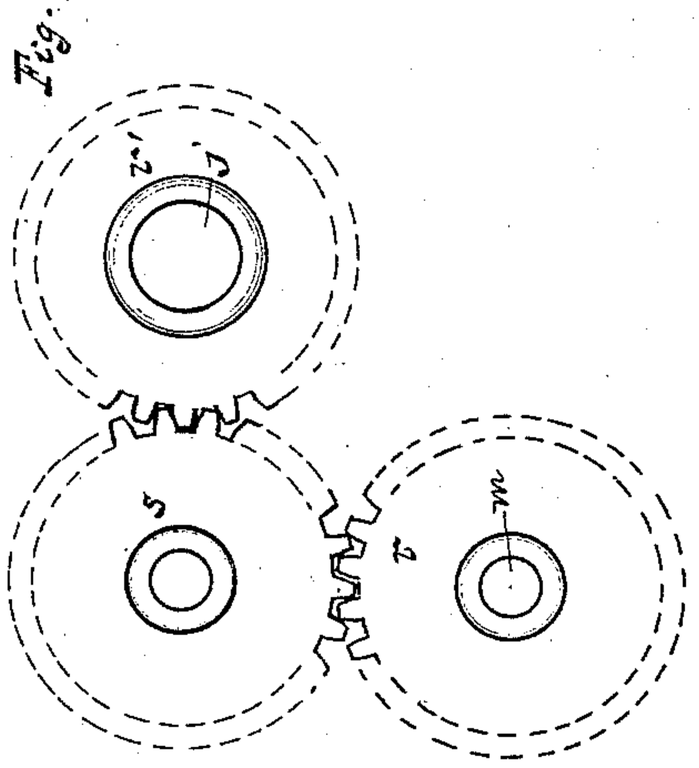
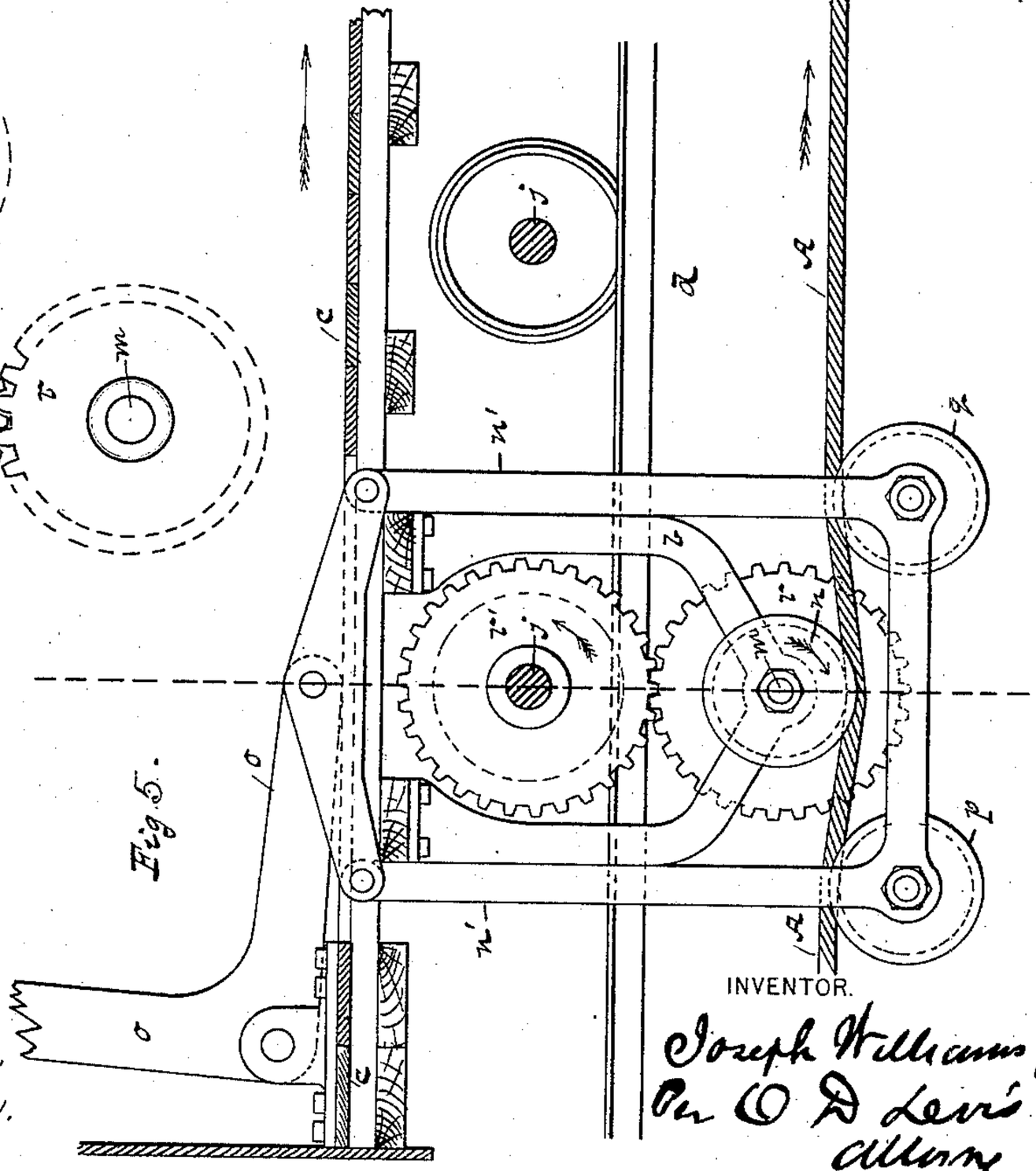


Fig. 5.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR OPERATING CABLE CARS.

