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K. A. SIMMON.

CONTROL APPARATUS.

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Fig. 1.

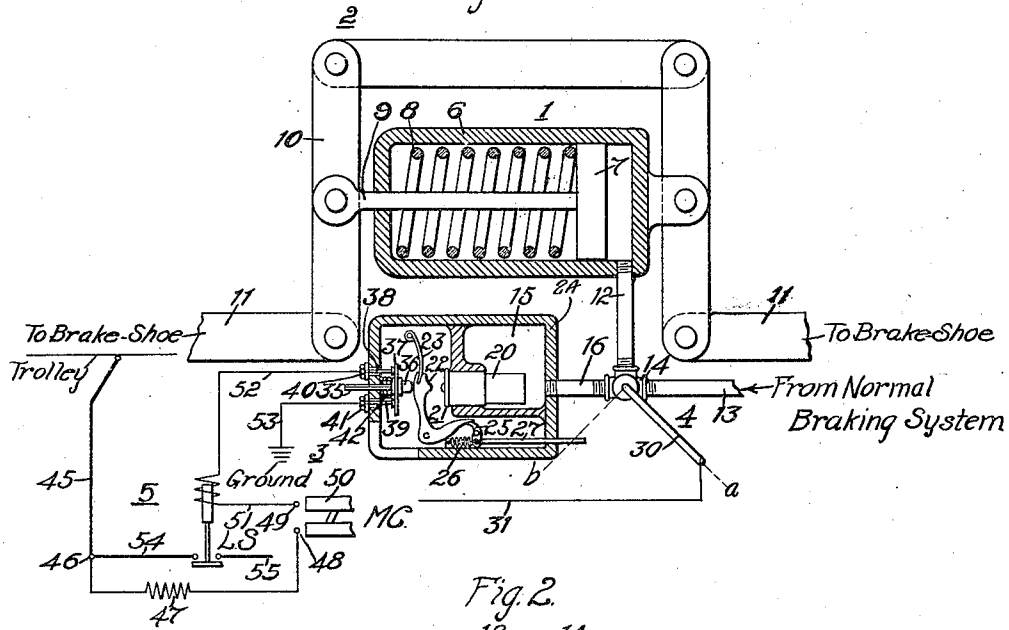
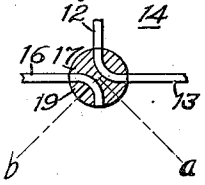


Fig. 2.



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UNITED STATES PATENT OFFICE.

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CONTROL APPARATUS.

Application filed November 3, 1919. Serial No. 335,477.

To all whom it may concern:

Be it known that I, KARL A. SIMMON, a citizen of the United States, and a resident of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Control Apparatus, of which the following is a specification.

My invention relates to control apparatus and particularly to emergency-brake means, for use in connection with electric-railway vehicles and the like.

In the interests of safety, various schemes have been proposed in the past to provide emergency-brake means for railway vehicles in case the usual source of power failed for any reason. For instance, various emergency braking systems dependent upon air pressure have been offered in order to insure the necessary braking effect in the event of a failure of supply-circuit voltage. An improved system is set forth in a copending application of Andrew H. Candee, Serial No. 260,308, filed October 30, 1918, and assigned to the Westinghouse Electric & Manufacturing Company. In this application, an explosive charge is employed as an ultimate braking means, whereby a control drum is actuated into such a position that dynamic braking circuits are completed.

One object of my present invention is to provide a more direct-acting ultimate emergency braking system, whereby the effect of the explosive charge is conveyed directly to the brake-cylinder of the usual air-braking system. In this way, a reliable and practically infallible emergency braking system is provided in cases where supply-circuit voltage and air-pressure both fail.

Another object of my invention is to provide a braking system of the character indicated which shall be remotely controlled to effect firing of the explosive charge, the conveyance of the explosive effect to the brake-cylinder, and the interruption of the communication of the brake-cylinder with the usual air-braking system, all by one movement of a train operator, whereby the emergency braking action may be rapidly effected without requiring any special thought upon the part of the operator.

