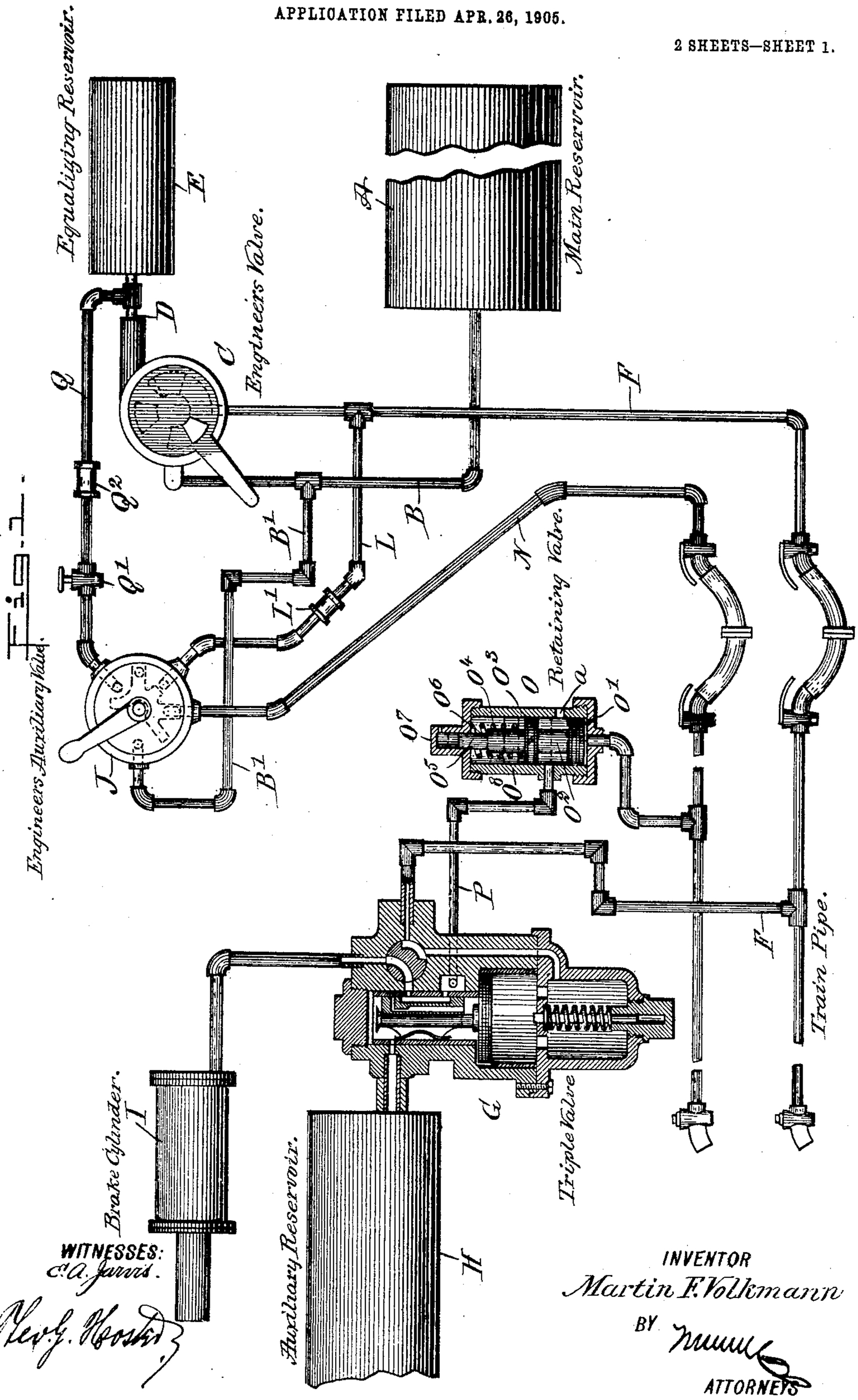
No. 803,943. PATENTED NOV. 7, 1905.

