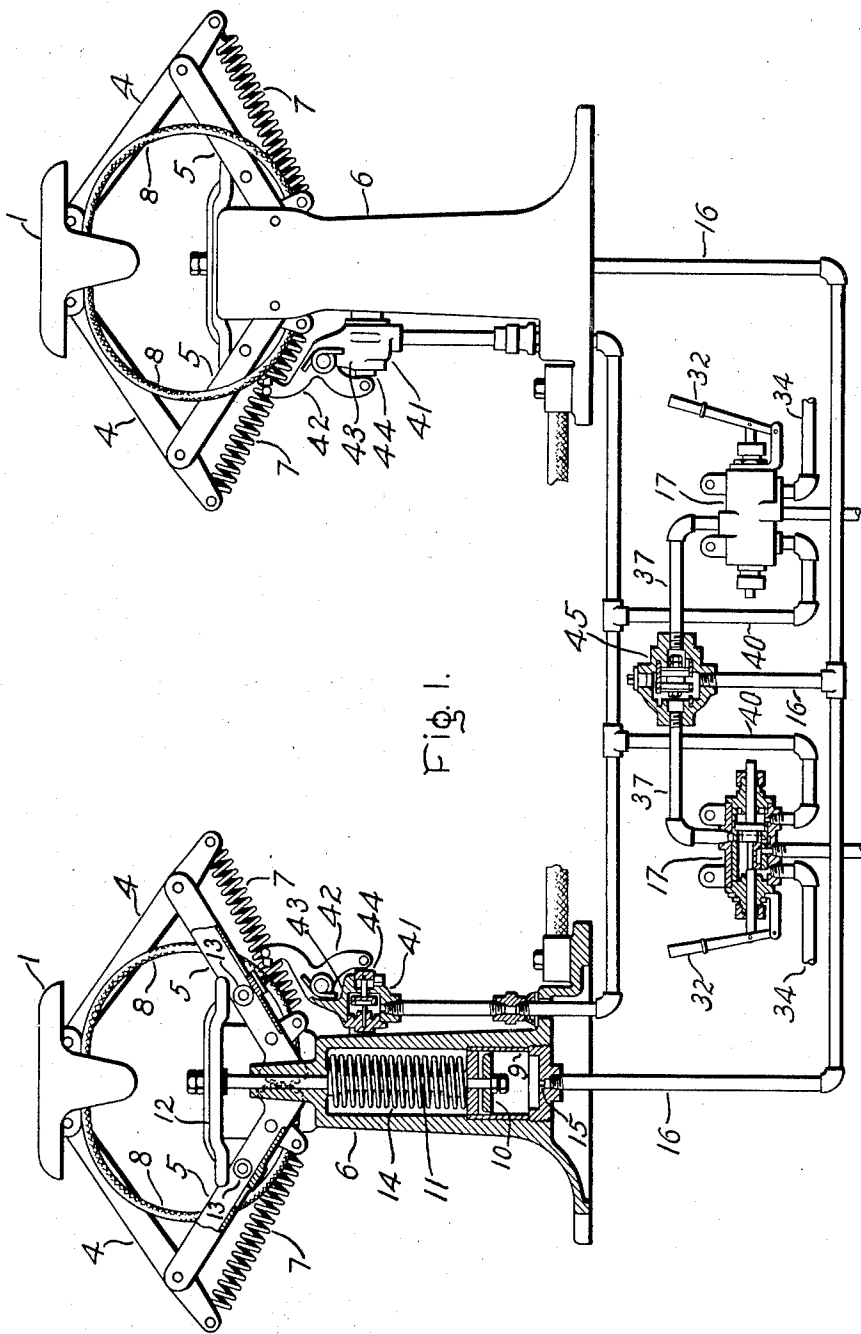


No. 868,889.

PATENTED OCT. 22, 1907.

