W. H. SAUVAGE.

FLUID PRESSURE BRAKE SYSTEM.

APPLICATION FILED MAR. 5, 1909.

934,019. Patented Sept. 14, 1909.

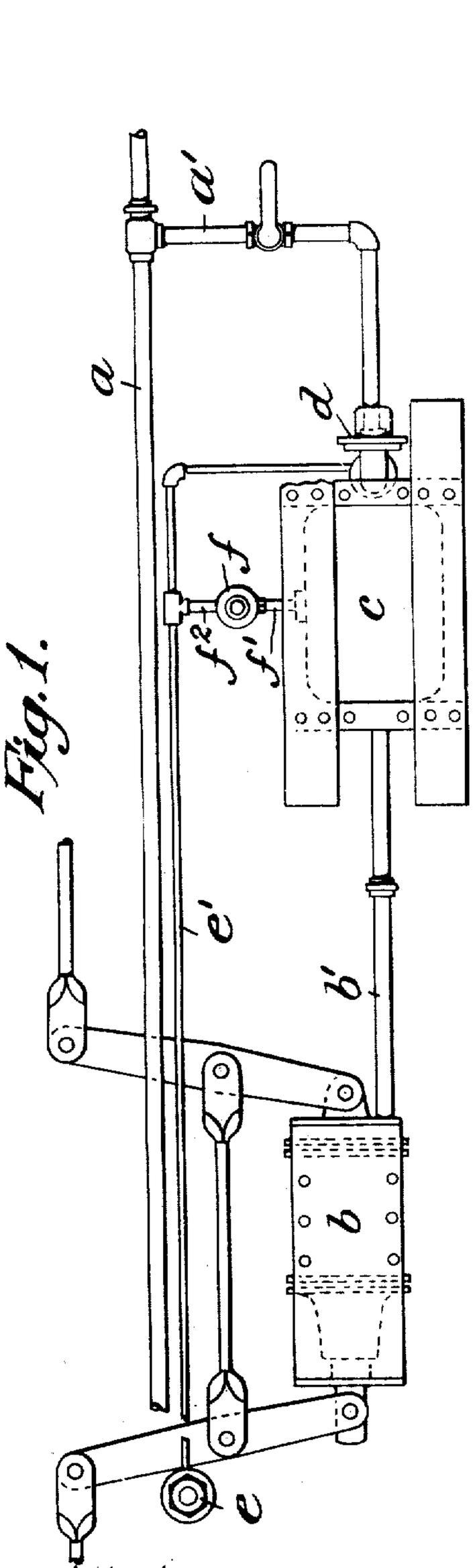

Fig. 1.

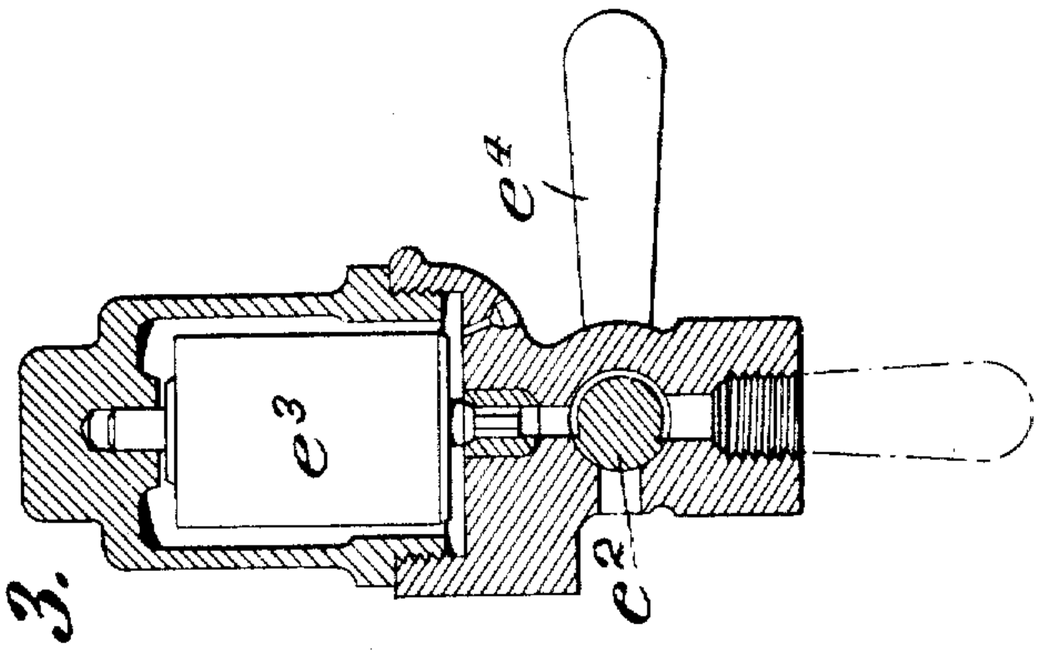

Fig. 3.

