No. 748,098. PATENTED DEC. 29, 1903.

E. D. PRIEST.

SYSTEM FOR CONTROLLING FLUID PRESSURE.

APPLICATION FILED MAY 21, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

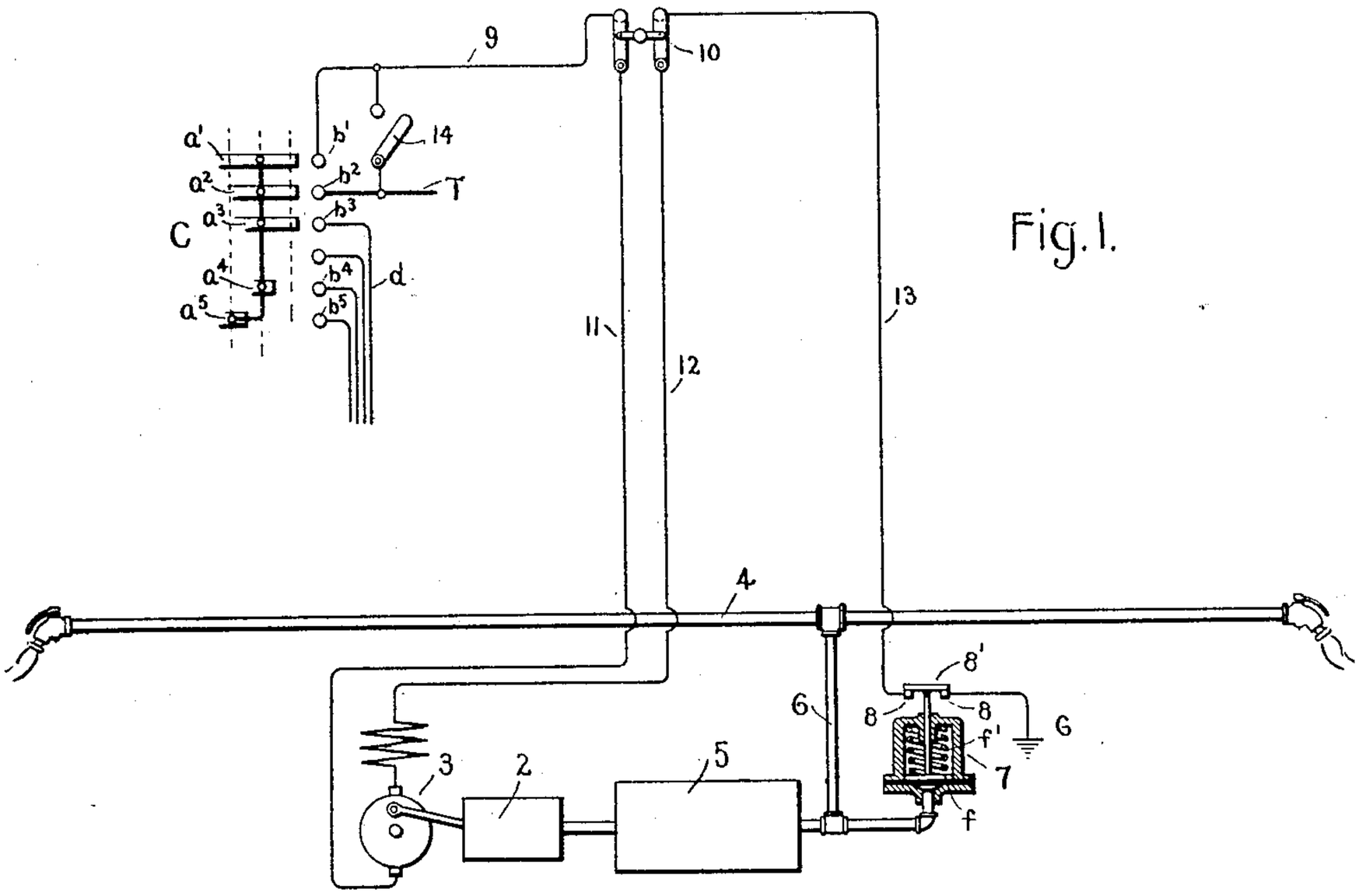
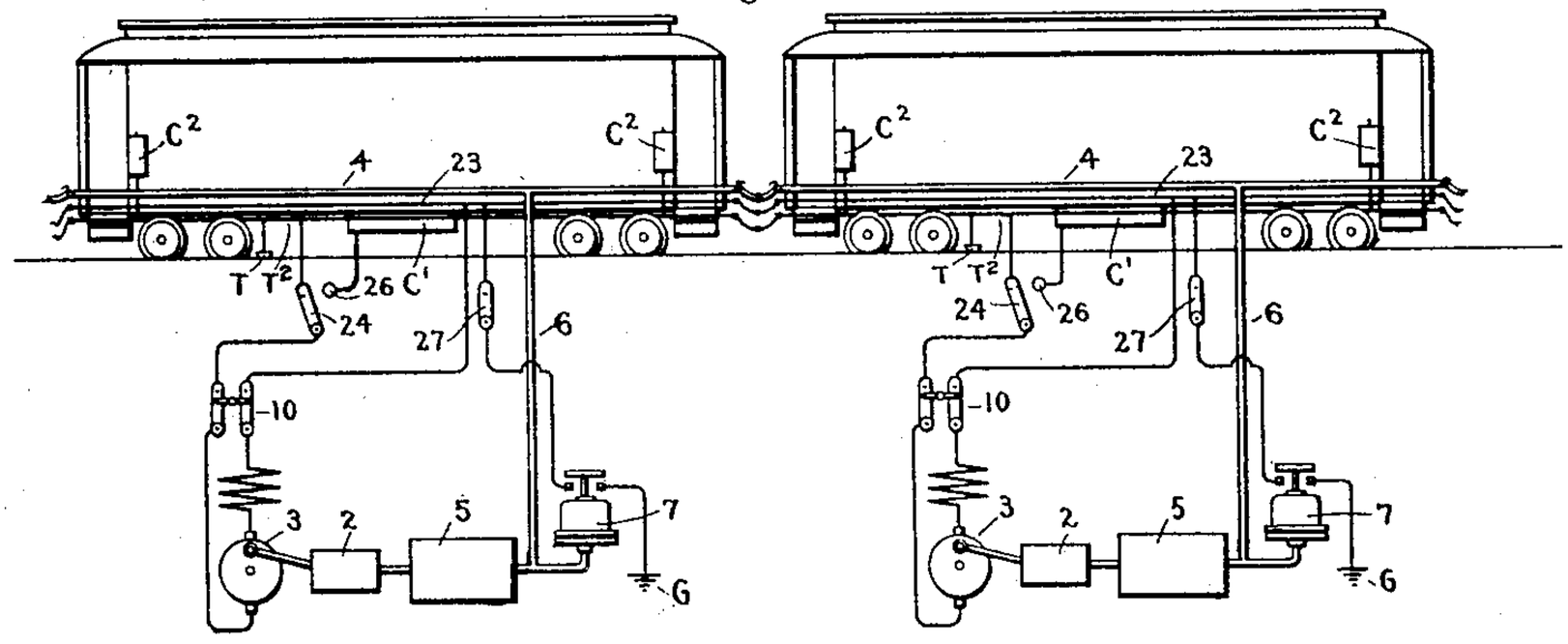


