No. 706,867. Patented Aug. 12, 1902.

W. V. TURNER & F. C. FARQUHARSON.

RETAINING VALVE.

(Application filed June 26, 1901.)

(No Model.)

Fig. 1

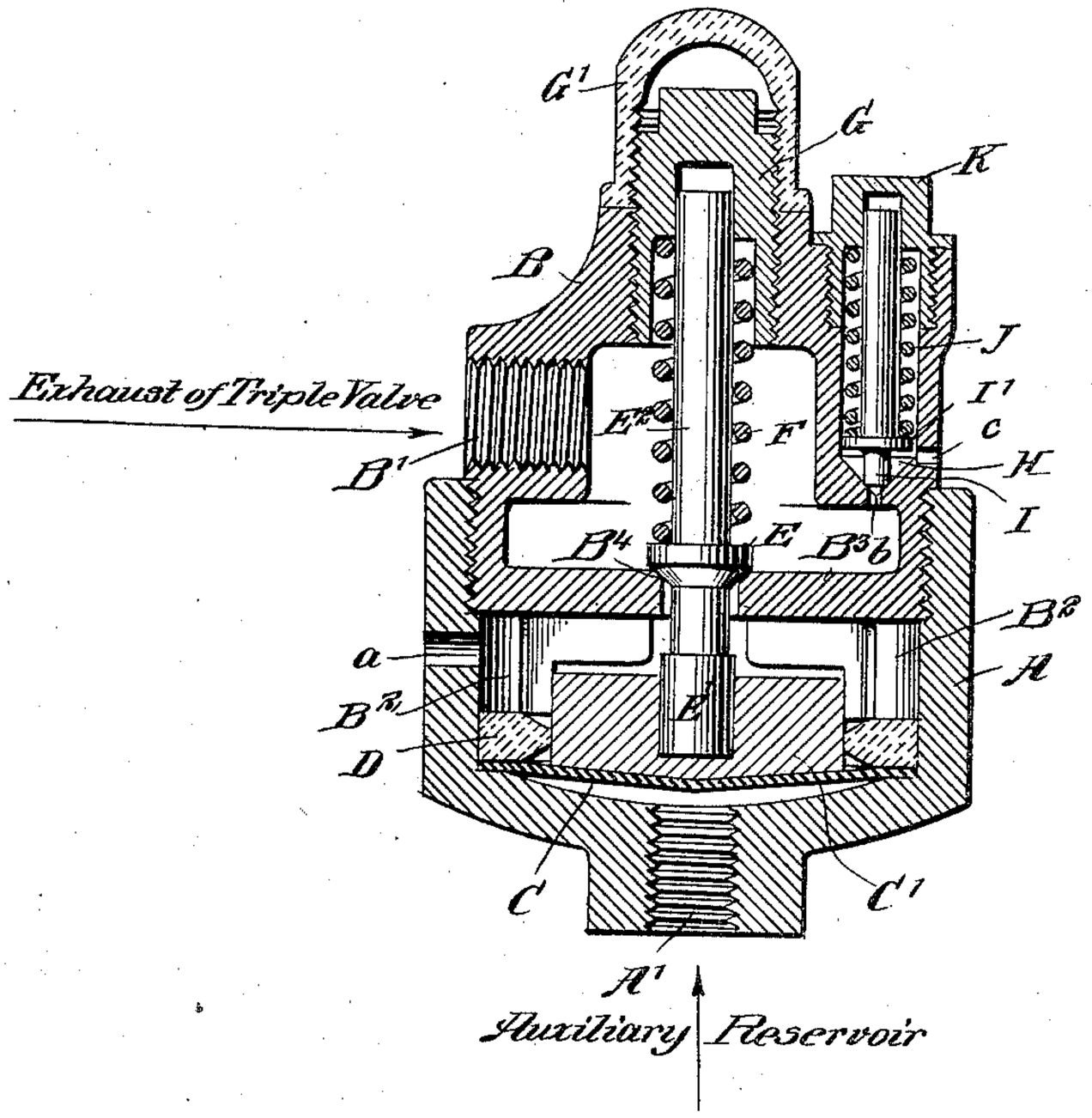
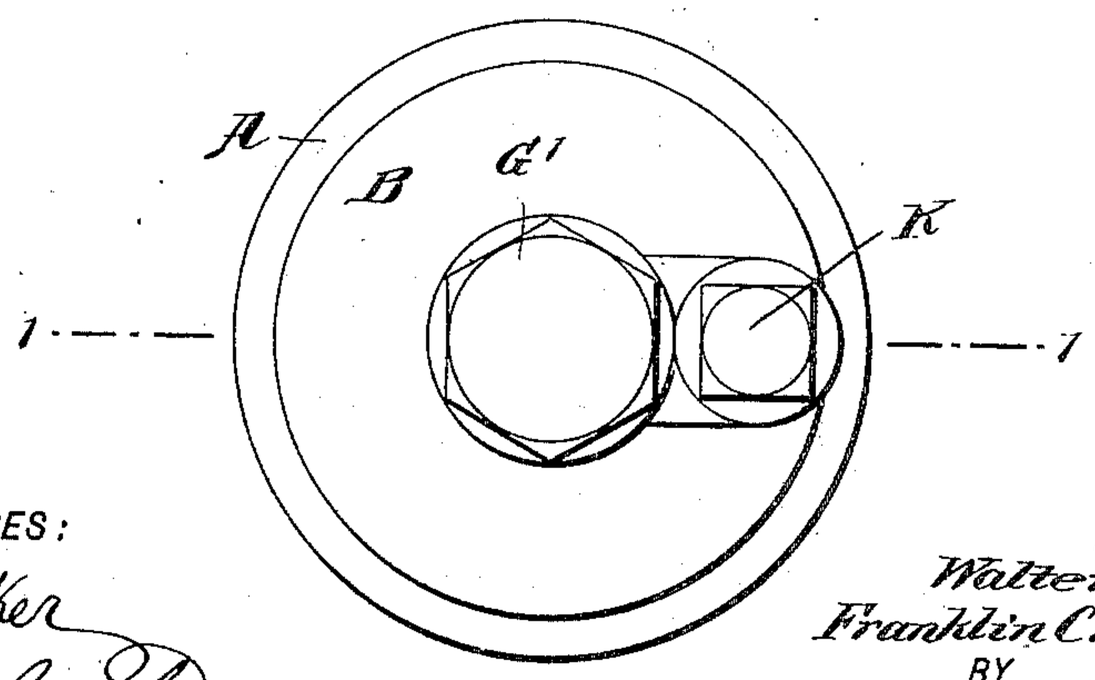


