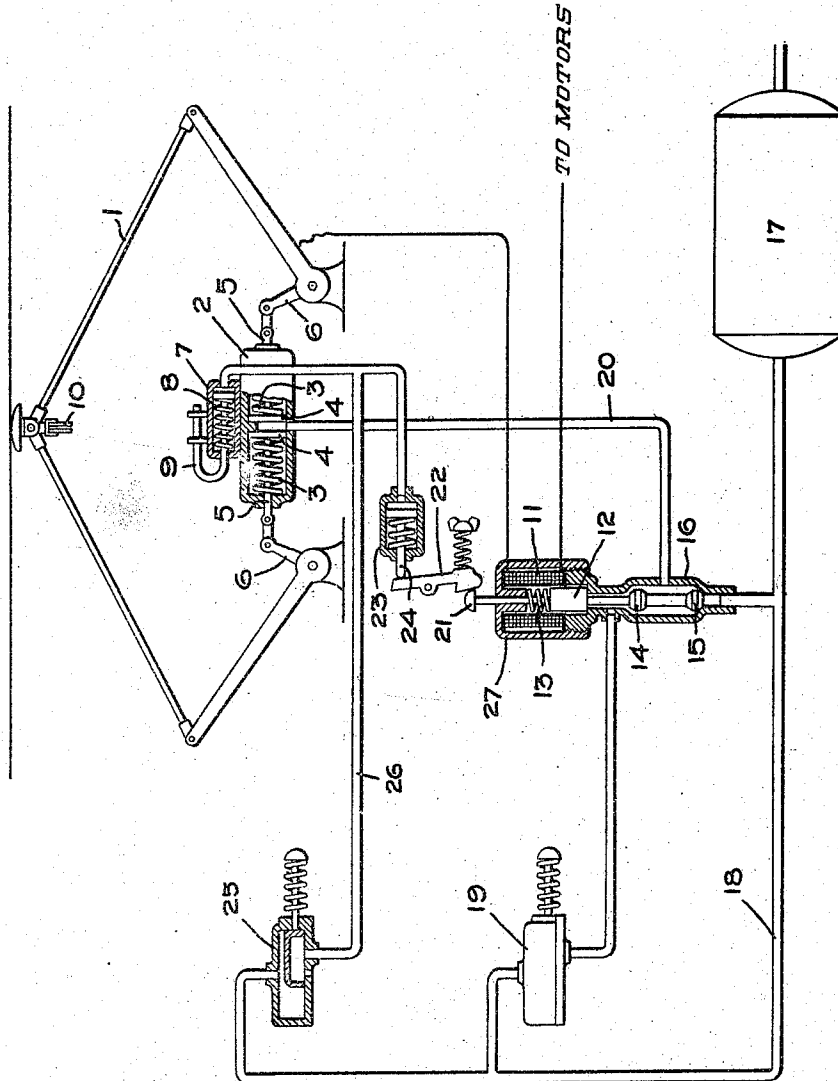


F. E. CASE.  
TROLLEY CONTROL SYSTEM.  
APPLICATION FILED AUG. 24, 1910.

1,000,779.

Patented Aug. 15, 1911.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANK E. CASE, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## TROLLEY-CONTROL SYSTEM.

1,000,779.

Specification of Letters Patent.

Patented Aug. 15, 1911.

Application filed August 24, 1910. Serial No. 578,656.

*To all whom it may concern:*

Be it known that I, FRANK E. CASE, 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-Control Systems, of which the following is a specification.

My invention relates to emergency control systems with particular reference to high voltage alternating current railway systems, and its object is to provide simple and effective means for the protection of the electrical equipment of cars and locomotives in case of over-loads.

The design of efficient over-load protective devices for low voltage systems is comparatively simple, and the incidental failure of the protective device on systems of low potential is not accompanied by serious results, but, in dealing with higher voltages, difficulties are encountered which often are of a dangerous character. This condition of affairs necessitates some means for the protection of high voltage railway equipment and the personal safety of operators and passengers, in addition to the ordinary circuit breakers and contactors, which, in their present state of development, have been known to fail to open the line when over-load comes on. I propose to make assurance doubly sure and to relieve the usual protective devices, which are usually located in the interior of the car or locomotive, of the more strenuous service by taking advantage of the large air gap between the trolley in its lowered position and the trolley wire for opening the circuit upon over-loads. By using the trolley as a circuit opener, the over-load devices as ordinarily used may be of a less expensive design, or possibly entirely dispensed with, and, furthermore, all the electrical apparatus is simultaneously isolated from the source of power.

