No. 654,987. Patented July 31, 1900.

J. S. LAPISH.

RETAINING VALVE.

(Application filed Oct. 7, 1899.)

(No Model.)

2 Sheets—Sheet 1.

FIG.1.

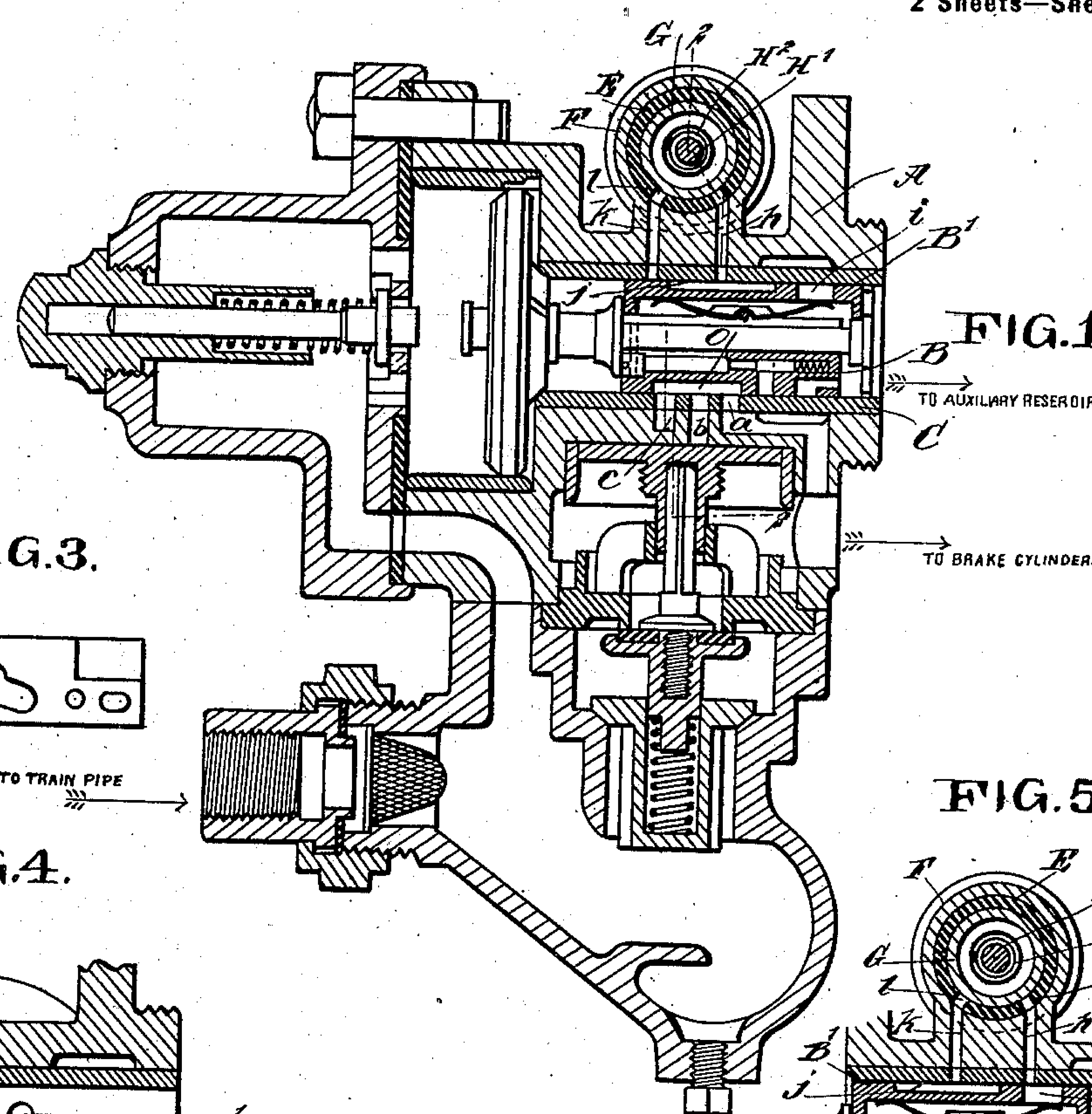


FIG.3.

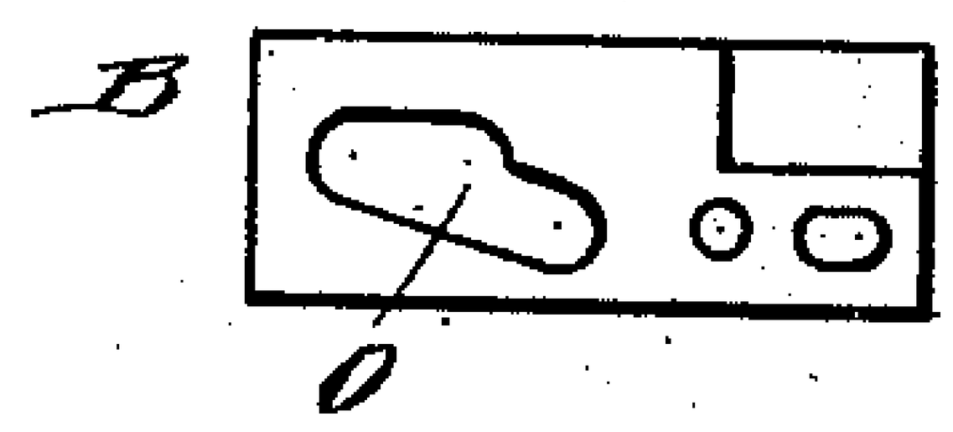


FIG.4.

