No. 800,762. PATENTED OCT. 3, 1905.

A. L. PRENTISS.

TROLLEY POLE.

APPLICATION FILED OCT. 18, 1904.

4 SHEETS—SHEET 1.

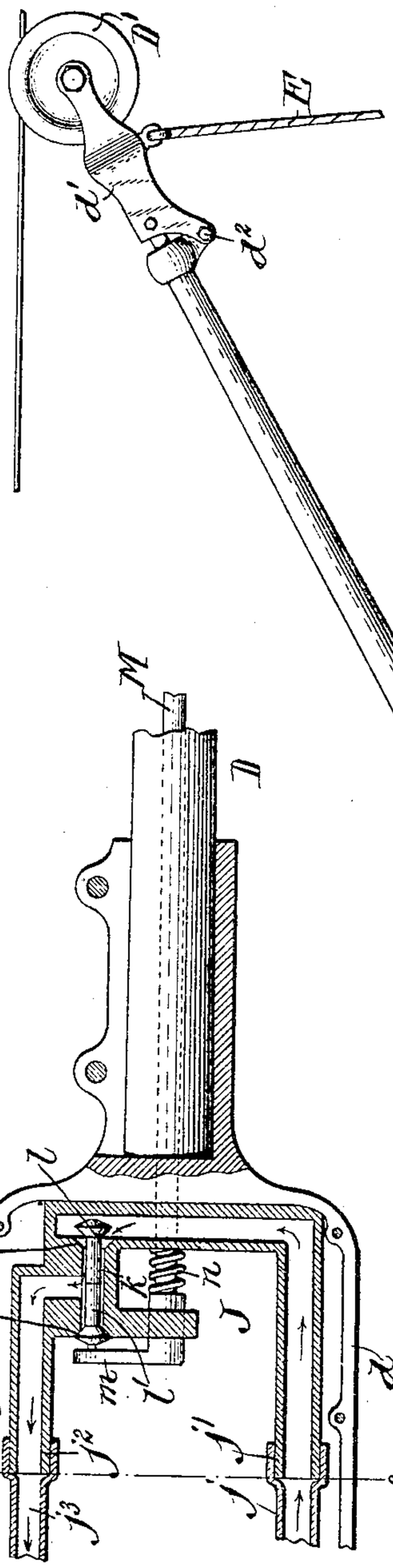

Fig. 2.

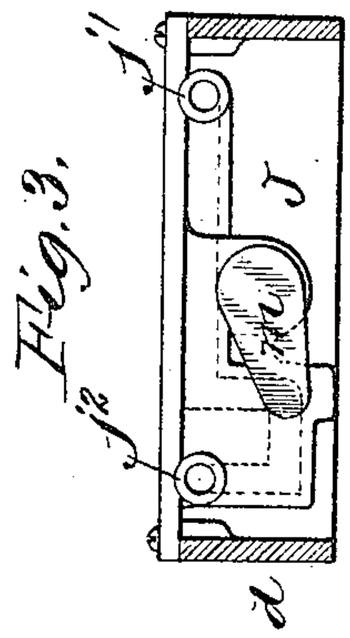

Fig. 3.

