No. 711,774. Patented Oct. 21, 1902.

W. G. LAMB.

RETAINING VALVE.

(Application filed July 9, 1902.)

(No Model.)

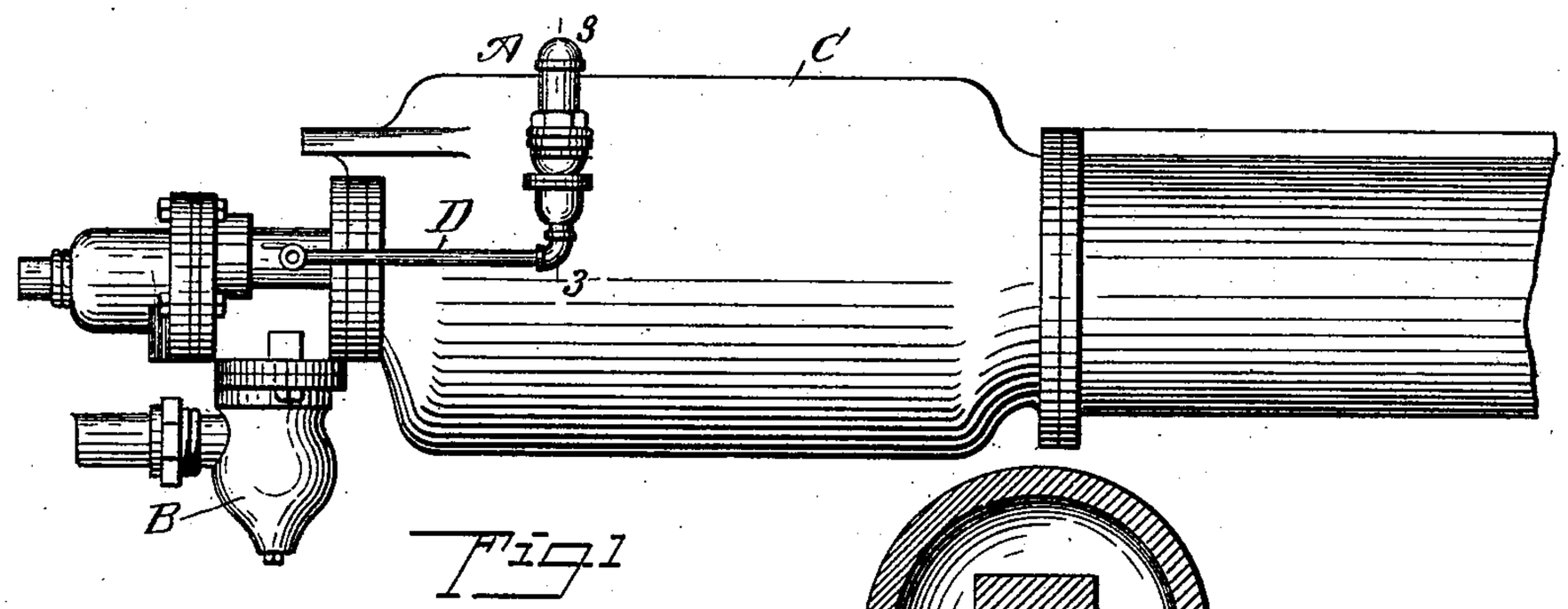

Fig. 1

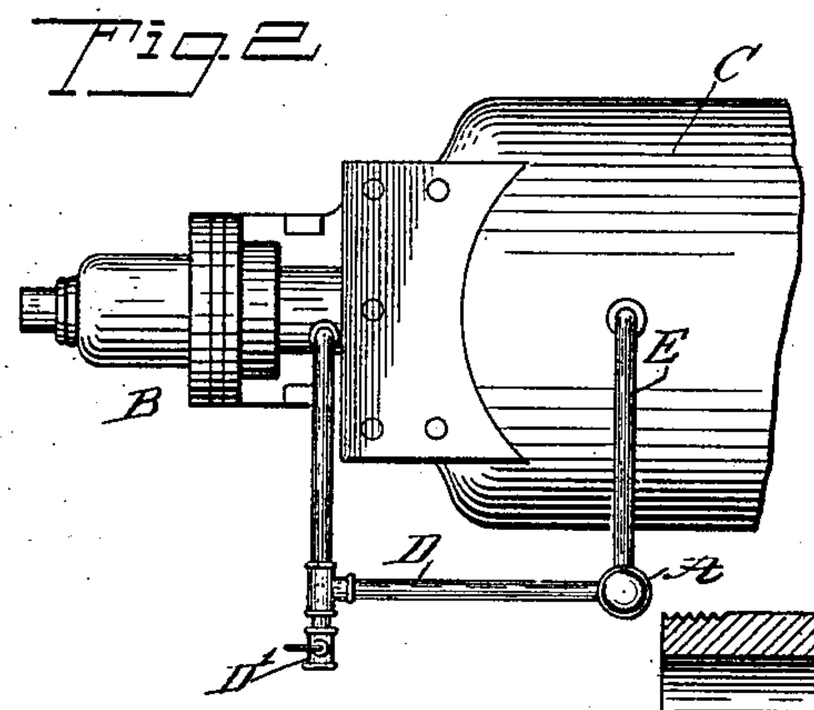

Fig. 2

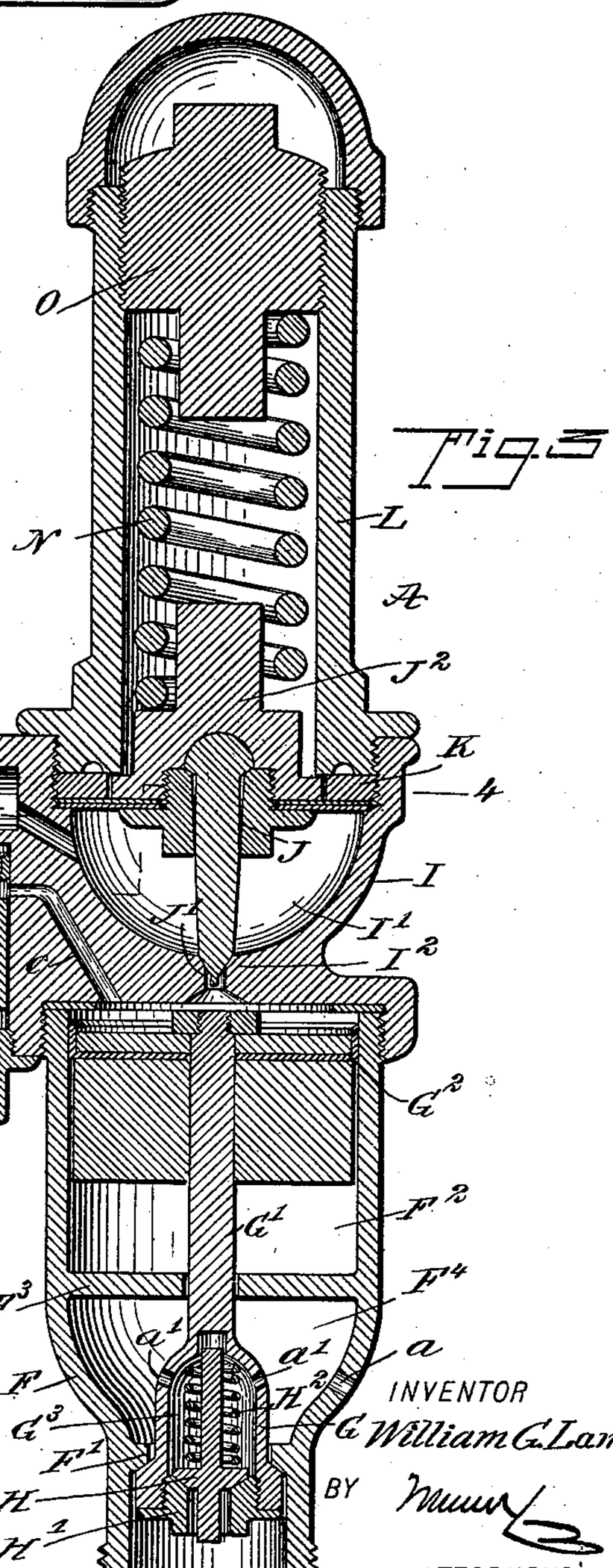

Fig. 3

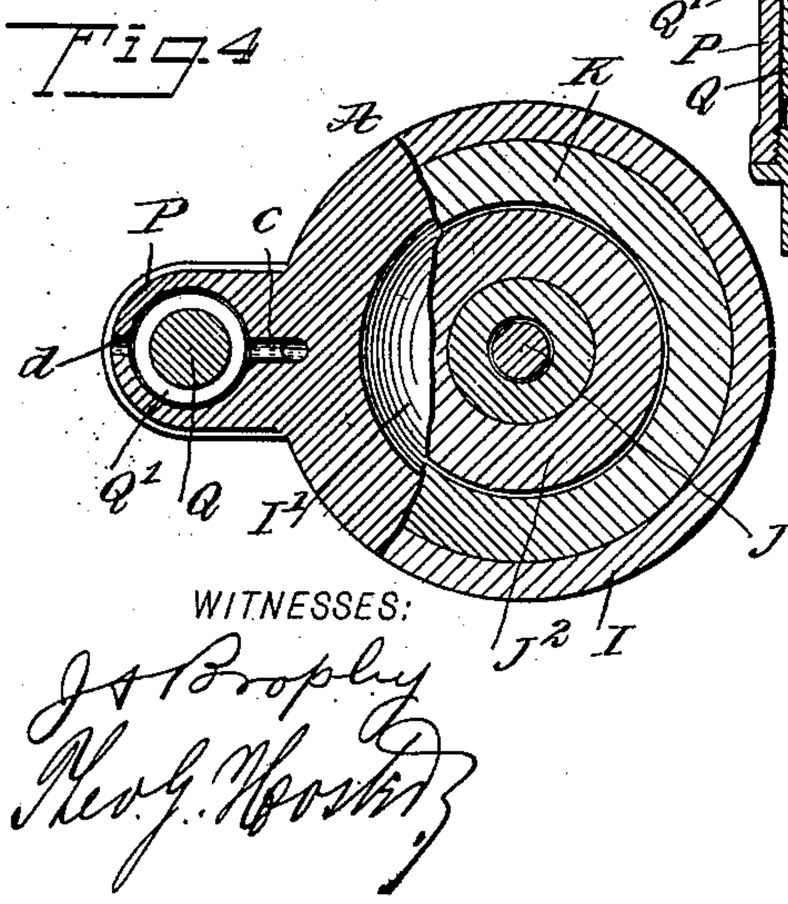

Fig. 4

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RETAINING-VALVE.

SPECIFICATION forming part of Letters Patent No. 711,774, dated October 21, 1902.

Application filed July 9, 1902. Serial No. 114,903. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GOTT LAMB, a citizen of the United States, and a resident of the city of Mexico, Mexico, have invented a new and Improved Retaining-Valve, of which the following is a full, clear, and exact description.

The invention relates to fluid-pressure brakes of the Westinghouse type, and more particularly to retaining-valves such as shown and described in the Letters Patent of the United States No. 702,802, granted to me June 17, 1902.

The object of the invention is to provide a new and improved retaining-valve arranged to automatically hold the full pressure on the brakes while recharging the auxiliary reservoir and to insure a proper release of the brakes whenever the train-pipe is recharged, the retaining-valve being exceedingly sensitive in operation.

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 sectional side elevation of the improvement as applied. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged transverse section of the improvement on the line 3 3 of Fig. 1, and Fig. 4 is a sectional plan view of the same on the line 4 4 of Fig. 3.

The improved retaining-valve A, as illustrated in the drawings, is connected with the exhaust of the triple valve B and the auxiliary reservoir C, and for the purpose mentioned a pipe D leads from the exhaust of the triple valve B to the lower end of the retaining-valve A, and a pipe E connects the auxiliary reservoir C with the middle portion of the retaining-valve A, as hereinafter more fully described.