A further object of my invention is to provide an apparatus of the class under consideration wherein it is necessary to reset the emergency braking apparatus before power may be re-supplied to the motors. In this way, the added safety feature is always available.

My invention may best be understood by reference to the accompanying drawing, wherein Fig. 1 is a semi-diagrammatic view of a portion of a pneumatic-braking system to which my invention is applied, and Fig. 2 is an enlarged sectional view of a valve means that is shown in the apparatus of Fig. 1.

Referring to the drawing, the structure here shown comprises a brake-cylinder device 1 for actuating a suitable brake-rigging 2, and also an emergency braking device 3 which may be rendered operative through the agency of a remote-control actuating apparatus 4, together with a portion of a car-motor governing system 5.

It will be understood that my present invention may be readily applied to any existing type of air-braking apparatus and, since such apparatus, in general, is well known, I have not deemed it necessary to illustrate or describe a complete vehicle-braking system.

The brake-cylinder apparatus 1 is shown as comprising a suitable casing or cylinder 6, together with a co-operating piston 7 and the customary biasing spring 8, whereby the car-brakes are normally released. The piston rod 9 is operatively connected to a link 10, which is associated in a familiar manner with a plurality of brake-rods 11 to which the brake-shoes (not shown) are attached.

A delivery pipe or passage 12 is normally placed in communication with a fluid-supply pipe 13 through the agency of a three-way or transfer valve 14, a sectional view of which is shown in Fig. 2. The pipe 13 is connected with the engineer's valve or distributing valve, in accordance with any well known practice, whereby the brake-cylinder apparatus 1 normally communicates with the remainder of the usual braking system to permit the customary air-braking operation of the vehicle.

The emergency braking device 3 comprises a fluid-tight pressure or combustion chamber 15, which communicates with the transfer valve 14 by means of a pipe or passage 16. Referring to the sectional view of Fig. 2, it will be seen that, normally, the rotatable valve-member or cylinder 17 occupies a position, *a*, to effect communication between the supply pipe 13 and the delivery pipe 12,

whereby the desired normal operation of the air-braking system may be effected. However, upon the rotation of the valve cylinder 17 into its other operative position *b*, such normal communication is interrupted, and a passage 19 serves to effect communication between the delivery pipe 12 and the pipe 16 from the pressure chamber 15.

A cartridge 20 or other vapor-producing shell has its discharge end located within the pressure chamber 15, and a suitable firing mechanism 21 is placed in proper relation to the cartridge 20, being enclosed by a suitable shell or cylinder 24, to which the combustion chamber 15 is attached in any convenient manner. The illustrated firing mechanism 21 comprises a bell-crank lever or hammer 22, which is biased towards its firing position, in contact with the cartridge 20, by means of a suitable flat spring 23. The hammer 22 is normally restrained in its illustrated inoperative position by means of a trigger or detent 25, which is biased towards the illustrated latching position by means of a coil spring 26. A firing pin 27 is loosely attached to the trigger 25 and extends a short distance beyond one end of the combustion chamber 15.

The rotatable member or cylinder 17 of the transfer valve 14 may be operated by means of a handle or lever 30, the free end of which is secured to a rope or cable 31 corresponding to the customary emergency bell-cord in steam railway vehicles. The cable 31 may be located in any convenient position, whereby it may be operated by the motorman, the conductor or a passenger.

The relative location of parts is such that a movement of the lever 30 towards the left, into its position *b*, will effect engagement of the lever with the firing pin 27.

The portion of the car-motor governing system 5 that is illustrated comprises a rod or plunger 35 that extends through the shell 24 of the emergency device 3, and the inner end 36 of which abuts against the hammer 22. In the illustrated normal position, a contact disk or plate 37, that is rigidly secured to, and insulated from, the plunger 35, bridges a pair of insulated stationary contact terminals or posts 38 and 39 which are provided outside of the shell 24 with suitable securing nuts 40 and 41 to which the external electrical circuits are suitably connected, as about to be set forth. A coil spring 42 serves to bias the contact disk 37 to a position out of engagement with the contact terminals 38 and 39, but, normally, the hammer 22 abuts against the plunger rod 36 and maintains the circuit closed, as illustrated.