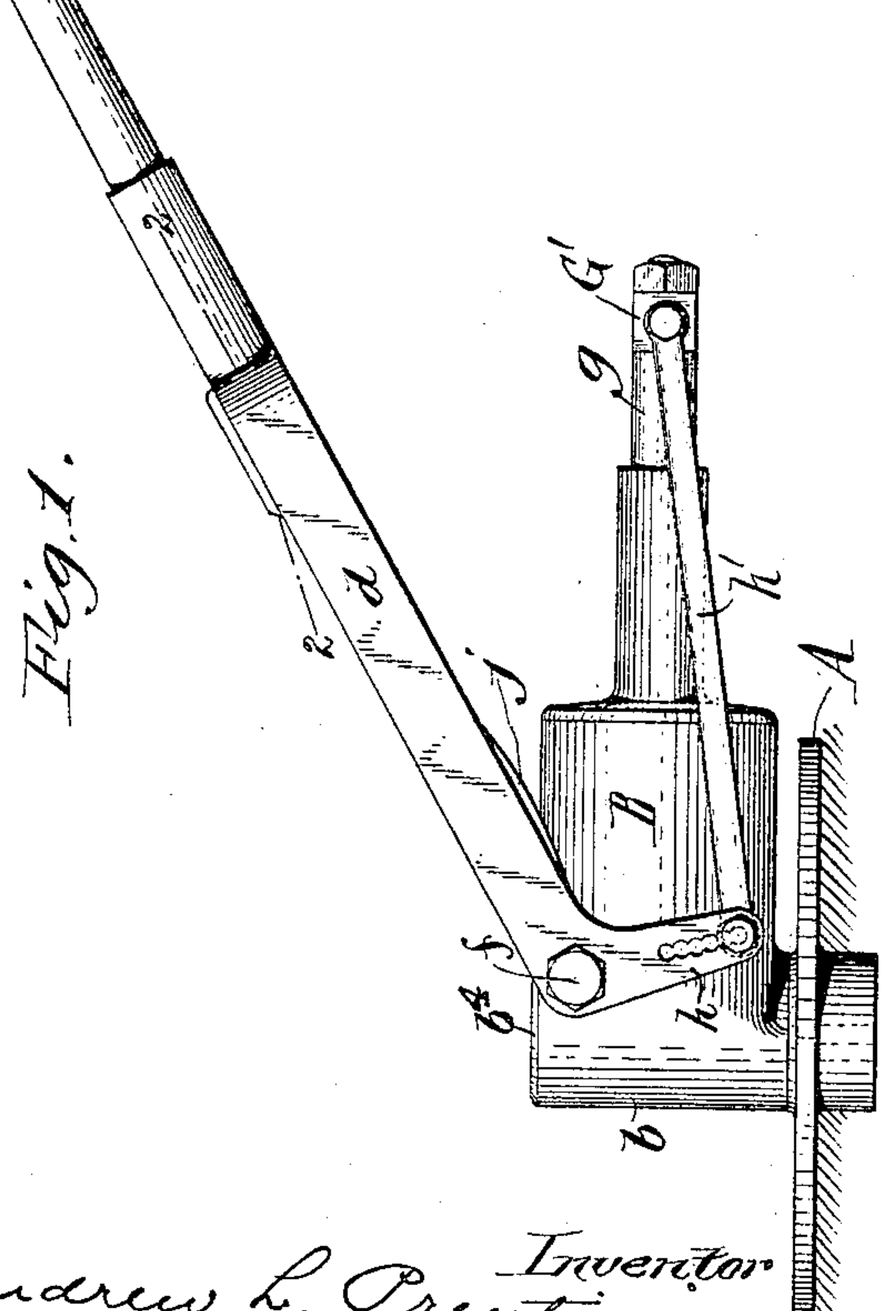

Fig. 1.

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4 SHEETS—SHEET 2.

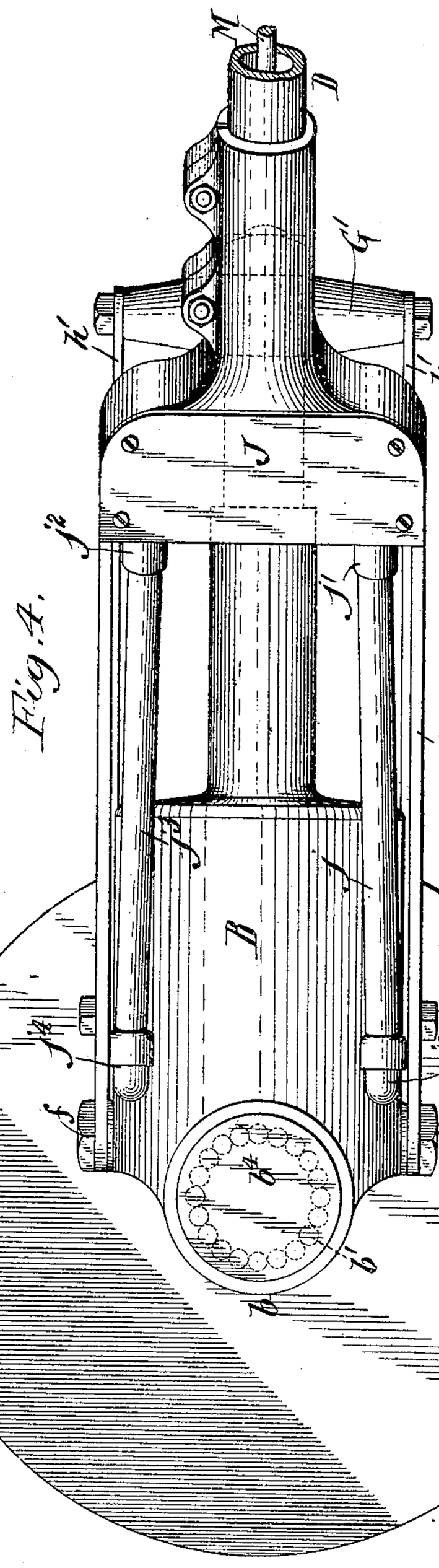

Fig. 4.

Fig. 5.

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4 SHEETS—SHEET 3.