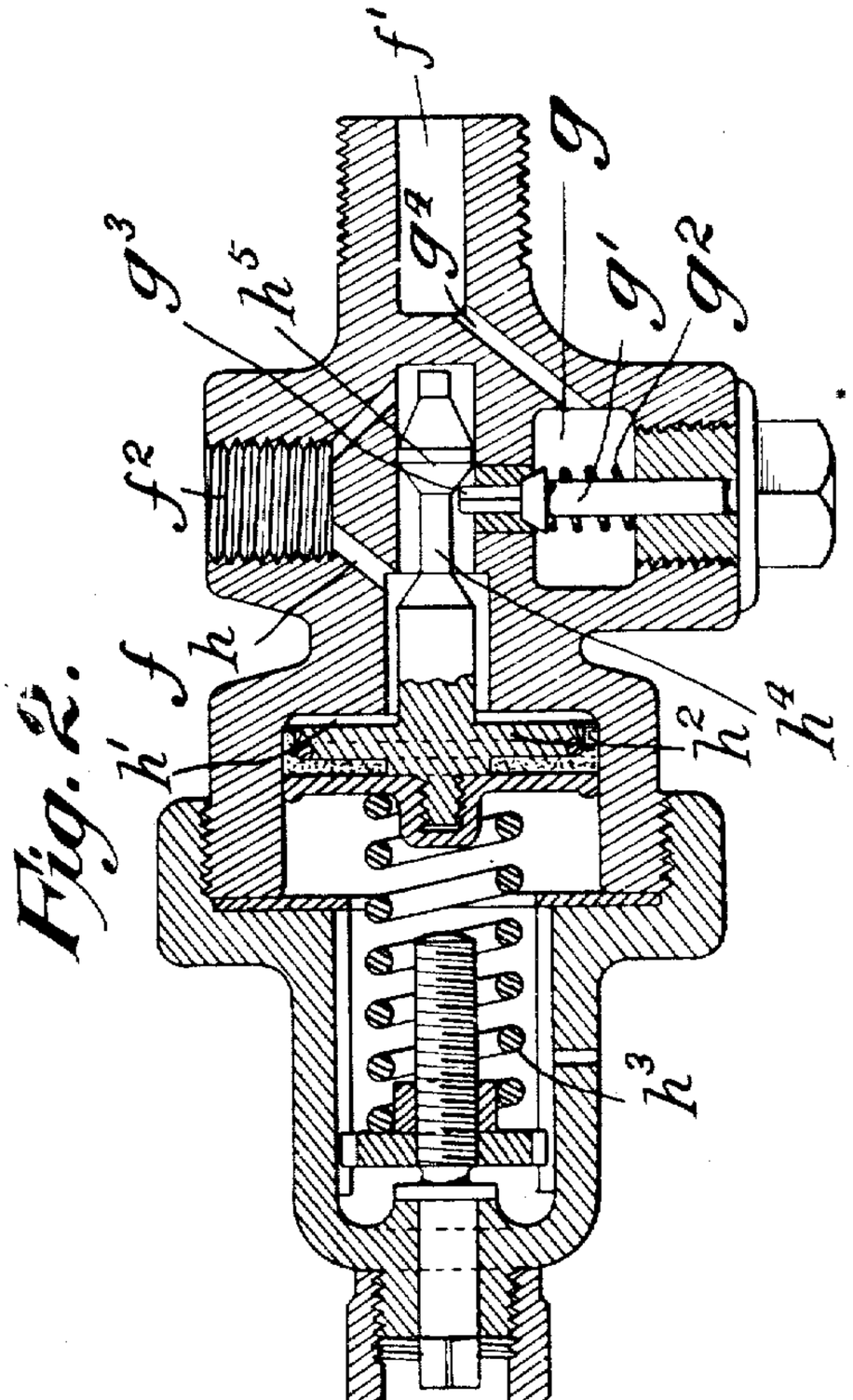

Fig. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM H. SAUVAGE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO RICHARD F. HAMILTON, OF BALTIMORE, MARYLAND.

FLUID-PRESSURE BRAKE SYSTEM.

934,019. Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed March 5, 1909. Serial No. 481,429.

To all whom it may concern:

Be it known that I, WILLIAM H. SAUVAGE, a citizen of the United States, residing in the borough of Manhattan of the city of New York, in the State of New York, have invented certain new and useful Improvements in Fluid-Pressure Brake Systems, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention has for its general object to provide means for automatically restoring the predetermined pressure which is intended to be maintained upon the brake pistons through the operation of the usual retaining valves during the descent of a long grade by a heavy train, whenever such predetermined pressure is depleted through dancing of the retaining valves or leakage or from any other cause.