The auxiliary or governing-circuit connections extend from the supply-circuit conductor Trolley through conductor 45, junction-point 46, voltage-reducing resistor 47, control fingers 48 and 49, which are bridged by contact segment 50 of the customary master controller MC, for example, whence circuit is continued through conductor 51, actuating coil of the line switch LS, conductor 52, nut 40, contact posts 38, contact disk 37, contact post 39, nut 41 and conductor 53 to the negative supply-circuit conductor Ground. Thus, the actuating coil of the line switch LS is energized whenever the master controller is thrown to an operative position, provided that the firing mechanism 21 in the emergency-braking device 3 occupies its illustrated position.

When the line switch LS is closed, a main circuit is established from the junction-point 46, through conductor 54, line switch LS and conductor 55 to the propulsion motors, as will be understood.

The operation of the illustrated apparatus may be set forth as follows: Whenever an emergency braking action is desired, by reason of failure of the supply-circuit voltage or air-pressure, the cable 31 is pulled, whereby the lever 30 is actuated to position *b* and strikes the firing pin 27 to release the trigger 25 and allow the spring 23 to force the hammer 22 to impinge upon the cap of the cartridge 20. The resulting explosive effect or fluid pressure is conveyed through the pipe 16, the transfer valve 14 and the delivery pipe 12 to the brake-cylinder 6. The movement of the valve lever 30, prior to firing the cartridge, rotates the valve cylinder 17 into its emergency position, whereby the above-mentioned communications between the pipes 16 and 12 is established, and, moreover, the normal communication of the delivery pipe 12 with the remainder of the usual braking system is interrupted. Consequently, the full effect of the explosive action is transmitted into the brake-cylinder 6, whereby the piston 7 is actuated towards the left to apply the vehicle brakes in the customary manner.

To release the brakes, the valve lever 30 may be returned to its illustrated normal position *a* in any suitable manner, such as by an additional cable or by direct manual operation. The vehicle is then in condition for permitting the use of the normal braking system, while, by placing another cartridge in the combustion chamber 15, another emergency braking action may be obtained in the above-described manner at any desired time.

By reason of the provision of the interlocking switching device in connection with the emergency braking device, it is impossible to start the vehicle unless the normal braking power is available and the firing mechanism 21 has been reset. This function is provided since, whenever the firing mechanism 21 has been tripped by actuating

the valve lever 30 to its emergency position *b*, the spring 42 forces the contact disk 37 out of engagement with the stationary contact member 38 and 39 to interrupt the circuit for the energizing coil of the line switch LS and, therefore, cut off power from the car motors. The energizing circuit in question may be completed only by resetting the firing mechanism 21 to the illustrated position, which means that the valve lever 30 has been actuated to its normal position *a*. Consequently, normal braking power is available whenever electric power is available.

Although this interlocking function is valuable, even though the line switch LS is of the solenoid type, still further protection is provided in the case of a pneumatically-operated line switch, since not only is it impossible to energize the switching coil unless the emergency braking mechanism has been reset but, furthermore, the switch cannot be closed unless a predetermined degree of fluid pressure is available which is sufficient to provide reliable braking operation of the vehicle.

The resetting of the firing mechanism 21 and the replacement of the cartridge 20 will be understood without detailed description. The biasing spring 26 serves to return the hammer 22 and, therefore, the contact disk 37, to the illustrated normal positions as soon as the valve lever 30 is moved out of engagement with the firing pin 27, and the empty shell of the exploded cartridge may then be readily removed through the opening provided in the shell 24, whereupon a new cartridge may be inserted in place to prepare the system for the next emergency braking operation.

I do not wish to be restricted to the specific structural details or arrangement of parts herein set forth, as various modifications thereof may be effected without departing from the spirit and scope of my invention. I desire, therefore, that only such limitations shall be imposed as are indicated in the appended claims.