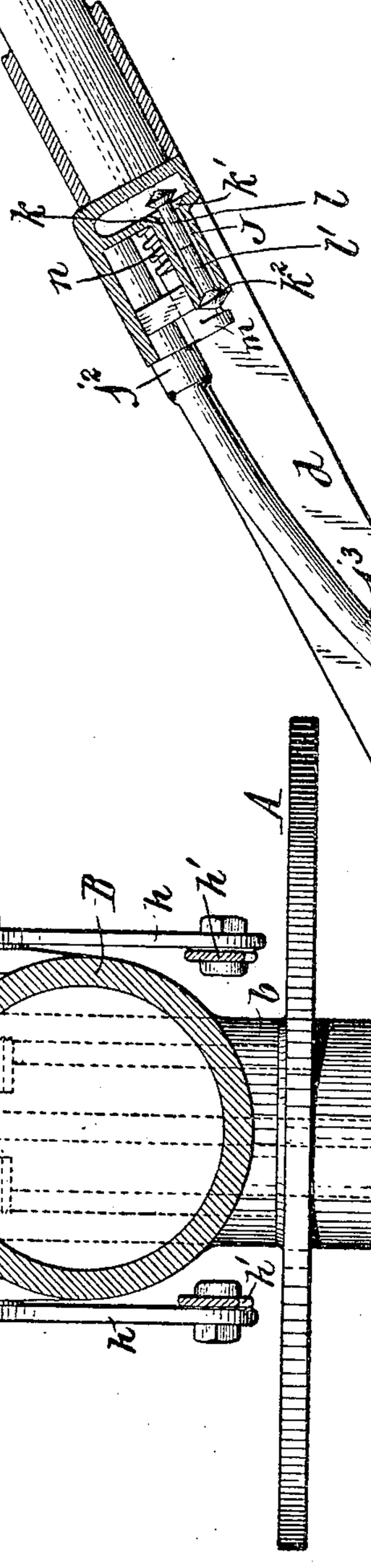

Fig. 6.

Fig. 7.

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4 SHEETS—SHEET 4.

Fig. 8.