Fig. 2



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RETAINING-VALVE.

SPECIFICATION forming part of Letters Patent No. 706,867, dated August 12, 1902.

Application filed June 26, 1901. Serial No. 66,137. (No model.)

To all whom it may concern:

Be it known that we, WALTER VICTOR TURNER and FRANKLIN CLAYTON FARQUHARSON, citizens of the United States, and residents of Raton, in the county of Colfax, Territory of New 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 its object is to provide a new and improved retaining-valve connected with the auxiliary reservoir and the exhaust of the triple valve and completely under the control of the engineer, so that the latter may at all times know whether the retainers are all on or off, the arrangement being such that the brakes are uniformly applied on all the cars in a train, and sliding of the wheels is largely prevented, as the engineer cannot apply more then the maximum pressure to which the release-valves are set.

The invention consists of novel features and parts and combinations of the same, as will be 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 both the views.

Figure 1 is a sectional elevation of the improvement on the line 1 1 in Fig. 2, and Fig. 2 is a plan view of the same.

The casing of the retaining-valve consists, essentially, of the sections A and B, screwed or otherwise fastened together and of which the section A is connected at its bottom at A′ with an auxiliary reservoir and the section B is connected at its side at B′ with the exhaust of the triple valve. In the section A is arranged a diaphragm C, held in position by a ring D, engaged on top by depending lugs B^2, formed on the under side of the bottom B^3 of the section B, so that when the latter is screwed on the section A said lugs B^2 engage the ring D and lock the latter in position to hold the diaphragm in place in the section A. On the top of the diaphragm C is arranged a boss C′, mounted to slide on the inside of the ring D as a bearing, and said boss C′ is formed in its top with a recess engaged by the lower end of the valve-stem E′ of a release-valve E, which when the brakes are charged is seated on a valve-seat B^4, formed in the bottom B^3, and serves to connect the interior of the section B with the interior of the section A at the time the valve E is off its seat. When this takes place, the exhaust from the triple valve can pass from the section B through the valve-seat B^4 into the section A and through a port *a* in the side thereof to the outer air to completely release the brake-cylinder of its pressure.