M. F. VOLKMANN.

FLUID PRESSURE BRAKE.

APPLICATION FILED APR. 26, 1905.

2 SHEETS—SHEET 1.



WITNESSES:
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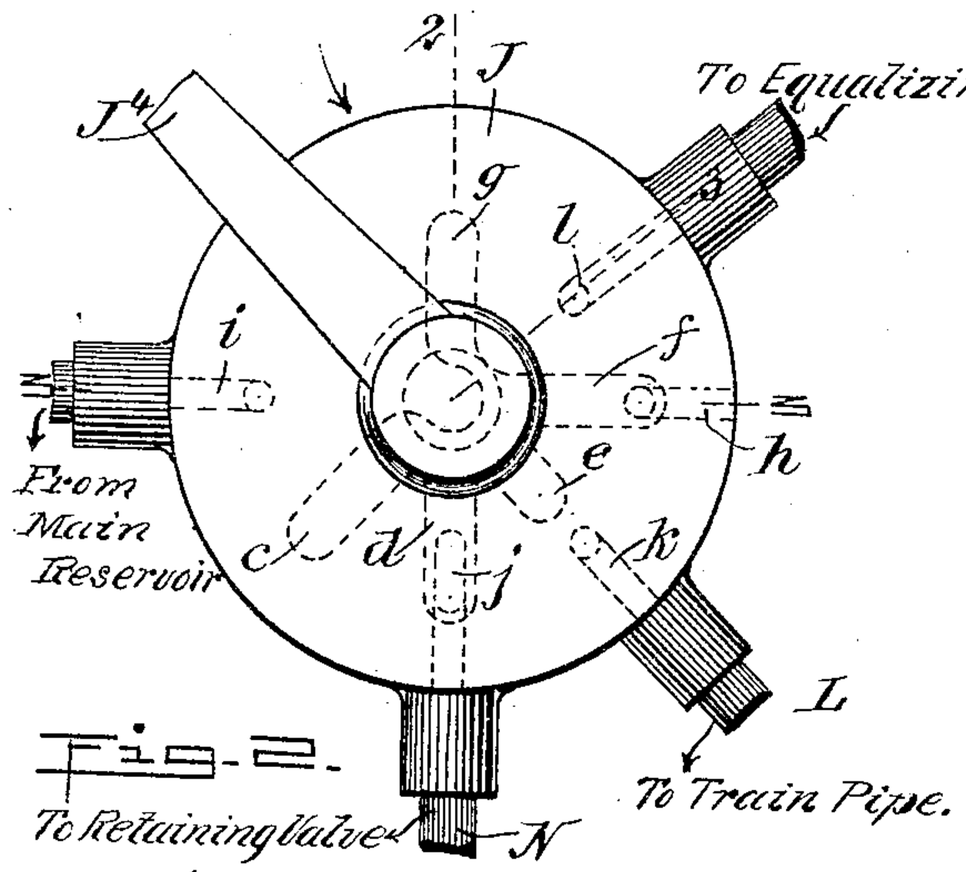


Fig. 2.

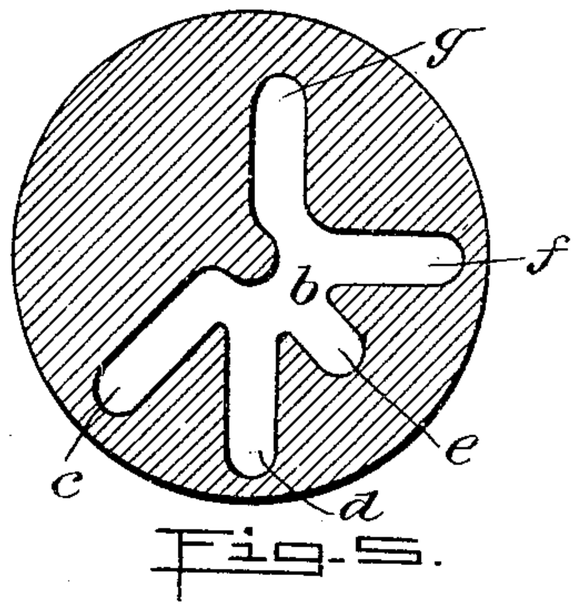


Fig. 5.