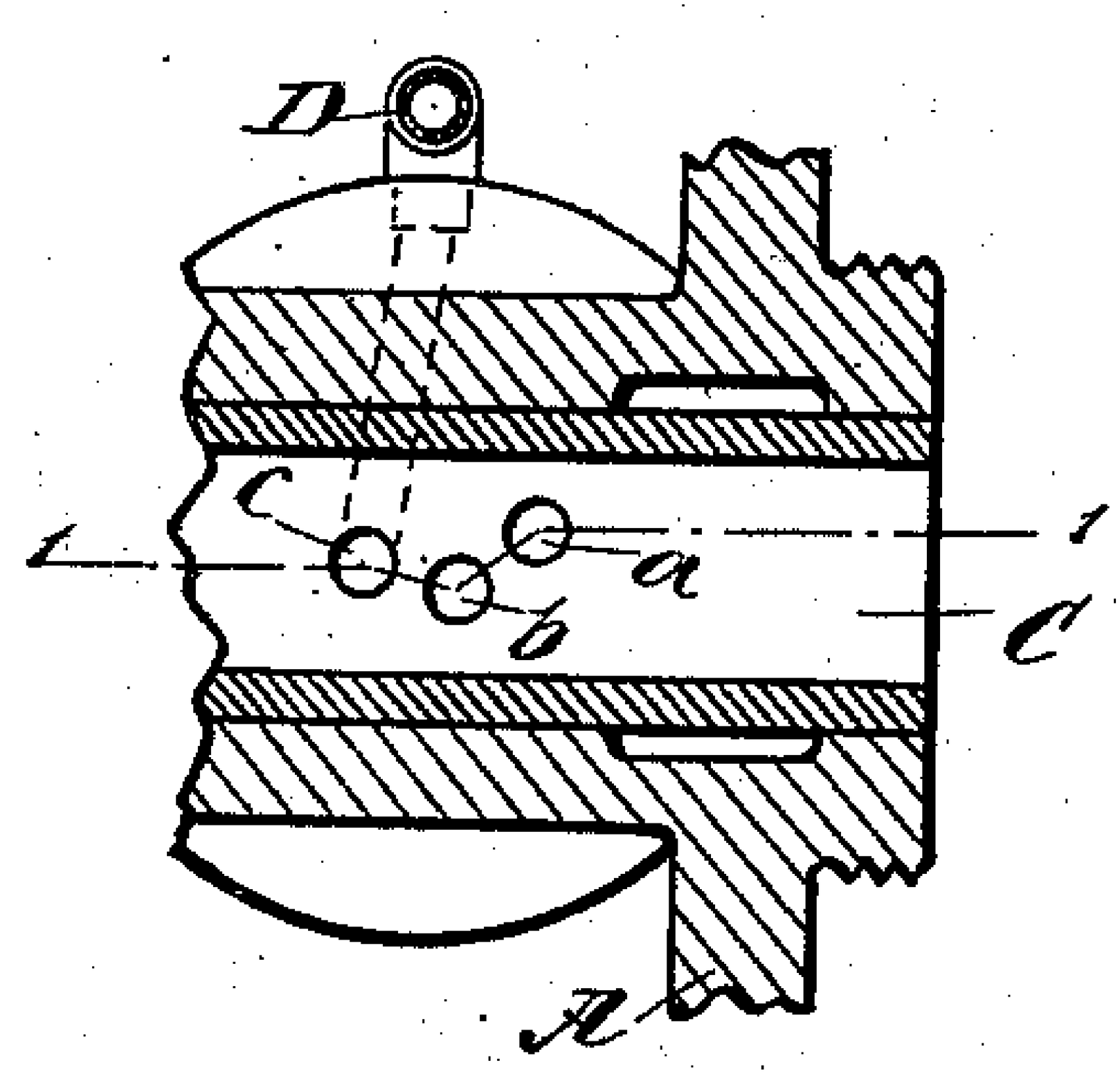


FIG.5.