R. H. ROGERS.
TROLLEY OPERATING VALVE.
APPLICATION FILED NOV. 17, 1905.

2 SHEETS—SHEET 1.



Witnesses:

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Allen Reford

Inventor:

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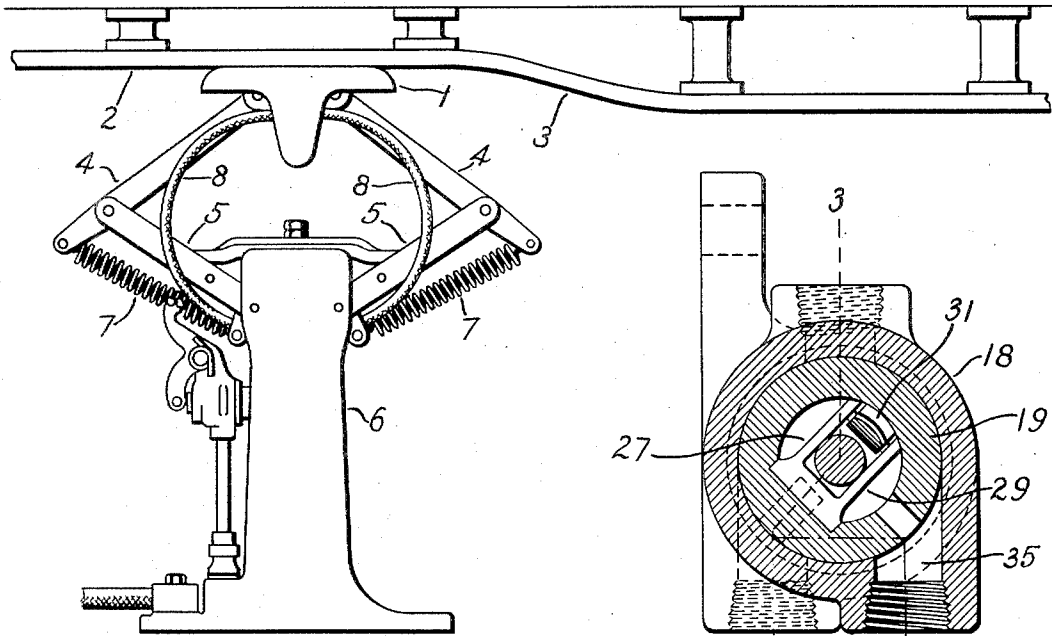
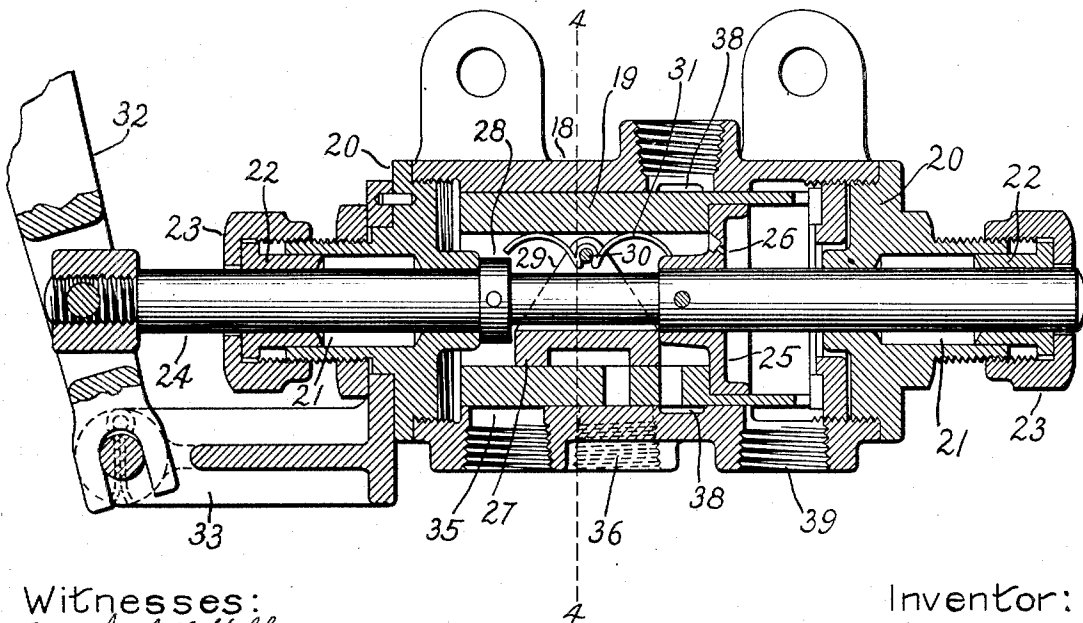


