

No. 630,938.

Patented Aug. 15, 1899.

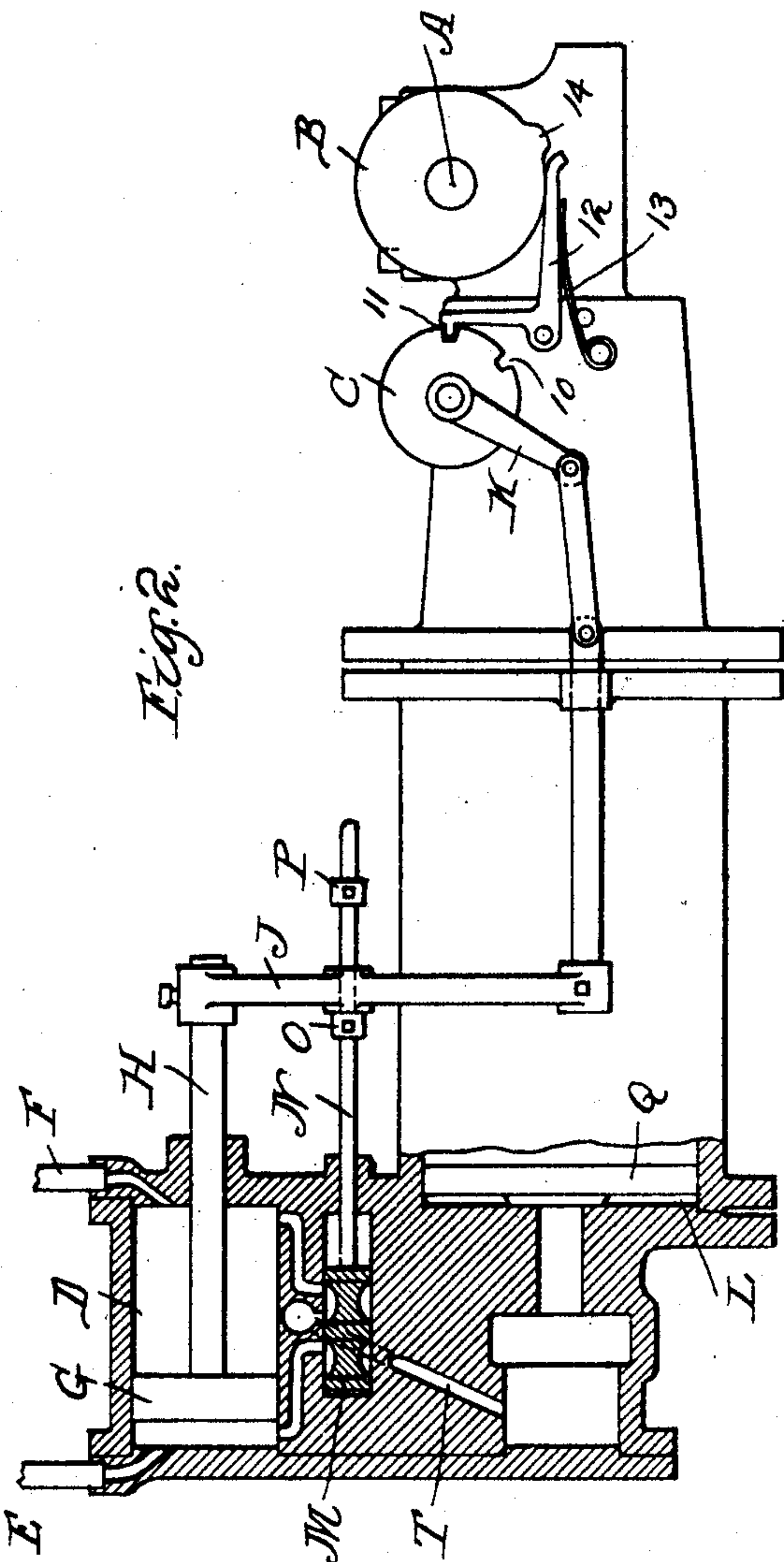
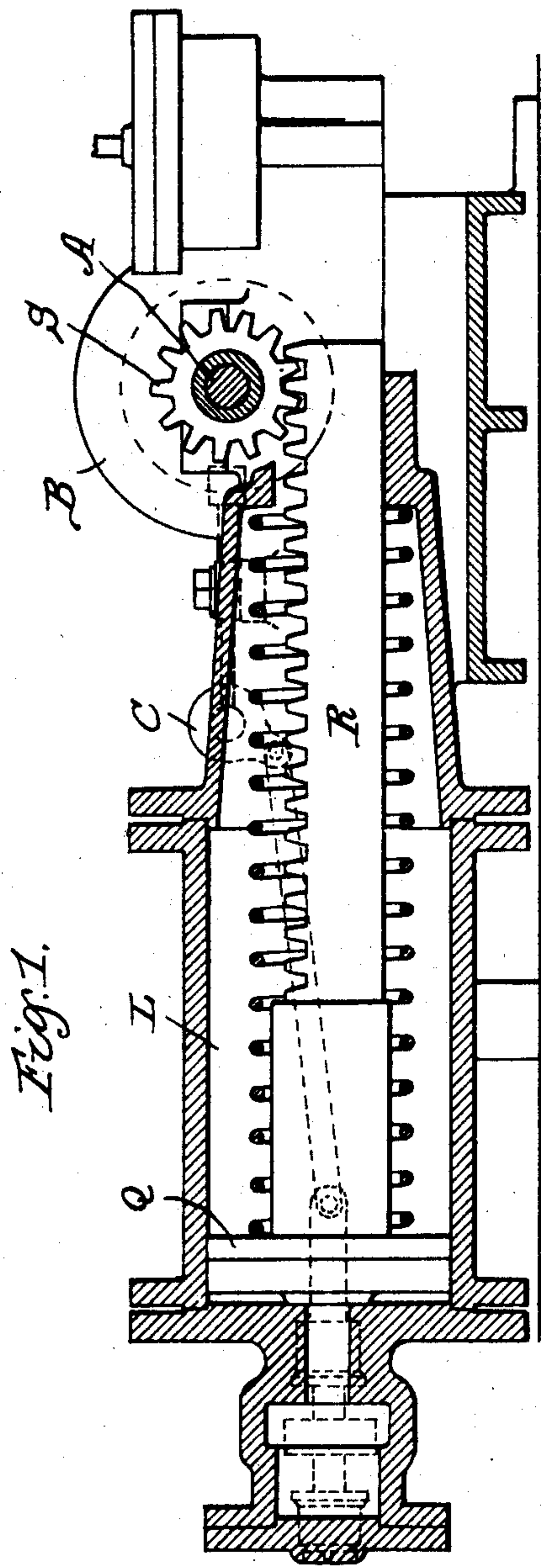
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CONTROLLING MECHANISM FOR ELECTRIC RAILWAYS.