Fig. 1.

Fig. 2.



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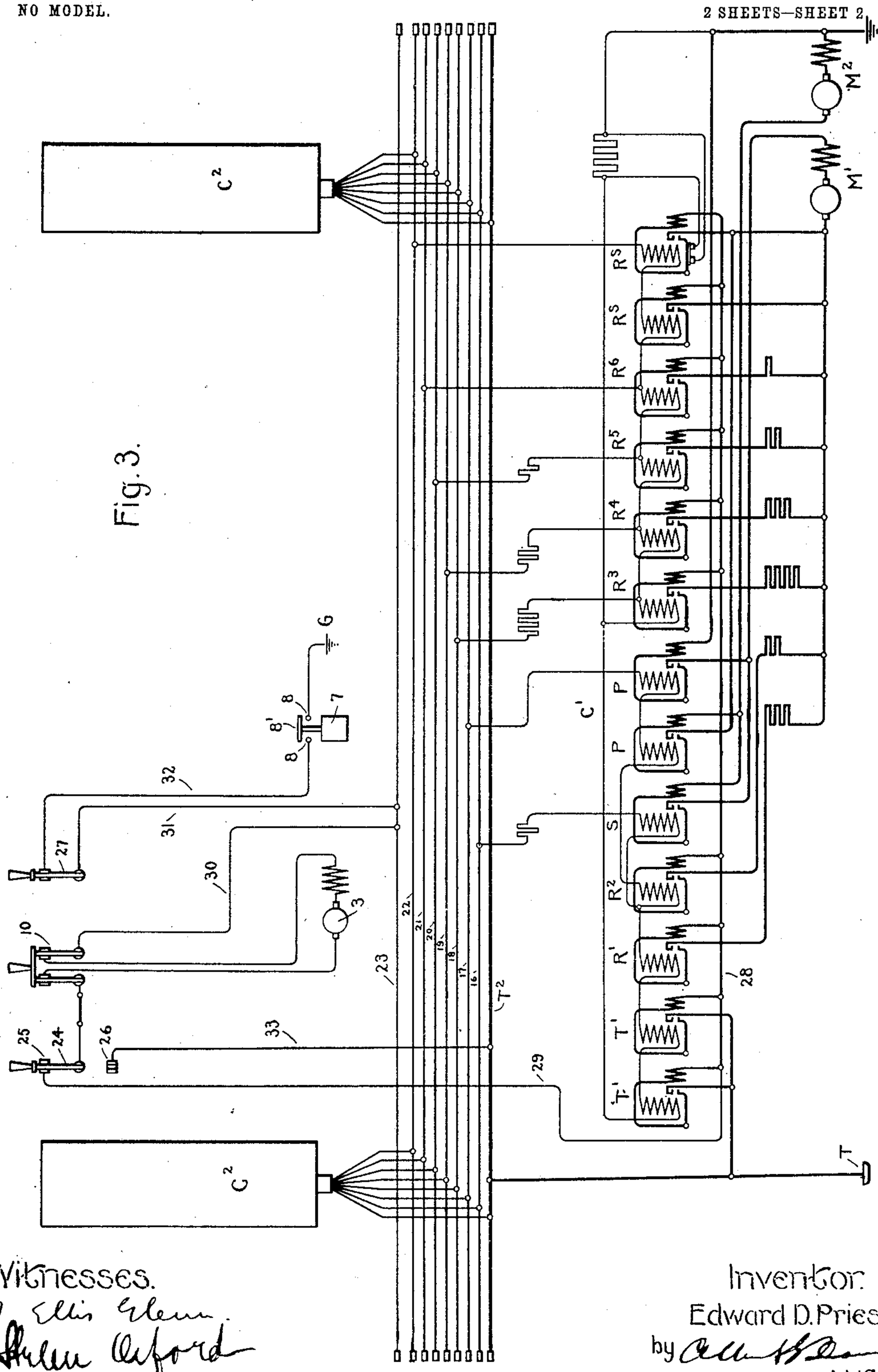
NO MODEL. 2 SHEETS—SHEET 2

Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD D. PRIEST, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SYSTEM FOR CONTROLLING FLUID-PRESSURE.

SPECIFICATION forming part of Letters Patent No. 748,098, dated December 29, 1903.

Application filed May 21, 1903. Serial No. 158,202. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. PRIEST, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Systems for Controlling Fluid-Pressure, of which the following is a specification.

My present invention relates to fluid-pressure-controlling systems, and more particularly to systems for controlling the supply of compressed air to the storage reservoir or reservoirs of air-brake systems.

In the majority of air-brake systems which have been heretofore suggested and in the systems which are now commonly employed on electrically-propelled vehicles the power-driven air-compressor is so constructed and arranged with respect to the air-brake system that it will operate to supply compressed air to the main reservoir of the system when the pressure in the said reservoir falls below a predetermined minimum limit and will continue to operate until a predetermined maximum pressure is reached, at which time it is automatically stopped. The operation of the fluid-compressor is independent of the operation of the car or vehicle. It therefore very often happens that the compressor is operating while the car is standing still, thereby causing considerable vibration and noise, a condition of affairs which is very annoying and distasteful to the passengers.

The object of my invention is to prevent the operation of the air-compressor while the car is standing still, and thus do away with the objectionable vibration and noise caused by said compressor.

In the preferred form of my invention I employ a power-driven fluid-compressor for supplying compressed air to the air-brake system or for any other desired purpose and connect the compressor-driving means to the motor-controller, which is in an independent motor-circuit, in such a manner that the said fluid-compressor is rendered inoperative when the motors in said independent circuit are deprived of current. I also provide means for controlling said compressor-driving means independent of said motor-controller.