The release-valve E is held normally to its seat by a graduated spring F, the lower end of which rests on the top of the valve E and abuts with its other end against an adjusting-nut G, screwing in the top of the section B and locked in place by a cap-nut G′, screwing on the nut G as a jam-nut. The nut G also forms a bearing for the upper end of the valve-stem E^2 of the valve E and around which stem the spring F is coiled. By adjusting the nut G in the section B the tension of the spring F can be regulated so as to hold the valve E with a desired pressure to its seat, and when the pressure in the auxiliary reservoir exceeds the pressure to which the spring F is set then the preponderance of pressure against the under side of the diaphragm C causes an upward movement thereof to lift the valve E off its seat B^4 and allow the air from the brake-cylinder to escape by way of the seat B^4 and port *a*, as previously mentioned.

On the section B is arranged a retainer-valve having a casing H and a valve I, movable therein and pressed by a coil-spring J upon a seat *b*, connecting the interior of the section B with the casing H. A port *c* leads from the casing H to the atmosphere, so that when the valve I is moved off its seat *b* then escape of air from the exhaust of the triple valve can take place by way of the section B, the seat *b*, casing H, and port *c*, the valve I closing as soon as the pressure in the brake-cylinder has been reduced to that to which the spring J is set to prevent further escape of air from the brake-cylinder, except by way

of the release-valve E. A cap K serves to close the casing H and also permits of setting the spring J to a desired predetermined pressure, said spring J resting with its lower end on a collar I', formed on the valve I, and the said spring rests with its upper end on the cap K.

The operation is as follows: It is understood that the tension of the springs F and J, and consequently the resistance to the air-pressure, is arbitrary; but it is assumed that the springs operate according to standard pressure—seventy pounds in the train-line and fifteen pounds to be retained in the brake-cylinder by the retaining-valve. Now when the device is in use and attached as described and the spring F is set to a tension, say, of fifty-three pounds and the spring J to a tension of fifteen pounds then when the pressure in the train-pipe and the auxiliary reservoir reaches fifty-three pounds the pressure on the diaphragm C forces the latter upward and lifts the valve E off its seat B^4, as previously described, to allow escape of air from the brake-cylinder through the valve-seat B^4 and the port *a*, as previously mentioned. The several parts will remain in this position until an application of the brakes is made by the engineer and through which application a reduction of pressure in the train-line is had to below fifty-three pounds, so that the spring F will move the valve E to its seat, and the diaphragm C is returned to its lowermost position. When the brakes are released by the pressure in the train-pipe being increased, then the released air from the brake-cylinder will flow through the triple-valve exhaust-port into the section B, and as this pressure is now in excess of the fifteen pounds to which the spring J is set it is evident that the valve I is raised and air escapes by way of the valve-seat *b*, casing H, and port *c* until the pressure in the brake-cylinder is a little less than fifteen pounds, when the valve I will close and fifteen pounds pressure will be retained in the brake-cylinder. When the engineer has placed the valve in a release position and desires to retain fifteen pounds pressure in the brake-cylinder, he immediately returns the engineer's valve to running position and watches the gage until the latter shows a pressure in the train-pipe of fifty-seven pounds. As it now requires fifty-eight pounds to lift the valve E off its seat, it will be seen that the brakes are not entirely released when the brake-cylinder pressure is reduced to fifteen pounds. The object of returning the engineer's valve to a running position is that in this position the increase in train-line pressure will be more gradual, and thus allow the engineer to have the increase of pressure under better control, for if the engineer would permit the auxiliary reservoir to charge about fifty-seven pounds then the release-valve would lift and the fifteen pounds pressure held by the retainer would escape. In the first instance there is supposed to be no air in section B, as there has been no exhaust from the triple valve, and consequently no back pressure on the valve E, whereas in the second instance it is supposed that a sufficient reduction of pressure in the auxiliary reservoir has been made to throw the retaining-valve in operation and that the valve E has taken its seat and in an attempt to recharge the auxiliary reservoir a release of brakes has been made, and consequently an exhaust of air from the brake-cylinder through the triple valve into the section B. This exhaust-pressure as retained by the valve I is exerted against the valve E, the seat of which is made in such proportion to the pressure retained as to receive a pressure additional to the tension of the spring F of five pounds or whatever desired. As soon as the pressure reaches fifty-seven pounds the engineer moves the valve into "lap" position and leaves it there until he desires to make either another application of the brakes or wishes to throw off the retainer and release the brakes entirely. Now in case the engineer wishes to make another application of the brakes the engineer's valve is first moved into service position and the engineer makes whatever reduction he desires and sets the brakes correspondingly. In case the engineer makes a sufficient reduction from the fifty-seven pounds to give equalization between the auxiliary reservoirs and the brake-cylinders he has set the brakes at about fifty pounds to the square inch, and thus he obtains approximately the same braking power as he would with seventy pounds of air in the reservoirs and no retaining-valves in use. Fifteen pounds of pressure is always maintained in the brake-cylinder unless a complete release is had on treating the valve E, as previously explained. In case the engineer does not desire to make another application of the brakes, but wishes to entirely release the same, then he moves the engineer's valve into release position until the pressure in the auxiliary reservoir rises to fifty-eight pounds, so that the pressure on the diaphragm C causes the valve E to be lifted from its seat, and all the air is discharged from the brake-cylinder to the atmosphere by way of the seat B^4 and the port *a*. Thus it will be seen that the engineer can make applications of air to the brakes as he desires, ranging from fifteen pounds pressure held by the retaining-valve to a full service application and recharge the auxiliary reservoir to fifty-seven pounds, or the engineer can release all the brakes, if he so desires, as the range of pressure required to hold the retaining-valves on or to throw them off is only about one to two pounds above fifty-seven pounds, and as usually ninety pounds of air-pressure is maintained in the reservoir on the engine it is evident that he has much more reserve pressure than when he has to operate the brakes with a seventy-pound train-line pressure, as heretofore practiced. By the arrangement described the retaining-valves on the several cars of the