In Letters Patent of the United States, No. 902,114, granted October 27, 1908, there is set forth an invention which has the same general purpose as that just mentioned, and it is the particular object of the present invention to provide a substitute for the invention described in said Letters Patent which shall overcome some of the difficulties which are more or less necessarily incident to the practical use of the former invention, and particularly to provide means for the general purpose in view, the practical operation of which shall in no manner whatsoever interfere with or modify the action of the usual brake actuating devices. In the former invention, described in said Letters Patent, the automatic pressure regulating device was connected between the train pipe and the brake cylinder or the retaining valve pipe, an arrangement which led to the undesirable results in practical operation above alluded to.

By the present invention the automatic pressure regulating device is connected between the auxiliary reservoir and the retaining valve pipe so that a reduction in pressure in the retaining valve pipe immediately effects a restoration of pressure in the retaining valve pipe and in the brake cylinder directly from the auxiliary reservoir, but only when the retaining valve is in operation. When the retaining valve is not in operation and the pressure in the retaining valve pipe is exhausted into the atmosphere, the automatic pressure regulating device is immediately thrown out of operation and the usual elements of the brake system then operate as if the automatic pressure regulating device did not exist and perform their usual functions without interruption or modification.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which it is illustrated and in which—

Figure 1 is a diagrammatic or outline view of so much of an ordinary fluid pressure brake system as is necessary to enable the application of the invention to be understood, the automatic pressure restoring device being shown as directly connected between the auxiliary reservoir and the retaining valve pipe. Fig. 2 is a detail view, in section, of the automatic pressure restoring device on a larger scale than that of Fig. 1. Fig. 3 is a detail view, in section, of an ordinary retaining valve, such as may be employed in connection with the invention.

Except so far as the automatic pressure restoring device and its immediate connections are directly concerned, the brake system may be of any usual or suitable construction, as shown, for example, in Fig. 1 of the drawings, in which the train-pipe a, supplied as usual with air under pressure from the locomotive and under the control of the driver, is connected by a train pipe connection a' with the triple valve d which is in turn connected with the brake cylinder b through the brake cylinder connection b' and with the auxiliary reservoir c, the brake cylinder connection b' being represented as passing through the auxiliary reservoir as usual. The retaining valve e is connected with the exhaust of the triple valve by the retaining valve pipe e' and may comprise, as usual, a hand-operated valve e^2 which may be placed so as to permit the exhaust of the triple valve to communicate directly with the atmosphere, or to communicate with the atmosphere under the control of a weighted valve e^3 which, under operative conditions, serves to maintain a predetermined pressure in the brake cylinder.

The retaining valve handle e^4 usually stands in the position indicated by dotted line in Fig. 3, establishing direct communication between the exhaust of the triple valve and the atmosphere, and is turned up into the full line position to place the pres-

sure in the retaining valve pipe under the control of the weighted valve e^3, just before the train, of which each car equipped with the retaining valve is a part, passes over the summit of the grade, so that during the descent of the grade a predetermined pressure shall be maintained in the retaining valve pipe and therefore, through the triple valve and the brake cylinder pipe b', in the brake cylinder b, the brakes being thereby held set with a predetermined pressure during the descent of the grade. The engineer or driver may, therefore, throw his valve to the full release position, as is necessary to effect the recharging of the auxiliary reservoirs, without releasing the brakes, and moreover, since the balance of braking power necessary to control the train, when the brakes are thus set, lies in the brakes on the engine and the tank, and since the operation of the brakes is in no wise affected by the application of the present invention, he can, by the application of straight air to the engine and tank brakes, maintain perfect control of the train. The triple valve d may also be of ordinary construction, having a train pipe connection indicated at a', a brake cylinder connection indicated at b' and an exhaust and retaining valve connection indicated at e', being itself, as usual, mounted upon one end of the auxiliary reservoir c and directly connected therewith.

The automatic pressure restoring device f is directly connected on one side, as at f', to the auxiliary reservoir c, and on the other side, as at f^2, to the exhaust or retaining valve pipe e', and it is in this connection and combination of the automatic restoring valve that the present invention resides. The construction of the valve may be of any suitable character which is adapted to control the communication between the auxiliary reservoir and the exhaust or retaining valve pipe under the influence of the variation of pressure in the exhaust or retaining valve pipe.