(Application filed Dec. 7, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.  
Wm M. Rheem.  
Edward R. Barrett.

Inventor  
Sidney H. Short  
by  
Mowbray & Darby  
attys.

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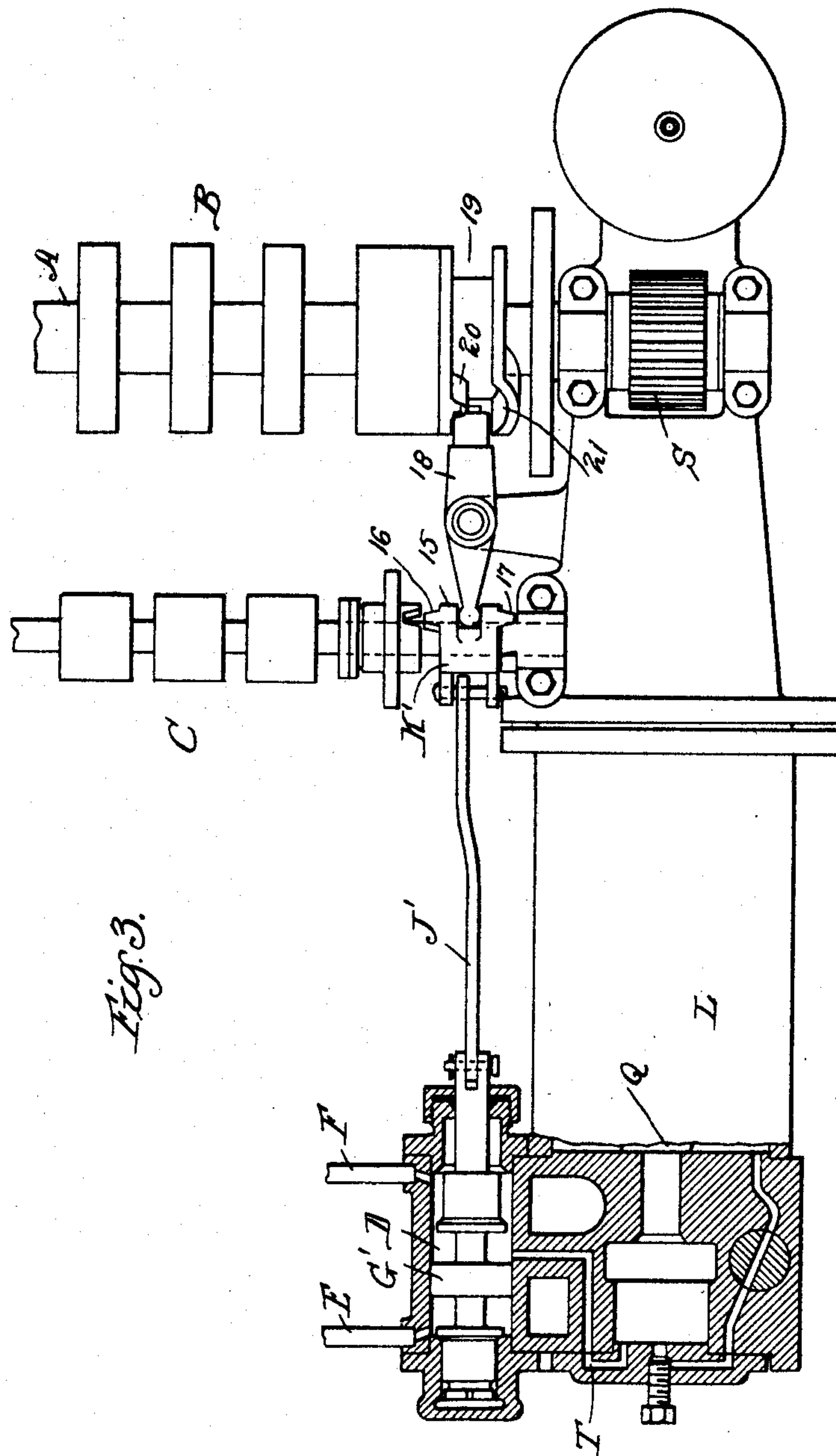


Fig. 3.

Witnesses:  
Wm. M. Rheem.  
Edward Bennett.

Inventor  
Sidney H. Short  
by Mowbray & Parry atty's



# UNITED STATES PATENT OFFICE.

SIDNEY H. SHORT, OF CLEVELAND, OHIO, ASSIGNOR TO THE WALKER COMPANY, OF NEW JERSEY.

## CONTROLLING MECHANISM FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 630,938, dated August 15, 1899.

Application filed December 7, 1898. Serial No. 698,552. (No model.)

*To all whom it may concern:*

Be it known that I, SIDNEY H. SHORT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Pneumatic Controlling Mechanism for Electric Railways, of which the following is a specification.

This invention relates to pneumatic controlling mechanism for electric railways.

10 The object of the invention is to provide pneumatically-operated means whereby the motor-circuits are properly connected up for "ahead" or "reverse" movements in advance of the resistance-varying changes that are introduced into the working circuit and in advance of the changes in the relation of the motors, where more than one motor is employed, through the usual controller-cylinder.

20 The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally specifically pointed out in the appended claims.

25 Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in longitudinal section of an apparatus embodying the principles of my invention. Fig. 2 is a view partly in longitudinal section and in a plane at right angles to the section upon which Fig. 1 is taken and partly in side elevation. Fig. 3 is a view similar to Fig. 2, showing a slightly-modified arrangement embodying the principles of my invention.