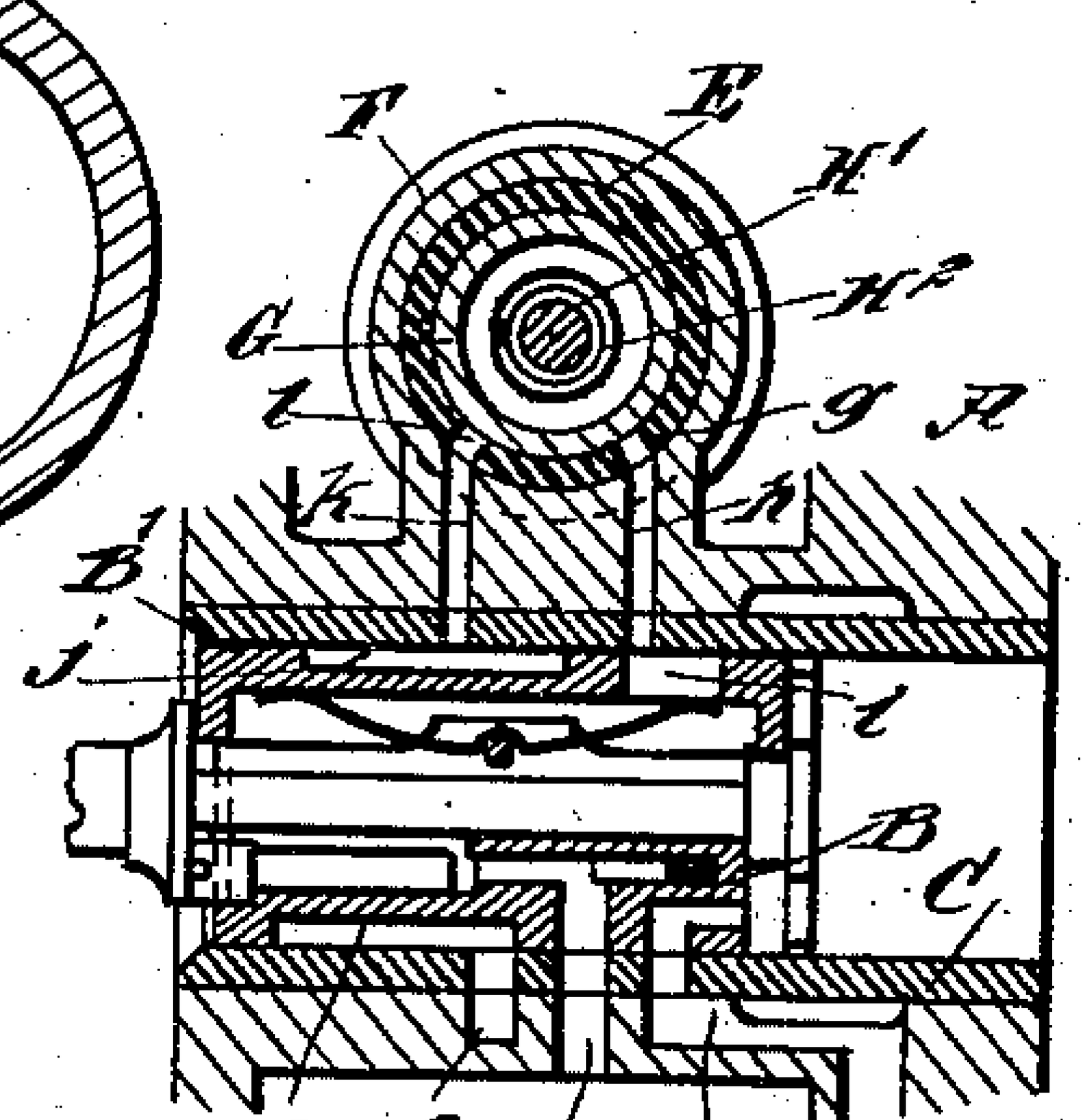
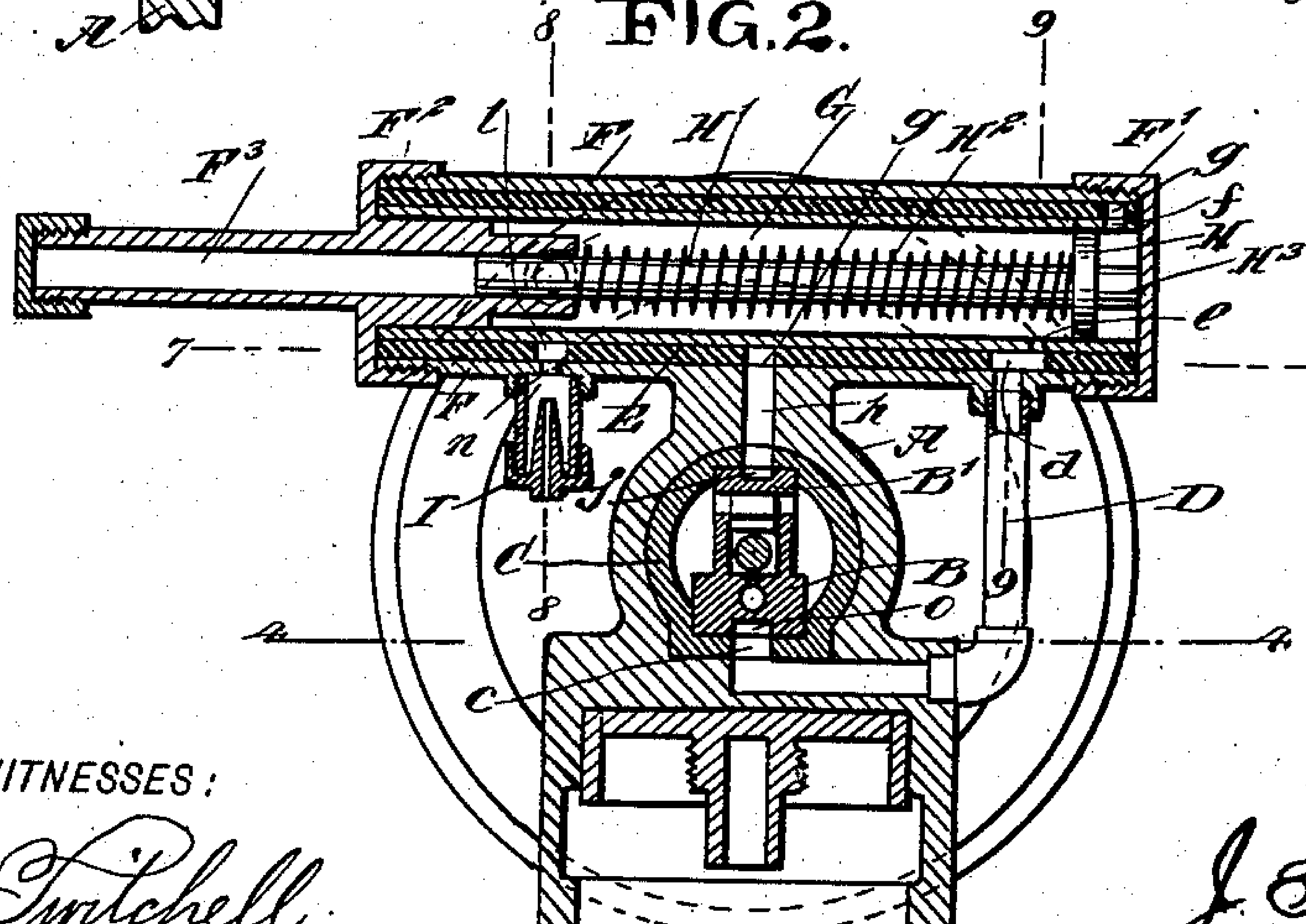


FIG.2.