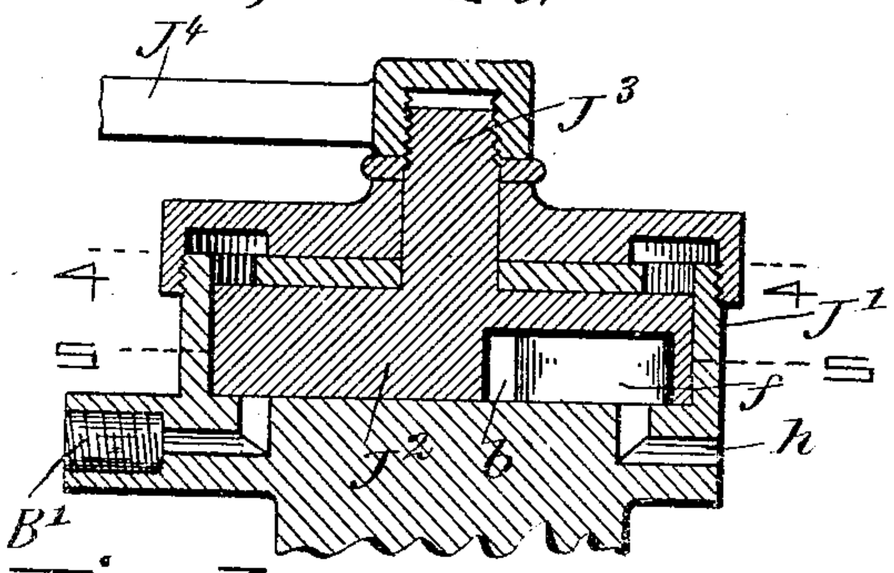
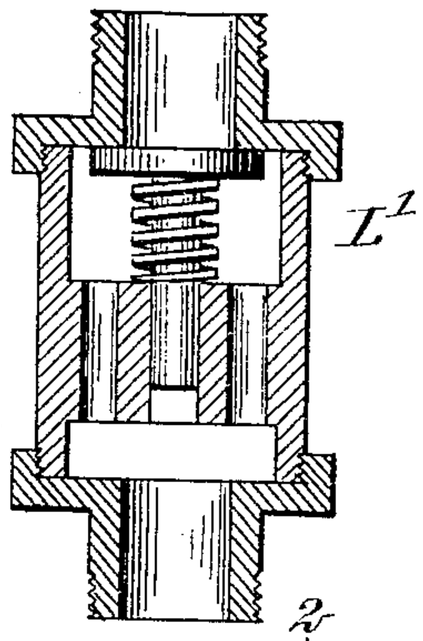


Fig. 3.