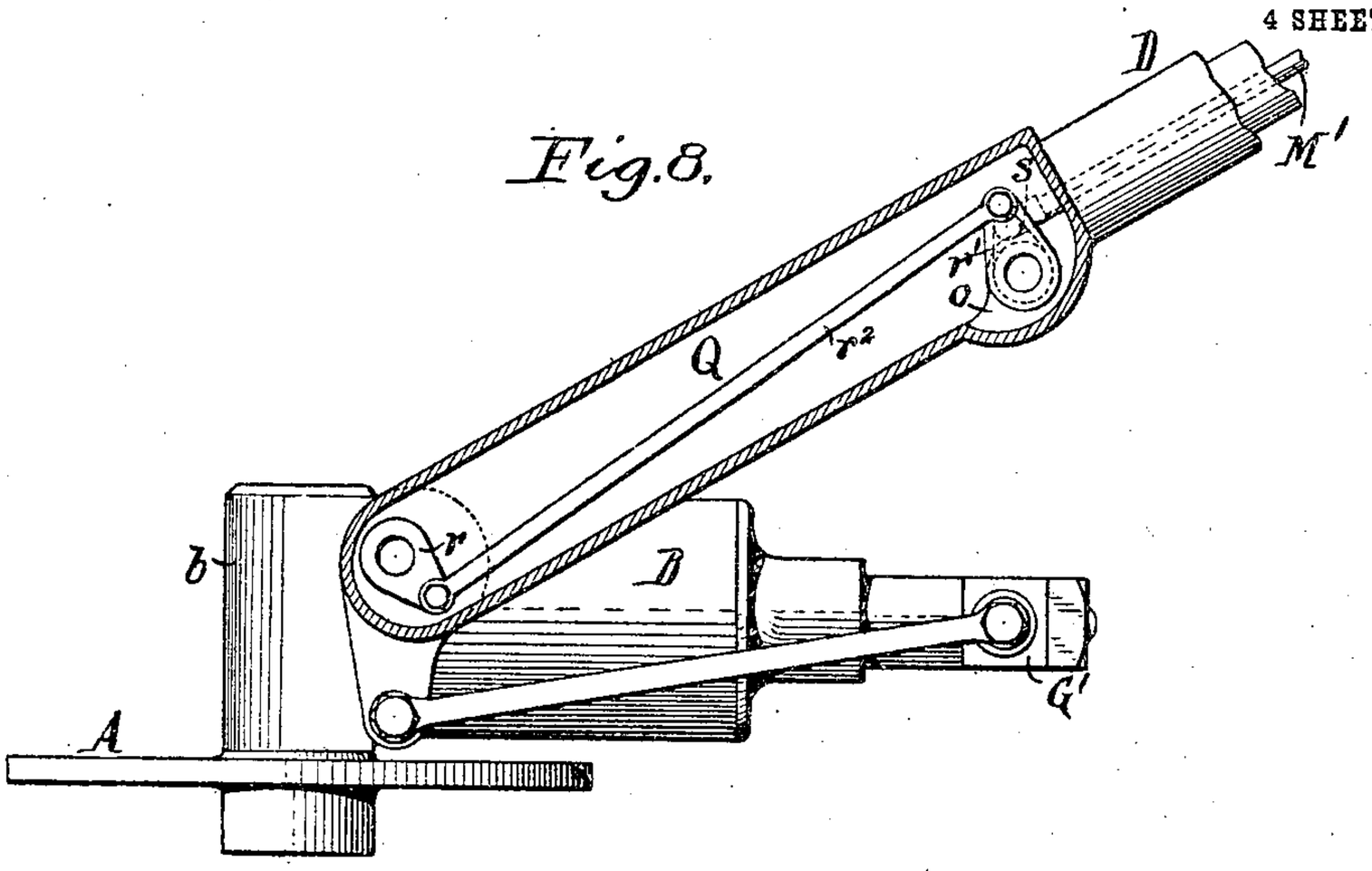


Fig. 9.