WITNESSES:

Donn Twitchell

Red G. Foster

INVENTOR

J. S. Lapish

BY Munn & Co

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 654,987. Patented July 31, 1900.

J. S. LAPISH.

RETAINING VALVE.

(Application filed Oct. 7, 1899.)

(No Model.) 2 Sheets—Sheet 2.

FIG. 6.

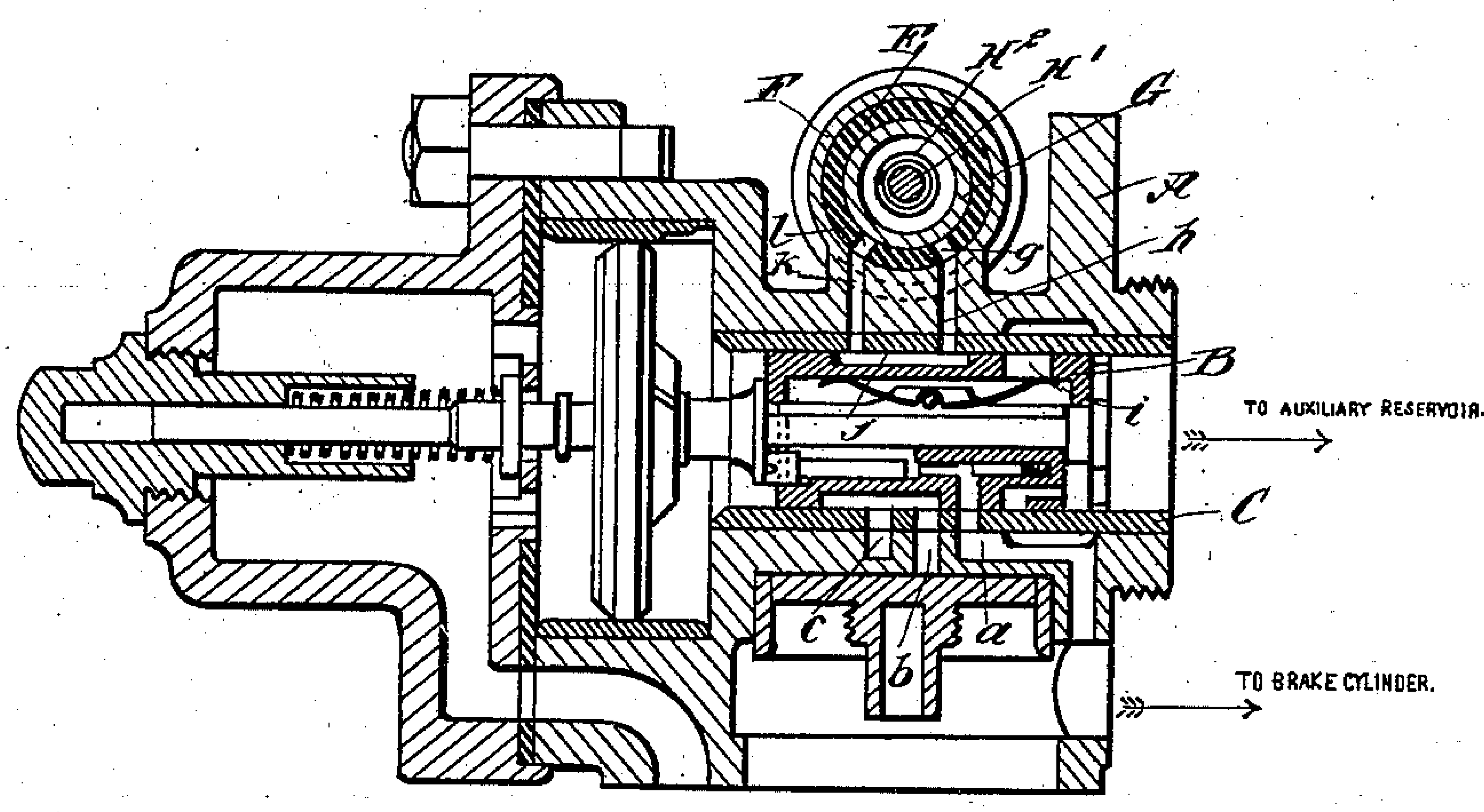


FIG. 7.