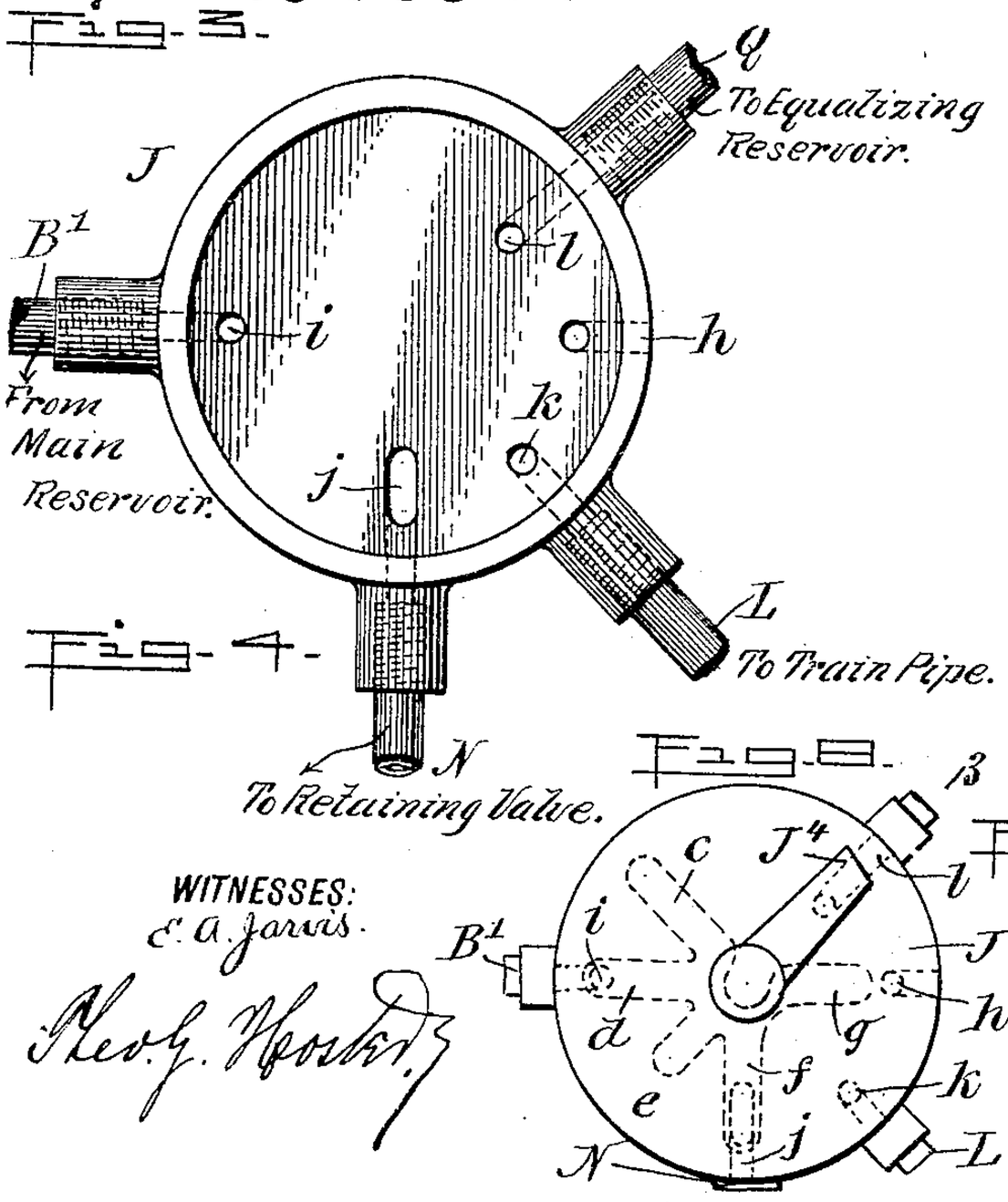


Fig. 4.