SPECIFICATION forming part of Letters Patent No. 409,622, dated August 20, 1889.

Application filed April 1, 1889. Serial No. 305,614. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH WILLIAMS, Jr., a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus or Grips for Operating Cable Cars; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in the mode and apparatus for operating cable cars; and it consists in a device for gripping the cable and transferring the motion of the same to one of the axles of the car by means of suitable gearing or its equivalent, and also of a means whereby the grip may be released and moved vertically away from the cable for the purpose of crossing the cable of other railway-lines, together with certain other details of construction and combination of parts, as will be fully described hereinafter.

In the accompanying drawings, Figure 1 is a side elevation of my improved apparatus for operating cable cars, which is constructed in accordance with my invention. Fig. 2 is an end sectional elevation of the same. Fig. 3 is a side elevation of a modification, in which one of the frames is rigidly secured beneath the floor of the car. Fig. 4 is an end sectional elevation of the same. Fig. 5 is a side elevation of another modification, in which the motion from the cable is transferred direct to the axle by means of two gear-wheels, the one meshing with the other. Fig. 6 is an enlarged end sectional elevation of the same. Fig. 7 is a diagram of an arrangement of gearing by means of which a reverse movement of the car may be obtained.

To put my invention into practice with an ordinary cable car such as is now in common use, and an underground cable A, arranged and operated in a manner well known to the art, I provide two frames *b n'*, of suitable size and form of construction, and the one *b* capable of sliding within the other *n'*. These two frames *b n'* are suspended to two L-shaped levers *o o'*, hinged to the floor of the car *c* and adapted to be operated by the gripman to elevate or lower the frames *b n'*.

Mounted near the top of the inner frame *b*, and rigidly secured to the same shaft *g*, are two small pulleys or sprocket-wheels *f f'*, one of which is connected by a wire-rope belt *l'* to another and similar wheel *i'*, firmly secured on one of axles *j* of the car. The other sprocket-wheel *f'* is connected by a wire-rope belt *l'* to a wheel *k* of the same construction, arranged on a short shaft *m*, mounted in suitable bearings at the base of the frame *b*.

Attached to the same shaft *m* as the lower sprocket-wheel *k* is a grooved sheave *n*, which is adapted to contain and remain on the top of the cable A, and to rotate the several sprocket-wheels above by the friction of the cable.

Mounted at the base of the outer frame *n'* are two sheaves *p' q'*, which occupy a position on either side of the sheave *n*, and are adapted to contain and ride against the lower side of the cable A in a manner that when the frame *n'* is elevated by means of the lever *o'* the two sheaves *p' q'* lift the cable A and press the same tightly against the sheave *n*.

In operation, the lower portions of the two frames *b n'* extend into the conduit *d*, in which the cable A is operated, the said cable A being in rapid motion in a direction opposite to that in which the car travels, as indicated by the arrows in Fig. 1. When desired to start the car, the lever *o'* is pressed forward, which motion elevates the outer frame *n'*, and the sheaves *p' q'*, pressing the cable A tightly against the sheave *n*, compel the said sheave *n* to rotate by friction. This sheave *n*, being in motion, rotates the sprocket-wheel *k*, which in its turn revolves the sprocket-wheel *f* above by means of the belt *l*. From this point the motion is conveyed to the axle *j* by means of the two sprocket-wheels *f' i'* and belt *l'*, which revolves the wheels and propels the car forward. When crossing another cable at right angles with the cable A, connected to this apparatus, the same may be released and the frames *b n'* elevated above the interfering cable by pressing the two levers *o o'* forward, the cable A being first released from the sheaves *n p' q'* by changing its direction, in a manner well known to the art.

In Figs. 3 and 4 on the drawings I have

shown a modification of my invention, in which one of the frames *b* is rigidly secured beneath the floor *c* of the car, with its lower portion extending beneath the surface of the street and into the conduit *d*, containing the cable A. Mounted on this frame *b*, in suitable bearings *e*, is a shaft *g*, carrying a small chain or sprocket wheel *f*, and on the same shaft *g* is a small toothed wheel *h*, which meshes with another *i*, of the same size, or nearly so, rigidly attached to one of the axles *j* of the car. At the lower end of the frame *b* is mounted a small sprocket-wheel *k*, which is connected by a chain belt *l* to the wheel *f* above. On the same shaft carrying the sprocket-wheel *k* is a grooved pulley *n*, adapted to contain and remain on the top of the cable A and to operate the same by friction.