35 The same part is designated by the same reference-sign wherever it occurs throughout the several views.

40 In my Patent No. 559,807, dated March 1, 1898, I have shown, described, and claimed a pneumatic controlling mechanism for electric-railway cars wherein each car of a train is equipped with pneumatically-actuated apparatus for effecting from either end of any one of the cars of the train a coincident control of all the motors throughout the train, one or more cars of the train being equipped with motors and controllers. In said patent, wherein the broad idea of a pneumatic 50 controlling system is shown and claimed, I

have disclosed a system wherein two controllers are provided for the motors upon each car, one controller arranged to control the ahead movements of the motors and the other for controlling the reverse movements of the controller, the arrangement being such that one of said controllers is out of operation while the other is in commission. I have conceived, however, the idea of employing a pneumatically-actuated apparatus for effecting the actuation of a controller, and I have combined therewith an automatic reversing-switch, whereby I dispense with the two sets of controllers, as illustrated in the specific arrangement of my said prior patent, and in place thereof employ a single controller-cylinder having associated therewith a reversing-switch. In the accompanying drawings I have illustrated operative embodiments of the invention embodying these principles.

70 Referring to the constructions shown in Figs. 1 and 2, reference-sign A designates the shaft of the controller-cylinder B, which may be of any suitable and well-known construction and arrangement, for introducing into the working circuit of the motors the desired resistance variations and changes in the relation of the motors. Reference-sign C represents a reversing-switch, which may be of any desired construction and arrangement and the purpose of which is to properly connect up the motor-circuit for ahead or reverse movement according to the direction in which said cylinder or switch is moved. It is the special purpose of the present invention to provide an arrangement, pneumatically operated, whereby the movement of the reversing-switch in the proper and desired direction is effected in advance of the actuation of the main controller, so that the motor-circuit is coupled up for ahead or reverse movement, as the case may be and as may be desired, before the controller-cylinder is actuated. This advance movement of the reversing-switch is effected in the following manner: Pneumatic pressure is admitted to one end or the other of an auxiliary chest or cylinder D through the pipes E F. Operating in cylinder D is a piston G, to the rod H of which is connected an arm J, having 100



suitable connection to a crank-arm K on the shaft of the reversing-switch, the arrangement being such that when the piston G moves from one end of auxiliary cylinder D toward the other the crank-arm K is rocked, thereby rocking the reversing-switch cylinder. The pressure from auxiliary cylinder D is admitted to the main cylinder L through suitable port openings and passages controlled by a valve M. Upon the stem N of this valve are suitable stops O P, arranged to be engaged by arm J when moved in one direction or the other, whereby the valve M may be moved to open or close the passage to the main cylinder L. The main piston Q is arranged to operate in cylinder L, and the stem thereof is in the form of or carries a rack R, arranged to engage a pinion S on the shaft of the main controller for actuating the same in the manner more fully set forth, described, and claimed in my prior patent above referred to.

The operation is as follows: Air-pressure for operating the main piston Q is admitted, first, to auxiliary chamber or cylinder D, the valve M being in position to close the passage from said auxiliary cylinder to the main cylinder. The pressure thus admitted to cylinder D acts upon auxiliary piston G therein, moving the same from the left to the right, for instance. This causes arm J to move to the right, (see Fig. 2,) thus rocking arm K, and hence rotating the reversing-cylinder into proper position for the ahead movement, for instance, of the motor. The movement of the auxiliary piston a distance sufficient to effect the movement of the reversing-switch to the proper position brings arm J into contact with stop P on the stem N of valve M, thus moving said valve M into position to open the passage to the main cylinder L, thus admitting pressure to the main cylinder and actuating the main piston and its connected rack R, thus causing the main controller to be actuated. Thus it will be seen that the actuation of the reversing-switch is in advance of the actuation of the controller-cylinder. Similarly by admitting the pressure to auxiliary cylinder D through pipe F, for instance, the auxiliary piston G is moved in the opposite direction, and hence effecting, through the connection between the stem of said piston and the reversing-switch, the proper actuation of the latter before the arm J engages stop O on the stem of valve M to open the passage to the main cylinder. Therefore in any event the reversing-cylinder is actuated in advance of the actuation of the main controller-cylinder, whether for the ahead or the reverse movements of the motor, and hence the motor connections are properly made before the resistance variations are introduced or before the motor relations are varied in the ordinary operation of motor-controllers.