I claim as my invention:

1. The combination with a braking system including a brake-cylinder, of means for effecting an explosive action, and means for conveying the effects of such action directly into said brake-cylinder to alone effect a braking operation.

2. The combination with a braking system including a brake-cylinder and a piston, of means for rendering said piston directly operative by explosive action thereupon.

3. The combination with a braking system including a brake-cylinder, of an explosive charge, and means for directing the explosive force of said charge into said cylinder.

4. The combination with a braking system including a brake-cylinder and piston, of a braking-system member operatively attached to said piston, and explosive means for acting directly upon said piston to move said member to an active position.

5. The combination with a braking system including a brake-cylinder and piston, of explosive means for alone actuating said piston.

6. The combination with a braking system including a brake-cylinder and piston, of a pressure chamber communicating with said cylinder, a cartridge located in said chamber, and means for firing said cartridge to effect movement of said piston.

7. The combination with a braking system including a brake-cylinder and piston, of a pressure chamber communicating with said cylinder, a cartridge located in said chamber, and remote-control means for firing said cartridge to effect braking movement of said piston.

8. The combination with a braking system including a brake-cylinder and piston, of a pressure chamber, a cartridge located in said chamber, valve means for normally effecting communication of said cylinder with the remainder of the usual braking system, and means for actuating said valve means to fire said cartridge and to substitute communication between said cylinder and said pressure chamber for the first-named communication.

9. The combination with a braking system including a brake-cylinder and piston, of a pressure chamber, a cartridge located in said chamber, and remote-control means for firing said cartridge and effecting communication of said pressure chamber with said brake cylinder.

10. The combination with a braking system including a piston and a co-operating brake-cylinder normally communicating with the remainder of the system, of a pressure chamber, a cartridge located in said chamber, and remote-control means for firing said cartridge, effecting communication between said pressure chamber and said brake-cylinder, and interrupting said normal communication.

11. In a vehicle, the combination with an electric governing system and a braking system including a brake-cylinder and piston, of means for rendering said piston operative by explosive action, and means for preventing the operation of said governing system unless the braking system is in an operative condition.

12. In a vehicle, the combination with a motor governing system and a braking system, of explosive means for operating the braking system, and means dependent upon the condition of said braking system for controlling said motor governing system.

13. In a vehicle, the combination with an

electric governing system and a braking system including a brake cylinder and piston, of a braking-system member operatively attached to said piston, explosive means for acting upon the piston to move said member to an active position, and means dependent upon the restoration of normal conditions in the braking system for permitting further operation of said electrical governing system.

14. In a vehicle, the combination with an electric governing system and a braking system including a brake cylinder and piston, of a pressure chamber communicating with said cylinder, a cartridge located in said chamber, means for firing said cartridge to effect movement of said piston, and means responsive to the position of said firing means for controlling said electrical governing system.

15. In a vehicle, the combination with an electric governing system and a braking system including a brake cylinder and piston, of a pressure chamber communicating with said cylinder, a cartridge located in said chamber, means for firing said cartridge to effect movement of said piston, and means dependent upon the resetting of said firing means for rendering further operation of the electrical governing system possible.

16. In a vehicle, the combination with an electric governing system and a braking system including a brake cylinder and piston, of a pressure chamber, a cartridge located in said chamber, valve means for normally effecting communication of said cylinder with the remainder of the usual braking system, means for actuating said valve means to fire said cartridge and to substitute communication between said cylinder and said pressure chamber for the first-named communication, and switching means responsive to the position of said valve means for controlling said electrical governing system.

17. In a vehicle, the combination with an electric governing system and a braking system including a brake cylinder and piston, said cylinder normally communicating with the remainder of the system, of a pressure chamber, a cartridge located in said chamber, remote-control means for firing said cartridge, effecting communication between said pressure chamber and said brake-cylinder, and interrupting said normal communication, and switching means for preventing the energization of said electrical governing system unless said remote-control means occupies its normal or reset position.

In testimony whereof, I have hereunto subscribed my name this 27th day of Oct., 1919.

KARL A. SIMMON.