More specifically considered, my invention consists of the combination, with a train-control system employing motor-controllers of the separately-actuated contact type, of a motor-driven fluid-compressor on each motor-car connected to the motor-controller on that car in such a manner that it is rendered inoperative when the master-controller of the train-control system is in its initial or "off" position. I prefer to employ in these forms of my invention an automatically-actuated governor which is adapted to maintain the pressure in the air-brake system within certain predetermined limits.

Referring to the drawings, which illustrate the preferred embodiment of my invention, Figure 1 represents diagrammatically a fluid-pressure-controlling system the operating-circuits of which are connected to a car-motor controller of the ordinary type. Fig. 2 is a diagrammatic representation of my improved fluid-pressure-controlling system as applied to a train-control system; and Fig. 3 shows diagrammatically part of the electrical equipment carried by a single car in a train-control system illustrated in Fig. 2, said system employing motor-controllers of the separately-actuated contact type.

Referring now to Fig. 1, 2 represents a fluid-compressor driven by the motor 3. The said fluid-compressor 2 supplies compressed air to the train-pipe 4 of the air-brake system through the reservoir 5. Connected with the pipe 6, leading from the reservoir to the train-pipe 4, is an automatically-actuated governor 7, which is adapted to complete a circuit through the motor 3 when the pressure in the reservoir 5 drops below a predetermined minimum amount and is also adapted to open said circuit when the pressure is said reservoir 5 reaches a predetermined maximum limit. A controller for the propelling-motors of the car is partly shown at C, some of the contact-segments mounted on the movable member of said controller being indicated by a' to a^5, inclusive, and the contact-fingers which engage with said contact-segments being indicated by b' to b^5, inclusive. The trolley connection is indicated by T. The circuits through the propelling-motors on the car are not shown, since they are not necessary and their presence would further com-

plicate the diagram. The double-pole switch 10 is provided for the purpose of cutting the motor 3 entirely out of circuit when so desired. This system is especially applicable to locomotives and single-car equipments.

In the operation of the system shown in Fig. 1 the movable member of the motor-controller C is operated so that the contact-segments a', a^2, and a^3 engage with the contact-fingers b', b^2, and b^3, respectively, thereby completing a circuit through the propelling-motors of the car from trolley T, contact-finger b^2, contact-segments a^2 and a^3, contact-finger b^3, conductor d, &c., and also completing a circuit from the trolley T through the contact-finger b^2, contact-segments a^2 and a', contact-finger b', conductor 9, one pole of switch 10, conductor 11, motor 3, conductor 12, the other pole of switch 10, conductor 13, through the contacts 8 and 8′ of the governor 7 to ground at G. This latter circuit is completed provided the pressure in the reservoir 5 has dropped below the predetermined limit, thereby allowing the movable member 8′ of the governor to engage the contacts 8. The fluid-compressor 2 will therefore operate until the pressure in the reservoir 5 reaches the maximum limit, at which time the movable member 8′ of the governor will be moved away from the contacts 8 and the circuit through the motor 3 will be broken. The movable member 8′ is operated by the compressed fluid acting upon the piston f against the action of the spring f'. The automatically-actuated governor 7 may be dispensed with, if desired, and the connections made directly to the ground from the motor 3 in such a manner that the circuit through said motor will be completed so long as the car-motors are supplied with current, thus operating the air-compressor while the car is running with power on and preventing it from operating when the car is standing still. If at any time it becomes necessary or desirable to allow the motor of the air-compressor to run continuously or to operate it while the car is standing still, the switch 14 is closed, thereby shunting the contacts b' and b^2 of the car-motor controller and connecting the motor of the air-compressor in circuit directly between the trolley and ground in such a manner as is shown and described in the patent to S. B. Stewart, Jr., No. 671,244, granted April 2, 1901. A detailed description of the preferred form of governor may be found in said patent.

