No. 705,239. Patented July 22, 1902.

H. J. HEDDEN.

FLUID PRESSURE BRAKE SYSTEM.

(Application filed June 12, 1902.)

(No Model.) 2 Sheets—Sheet 1.

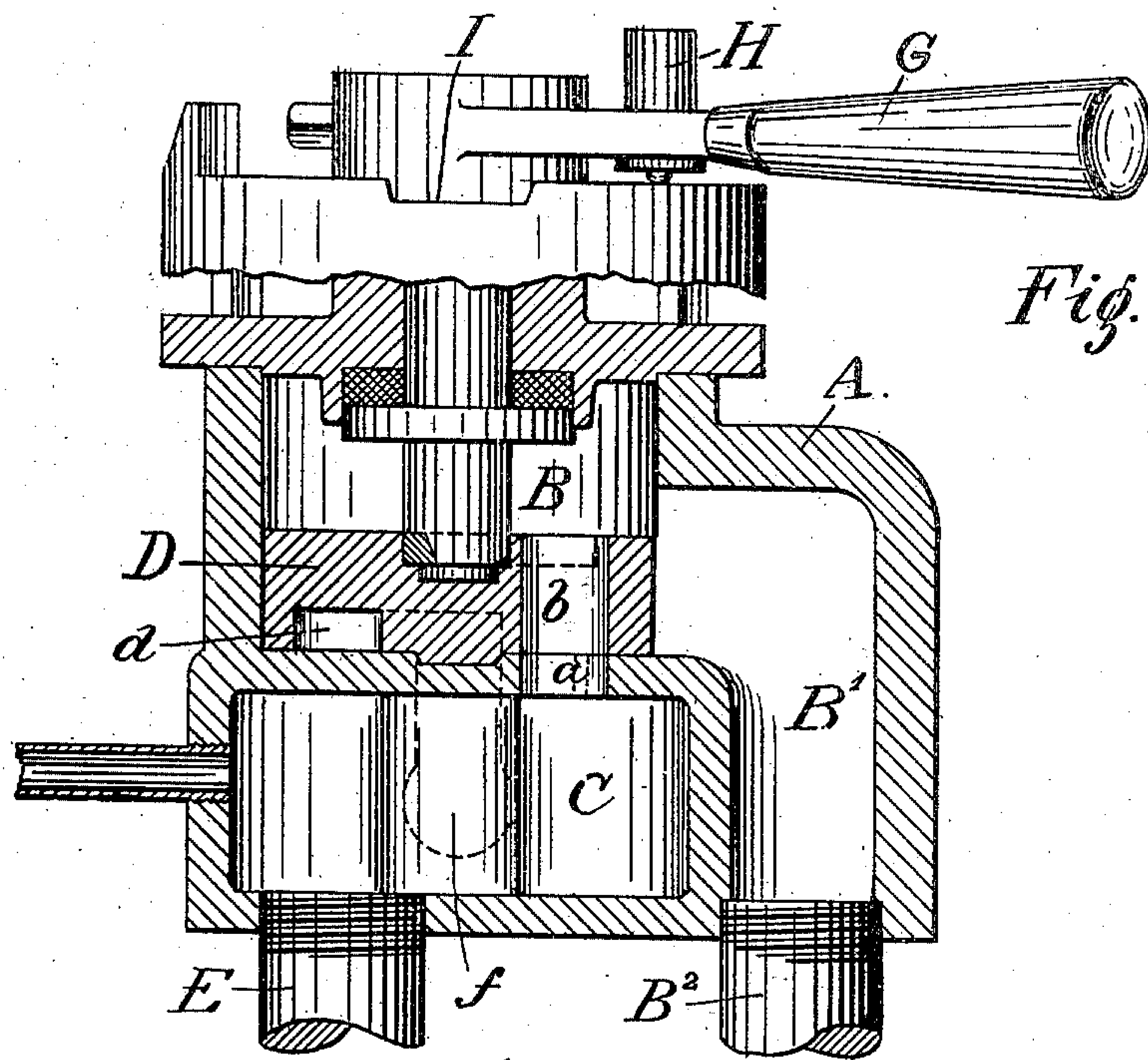