Fig. 2.

Fig. 4.

Fig. 3.



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UNITED STATES PATENT OFFICE.

ROBERT H. ROGERS, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

TROLLEY-OPERATING VALVE.

No. 868,889.

Specification of Letters Patent.

Patented Oct. 22, 1907.

Application filed November 17, 1905. Serial No. 287,818.

To all whom it may concern.

Be it known that I, ROBERT H. ROGERS, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Trolley-Operating Valves, of which the following is a specification.

This invention relates to electric railways and especially to the apparatus mounted on an electric railway vehicle for collecting current from an overhead conductor or a third rail.

It is sometimes found to be advisable or necessary to operate one portion of a railway by means of current supplied by a trolley wire or overhead conductor, and another portion by current taken from a third rail arranged near the roadbed. The moving vehicle must therefore be equipped with two or more current collecting devices to cooperate with these two supply conductors. Means must be provided, also, for retracting the collecting devices, so that the idle one may rest out of the way and be prevented from striking any structures erected adjacent to the track. The broad features of such a scheme have been disclosed by other inventors.

My invention relates mainly to an engineer's or motorman's valve which can be operated both automatically and manually to retract and advance a current collecting device. For the sake of convenience, I have illustrated its application to an overhead trolley; but it is equally applicable to the shoe of a third rail system.

In the accompanying drawing, Figure 1 is a diagram of piping and valves for pneumatically controlling two trolleys; Fig. 2 shows a portion of an overhead conductor, and a trolley; Fig. 3 is a longitudinal section on the line 3—3 of Fig. 4 of my improved engineer's valve, on a large scale; and Fig. 4 is a cross section of the same on the line 4—4 of Fig. 3.

I have chosen to show two trolleys and two valves, though it is evident that but one may be used, if desired. As they are both alike, a description of one will suffice.

The trolley is properly of the lazy-tongs variety. The shoe 1 slides in contact with the overhead conductor 2, which is provided with a depressed portion 3 at the point in the line where it is desired to retract the trolley. The shoe is pivoted to the upper members 4 of two toggles, whose lower members 5 are pivoted on a pedestal 6 mounted on the electric vehicle. The adjacent ends of the lower members 5 are provided with sector gears which intermesh so that the members move in unison. The lower ends of the upper members extend beyond their pivots, and strong

springs 7 are attached thereto and to the lower members 6 at or near their pivots. These springs urge the shoe upwardly against the conductor: the shoe being connected with the pedestal by flexible leads 8.

The pedestal is hollow and contains a cylinder 9 in which fits a piston 10 connected by a piston-rod 11 with a yoke 12 which stands above the lugs 13 on the lower members of the toggles. A strong helical spring 14 is compressed between the top of the pedestal and the piston and urges the latter downward with a force amounting to several hundred pounds: sufficient to overcome the upward thrust of the springs 7, and pulls the shoe away from the conductor when the yoke presses down on the lugs 13.

The lower end of the pedestal is closed, as by a screw-plug 15, so that a chamber is formed under the piston to which compressed air or other fluid can be admitted through a pipe 16. The area of the piston is sufficient to enable the air to lift it against the tension of the spring, and hold the yoke out of engagement with the lugs 13.