In Fig. 3 I have shown a slightly-modified arrangement, wherein air-pressure is sup-

plied to either end of the auxiliary cylinder D, similar in all respects to the same parts shown in Figs. 1 and 2. In the construction shown in Fig. 3, however, instead of employing a separate valve M for controlling the passage to the main cylinder L said passage is controlled by the auxiliary piston G', which serves both as a piston and also as a valve for opening or closing the passage T to the main cylinder. To the stem of piston-valve G' is pivotally connected an arm J', having pivotal connection at its free end to a crank-arm K', connected to or carried by the shaft of reversing-cylinder C, whereby when pressure is admitted to one side or the other of valve-piston G' to effect the movement thereof the reversing-cylinder is actuated to properly connect up the circuits of the motor for ahead or reverse movement, as the case may be, in advance of the opening of passage T to the main-controller-actuating cylinder.

It is desirable that when the reversing-switch is actuated to the desired point for establishing the proper circuits of the motor said reversing-switch be locked in that position, so as to remain in locked condition during the subsequent variations and changes introduced into the working circuit by the actuation of the controller-cylinder B. In Fig. 2 I have shown an arrangement for effecting this result, wherein a disk on the shaft of the reversing-switch is provided with suitable notches 10 11, respectively, corresponding to the ahead and reverse positions thereof, and a pawl 12, pivotally mounted, is arranged to have a finger enter said notches when the reversing-cylinder reaches the desired points. A spring 13 serves to normally press said fingers in a direction to enter said notches, a suitable lug 14 on the main controller effecting the disengagement of said finger with the notches. In Fig. 3 the same result is attained by providing a sleeve 15 upon the shaft of the reversing-switch, having lugs 16 17 on opposite sides thereof respectively arranged to engage in cooperating notches on fixed parts of the frame. A lever 18, pivotally mounted intermediate its ends, is arranged with one of the ends thereof engaging said sleeve 15 and the other end arranged to ride in a groove 19, carried by the main controller. A lug 20, formed in one wall of groove 19 and cooperating with the depression or seat 21 in the opposite wall of said groove, serves to effect the proper rocking of lever 18 to throw sleeve 15 into or out of engagement at the desired points for locking the reversing-switch.

From the foregoing description it will be observed that I provide an exceedingly simple and efficient arrangement for effecting the desired circuit connection of the motor for ahead or reverse movements in a single structure and in advance of the actuation of the controller-cylinder, and hence am enabled to dispense with the use of separate controller-cylinders with the additional appa-



tus required for separately operating the independent controllers, as in my prior patent. I desire it to be understood, however, that the specific constructions illustrated are merely illustrative embodiments of practical means for accomplishing the desired results, and many changes and variations therein would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention; but

Having now set forth the object and nature of my invention and various forms of apparatus embodying the same, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In a pneumatic controlling mechanism for electric-railway cars, the combination with a controller and a reversing-switch, and pneumatically-operated means for actuating said reversing-switch in advance of the actuation of said controller, as and for the purpose set forth.

2. In a pneumatic controlling mechanism for electric-railway cars, the combination with a controller and a reversing-switch, of means for actuating said switch and controller, said means operating to move said switch to the desired position in advance of the actuation of said controller, as and for the purpose set forth.

3. In a pneumatic controlling mechanism for electric-railway cars, a controller and a reversing-switch, in combination with pneumatically-actuated means for operating said controller and switch, said means operating to move said switch into the desired position

in advance of the actuation of said controller, as and for the purpose set forth.

4. In a pneumatic controlling mechanism for electric-railway cars, a controller and a reversing-switch, an air-cylinder and piston for actuating said controller, a passage for admitting pressure to said cylinder, a valve for controlling said passage, and means actuated coincidentally with the movement of said valve to open said passage for moving said reversing-switch, as and for the purpose set forth.

5. In a pneumatic controlling mechanism for electric-railway cars, a controller and reversing-switch, a cylinder and piston for actuating said controller, an auxiliary cylinder arranged in the passage of the pressure to said cylinder, an auxiliary piston arranged in said auxiliary cylinder, and means actuated by the movement of said auxiliary piston for moving said reversing-switch and opening said passage, as and for the purpose set forth.

6. In a pneumatic controlling mechanism for electric-railway cars, a controller and a reversing-switch, pneumatically-operated means for actuating said controller and switch, said means operating to move said switch in advance of the movement of said controller, and means for locking said switch, as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 3d day of December, 1898, in the presence of the subscribing witnesses.

SIDNEY H. SHORT.

Witnesses:

CHARLES C. OWENS,  
W. B. WHITING.