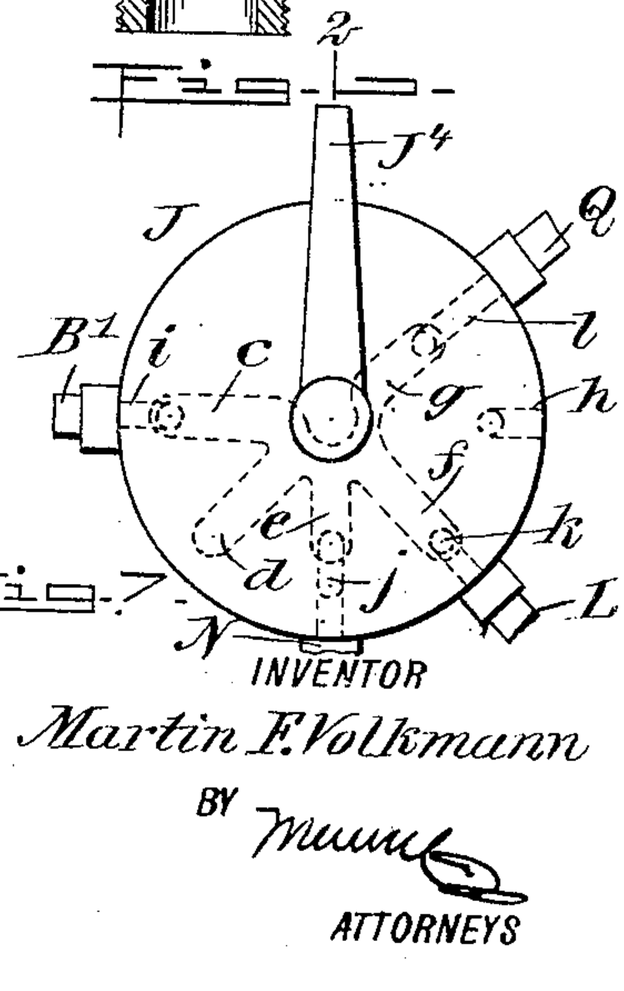


Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE.

MARTIN FREDERICK VOLKMANN, OF SANTA MONICA, CALIFORNIA.

FLUID-PRESSURE BRAKE.

No. 803,943. Specification of Letters Patent. Patented Nov. 7, 1905.

Application filed April 26, 1905. Serial No. 257,493.

To all whom it may concern:

Be it known that I, MARTIN FREDERICK VOLKMANN, a citizen of the United States, and a resident of Santa Monica, in the county of Los Angeles and State of California, have invented a new and Improved Fluid-Pressure Brake, of which the following is a full, clear, and exact description.

The invention relates to fluid-pressure brakes of the Westinghouse type; and its object is to provide a new and improved fluid-pressure brake arranged to permit the engineer to directly control the retaining-valves with a view to recharging the auxiliary reservoirs without first releasing the brakes and to allow of increasing the pressure in the brake-cylinders after the auxiliary reservoirs are recharged.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of the improvement, parts being shown in section. Fig. 2 is an enlarged plan view of the engineer's auxiliary valve. Fig. 3 is a sectional side elevation of the same on the line 3 3 of Fig. 2. Fig. 4 is a sectional plan view of the same on the line 4 4 of Fig. 3. Fig. 5 is a similar view of the valve-plug for the engineer's auxiliary valve, the section being on the line 5 5 of Fig. 3. Fig. 6 is an enlarged sectional side elevation of the check-valve in the connection between the engineer's auxiliary valve and the train-pipe, and Figs. 7 and 8 are reduced plan views of the engineer's auxiliary valve in different positions.

The main reservoir A on the locomotive is connected by a pipe B with the engineer's valve C, connected by a pipe D with the equalizing-reservoir E. From the engineer's valve C leads a train-pipe F, connected with a triple valve G, having the usual connections with the auxiliary reservoir H and the brake-cylinder I.

The parts so far described are of the usual construction, so that further description of the same is not deemed necessary.