train are all either on or off at the same time, and the engineer is aware of this and can make the applications properly, as required. After the first application of the brakes it is not necessary to recharge the train-line to seventy pounds pressure, as fifty-seven pounds applied on the system having the retaining-valve is equal to seventy pounds without retaining-valves, and consequently the air-pump is not required to do so much work as is necessary for the ordinary arrangement.

The danger of sliding of the wheels is greatly reduced, as the engineer cannot apply pressure above the maximum pressure to which the release-valves are set, as it is evident that if the engineer permits the train-line to charge above fifty-eight pounds the release-valves all release; but if he puts on lap at fifty-seven pounds and has to apply the brakes again then he will obtain a full service application or whatever he may desire on all cars alike instead of an emergency pressure on some of the cars and service pressure on others.

From the foregoing it is understood that the engineer cannot get a pressure in the brake-cylinder above that at which the pressure held in the brake-cylinder by the retainer will equalize at with the maximum pressure to be carried in the auxiliary reservoir and still hold the retainers on. Thus fifty pounds being the standard pressure allowed in the brake-cylinder for a service application of the brakes the fifteen pounds held in the brake-cylinder by the retainer will equalize with fifty-seven pounds held in the auxiliary reservoir as the maximum pressure and still hold the retainers on at approximately fifty pounds.

Having thus fully described our invention, we claim as new and desire to secure by Letters Patent—

1. A retaining-valve connected with the exhaust of the triple valve and the auxiliary reservoir, and comprising a diaphragm under pressure of the auxiliary reservoir, a release-valve controlled by the diaphragm, for releasing all the pressure from the brake-cylinder, and a graduated retainer-valve controlling some of the triple-valve exhaust-pressure to the atmosphere, as set forth.

2. A retaining-valve comprising a casing having a triple-valve exhaust-section and an auxiliary-reservoir section having a port to the atmosphere, a graduated release-valve controlling a seat between the said sections, a diaphragm in the auxiliary-reservoir section and under pressure of the auxiliary reservoir to control the said release-valve and a graduated retainer-valve in the said triple-valve exhaust-section for exhausting some of the triple-valve exhaust-pressure to the atmosphere, as set forth.

3. A retaining-valve connected with the exhaust of the triple valve and the auxiliary reservoir, and comprising a diaphragm under pressure of the auxiliary reservoir, a release-valve controlled by the diaphragm, for releasing all the pressure from the brake-cylinder, and a graduated retainer-valve controlling some of the triple-valve exhaust-pressure to the atmosphere, said retainer-valve being pressed by a graduated spring and controlling a discharge to the atmosphere, as set forth.

4. A retaining-valve connected with the exhaust of the triple valve and the auxiliary reservoir, comprising a graduated release-valve and a graduated retainer-valve, of which the graduated release-valve is controlled by auxiliary-reservoir pressure and the retainer-valve opens to the atmosphere under brake-cylinder pressure until the latter is reduced to the pressure to which the retainer-valve is set and the said graduated release-valve opens to completely exhaust the brake-cylinder pressure on recharging the auxiliary reservoir, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WALTER VICTOR TURNER.
FRANKLIN CLAYTON FARQUHARSON.

Witnesses:
BERT DUDLEY,
J. F. WHITE.