Fig. I

Fig. II

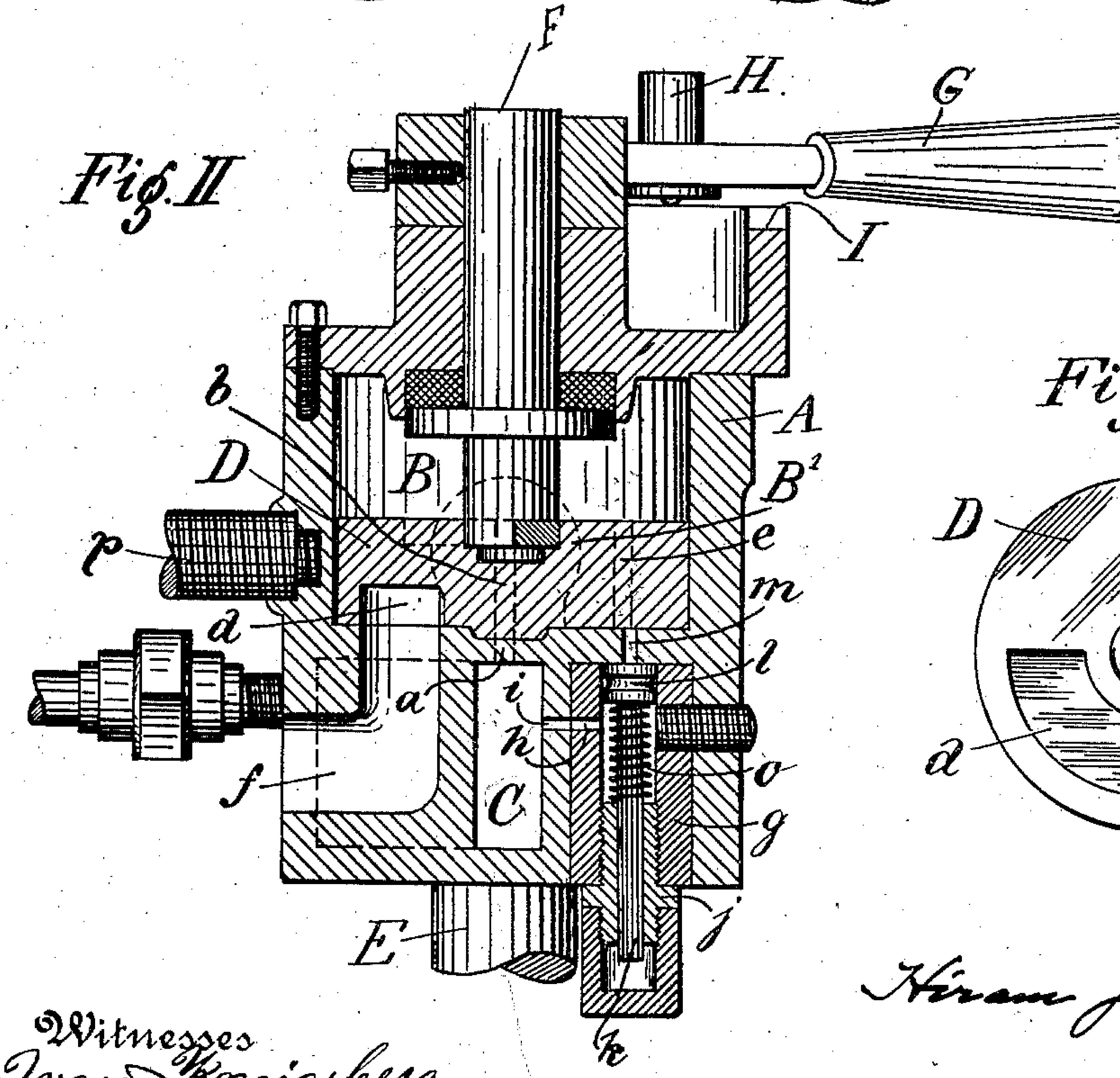
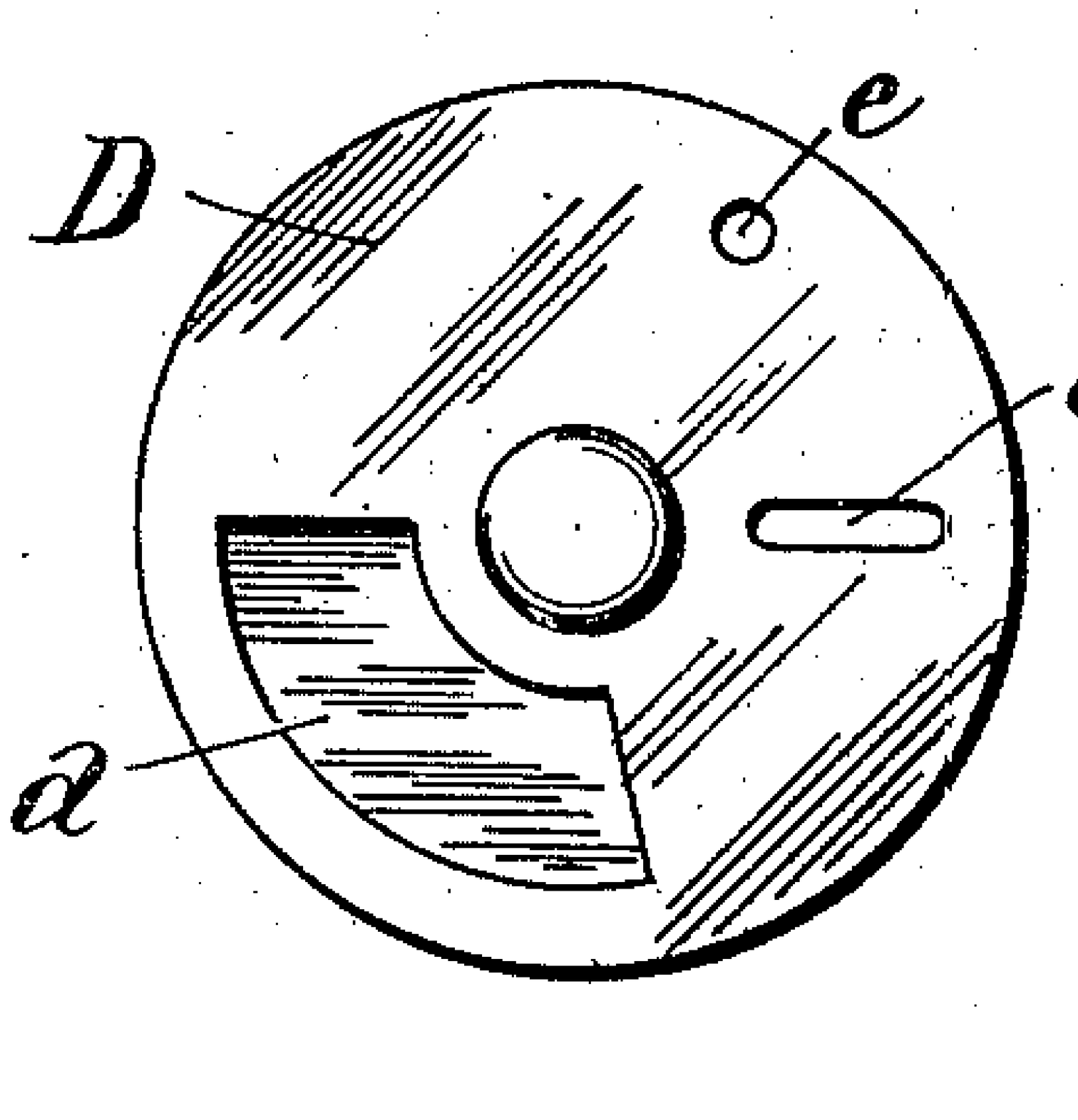