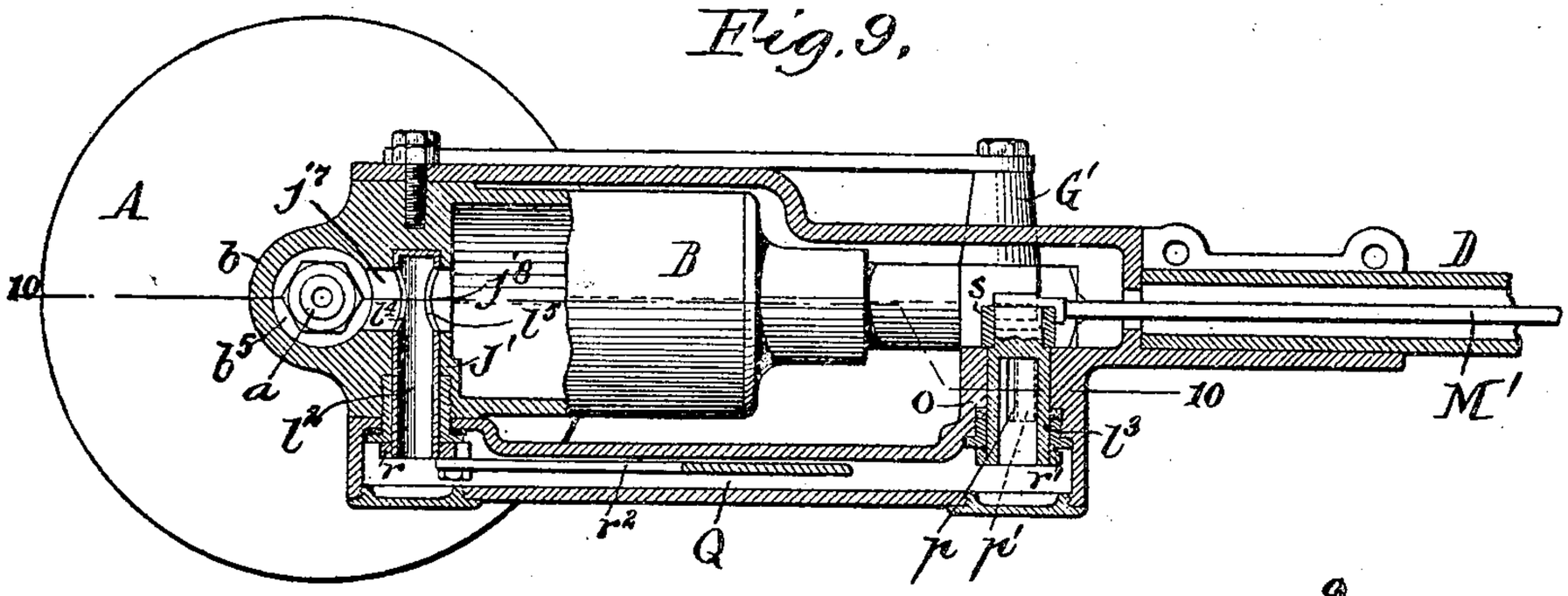
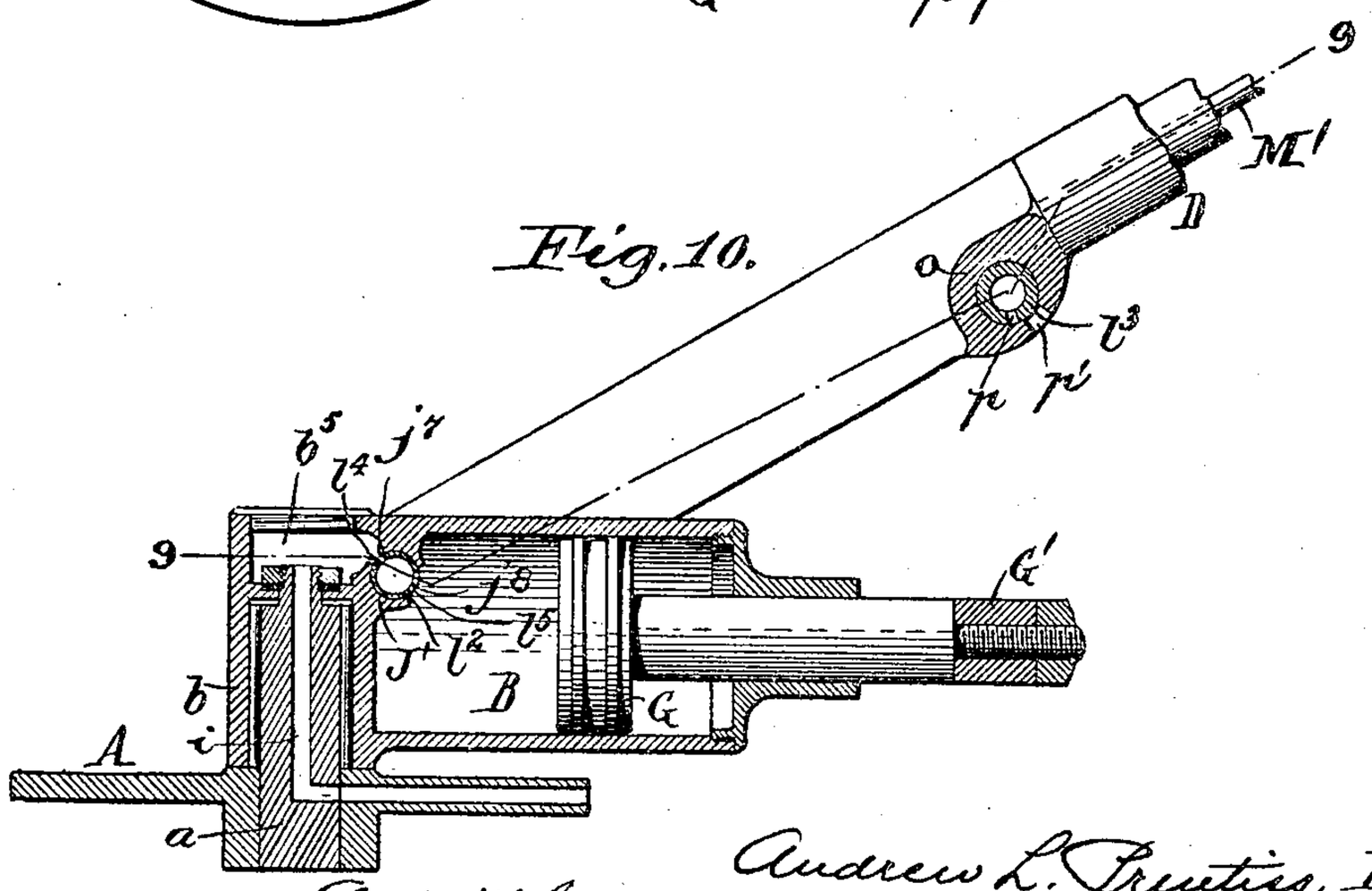