Loosely attached to the frame *b* is another frame *n'*, capable of a limited vertical movement by means of an L-shaped lever *o*, suitably mounted in the interior of the car and to be operated by the gripman. Mounted at the base of the sliding frame *n'* are two grooved pulleys *p q*, which contain and remain on the under side of the cable A. These last-described pulleys *p q* are separated the one from the other and arranged to occupy a position on each side of the stationary pulley *n* in a manner that when the frame *n'* is elevated by means of the lever *o*, the two pulleys *p q* lift and at the same time press the cable tightly against the pulley *n*.

In operation, the cable A being in rapid motion and it is desired to start the car, the lever *o* is pressed forward, which elevates the sliding frame *n'*, thereby carrying the cable A upward against the pulley *n*, which operation gives the same a rapid rotary motion. This pulley *n* when revolving rotates the sprocket-wheel *k* on the same shaft *m*, and by means of the chain-belt *l* revolves the sprocket-wheel *f*, above, and toothed wheel *h*. This toothed wheel *h*, meshing with another *i*, attached on the axle *j*, revolves the same and thereby propels the car forward in the same direction as the run of the cable.

At Figs. 5 and 6 on the drawings I have shown another modification of my invention, which consists of the rigid and vertically-moving frames *b n'*, as before described, the stationary grooved pulley *n*, and vertically-moving pulleys *p q*, and differs from that shown at Figs. 1 and 2 by a direct connection from the shaft *m*, carrying the pulley *n* and the axle *j* of the car by means of toothed wheels *r' r*, meshing with each other, which conveys the motion from the cable A to the axle *j* by friction.

The operation of this device is analogous to that before described.

In Fig. 7 of the drawings I have shown an arrangement of gearing by means of which a motion may be given to the axle *j* of the car to cause the latter to travel in a reverse direction to the run of the cable, and it consists in an intermediate toothed wheel *s*, placed between and meshing with the toothed wheel *r'* on the axle *j* and the wheel *r* operated by the pulley *n*. It is obvious by this arrangement of gearing the car is propelled in an opposite direction to that in which the cable A is traveling.

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

1. The combination, with a car and a cable, of two frames carried by the car, one of which is adapted to be moved vertically with relation to the other, friction-rollers carried by the vertically-movable frame and arranged to contact with the cable to lift the latter, a shaft carried by the other frame and having means adapted to be driven by the cable when the latter is elevated, and gearing intermediate of said shaft and one of the axles of the car, substantially as described, for the purpose described.

2. The combination, with a car and a cable, of a normally-stationary frame carried by the car, a vertically-movable frame also carried by the car and having rolls at its lower end arranged to contact with the cable to lift the latter when said frame is elevated, a shaft journaled in the other frame and having a friction-roll adapted to be positively driven by the cable when it is elevated by the movable frame, and gearing intermediate of said shaft and one of the axles of the car, all arranged and combined for service, substantially as and for the purpose described.

3. The combination, with a car and a cable, of a vertically-movable frame carried by said car and having at its lower extremity the spaced friction-rolls which are arranged to contact with the lower side of the cable, a normally-stationary frame arranged within said vertically-movable frame and suitably mounted on the car, a shaft journaled in said stationary frame at a point between and above the rollers of the movable frame, and having a friction-roll adapted to engage and be positively rotated by the cable when it is elevated by said movable frame, and gearing intermediate of said shaft and one of the axles of the car, substantially as and for the purpose described.

4. The combination, with a car and a cable, of a vertically-movable frame, as *n'*, carried by said car and having friction-rolls adapted to engage the cable to lift the same when the frame is elevated, another frame, as *b*, arranged within the first-mentioned frame *n'*, which remains normally at rest and is capable of vertical play within the vertically-movable frame *n'*, a shaft carried by the frame *b* and having a friction-roll adapted to be positively driven by the cable when it is lifted by the rolls of said frame *n'*, and gearing intermediate of the shaft and one of the axles of the car, substantially as and for the purpose described.

5. The combination, with a car and a cable, of an outer vertically-movable frame sus-

pended from the car and having friction-rolls adapted to engage the cable to lift the same when said frame is elevated, an inner movable frame arranged within the outer frame and carrying a shaft which is adapted to engage and be rotated by the cable when said inner frame is at its lowest position and which is withdrawn from the cable when said frame is elevated, and gearing intermediate of said shaft and an axle of the car, arranged and combined for service, substantially as herein shown and described.

6. The combination, with a car and a cable, of two frames carried by the car, one having friction-rollers arranged to engage the lower side of the cable and the other having a shaft provided with a friction-roll which is adapted to be rotated by the cable when the latter is lifted, another shaft journaled in the last-mentioned frame, and suitable belt-gearing intermediate of the two shafts and an axle of the car, all arranged and combined for service, substantially as and for the purpose described.

In testimony that I claim the foregoing I hereunto affix my signature this 6th day of March, A. D. 1889.

JOSEPH WILLIAMS, JR. [L. S.]

In presence of—
C. C. LEE,
M. E. HARRISON.