Referring now to Figs. 2 and 3, I have shown diagrammatically the manner in which my invention may be applied to a train-control system employing a motor-controller or motor-controllers of the separately-actuated contact type, such as is shown and described in the patent to Perry, No. 687,060, granted November 19, 1901. In the diagram Fig. 3, C′ represents a motor-controller made up of separate electrically-actuated contacts T′, T′, R′, R^2, S, P, P, R^3, R^4, R^5, R^6, R^s, and R^s, which control the connections of the motors M′ and M^2. The train-wires of the control-circuits of said system are represented by 16 to 22, inclusive, and the master-controllers, which may be located at any desired point on the car or train, are here represented diagrammatically at each end of the car by C^2. The trolley or collector shoe is indicated by T and the trolley train-wire by T^2. The train-wire for the fluid-compressors is represented by 23. As in Fig. 1, 3 represents the motor for the air-compressor, and 7 represents the automatically-actuated governor for said compressor. The double-pole cut-out switch 10 is provided on each car for cutting out the motor 3. The switch 24 when its movable member is in engagement with the contact 25, as shown in Fig. 3, connects the motor 3 in circuit through the motor-controller C′ and when in engagement with the contacts 26 connects said motor 3 directly in a circuit from the trolley train-wire T^2. The switch 27 is provided on each car for the purpose of cutting out the automatically-actuated governor on that car. It will be understood that whenever the motor-controller C′ is in any of its operative positions the switches or contacts T′ and T′ are closed and the conductor or bus-bar 28 is energized—that is to say, said bus-bar receives current from the trolley T through said separately-actuated contacts T′ T′. Therefore if the fluid-compressor mortor 3 is connected in circuit with said bus-bar it will receive current only when the master-controller C^2 is in its operative positions and the motors M′ and M^2 are receiving current, provided the compressor-circuit is not opened by the governor 7. In the operation of this system when the master-controller C^2 is moved from its initial or off position into any of its operative positions the motor-controller C′ is operated to complete the circuit through the motors M′ and M^2. Then if the contact 8′ of the automatically-actuated governor 7 is in engagement with the contacts 8 and the switches 24, 10, and 27 are in the position shown in Fig. 3 a circuit will be completed from trolley T to bus-bar 28, thence through the conductor 29, contact 25 of the switch 24, through one pole of the switch 10, air-compressor motor 3, other pole of the switch 10, conductor 30, fluid-compressor train-wire 23, conductor 31, switch 27, conductor 32, contacts 8 and 8′ of the automatically-actuated governor 7 to ground at G. As in the system illustrated in Fig. 1, the automatically-actuated governor 7 may be dispensed with and the train-wire 23 may be connected directly to ground through the switch 27, if so desired. If the operation of the air-compressor while the car is running is insufficient to supply enough air to operate the air-brake satisfactorily, the switch 24 may be thrown so as to bring its movable arm into engagement with the contact 26 and cause said compressor to run as long as desired independent of the position

of the controlling-switch or master-controller. Then when the pressure in the air-brake system reaches the predetermined minimum amount or drops below said amount a circuit will be completed from the trolley T, trolley train-wire T^2, conductor 33, contact 26, movable arm of the switch 24, one pole of the switch 10, motor 3, other pole of the switch 10, conductor 30, air-compressor train-wire 23, conductor 31, switch 27, conductor 32, contacts of the automatically-actuated governor to ground at G.

In Fig. 2 each car is equipped with a motor-controller C′, master-controller C^2, and with the air-compressor and governor, as indicated in Fig. 3. Each car is also equipped with a set of switches 24, 10, and 27, and the compressor train-wire 23, trolley train-wire T^2, and air-brake train-pipe 4 run through the train. It will thus be seen that when the controlling-switches for the air-compressor on each car are in their proper position the motors of the air-compressors will be supplied with current only when the motors on the respective cars are supplied with current, and the said compressors will be rendered inoperative when the motor-controllers are in the position corresponding to the off position of the master-controller. Furthermore, the motors of the air-compressors are entirely independent of one another, and the compressor-motor on one car may be run directly from trolley, while the motor connected to the air-compressor on another car is controlled by the master-controller through the motor-controller on that car. It will also be seen that since all the automatically-actuated governors throughout the train are connected to the compressor train-wire 23, and since it is only necessary to ground said train-wire anywhere in order to start into operation all of the air-compressors, provided the controlling-switches are in the proper position, the said compressors will continue to run until the last automatically-actuated governor in the train is operated to move the contact 8′ of said governor away from its contacts 8.

In the appended claims I aim to cover all modifications of the system herein shown and described which do not involve a departure from the spirit and scope of my invention.

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

1. In combination, a motor, a controlling-switch for said motor, a fluid-compressor, means independent of said motor for driving said fluid-compressor, and means for rendering said compressor-driving means inoperative when the circuit of said motor is opened.

2. In combination, a motor-circuit including a motor and controller for said motor, a fluid-compressor, means for driving said compressor, and means operatively connected to said motor-controller for preventing the operation of said fluid-compressor when the motor-controller is operated to open the motor-circuit.