The pipe B, connecting the main reservoir A with the engineer's valve C, is connected by a branch pipe B′ with the engineer's auxiliary valve J, arranged in the cab of the locomotive adjacent to the engineer's valve C, so that both valves C and J are within convenient reach of the engineer. The engineer's auxiliary valve J is connected by a pipe L, having a check-valve L′, with the train-pipe F and by a pipe N with the retaining-valve O, connected by a pipe P with the usual exhaust-cavity in the triple valve G, so that the brake-cylinder I can exhaust by way of the pipe P and the port *a* in the retaining-valve O to the atmosphere, as will be readily understood by reference to Fig. 1. When, however, pressure is sent by way of the main reservoir A, pipe B, branch pipe B′, engineer's auxiliary valve J, and pipe N into the retaining-valve O, then the exhaust-port *a* is closed by a piston O′, moved upward by the entering pressure, so that the pressure from the brake-cylinder I cannot exhaust for the time being. The piston O′ has its piston-rod O^2 connected with a piston O^3, pressed on by a spring O^4, so as to normally hold the pistons O^3 and O′ in a lowermost position to allow the exhaust from the triple valve G to pass out by way of the port *a*. The stem O^5 for the piston O^3 is provided with a shoulder O^6, adapted to butt against the cap O^7 of the casing O^8 of the retaining-valve O to limit the upward movement of the pistons O′ and O^3—that is, to hold the piston O′ in position over the port *a* to close the same. The engineer's auxiliary valve J is also connected by a pipe Q with the pipe D, leading from the equalizing-reservoir E to the engineer's valve C, and in the said pipe Q is arranged a cut-off valve Q′ and a check-valve Q^2, similar to the check-valve L′, (see Fig. 6,) and arranged to prevent the flow of air-pressure from the equalizing-reservoir E to the engineer's auxiliary valve J at the time the latter is in its normal position, as shown in Fig. 1.

The engineer's auxiliary valve J is provided with a valve-casing J′ and a valve-plug J^2, carrying on its stem J^3 a handle J^4 under the control of the engineer, and in the under side of the valve-plug J^2 is arranged a channel or recess *b*, having a number of radial branches *c*, *d*, *e*, *f*, and *g*, (see Fig. 5,) and in the valve-casing J′ is formed an exhaust-port *h*, leading to the atmosphere, (see Figs. 3 and 4,) and in the said casing J′ are also formed ports *i*, *j*, *k*, and *l*, adapted to be connected with the channel *b* by its branches, as hereinafter more fully described. The ports

i, *j*, *k*, and *l* lead to the pipes B′, N, L, and Q, respectively, and when the handle J⁴ is in the normal position 1 (shown in Figs. 1, 2, and 3) then the branches *d* and *f* only are in register with the ports *j* and *h* to connect the pipe N with the atmosphere. When the handle J⁴ is moved by the engineer from its normal position 1 to position 2 (see Fig. 7) with a view to recharge the auxiliary reservoir H, then the branch *c* registers with the port *i*, the branch *e* registers with the port *j*, the branch *f* registers with the port *k*, and the branch *g* registers with the port *l*. When the handle J⁴ is turned by the engineer to the position 3 (see Fig. 8) with a view to increase the pressure in the brake-cylinder I, then the branch *d* registers with the port *i* and the branch *f* registers with the port *j* to connect the pipes B′ and N with each other, the remaining ports then being cut out.