Fig. 10.



Witnesses { Louis W. Gratz. Robert Weitkrecht

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UNITED STATES PATENT OFFICE.

ANDREW L. PRENTISS, OF BUFFALO, NEW YORK.

TROLLEY-POLE.

No. 800,762. Specification of Letters Patent. Patented Oct. 3, 1905.

Application filed October 18, 1904. Serial No. 228,950.

To all whom it may concern:

Be it known that I, ANDREW L. PRENTISS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Trolley-Poles, of which the following is a specification.

This invention relates more particularly to the class of trolley-poles having automatic controlling means which permit the same to fall to a position below the plane of the trolley-wire and the cross-wires or supports when the trolley-wheel accidentally leaves or jumps the wire, so as to avoid damage to the pole, the trolley-wire, and its supports.

The object of my invention is to provide a simple and reliable controlling mechanism for the pole which is operated by compressed air or similar fluid and which holds the trolley-wheel against the wire by fluid-pressure and permits the pole to be readily restored to its operative position.

In the accompanying drawings, consisting of four sheets, Figure 1 is a side elevation of a trolley-pole and base embodying my invention, the pole being shown in its operative position. Fig. 2 is a fragmentary longitudinal section of the pole in line 2 2, Fig. 1, on an enlarged scale. Fig. 3 is a transverse section in line 3 3, Fig. 2. Fig. 4 is a fragmentary top plan view of the pole, on an enlarged scale. Fig. 5 is a fragmentary horizontal section in line 5 5, Fig. 7. Fig. 6 is a fragmentary longitudinal section of the pole at right angles to Fig. 2. Fig. 7 is a transverse section in line 7 7, Fig. 6. Fig. 8 is a fragmentary sectional elevation of a modified construction of the pole. Fig. 9 is a longitudinal section in line 9 9, Fig. 10. Fig. 10 is a longitudinal section in line 10 10, Fig. 9.

Similar letters of reference indicate corresponding parts throughout the several views.

Referring to the construction shown in Figs. 1 to 7, inclusive, A is a stationary base-plate adapted to be secured to the car-roof and having a fixed post or stud a.

B indicates a horizontally-swinging air or pressure cylinder provided at its rear end with an upright hub or bearing b, by which it is swiveled to the post a. Antifriction-rollers b' are preferably interposed between this hub and the post, as shown in Figs. 4 and 6. As shown in Fig. 6, the reduced upper end a' of the post passes centrally through a fixed diaphragm b^2, arranged in the upper portion of the hub, the portion of the hub above this diaphragm forming an air-chamber b^3, which is closed by a screw-plug b^4. An air-tight joint is formed between the hub and the post by suitable packing c, interposed between the upper side of the diaphragm and a clamping-nut c', which engages with an internal screw-thread of the air-chamber. The upper end of the post a passes loosely through said clamping-nut.

D is the trolley-pole, preferably consisting of a main body-section, provided at its lower end with a yoke or bifurcated portion d, rigidly connected therewith, and at its upper end with a hinged section d', carrying the trolley-wheel D′ and pivoted to the body-section by a transverse pivot d^2, so as to permit the upper section to swing vertically on the lower or body section. E is the customary depressing-cord, which is connected to the upper section d'.

The branches of the yoke d straddle the cylinder B and are pivoted at their lower ends to opposite sides thereof by horizontal pins f, thus permitting the pole to swing vertically on the swiveling cylinder. In this cylinder is arranged a reciprocating piston G, the rod g of which passes through the rear head of the cylinder and carries a cross-head G′. The branches of the yoke d are provided with depending arms h, which are connected with opposite ends of this cross-head by links h', by which connection the pole is caused to swing upward and the trolley-wheel pressed against the wire or conductor when the piston is moved rearwardly in the cylinder by the compressed air supplied to the latter.

The post a is provided with a longitudinal air-inlet passage i, which leads to the air-chamber b^3 of the hub b and which is connected with a compressed-air-supply tank carried by the car and not shown in the drawings. The air-chamber b^3 is connected by a flexible tube or conduit j with a valve-chamber J, carried by the lower section D of the pole and preferably located at the junction of said section with its yoke d, as shown. This valve-chamber has an inlet passage or nipple j', to which the adjacent end of the tube j is connected, and a discharge passage or nipple j^2, to which a flexible return tube or conduit j^3 is connected. This return-tube is connected at its opposite end with a nipple j^4, which communicates by a port j^5 with the front portion of the cylinder. The latter is provided opposite its nip-

ple j^4 with a similar nipple j^6, to which the front end of the other tube j is attached, as shown in Figs. 4 and 5.

The inlet and discharge passages $j' j^2$ of the valve-chamber are connected by an intermediate passage k, which opens at one end into the atmosphere and forms a pressure-releasing or exhaust port. This connecting-passage is provided at opposite ends with valve-seats $k' k^2$, to which are applied oppositely-acting valves $l\ l'$, the valve l controlling communication between the inlet and discharge passages of the valve-case, while the valve l' controls the escape of the air from the case. The stems of these valves are guided in the connecting-passage k and may be connected or disconnected, as preferred. It will now be understood that when the supply-valve l is open and the exhaust-valve l' is closed, as shown in Figs. 2 and 6, the compressed air entering the chamber b^3 does not pass directly into the cylinder B, but reaches the same indirectly through the tube j, valve-chamber J, and return-tube j^3.

The valves $l\ l'$ are actuated by the pivoted upper section d' of the trolley-pole through the medium of a sliding rod M, preferably passing through the hollow body-section D of the pole and provided at its lower end with a toe m, which bears against the projecting outer end of the exhaust-valve l', as shown in Fig. 2.

n is a spring applied to the sliding rod between a shoulder thereof and the adjacent head of the yoke d and tending to move the rod downward in the pole.