The air is stored in a reservoir and the pressure is maintained by any suitable air compressor (not shown). The admission of the air to the cylinder in which the piston works, and its exhaust therefrom, are controlled by a valve or valves 17 located at some point or points on the vehicle convenient for the engineer. Inasmuch as electric vehicles are usually arranged to run either end foremost, there is a valve at each end of the vehicle, and each valve controls both current collecting devices, if more than one is used. The construction of this engineer's valve forms the main feature of novelty in the present application. It comprises a casing 18, preferably provided with a bushing 19 and closed at each end by a flanged screw-plug 20 having a stuffing-box 21 provided with a gland 22 secured by a nut 23. A piston-rod 24 is arranged lengthwise of the casing and preferably passes through the casing and the stuffing-boxes, and carries a piston 25 which has a sliding fit in the bushing 19. A small leakage port 26 is drilled through the piston. The piston-rod also engages with a D valve 27 sliding in a longitudinal groove in the bushing. The chamber in the bushing in which the piston fits is preferably of greater diameter than that in which the valve slides, so that the piston may have as large an area as possible. The valve is held between the hub of the piston at one end and a collar 28 on the piston-rod at the other end, so that it moves with the rod but is not attached thereto. It has wings 29 which extend up past the rod and are connected by a transverse pin 30 which supports a spring 31 having arms which press against

the top of the bushing and keep the valve on its seat. The piston-rod has a handle at one end, preferably a lever 32 fulcrumed on a bracket 33 secured to the screw-plug at that end of the casing, and pivotally connected with said rod.

The air reservoir is connected with the valve chamber by means of a pipe 34 running to the supply port 35. An exhaust port 36 is in constant connection with the cavity of the slide-valve. The cylinder 10 in the trolley pedestal is connected by pipes 16 and 37 with the delivery port 38 shown in Fig. 3 as leading to the valve chamber, but adapted to be connected with the exhaust by moving the valve to the right. This movement can be performed manually by means of the lever handle. But it is preferred to provide also for effecting it automatically by a downward movement of the trolley occasioned by the depressed portion 3 of the overhead conductor. This operation is effected as follows. By reason of the leakage port 26 in the piston 25, the piston chamber is normally filled with air at the reservoir pressure, so that its fluid pressures on the piston are balanced and it has no tendency to move. But if the piston chamber is suddenly freed of its air pressure the leakage port cannot admit air fast enough to maintain the balance, and the piston and valve will be forced to the right (in Fig. 3), causing the air to exhaust from the cylinder 10, and permitting the spring 14 to pull down the yoke and retract the trolley. To this end, an operating or control port 39, communicating with the piston chamber, is connected by a pipe 40 with a puppet valve 41 which is normally held closed by the air pressure, but can be opened by a lever 42 pivoted on the valve casing 43 and having an arm bearing against the projecting stem 44 of the puppet valve. The other arm of said lever is arranged to be struck by the lower member 5 of one of the toggles when the trolley shoe is pushed down by the depressed track-portion 3. The instant this occurs the puppet valve is opened, the piston chamber is bled, the slide valve 27 is shifted, the cylinder 10 is exhausted, and the spring 14 pulls the trolley down to its retracted position.

In order to operate both trolleys simultaneously, the pipes 40 are connected, so that the operation of either of the engineer's valves by hand or by the opening of either puppet valve will bleed both piston chambers, shift both slide valves, and exhaust both cylinders.