The retaining-valve A is provided with a casing or valve-body preferably made in several parts, and the lower part F of these sections is connected with the pipe D and contains a valve-seat F′, adapted to be closed by a valve G under pressure from the exhaust of the triple valve. The valve G is provided with an upwardly-extending stem G′, carrying a piston G^2, mounted to slide in the cylinder F^2, formed on the part F, the said stem G′ passing through a partition F^3, dividing the cylinder F^2 from an exhaust-chamber F^4, having an outlet-port *a* to the atmosphere to allow the air to escape from the triple-valve exhaust, as hereinafter more fully described.

The valve G is provided in its bottom with a valve-seat H′, opening into a valve-chamber G^3, formed in the top of the valve G, the said chamber having ports *a*′ opening into the exhaust-chamber F^4 to connect the interior of the chambers G^3 and F^4 with each other. A valve H is seated on the valve-seat H′ and opens upward into the chamber G^3 against the tension of a spring H^2, set to, say, twenty pounds, and serves to hold the valve H normally to its seat H′.

At the top of the cylinder F^2 is screwed or otherwise secured the middle part I of the retainer-valve casing, and on the said part I screws the pipe E, previously mentioned, the said pipe E connecting by a port *b* with a chamber I′, formed in its bottom with a needle-point-valve seat I^2 for connecting the chamber I′ with the top of the cylinder F^2. The seat I^2 is engaged by the needle-point J′ of a diaphragm-valve J, having its diaphragm seated on a gasket K, held on the under side of the top part L of the casing or valve-body, the said top part being screwed or otherwise secured to the top of the middle part I. The body J^2 of the diaphragm-valve J is pressed on by a spring N, contained in the top part L and resting against the under side of a plug O, adjustable in the part L to regulate the tension of the spring N and allow of setting the valve J at the desired pressure. The spring N is set, say, to seventy pounds.

The upper end of the cylinder F^2 is connected by a port *c* with a small auxiliary cylinder P, containing a piston Q, having an annular groove Q′ for connecting the ports *c* with a port *d*, formed in the wall of the cylinder P and leading to the atmosphere. A spring R, set, say, to fifty pounds, presses against the under side of the piston Q to normally hold the piston in such a position that its groove Q′ registers with both ports *c* and *d* to relieve the upper end of the cylinder F^2

of air-pressure. A port *f* connects the top of the cylinder P with the pipe E, connecting the chamber I′ with the auxiliary reservoir.

The operation is as follows: When the air in the auxiliary reservoir C reaches the desired pressure to which the valve J is set—say seventy 70 pounds—then the valve J is moved upward to lift the needle-point J′ off the seat I^2 and allow the air to pass from the auxiliary reservoir C by way of the pipe E, port *b*, chamber I′, and seat I^2 into the upper end of the cylinder F^2 to force the piston G^2 downward, so that the valve G moves from its seat F′ to allow the exhaust from the triple valve B to pass through the valve-seat F′ into the chamber F^4 and by the port *a* to the atmosphere to release the brakes. The pressure of seventy pounds from the auxiliary reservoir passes by way of the port *f* into the upper end of the cylinder P to force the piston Q therein downward against the tension of the spring R, set to only fifty pounds, as previously mentioned. A downward movement of the piston Q disconnects the annular groove Q′ from the ports *b* and *c* to close the same, and hence the air which entered the upper end of the cylinder F^2 from the chamber I′, as previously described, cannot escape from the cylinder F^2 during the release of the brakes.

In applying the brakes, the pressure in the auxiliary reservoir and train-pipe being reduced to, say, fifty pounds, as the piston of the brake-cylinder is forced ahead the spring N forces the valve J downward against the reduced pressure in the chamber I′ and causes the needle-point J′ to move to its seat I^2, and thereby disconnect the chamber I′ from the upper end of the cylinder F^2. When the valve J is in such position and brakes released, then the exhaust from the triple valve, acting on the piston G^2, causes the piston to slide upward in the cylinder F^2 to move the valve G to its seat, and the exhaust now opens the valve H against the tension of the spring H^2, so that the exhaust now passes through the valve-chamber G^3 and port *a*′ into the chamber F^4 and by way of the port *a* to the atmosphere. The valve H remains open until the pressure is reduced to twenty pounds. Then the spring H^2 closes the valve H, so as to retain, say, twenty pounds of pressure in the brake-cylinder. This pressure in the brake-cylinder keeps the brake supplied until the auxiliary reservoir is replenished to the full pressure—that is, to seventy pounds—after which the above-described operation is repeated—that is, the pressure of seventy pounds in the chamber I′ causes the diaphragm-valve J to move the needle-point J′ from its seat I^2—to allow this pressure to act on the piston G^2 and force the valve G off its seat to allow escape of air from the exhaust of the triple valve, as above mentioned. When the reduction in the auxiliary reservoir takes place—say to fifty pounds or below—then the spring R forces the piston Q upward to bring the groove Q′ in register with the ports *c* and *d* to allow the air in the upper end of the cylinder F^2 to escape to the atmosphere by way of the port *c*, groove Q′, and port *d*. By this arrangement the piston G^2 readily moves up under exhaust-pressure from the brake-cylinder—that is, the piston G^2 and its valve G are rendered very sensitive.