The pressure of the trolley-wheel against the wire tends to straighten or swing the hinged upper section of the pole downwardly on the lower section, drawing the rod M upward and compressing the spring n. This movement causes the toe m to close the exhaust-valve l' and open the supply-valve l and hold them in that position so long as the trolley remains against the wire. Compressed air is therefore allowed to pass through the valve-case J into the cylinder under these conditions, forcing the piston G toward the rear end of the cylinder and pressing the trolley-wheel against the wire. When the trolley-wheel accidentally leaves the wire, the upper pole-section d' swings upward on the lower section under the reaction of the spring n and causes the toe m to recede from the exhaust-valve l', allowing the latter to open under the air-pressure and closing the supply-valve. When the valves are thus reversed, the further supply of compressed air to the cylinder is cut off and the air behind the piston is allowed to escape through the return-tube j^3, discharge-passage j^2, and exhaust-port k. The piston now recedes under the weight of the pole exerted through the links h' and the cross-head G' and the pole drops to a horizontal position or below the plane of the usual cross-wires which support the trolley-wire, thus preventing injury to the same and the pole.

To restore the pole to its operative position, it is only necessary to pull down on the cord E, so as to again straighten the upper pole-section d'. This causes the supply and exhaust valves to be reversed to their former position, as shown in the drawings, thereby cutting off the further escape of the air, again supplying pressure to the cylinder, and causing the piston to elevate the pole and hold it in contact with the wire.

While I prefer to employ the valve mechanism shown in the drawings, various other kinds of valves will suggest themselves to the skilled mechanic which may be substituted therefor without departing from my invention. The arrangement and location of the supply and exhaust valves is also susceptible of modification. For example, Figs. 8, 9, and 10 illustrate a modified form in which the supply-valve l^2 is carried by the air-cylinder and the exhaust-valve l^3 by the trolley-pole. In this case the supply-valve consists of a hollow rotary plug closed at its inner end and open at its outer end and seated in a horizontal valve-case J', arranged at the front end of the cylinder and communicating by ports j^7 j^8 with the cylinder and the air-chamber b^5. The rotary plug is provided in opposite sides with ports $l^4\ l^5$, adapted to register with the ports $j^7\ j^8$, as shown in Figs. 9 and 10, for admitting compressed air from the chamber b^5 directly to the cylinder behind its piston.

The exhaust-valve l^3 is closed at its inner end and open at its outer end and seated in a case o, formed in the yoke of the trolley-pole. This valve is provided with an exhaust-port p, adapted to register with a similar port p' in the bottom of its case when the trolley-wheel jumps the wire. The open outer ends of the supply and exhaust valves are connected by an air passage or chamber Q, arranged lengthwise in the adjacent yoke member of the trolley-pole. These valves are caused to operate in unison by oppositely-disposed rock-arms $r\ r'$, secured to their outer ends and connected by a link r^2, the connection being such as to cause the exhaust-valve to close when the supply-valve opens, and vice versa. The two valves are actuated from the upper hinged pole-section d' by the rod M', which is connected at its lower end to a rock-arm s, secured to the inner end of the exhaust-valve l^3. When the parts of this modified construction are in their normal position, the supply-valve l^2 is open and the exhaust-valve l^3 closed, as shown in the drawings, thus admitting compressed air into the cylinder behind the piston and preventing its escape therefrom and holding the trolley-wheel against the wire by the rearward movement of the piston, as explained in connection with the first-described construction. When the trolley-wheel acci-

dentally leaves the wire, the downward movement of the rod M′ causes the supply-valve to close and the exhaust-valve to open, cutting off the further supply of pressure to the cylinder and permitting the air behind the piston to escape into the hollow supply-valve through its rear port l^5 and thence through the passage Q, hollow exhaust-valve, and the exhaust-ports p p' into the atmosphere. To permit the escape of the air through the supply-valve and at the same time cut off communication between the inlet-chamber b^5 and the cylinder, the rear port l^5 of this valve is so wide that it still remains open after the front port l^4 has been closed. It will be observed that in this improved pneumatic controlling mechanism a single pressure-cylinder and coöperating piston are employed for holding the pole in its operative position and that the supply of the pressure fluid to the cylinder and its release therefrom to permit the dropping of the pole are governed by suitable valve mechanism, preferably located wholly on the trolley-pole, but which may be modified in construction and arrangement without departing from the gist of the invention. The use of a single cylinder for this purpose materially simplifies the construction and reduces the cost of the controlling devices.

I claim as my invention—

1. The combination of a trolley-pole, a pressure-cylinder containing a piston, means for connecting the trolley-pole with the piston, a valve-case mounted on the pole and having an inlet-port, a conduit connecting the pressure-cylinder with said valve-case, and valve mechanism controlling the admission of the pressure fluid to said cylinder and its escape therefrom and operated by the movements of the pole, substantially as set forth.

2. The combination of a trolley-pole, a pressure-cylinder containing a piston, means for connecting the trolley-pole with the piston, a valve-case mounted on the pole and having an exhaust-port, a conduit connecting the pressure-cylinder with said valve-case, and valve mechanism controlling the admission of the presure fluid to said cylinder and its escape therefrom and operated by the movements of the pole, substantially as set forth.