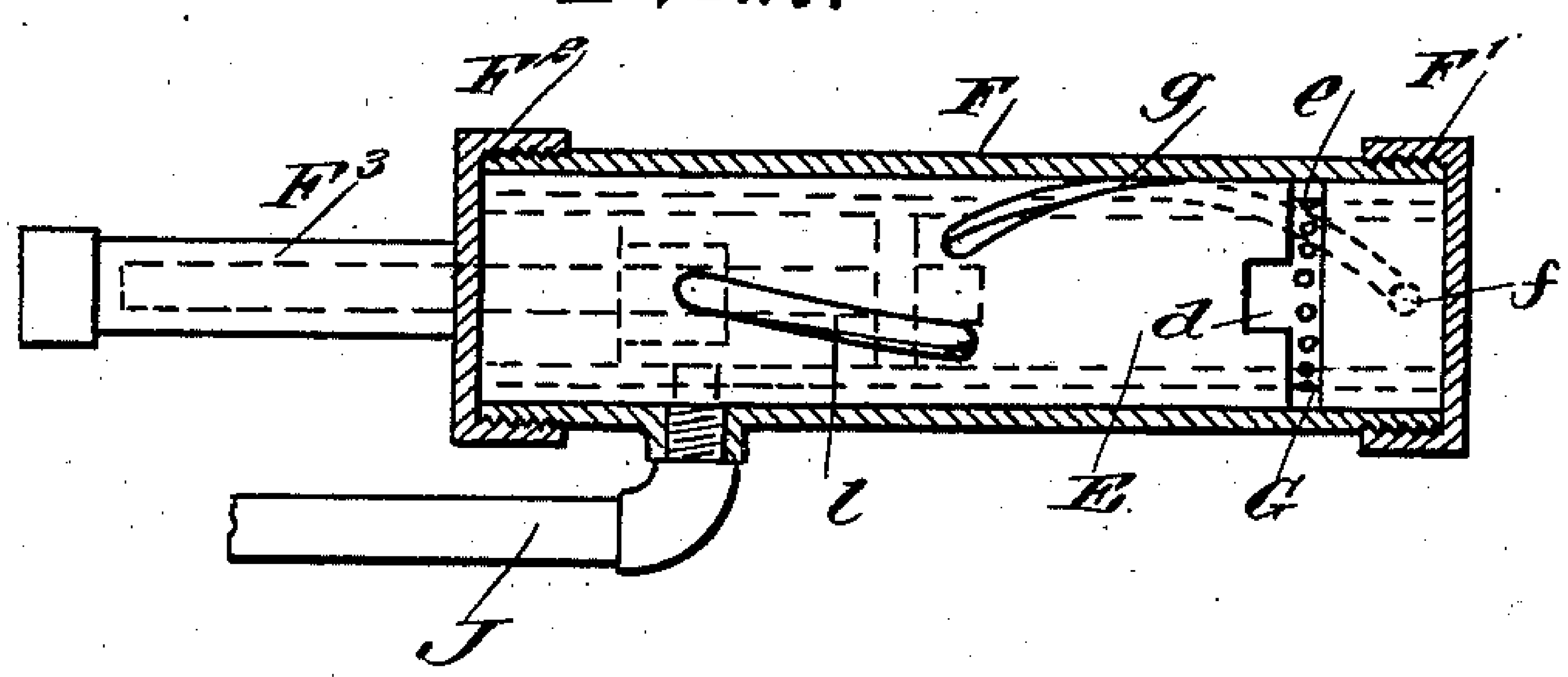


FIG. 8.

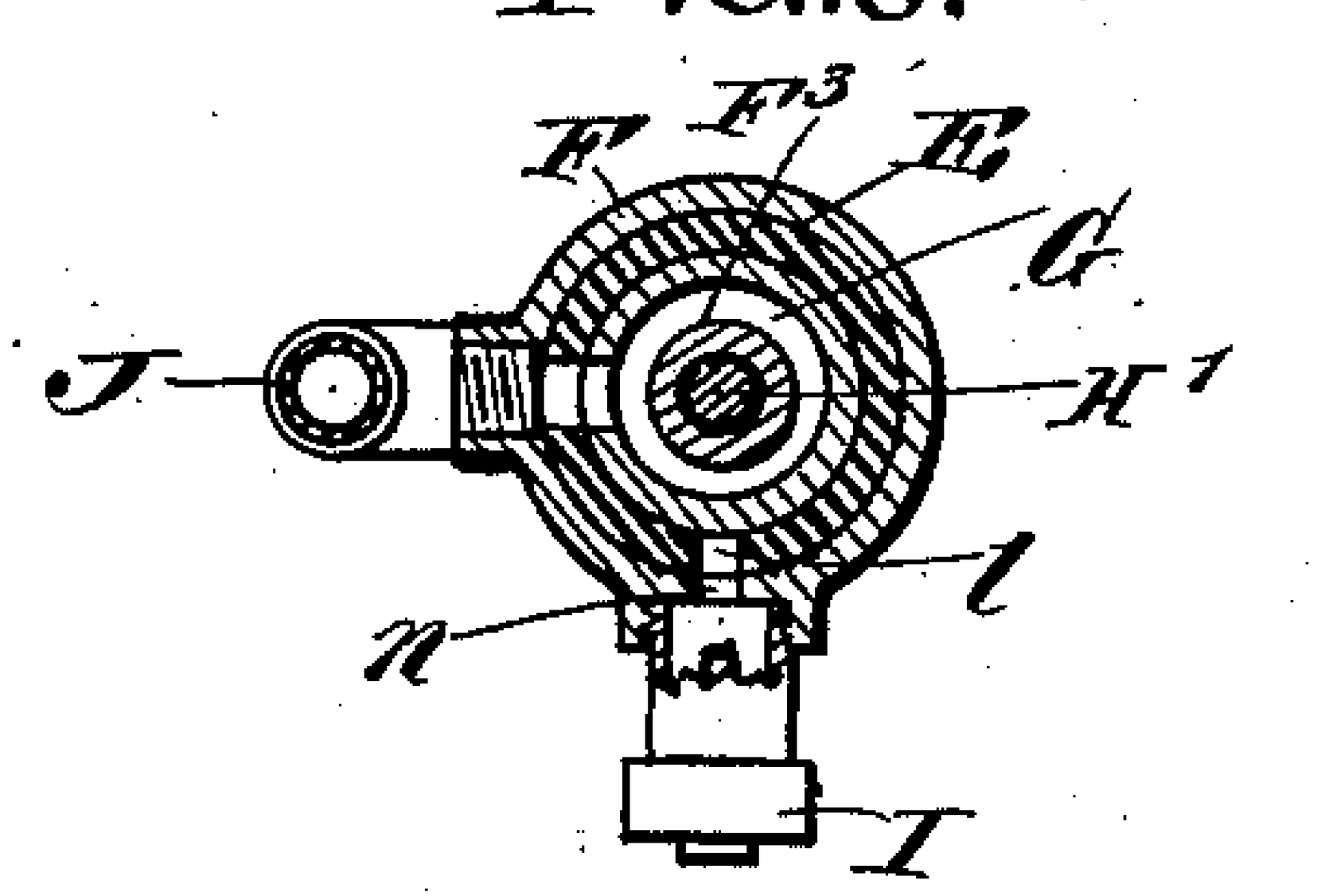
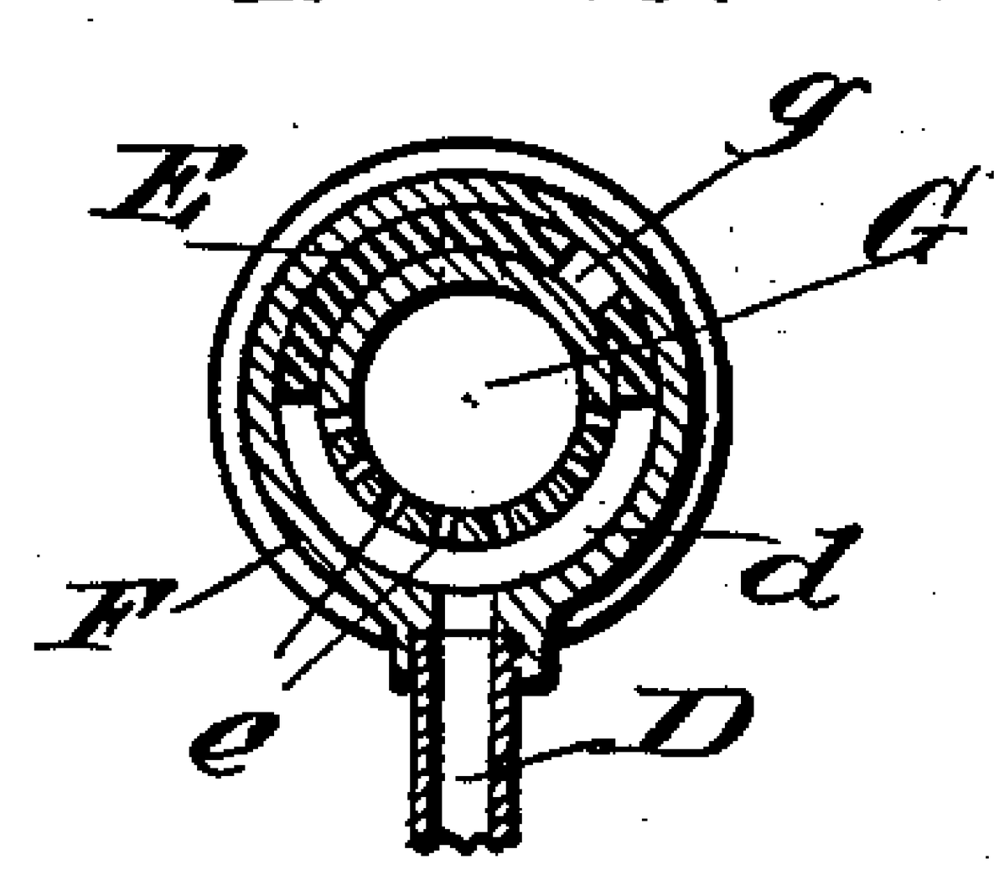