In the construction shown in Fig. 2 whatever pressure is in the exhaust or retaining valve e' is communicated through the port and passage h to a chamber h' in which is located, subject to the pressure in the pipe e', a diaphragm or piston h^2, which is acted upon, in opposition to the fluid pressure in the chamber h' by a spring h^3 which is adjusted so as to maintain in the chamber h' the predetermined pressure which is to be maintained in the brake cylinder. The stem h^4 of the diaphragm or piston h^2 carries a cam h^5 which coöperates with the extension g^3 of a valve g' held by a spring g^2 against its seat in the wall of the valve chamber g, which is in direct communication with the auxiliary reservoir c through the channel g^4.

So long as the handle e^4 of the retaining valve is turned down so that the exhaust of the triple valve communicates directly with the atmosphere, the piston or diaphragm h^2 and therefore the cam h^5 are held in their extreme forward positions. They thus remain and the device is therefore inoperative until the handle of the retaining valve is turned up so that the retaining valve shall operate to maintain in the brake cylinder the predetermined pressure under which the brakes are to be held. As soon as the retaining valve becomes operative, the pressure in the retaining valve pipe and, through the triple valve, the pressure in the brake cylinder, is immediately built up, until it reaches the predetermined pressure. Under the influence of this predetermined pressure in the pipe e', the diaphragm or piston h^2 is thrust back against the pressure of the spring h^3 and the cam h^5 passes quickly over the extension g^3 of the valve g', the piston h^2 finally coming to rest against the end of the chamber in which it is located. If now the pressure in the pipe e', either through dancing of the retaining valve, or through leakage, or from any other cause, is depleted, the piston h^2 yields to the pressure of the spring h^3 and causes the cam h^5 to act against the extension g^3 of the valve g', thrusting the valve slightly from its seat and permitting the fluid under pressure in the chamber g and in the auxiliary reservoir to enter the chamber h and its connections until the pressure in the pipe e' and therefore in the brake cylinder, is restored to the predetermined degree. Inasmuch as the piston responds to slight variations of pressure, the pressure in the brake cylinder and its connections can fall but slightly below the predetermined degree being immediately restored. When the necessity for maintaining the pressure in the brake cylinder is passed and the retaining valve handle is again turned down, the pressure in the pipe e' will at once fall to atmospheric and the piston h^2 will be instantly thrown to its extreme forward position by the spring h^3. The cam h^5 passes completely over the extension of the valve g' so quickly that there is no material waste of pressure through the unseating of the valve g'.

I claim as my invention:

1. In a fluid pressure brake system, the combination with a brake cylinder, an auxiliary reservoir, a triple valve, a retaining valve and a retaining valve connection, of means operated by reduction of pressure in the retaining valve connection to admit fluid under pressure from the auxiliary reservoir to the retaining valve connection.

2. In a fluid pressure brake system, the combination of a brake cylinder, an auxiliary reservoir, a triple valve connected with the brake cylinder and with the auxiliary reservoir, a retaining valve and a connection between the triple valve exhaust and

the retaining valve, of means operated by reduction of pressure in the retaining valve connection to admit fluid under pressure from the auxiliary reservoir to the retaining valve connection.

3. In a fluid pressure brake system, the combination of a brake cylinder, an auxiliary reservoir, a triple valve connected with the brake cylinder and with the auxiliary reservoir, a retaining valve and a connection on the exhaust of the triple valve to the retaining valve, of a connection from the auxiliary reservoir to the retaining valve connection, a valve normally closing the last named connection and means operated by reduction of pressure in the retaining valve connection to open said last named valve.

4. In a fluid pressure brake system, the combination of a brake cylinder, an auxiliary reservoir, a triple valve connected with the brake cylinder and with the auxiliary reservoir, a retaining valve and a connection on the exhaust of the triple valve to the retaining valve, of a direct connection from the auxiliary reservoir to the retaining valve connection, a valve normally preventing the passage of fluid from the auxiliary reservoir to the retaining valve connection, a spring actuated piston subject to the pressure in the retaining valve connection and means actuated by the movement of the piston under reduction of pressure to open said valve.

5. In a fluid pressure brake system, the combination of a brake cylinder, an auxiliary reservoir, a triple valve connected with the brake cylinder and with the auxiliary reservoir, a retaining valve, a pipe connecting the exhaust of the triple valve with the retaining valve, a direct connection from the auxiliary reservoir to said pipe, a valve interposed in said connection and normally preventing the passage of fluid under pressure from the auxiliary reservoir to the retaining valve pipe, and means operated by reduction of pressure in the retaining valve pipe to open said valve.

This specification signed and witnessed this 24th day of February, A. D., 1909.

WILLIAM H. SAUVAGE.

Signed in the presence of—
W. B. GREELEY,
AMBROSE L. O'SHEA.