3. The combination of a trolley-pole, a pressure-cylinder containing a piston, means for connecting the trolley-pole with the piston, and valve mechanism mounted on the pole and controlling the admission of the pressure fluid to said cylinder and its escape therefrom, said valve mechanism being operated by the movements of the pole, substantially as set forth.

4. The combination of a trolley-pole, a pressure-cylinder containing a piston, means for connecting the trolley-pole with the piston, valve mechanism mounted on the pole and controlling the admission of the pressure fluid to said cylinder and its escape therefrom and flexible conduits connecting the cylinder with said valve mechanism, the latter being operated by the movements of the pole, substantially as set forth.

5. The combination of a trolley-pole, a pressure-cylinder containing a piston, means for connecting the trolley-pole with the piston, a valve-case mounted on the pole and having inlet and discharge passages and an exhaust-port, conduits connected with the cylinder and said inlet and discharge passages, a supply-valve controlling the passage of the fluid through the valve-case, an exhaust-valve controlling said exhaust-port, and means for automatically operating said valves by the movements of the trolley-pole, substantially as set forth.

6. The combination of a trolley-pole having upper and lower sections movable relatively to each other, a pressure-cylinder containing a piston, means for connecting the lower section of the pole with said piston, a valve-case mounted on the trolley-pole and having an exhaust-port, conduits connecting the pressure-cylinder with said valve-case, valve mechanism controlling the passage of the fluid through said valve-case and its escape through said exhaust-port, and operating means for said valve mechanism controlled by the movements of the upper trolley-pole section relative to the lower section, substantially as set forth.

7. The combination of a trolley-pole having upper and lower sections movable relatively to each other, a pressure-cylinder containing a piston, means for connecting the lower section of the pole with said piston, a valve-case mounted on the trolley-pole and connected with said cylinder, valves arranged in said case and controlling the passage of the fluid to and from the cylinder, and a sliding rod connected with the upper section of the pole and operating said valves, substantially as set forth.

8. The combination of a trolley-pole having upper and lower sections movable relatively to each other, a pressure-cylinder containing a piston, means for connecting the lower section of the pole with said piston, a valve-case mounted on the trolley-pole and connected with said cylinder, valves arranged in said case and controlling the passage of the fluid to and from the cylinder, and a sliding rod connected with the upper section of the pole and having a toe which engages said valves, substantially as set forth.

9. The combination of a trolley-pole, a pressure-cylinder having nipples or connections at opposite sides thereof, a fluid-supply passage leading to one of said nipples, a piston arranged in the cylinder and connected with the trolley-pole, a valve-case mounted on the pole and having nipples or connections corresponding to those of the cylinder, conduits attached at opposite ends to the nipples of the cylinder and the valve-case, and valve mech-

anism arranged in said case and controlling the supply of the fluid to said cylinder and its escape therefrom, said valve mechanism being controlled by the movements of the trolley-pole, substantially as set forth.

10. The combination of a trolley-pole, a pressure-cylinder having a fluid-supply chamber, a piston arranged in the cylinder and connected with the trolley-pole, a valve-chamber mounted on the pole, conduits leading from said supply-chamber to the valve-chamber and from the latter to the cylinder, and valve mechanism arranged in said case and controlling the supply of the fluid to said cylinder and its escape therefrom, said valve mechanism being controlled by the movements of the trolley-pole, substantially as set forth.

11. The combination of a base having a stud or post containing a fluid-supply passage, a pressure-cylinder having a hub swiveled on said post and provided with a fluid-chamber connected with said supply-passage, a trolley-pole pivoted to said cylinder, a piston arranged in said cylinder and connected with the trolley-pole, a valve-case mounted on the trolley-pole, conduits leading from said supply-chamber to the valve-case and from the latter to the cylinder, and valve mechanism arranged in said case and controlling the supply of the fluid to said cylinder and its escape therefrom, said valve mechanism being controlled by the movements of the trolley-pole, substantially as set forth.

12. The combination of a base having a stud or post containing a fluid-supply passage, a pressure-cylinder having a hub swiveled on said post and provided in its upper portion with a fluid-supply chamber connected with said passage and separated from the lower portion of the hub by a diaphragm, the upper end of the post passing through said diaphragm, a screw-nut engaging with the interior of said supply-chamber, packing interposed between said nut and said diaphragm, a piston arranged in said cylinder, a trolley-pole pivoted to said cylinder and connected with the piston, and valve mechanism controlling the admission of the pressure fluid to the cylinder and its release therefrom, said valve mechanism being controlled by the movements of the trolley-pole, substantially as set forth.

Witness my hand this 17th day of October, 1904.

ANDREW L. PRENTISS.

Witnesses:
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E. M. GRAHAM.