FIG. 9.



WITNESSES:

Donn Twitchell
Geo. G. Hoster

INVENTOR
J. S. Lapish
BY
Munn & Co
ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH S. LAPISH, OF SALT LAKE CITY, UTAH.

RETAINING-VALVE.

SPECIFICATION forming part of Letters Patent No. 654,987, dated July 31, 1900.

Application filed October 7, 1899. Serial No. 732,903. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH S. LAPISH, of Salt Lake City, in the county of Salt Lake and State of Utah, 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. 637,134, granted to me on November 14, 1899.

The object of the present invention is to provide a new and improved retaining-valve designed to retain the air-pressure in the brake-cylinder while the auxiliary reservoir is recharged and to avoid a waste of air when the brakes are released.

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 all the views.

Figure 1 is a sectional side elevation of a quick-action freight triple valve provided with the improvement and with the triple valve in running position, the section being on the line 1 1 in Fig. 4. Fig. 2 is a transverse section of the same on the line 2 2 in Fig. 1. Fig. 3 is an inverted plan view of the main valve of the triple valve. Fig. 4 is a sectional plan view of the improvement on the line 4 4 in Fig. 2. Fig. 5 is a sectional side elevation of part of the improvement with the triple valve in an emergency-application position. Fig. 6 is a like view of the same with the triple valve in a service-application position. Fig. 7 is an inverted sectional plan view of the retaining-valve cylinder and connected parts, the section being on the line 7 7 in Fig. 2. Fig. 8 is a sectional side elevation of the same on the line 8 8 in Fig. 2, and Fig. 9 is a similar view of the same on the line 9 9 in Fig. 2.

The triple valve is provided with the usual triple-valve body A and a main slide-valve B, moving on a slide-valve seat C, having in its bottom the usual ports *a b c* for making the regular connections with the brake-cylinder, the emergency piston-chamber, and the exhaust-port, respectively. The brake-cylinder exhaust-port *c*, instead of opening to the outer air, connects by a pipe D with a channel *d*, formed transversely in a bushing or cylindrical packing E, (see Figs. 2, 7, and 9,) contained in a retaining-valve cylinder F, secured to or forming part of the triple-valve body A and preferably arranged transversely thereon, as is plainly indicated in Fig. 2. The channel *d* registers at all times with a series of ports *e*, formed in the peripheral wall of a cylinder G, arranged within the bushing or packing E, the outer ends of the cylinder F, the bushing E, and the cylinder G being closed by caps F′ and F², screwed or otherwise secured on the ends of the cylinder F. (See Fig. 2.)