In order to raise the trolley, one of the engineer's valves must be restored to the position shown in the drawings. This is done by hand, by means of the handle 32. As soon as the slide valve opens the delivery port 38, the reservoir pressure passes from the valve chamber through the pipes 16 and 37 to the trolley cylinders, and lifts the pistons and yokes, thereby permitting the springs 7 to raise the trolley shoes. Inasmuch as the engineer's valve at the other end of the vehicle still remains shifted, with the pipe 37 connected by the slide valve with the exhaust, it is necessary to provide some means for preventing the reservoir from exhausting through this open line of communication. The means shown con-

sists of the double check valve 45 located at the point where the pipes 37 unite with pipes 16. When the reservoir pressure enters this check valve from either pipe, the valve is forced over and closes the other pipe, compelling the air to flow only through the common branch pipe 16 which communicates with both trolleys.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In current collecting apparatus for an electric railway vehicle, an engineer's valve comprising a casing, a rod arranged lengthwise thereof and provided with hand operating means, a piston secured to said rod and having a leakage port, and a slide valve engaged by said rod, said casing having supply and delivery ports and an exhaust port on one side of said piston, and an operating port on the other side thereof.

2. In current collecting apparatus for an electric railway vehicle, an engineer's valve comprising a casing, a bushing therefor, having a longitudinal groove, a rod running lengthwise of said casing and provided outside thereof with hand operating means, a piston secured to said rod and having a leakage port, and a slide valve engaged by said rod, said casing having an exhaust port and a delivery port controlled by said valve, a supply port opening into the valve chamber, and an operating port opening into the piston chamber.

3. In current collecting apparatus for an electric railway vehicle, an engineer's valve comprising a casing, a piston therein dividing it into chambers and provided with hand operating means, a slide valve in one of said chambers, a source of fluid pressure in constant communication with said chamber, a delivery port normally opening into said chamber, an exhaust port opening under the valve and adapted to be connected thereby with the delivery port, a leakage port in the piston for connecting the two chambers, and a control port opening out of the second chamber.

4. In current collecting apparatus for an electric railway vehicle, an engineer's valve comprising a casing, a slide valve therein having upwardly extending wings, a spring secured between said wings and bearing against the wall of the casing, a rod passing between said wings to the outside of said casing and provided with hand operating means, a collar on said rod engaging one end of said valve, and a piston on said rod engaging the other end of said valve.

5. In current collecting apparatus for an electric vehicle, the combination with an engineer's valve comprising a slide valve provided with hand operating means, and a piston connected therewith and subjected to balanced fluid pressures, of means for unbalancing said pressures by an abnormal movement of the trolley.

6. In current collecting apparatus for an electric vehicle, the combination with an engineer's valve comprising a slide valve and a piston connected therewith and subjected to balanced fluid pressures, of hand operating means connected to said valve pneumatic means controlled by said slide valve for retracting the trolley, pneumatic means for unbalancing the pressures on said piston, and means for operating said unbalancing means by an abnormal movement of the trolley.

7. In current collecting apparatus for an electric railway vehicle, the combination with two trolleys, of two engineer's valves, each comprising a piston subjected to balanced fluid pressures, and a slide valve connected with said piston, a double check valve connected with both valve casings, pneumatic trolley-retracting mechanism connected with said check valve, and means operated by each trolley for bleeding the fluid-pressure from one side of the pistons.

8. In current collecting apparatus for an electric railway, an engineer's valve comprising a casing having a stuffing-box at each end, a rod sliding through said stuffing-

boxes; a piston on said rod inside the casing and having a leakage port, a slide valve in the casing engaged by said rod, a handle attached to one end of said rod, supply, delivery and exhaust ports on one side of said piston, and an operating port on the other side thereof.

5 9. In current collecting apparatus for an electric vehicle, the combination with pneumatically actuated means for retracting the collector, of a valve mechanism therefor comprising a slide valve, means for actuating said valve

manually, means for actuating it pneumatically, and devices controlled by the movement of the collector for operating said pneumatic valve actuating means. 10

In witness whereof, I have hereunto set my hand this 13th day of November, 1905.

ROBERT H. ROGERS.

Witnesses:

BENJAMIN B. HULL,
MARGARET E. WOOLLEY.