From the foregoing it will be seen that the engineer is enabled to recharge the auxiliary reservoir to the full pressure without releasing the brakes, and this arrangement is therefore serviceable on long steep grades, as then the pressure is considerably reduced by leakage and it often becomes necessary to recharge the auxiliary reservoir to keep the brakes supplied. Now it is evident that if the brakes have to be released from time to time on a long steep downgrade while recharging the auxiliary reservoir, as heretofore practiced, it frequently happens that the train obtains such a momentum as to become completely out of control of the engineer. By my improvement above described the brakes remain supplied, say, with twenty pounds pressure (more or less according to the tension to which the spring H^2 is set) without recharging the auxiliary reservoir, the twenty pounds being sufficient to brake the wheels without sliding the same on the rails.

The pipe D, previously mentioned, is provided with a cock D′ for connecting the pipe D directly with the atmosphere, so that in case the retaining-valve is out of order then the triple-valve exhaust passes directly to the atmosphere the same as if the retaining-valve were not employed.

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

1. A retaining-valve comprising a valve-casing connected with the exhaust of the triple valve and with the auxiliary reservoir, a release-piston valve in the valve-casing, normally held to its seat by the exhaust from the triple valve, a spring-pressed auxiliary valve on the said release-piston, adapted to be opened by the exhaust from the triple valve to connect the exhaust with the atmosphere, and a spring-pressed diaphragm needle-point valve in the said casing, set to a desired pressure and controlled by pressure from the auxiliary reservoir, the said needle-point valve controlling a valve-seat, to permit pressure from the auxiliary reservoir to act on the piston of the said release-piston valve, to move the latter into an open position for the escape of the exhaust from the triple valve to the atmosphere, as set forth.

2. A retaining-valve comprising a valve-casing connected with the exhaust of the triple valve and with the auxiliary reservoir, a release-piston valve in the valve-casing, normally held to its seat by the exhaust from the triple valve, a spring-pressed auxiliary

valve on the said release-piston, adapted to be opened by the exhaust from the triple valve to connect the exhaust with the atmosphere, a spring-pressed diaphragm needle-point valve in the said casing, set to a desired pressure and controlled by pressure from the auxiliary reservoir, the said needle-point valve controlling a valve-seat, to permit pressure from the auxiliary reservoir to act on the piston of the said release-piston valve, to move the latter into an open position for the escape of the exhaust from the triple valve to the atmosphere, and a spring-pressed discharge-valve, for allowing the air-pressure to escape to the atmosphere from the cylinder of the piston of the release-piston valve, the said discharge-valve being controlled by pressure from the auxiliary reservoir, as set forth.

3. A retaining-valve comprising a valve-casing connected with the exhaust of the triple valve and with the auxiliary reservoir, a release-piston valve in the said casing, normally held to its seat by the exhaust from the triple valve, a spring-pressed diaphragm needle-valve in the said casing, set to a desired pressure and controlled by pressure from the auxiliary reservoir, and a spring-pressed discharge-valve controlled by pressure from the auxiliary reservoir and controlling ports for allowing the air-pressure from the cylinder of the piston of the said release-piston valve to escape to the atmosphere, on reduction of pressure in the auxiliary reservoir, as set forth.

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

WILLIAM GOTT LAMB.

Witnesses:
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L. P. FRISBIE.