3. In combination, a motor, a controlling-switch for said motor, a fluid-compressor, a motor for driving said compressor, and means for completing the circuit through said driving-motor when said controlling-switch is in one position and for opening said circuit when the switch is moved into another position.

4. In combination, a motor, a controlling-switch for said motor, a fluid-compressor, a motor for driving said compressor, means for completing the circuit through said driving-motor when said controlling-switch is in one position and for opening said circuit when the switch is moved into another position, and an independent switch for completing the circuit through said compressor-motor so that the compressor will operate independent of the position of said controlling-switch.

5. In combination, a motor-controller of the separately-actuated contact type, a plurality of motors controlled thereby, a master-controller for said motor-controller, a fluid-compressor, and means operatively connected to said motor-controller for operating said fluid-compressor when the master-controller is moved into any of its operative positions.

6. In combination, a motor-controller of the separately-actuated contact type, a plurality of motors controlled thereby, a master-controller for said motor-controller, a fluid-compressor, a motor connected to said motor-controller for operating said fluid-compressor when the master-controller is moved into any of its operative positions, and an independent switch for completing the circuit through said compressor-motor so that the compressor will operate independent of the position of said master-controller.

7. In combination, a motor-controller of the separately-actuated contact type, a plurality of motors controlled thereby, a master-controller for said motor-controller, a fluid-compressor, a motor for operating said fluid-compressor, and connections between said compressor-motor and said motor-controller whereby said compressor is allowed to operate when the master-controller is moved into its operative positions and is rendered inoperative when the master-controller is in its initial or "off" position.

8. In combination, a motor, a controlling-switch for said motor, a fluid-compressor, means independent of said motor for driving said compressor, a reservoir into which compressed fluid from said compressor is delivered, means operatively connected to said controlling-switch for rendering said compressor-driving means inoperative when the circuit of said motor is opened, and an automatically-actuated governor for stopping said compressor-driving means when the pressure in said reservoir reaches a predetermined limit.

9. In an electrically-propelled vehicle, a

propelling-motor, a controller for said motor, an air-compressor, means connected to said motor-controller for driving said fluid-compressor when the motor-controller is in its operative positions, and means for preventing the operation of said compressor-driving means when the controller is in its initial or "off" position.

10. In a train-control system, a plurality of motors, a plurality of motor-controllers, a master-controller for said motor-controllers, a plurality of power-driven fluid-compressors, and means for preventing the operation of said compressors when the master-controller is in its initial or "off" position.

11. In a train-control system, a plurality of motors, a plurality of motor-controllers, a master-controller for said motor-controllers, a fluid-compressor on each motor-car, means connected to the motor-controller on each car for operating the compressor on that car, and means for preventing the operation of said compressor when the master-controller is in its initial or "off" position.

12. In a train-control system, a plurality of motors, a plurality of motor-controllers of the separately-actuated contact type, a master-controller for said motor-controllers, a fluid-compressor on each motor-car, a motor for driving said compressor, and connections between the compressor-motor and the motor-controller on that car, whereby all the compressors are allowed to operate when the master-controller is in any of its operative positions and are rendered inoperative when said master-controller is in its initial or "off" position.

13. In a train-control system, a plurality of motors, a plurality of motor-controllers of the separately-actuated contact type, a master-controller for said motor-controllers, a fluid-compressor on each motor-car, a motor for driving said compressor, connections between the compressor-motor and the motor-controller on that car, whereby all the compressors are allowed to operate when the master-controller is in any of its operative positions and are rendered inoperative when said master-controller is in its initial or "off" position, and means for connecting any one of said compressors to trolley so as to operate it independent of the position of said master-controller.

14. In a train-control system, a plurality of motors, a plurality of motor-controllers, a master-controller for said motor-controllers, a plurality of power-driven fluid-compressors, means for preventing the operation of said compressors when the master-controller is in its initial or "off" position, a compressor train-wire with which the motors for operating said compressors are connected, and a plurality of automatically-actuated governors connected to said train-wire.

15. In a train-control system, a plurality of motors, a plurality of motor-controllers, a master-controller for said motor-controllers, a plurality of power-driven fluid-compressors, means for preventing the operation of said compressors when the master-controller is in its initial or "off" position, and means for controlling the operation of any one of said compressors independent of the position of said master-controller.

In witness whereof I have hereunto set my hand this 20th day of May, 1903.

EDWARD D. PRIEST.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.