In the interior of the cylinder G is mounted to travel a piston H, having a piston-rod H′ fitted to slide with its forward end in a bearing F³, carried by the cap F², and on said piston-rod H′ is coiled a spring H² for normally holding the piston H in an outermost position, with the end H³ of the piston-rod abutting against the cap F′, as shown in Fig. 2, the piston H then standing at the right of the port *e* and at the left of a port *f*, registering with a curved groove or channel *g*, formed in the bushing E. (See Fig. 7.) The forward end of the channel *g* registers with a port *h*, extending through the body A and the top of the slide-valve seat C, (see Figs. 1, 2, 5, and 6,) and the lower end of the port *h* is adapted to register with a port *i* in a slide-valve B′, operated by the same piston that operates the slide-valve B to connect with the port *i*, connecting with the auxiliary reservoir at the time the triple valve is in an emergency-application position, as shown in Fig. 5. The port *h* is also adapted to register with a channel *j* in the top of the slide-valve B at the time the triple valve is in a service-application position, as shown in Fig. 6, said channel *j* then also registering with a port *k*, extending from the top of the seat C and the body A to register with one end of a channel *l*, extending longitudinally in the bushing or packing E, the other end of the channel *l* being in register with a port *n*, leading to an outlet I, carried on the cylinder F and provided with a

small leakage-aperture opening to the outer air.

When the triple valve is in a running position, as shown in Fig. 1, then the port *k* is not in register with the channel *j*, and hence the two ports *h* and *k* are not connected with each other while the triple valve is in this position; but when the triple valve moves into service-application position, as shown in Fig. 6, then the two ports *h* and *k* are connected with each other, and consequently the right-hand end of the cylinder G is open to the outer air by way of the port *f*, channel *g*, port *h*, channel *j*, port *k*, channel *l*, port *n*, and outlet I. When the triple valve is in an emergency-application position, as shown in Fig. 5, then air from the auxiliary reservoir can pass by way of the ports *i h*, channel *g*, and port *f* into the right-hand end of the cylinder F to press against the piston H and force the same to the left beyond the port *e* and against the tension of the spring H^2. After this has taken place and the engineer desires to recharge the auxiliary reservoir he can do so, without releasing the brakes, by moving the triple valve back to the ordinary running position (shown in Fig. 1) to recharge the auxiliary reservoir in the usual manner. When the slide-valve B moves into this position, the right-hand end of the cylinder G is cut off from the auxiliary reservoir and from the outer air; but the air-pressure in the cylinder is now open to the brake-cylinder by way of the port *e*, channel *d*, pipe D, port *c*, and channel *o* in the valve B and connected with the port *a* for making brake-cylinder connection. Thus while the recharging of the auxiliary reservoir takes place the brake-cylinder is in communication with the cylinder G, containing air from the auxiliary reservoir, but now cut off therefrom, as above explained. This operation can be repeated as often as desired—that is, the engineer can make alternate emergency applications and recharge the auxiliary reservoir without releasing the brakes during the recharging of the auxiliary reservoir.

When service application is made, as shown in Fig. 6, and the ports *a* and *c* are cut off from each other, then the air leaks out from the right-hand end of the cylinder by way of the port *f*, channel *g*, port *h*, channel *j*, port *k*, channel *l*, port *n*, and outlet I, as above explained, so that the spring H^2 returns the piston H back to its normal position. (Shown in Fig. 2.) The extreme left-hand end of the cylinder G is provided with an exhaust-pipe J, so that when the triple valve is in the service-application position, as shown in Fig. 6, the emergency piston-chamber is connected by the port *b*, channel *o*, port *c*, pipe D, channel *d*, port *e*, and cylinder G with the exhaust-pipe J.

From the foregoing it is evident that in the regular-service working of the brakes the piston H in the retaining-cylinder is not moved, the air simply releasing through the regular retainers; but if at any time it should be desired to recharge the auxiliary reservoir without releasing the brakes it is only necessary to reduce the train-pipe pressure sufficiently to allow the auxiliary-reservoir pressure to compress the spring in the cap on the triple valve, thus drawing the slide-valves to their extreme positions, so that air will be admitted to force the piston H in an outward direction. If pressure is restored in the train-pipe while the piston in the retaining-cylinder is in this outer position, then the slide-valve B will be forced to a release position before the air in the retaining-cylinder G has had time to leak out and the brake-cylinder will become connected by the retaining-cylinder with the retaining-piston H between the ports *e* and *f*, so that the pressure in the brake-cylinder will be retained by the piston H in the retaining-cylinder, and the auxiliary reservoir can then be recharged without releasing the brakes. If the slide-valve B is brought to service-application position, air will leak out of the retaining-cylinder, as before explained, and the retaining-piston H will be moved beyond the port *e* back to the position shown in Fig. 2. In case an emergency application is accidentally made, thereby closing the emergency retainer, and it should be desired to release the brakes without recharging the auxiliary reservoir it will simply be necessary for the engineer to restore the pressure in the train-pipe equal to that of the auxiliary reservoir, when the ports *h* and *k* will register with the groove *g*, and the piston H in the retaining-cylinder G will be restored to its normal position by the action of the spring H^2 as the air leaks out. It is understood from the foregoing that the retaining-piston H does not work when service application of the brake is made, and thereby delays the release of the brakes until the air in the retaining-cylinder G leaks out; but when the slide-valve B is brought into emergency-application position then the leak-port will be closed while air is supplied to the retaining-cylinder, thereby avoiding waste of air.

In my previous patent, above referred to, air was supplied to the retaining-cylinder by the opening of the graduating-valve, and the supply of air to the retaining-cylinder was not shut off until the graduating-valve closed, and as the leak-port in my previous device is open all the time during the time the slide-valve is in service-application position and the graduating-valve is open and air is admitted to the retaining-cylinder there is an unnecessary waste of air, which is completely avoided in my present device, as the opening of the graduating-valve has nothing to do with the supply of air to the retaining-cylinder, and the leak-port is not opened until air is shut off from the retaining-cylinder.