The operation is as follows: In order to apply or release the brakes, the engineer in charge manipulates the engineer's valve C in the usual manner. Now when the train is, say, running downgrade and the brakes are applied and it is desired to recharge the auxiliary reservoir H without requiring a temporary release of the brakes then the engineer moves the handle J⁴ of the auxiliary valve J to position 2 (see Fig. 7) to establish communication between the pipes B′ and N by way of the channel *b*, its branches *c* and *e*, and the ports *i* and *j* to permit air-pressure to actuate the retaining-valve with a view to close the exhaust-port *a*. At the same time the pressure in the channel *b* passes by way of the branch *f* and port *k* into the pipe L and opens the valve L′, as the pressure from the main reservoir is greater than that of the train-pipe F, in which the air-pressure was reduced on applying the brakes. At the same time pressure flows into the pipe Q and into the equalizing-reservoir E. Now it is evident that the air-pressure flowing through the pipe L passes into the train-pipe F and by way of the triple valve G into the auxiliary reservoir H to recharge the same. The pressure in the pipes N and L and equalizing-reservoir E is now practically equal. After the auxiliary reservoir is recharged and it is desired by the engineer to apply the brakes with greater pressure then he moves the handle J⁴ to the position 3, (see Fig. 8,) whereby the pipes L and Q are cut out from the main-reservoir pressure, but the latter is maintained in the pipe N by way of the branches *d* and *f* and ports *i* and *j*. The engineer then moves the engineer's valve C to service-stop position to exhaust air from the train-pipe F to shift the triple valve G to allow the main-reservoir pressure to pass from the auxiliary reservoir H into the brake-cylinder I. The valve C is returned to original lap position as soon as a sufficient quantity of air has been exhausted from the train-pipe for shifting the triple valve G, as described. If it is desired to release the brakes, it is necessary for the engineer to return the handle J⁴ to the normal position 1, (shown in Figs. 1 and 2,) whereby the pipes B′, L, and Q are cut out completely and the pipe N is connected by the port *j* and branches *d* and *f* with the exhaust-port *h* to allow the air to exhaust from the pipe N to reduce the pressure against the under side of the piston O′. The spring O⁴ now returns the piston O′ O³ to normal position—that is, the port *a* is opened and air from the brake-cylinder I can now exhaust by way of the triple valve G, pipe P, and the retaining-valve O.

It is understood that the check-valve L′ in the pipe L prevents the air-pressure from flowing from the train-pipe F through the pipe L at the time the brakes are applied, and the engineer recharges the auxiliary reservoir H, as otherwise a greater reduction of pressure in the train-pipe would take place and the brakes would be set harder than desired—that is, the reduction in the train-pipe might reach an emergency application.

When the pressure in the train-pipe F is reduced while the auxiliary valve J is in recharging position, as above explained, and the pressure in the pipe B′ and channel *b* is greater than that in the train-pipe F and pipe L, air would flow through the pipe L into the train-pipe F and exhaust by way of the usual exhaust in the engineer's valve C, and in order to prevent such waste of pressure the auxiliary valve J is moved into position 3, as above described.

When the brakes are applied and the engineer's valve C is in lap position, then air-pressure in the train-pipe F is prevented from escaping by way of the engineer's valve C. When the auxiliary reservoir is recharged by the engineer manipulating the auxiliary valve J, as above described, and the handle J⁴ is moved to position 2, then communication is had between the main reservoir and the equalizing-drum E by way of the auxiliary valve J and pipe Q to hold the piston of the engineer's valve C in such position that the exhaust-valve for the exhaust-port in the engineer's valve C is held closed. If the equalizing-reservoir pressure were not reinforced from the main reservoir, as described and for the purpose mentioned, the pressure in the train-pipe would raise the piston in the engineer's valve and the exhaust-valve would open and the air would escape from the train-pipe.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A fluid-pressure brake provided with a retaining-valve for retaining the pressure in the brake-cylinder, and an engineer's auxiliary valve, under the control of the engineer and connected with the main reservoir and

the said retaining-valve, to move the latter into a retaining position, the said engineer's auxiliary valve having an outlet to the atmosphere, for allowing the retaining-valve to move into an exhaust position for the pressure to escape from the brake-cylinder, and a valve connection between the engineer's auxiliary valve and the equalizing-reservoir.

2. A fluid-pressure brake provided with a retaining-valve for retaining the pressure in the brake-cylinder, an engineer's auxiliary valve, under the control of the engineer and connected with the main reservoir and the said retaining-valve, to move the latter into a retaining position, a valved connection between the said engineer's auxiliary valve and the train-pipe, to recharge the auxiliary reservoir while the brakes are set and the retaining-valve is in a retaining position, and a valved connection between the said engineer's auxiliary valve and the equalizing-reservoir.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARTIN FREDERICK VOLKMANN.

Witnesses:

GEORGE FRANCIS DOTY,

T. J. TOWNSEND.