





# UNITED STATES PATENT OFFICE.

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## FLUID-PRESSURE SYSTEM.

No. 815,903.

Specification of Letters Patent.

Patented March 20, 1906.

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*To all whom it may concern:*

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

My invention relates to that class of fluid-pressure systems, such as air-brake systems, in which the fluid is automatically maintained at a substantially uniform pressure by the action of suitable controlling means, part of which is electrical in character; and it has for its object the provision of electrically-actuated means responsive to variations of pressure in the system for connecting and disconnecting a compressor with a suitable driving means.

One embodiment of my invention embraces a suitably-incased compressor mounted on the car-axle, a reservoir for holding the compressed fluid, a governor responsive to variations of pressure in the system to open and close an electric circuit, and a magnetic clutch keyed to said axle and adapted to throw the compressor into gear with the axle when the circuit is closed, whereby when the car is in motion the compressor is actuated to furnish compressed fluid to the system. This embodiment is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view showing one of the trucks of the car, the compressor, and other parts and diagrammatically indicating the electrical connections; and Fig. 2 is a horizontal section of the compressor driving-gear and inclosing case.

Referring to the drawings, in which like characters refer to like parts, A and B designate the axles of a car-truck, and upon one of these, as A, is mounted an electric motor C, adapted to rotate the shaft A to propel the car. Upon the other axle B is mounted a suitably-incased compressor D, which is adapted to be driven directly from said axle. The cylinder 10 of the compressor is connected to the reservoir E by suitable piping 11 12, and the reservoir is provided with a pipe 13, leading to the governor F. Since the compressor is mounted on the truck and must necessarily move with it and the reservoir and main piping ordinarily will be mounted on the body of the car, which has a separate

and distinct movement from that of the truck, it is necessary to provide some means to maintain a constant connection between the compressor and the reservoir. For this purpose a portion of the connecting-piping, as the piping 11, is flexible. The pipe 12 is provided with a check-valve 12<sup>a</sup> to insure a flow between the compressor and the reservoir in the proper direction.

The governor F is here referred to only generally and is shown diagrammatically. It is substantially the same as that disclosed in Patent No. 671,244, granted April 2, 1901, to S. B. Stewart, Jr., and therefore need not be described in detail in this application. The driving-gear of the compressor comprises a pinion 14, rotatably mounted on the axle B of the truck and geared with a two-part gear-wheel 15, suitably journaled in the casing 16 of the compressor and having its two parts firmly connected by the pin 17, to which is coupled the connecting-rod 18, through which the piston of the cylinder 10 is actuated. The two parts of the gear 15, with the connecting-pin 17, form a crank, which, together with the connecting parts, transforms the rotary motion of the axle into the reciprocating motion of the piston to supply compressed air to the system.

The casing 16 is made in two parts, which may be separated to gain access to the inclosed gearing. These parts separate on a substantially horizontal plane and are provided with ribs 37 and corresponding grooves and with suitably-apertured flanges, so that they may be accurately and readily positioned and bolted together. The ribs 37 are shown on the lower half of the casing 16, and the grooves into which they fit are located in the upper half. The casing 16 is sleeved upon the axle B and extends up to and is connected with the cylinder 10, so that all parts of the gearing are covered and protected.

Referring to the electrical connections, one terminal 21 of the governor F is connected by the wire 19 with a suitable source of supply, as the supply-wire 20, by any suitable agency, as the trolley 19<sup>a</sup>. The other terminal 23 of the governor is connected by the wire 22 with one terminal of the magnetic clutch 25. The other terminal of this clutch is provided with a ground connection G. The clutch comprises the winding 25<sup>a</sup>, inclosed in the channeled core 26<sup>a</sup>, which is keyed to the



axle B. The terminals of said winding are connected to the contact-rings 30 and 31, with which brushes 28 and 29 engage. These brushes are firmly held in brush-holders 24 and 26, insulated from each other and the casing 16 and supported upon the spindle 33, passing through said casing and held in place by the nuts 34 34. The casing is provided with suitable insulated openings 35 35 for the passage of the connecting-wires 22 and G, which are electrically connected to the under side of the brush-holders 24 and 26, respectively. A resistance 27 is interposed in the line 22 to cut down the amount of energy supplied to the clutch, so that a large rather than a small wire may be used in its winding. From the above it will be seen that an electrical path is formed from the wire 22 through the brush-holder 24, brush 28, ring 30, winding 25<sup>a</sup>, ring 31, brush 29, brush-holder 26 to ground. On the side of the pinion 14 adjacent to the winding 25<sup>a</sup> is a plate 32. A similar plate 36 incloses the winding 25<sup>a</sup> in the channel of the core 26<sup>a</sup> and is adapted to bear against the plate 32. When the clutch-winding is energized, the plates 32 and 36 are drawn and held together, so that the pinion 14 will be held to rotate with the axle B.

The operation of the system will be readily understood from the above description. Assuming that the system is idle, with the pressure in all parts at that of atmosphere, the circuit embracing the clutch will be closed at 21 22. If current is then supplied, as by putting the trolley-wheel on the wire 20, the clutch will be actuated, and when the car is started the compressor will begin to supply compressed fluid to the reservoir E. When the pressure reaches the amount for which the governor has been set to respond, it will be actuated to open the clutch-circuit, thus stopping the compressor. When the pressure in the system again falls, the clutch-circuit will be again closed and the compressor again started. By thus alternately starting and stopping the compressor the pressure in the system is kept substantially uniform.

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

1. In a fluid-pressure system, the combination of a compressor, means for driving said compressor, and electrically-operated means responsive to variations of pressure in the system to connect and disconnect said compressor and driving means.

2. In a fluid-pressure system, the combination of a compressor, means for driving said compressor, electrically-actuated means for connecting and disconnecting said compressor and driving means, and means responsive to variations of pressure in the system for controlling the action of said electrically-actuated means.

3. In a fluid-pressure system, the combination of a compressor, means for driving said compressor, an electrically-actuated clutch for connecting and disconnecting said compressor and driving means, and means responsive to variations of pressure in the system for controlling the action of said clutch.

4. In a fluid-pressure system, the combination of a compressor, means for driving said compressor, a magnetic clutch for throwing said compressor into and out of gear with said driving means, and a governor responsive to variations of pressure in the system for opening and closing the circuit for said clutch.

5. In a fluid-pressure system, the combination of a car-axle, a compressor mounted thereon and adapted to be driven thereby, a magnetic clutch for throwing said compressor into and out of gear with said axle, a circuit for said clutch, and a governor connected in said system to operate upon a variation of fluid-pressure in said system and provided with means for opening and closing said circuit.

6. In a fluid-pressure system, the combination of a car-axle, a compressor geared to said car-axle and adapted to be driven thereby, and electrical means for throwing said compressor into and out of gear with said axle.

7. In a fluid-pressure system, the combination of a magnetic clutch, an electric circuit therefor, and means responsive to variations of pressure in the system to open and close said circuit.

8. In a fluid-pressure system, the combination of a car-axle, a compressor, gearing including a magnetic clutch for driving said compressor from said axle, an electric circuit for said clutch, and a casing inclosing said gearing and the movable parts of said compressor.

9. The combination of a motor, a pump, mechanism connecting said two elements including a clutch having means whereby it is electrically operated, said mechanism being constructed to permit said motor to run continuously, an electric switch in the circuit of the clutch-operating device, and mechanism operated by variations in the condition of the fluid treated by the pump for opening and closing said switch and thereby throwing the clutch into and out of action, substantially as described.

In witness whereof I have hereunto set my hand this 18th day of February, 1903.

FRANK E. CASE.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.