From the foregoing it is also understood that when the brake is applied with full force and the train-pipe left empty, as is the case when the train breaks in two, then the full pressure of the auxiliary cylinder is applied

on the retaining-cylinder piston the same as to the triple-valve piston and the brake-cylinder piston, so as to hold the piston at the farther end of its cylinder, and thereby keep the brakes applied. It will also be seen that air is not shut off from the retaining-cylinder until the graduating-valve closes, which it will not do when train-pipe pressure is reduced beyond a certain point, thus giving trouble in releasing. This is a serious defect in the working of the device covered by my patent referred to, as well as the defect of having to delay retaining the brake until air has leaked out of the retaining-cylinder after the graduating-valve has closed.

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

1. A retaining-valve for a brake-cylinder, comprising a retaining-cylinder, and a spring-pressed piston therein in combination with an auxiliary slide-valve operatively connected with the triple-valve slide-valve arranged for allowing the auxiliary-reservoir pressure to pass into the said cylinder, to force the said piston therein in one direction into a closed position when the said slide-valve is in an emergency position, the said piston being moved in an opposite direction by its spring, to bring the piston back into an open or normal position as the air contained in the retaining-cylinder and which moved the piston forward leaks out, substantially as shown and described.

2. A retaining-valve for a brake-cylinder comprising a retaining-cylinder, and a spring-pressed piston therein in combination with an auxiliary slide-valve operatively connected with the triple-valve slide-valve arranged for allowing the auxiliary-reservoir pressure to pass into the said cylinder, to force the said piston therein in one direction into a closed position when the said slide-valve is in an emergency position, the said piston being moved in an opposite direction by its spring, to bring the piston back into an open or normal position as the air contained in the retaining-cylinder and which moved the piston forward leaks out, and the piston beginning its return or opening stroke when the said auxiliary slide-valve is returned to service-application position, substantially as shown and described.

3. A fluid-pressure brake, provided with a triple-valve slide-valve and an auxiliary valve moving in unison therewith, and having a port for connection with the auxiliary reservoir, a retaining-valve cylinder connected at one end with said port when the triple valve is in an emergency position, and a piston in said cylinder, and adapted to be forced outward by the pressure from the auxiliary reservoir by way of said port, the piston then closing the brake-cylinder exhaust, the retaining-cylinder connecting with the brake-cylinder when said slide-valve is shifted to recharging position, to retain the pressure in the brake-cylinder, substantially as shown and described.

4. A fluid-pressure brake, provided with a triple slide-valve, an auxiliary slide-valve carried by and moving in unison with the triple-valve slide-valve actuated by the triple-valve piston, the said auxiliary slide-valve having a channel and a port for connection with the auxiliary-reservoir pressure, a retaining-cylinder, and a spring-pressed piston therein, and adapted to be forced outward by the auxiliary-reservoir pressure at the time the triple valve moves into an emergency position, the exhaust end of the cylinder being connected by way of said channel with the outer air the time the triple valve is in service application, and said retaining-cylinder connecting with the brake-cylinder at the time the triple valve is in an auxiliary-reservoir-recharging position, substantially as shown and described.

5. A retaining-valve for a brake-cylinder, comprising a slide-valve on the triple-valve slide-valve and operated by the piston thereof, a retaining-cylinder and a spring-pressed piston therein, and moved in one direction into a closed position by auxiliary-reservoir pressure when the said triple-valve slide-valve is brought to an emergency-application position and moved in the opposite direction by its spring, to bring the piston back into an open or normal position as the air contained in the retaining-cylinder and which moved the piston forward leaks out, the said piston being arranged to remain in a closed position while the auxiliary reservoir is recharged and only beginning its return or opening stroke when the triple valve is returned to a service application, the arrangement permitting of recharging the auxiliary reservoir to any pressure and in any desired time, without releasing any air from the brake-cylinder, substantially as shown and described.

6. A fluid-pressure brake, provided with a retaining-cylinder forming the escape of the brake-cylinder, a piston in the said cylinder, and an auxiliary valve moving in unison with the triple-valve slide-valve and controlling a connection between the said retaining-cylinder and the auxiliary reservoir, to permit of forcing the said piston outward by pressure from the auxiliary reservoir when the triple valve is in an emergency position, the piston then closing the brake-cylinder escape, the said auxiliary slide-valve also controlling an outlet-port for the retaining-cylinder, to connect the latter with the open air when the triple valve is in service-application position, substantially as shown and described.

7. A fluid-pressure brake, provided with a retaining-cylinder forming the escape for the brake-cylinder, a piston in the said cylinder, and an auxiliary valve moving in unison with the triple-valve slide-valve and controlling a connection between the said retaining-cylinder and the auxiliary reservoir, to permit of

forcing the said piston outward by pressure from the auxiliary reservoir when the triple valve is in an emergency position, the piston then closing the brake-cylinder escape, the said auxiliary slide-valve also controlling an outlet-port for the retaining-cylinder to connect the latter with the open air when the triple valve is in service-application position, and a spring for returning the piston to open the brake-cylinder escape, substantially as shown and described.

8. A retaining-valve, comprising a retaining-cylinder, means for connecting the said retaining-cylinder with the brake-cylinder, to form the escape therefor, and a slide-valve moving with the triple-valve slide-valve, for connecting the said retaining-cylinder with auxiliary-reservoir pressure, and a spring-pressed piston movable in the cylinder and moved forward into a closed position by auxiliary-reservoir pressure, to cut off the escape of air from the brake-cylinder when the triple valve is moved into an emergency-application position, the spring of the piston returning the piston to an open or normal position as the air contained in the retaining-cylinder and which moved the piston forward leaks out, substantially as shown and described.

his
JOSEPH S. × LAPISH.
mark

Witnesses:
D. N. STRAUP,
J. W. LAPISH.