In illustrating my invention, I make use of a pneumatically operated pantograph trolley, and, in addition to the usually operated valve for controlling the supply of air to the trolley operating cylinder, I provide a valve which is operated by electro-magnetic means when over-load comes on.

For a better understanding of my invention reference may be had to the accompanying drawing which shows partly in section

and partly in elevation one embodiment of my invention.

Referring to the drawing by numerals, a pantograph trolley 1, similar to the one shown in my Patent No. 946753, dated January 18, 1910, and similarly equipped, has an operating cylinder 2 in which are located springs 3, 3 for normally holding the trolley 1 in its operating position, as shown in the drawing. These springs are in operative relation with their corresponding pistons 4, 4 and piston rods 5, 5, and the latter are linked to crank arms 6, 6 for operating the trolley 1. Located on top of cylinder 2 is an auxiliary cylinder 7 whose piston is normally pressed to the right end by a spring 8, and whose U-shaped piston rod 9, together with latch 10 (Fig. 5 of the patent above referred to) locks the trolley 1 in its lower position.

The coil 11 of a suitable electro-magnet is placed in series with the motors as indicated, and upon an over-load pulls up its core 12 against a spring 13. This core 12 carries from its lower end two plungers 14, 15 which close alternately the two ports of a two port valve 16. The tension of spring 13 is great enough to overcome the upward pressure exerted upon plunger 15 by the air pressure in reservoir 17 and distributing pipe 18, and the plunger 15 therefore normally keeps the lower port of valve 16 closed as shown.

At 19 is shown a motorman's ordinary two way valve by which the motorman may either supply compressed air from pipe 18 through the upper port of valve 16 and thence through pipe 20 to cylinder 2 for retracting trolley 1, or connect this cylinder 2 with the atmosphere and thereby allow springs 3, 3 to raise trolley 1 to the operating position as is shown in the drawing. When over-load comes on, the core 12 pulls up, closes the upper port by means of plunger 14 and lifts plunger 15 from its seat in the lower port, thereby allowing air to escape through this lower port from pipe 18 to pipe 20 and thence to cylinder 2 for retracting the trolley and opening the circuit. The core 12 has projecting upwardly from its upper end a rod with a head 21. When the core 12 lifts up, this head 21 is engaged by a spring controlled latch 22 so that the core 12 with its plungers 14 and 15 cannot return to its lower position until this latch is tripped by the motorman. An auxiliary

cylinder 23, with its spring controlled piston and piston rod 24, is provided for tripping latch 22 and is operated simultaneously with tripping cylinder 7 in order that the trolley may be free to ascend at the same time that plunger 14 descends and opens the upper port of valve 16 which connects the trolley cylinder 2 with the atmosphere. A motor-man's valve 25, similar to valve 19 and a well known design, supplies air to the tripping cylinders 7 and 23 through a pipe 26. The coil 11 has a casing 27 therearound, preferably of magnetic material, which is screwed onto an enlarged upward extension of the casing of valve 16.

I do not desire to restrict myself to the particular form or arrangement of parts herein shown and described since it is apparent that they may be changed and modified without departing from my invention.

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

1. In an emergency control system, a railway current collector in combination with means for automatically retracting said collector upon over-load.

2. In an emergency control system, a railway trolley in combination with means for automatically retracting said trolley upon over-load.

3. In an emergency trolley control system; a trolley in combination with electro-magnetic and pneumatic means for automatically retracting said trolley upon over-load.

4. In an emergency trolley control system.

a trolley in combination with pneumatic means for retracting said trolley, and electro-magnetic means for automatically putting said pneumatic means into action upon over-load.

5. In an emergency trolley control system, a trolley operated by pneumatic means, a valve for supplying compressed air to said pneumatic means and an electro-magnet in series with the trolley for actuating said valve upon over-load.

6. In an emergency trolley control system, a trolley operated by pneumatic means, a two port valve for alternately connecting said pneumatic means to the air supply and to a motor-man's valve, and an electro-magnet in series with the trolley for actuating said two port valve to supply air to said pneumatic means upon over-load.

7. In a trolley control system, a trolley and an operating cylinder for same, a two port valve for alternately connecting said cylinder to the air supply and to a motor-man's valve, an electro-magnet in series with the trolley for actuating said two port valve to supply air to said cylinder upon over-loads and a pneumatically tripped latch for automatically locking said plungers in the actuated position.

In witness whereof, I have hereunto set my hand this 23rd day of August, 1910.

FRANK E. CASE.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.