Fig. III



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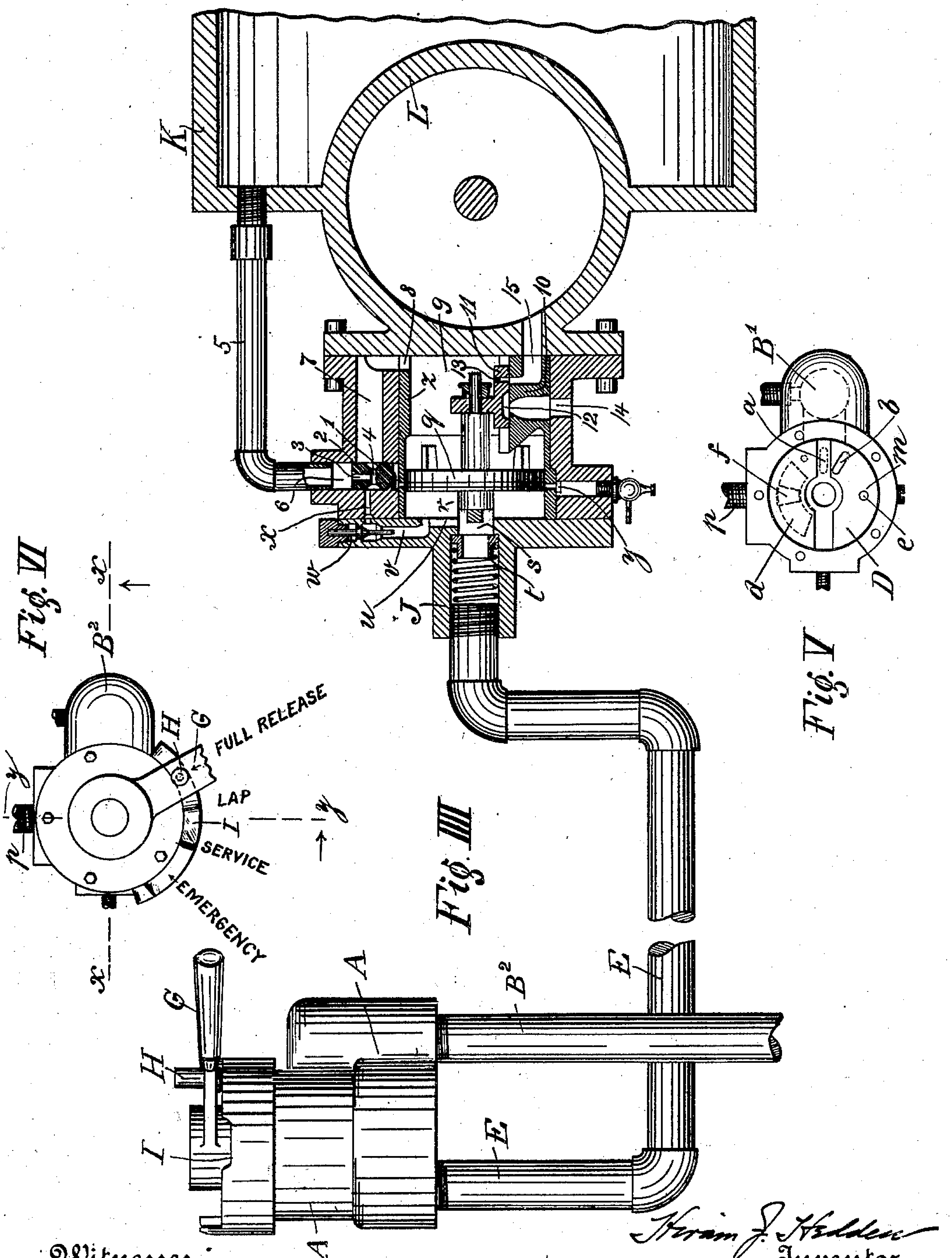

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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE BRAKE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 705,239, dated July 22, 1902.

Application filed June 12, 1902. Serial No. 111,314. (No model.)

To all whom it may concern:

Be it known that I, HIRAM J. HEDDEN, a citizen of the United States, residing at Whiteplains, county of Westchester, State of New York, have invented certain new and useful Improvements in Fluid-Pressure Brake Systems, of which the following is a full, clear, and exact description.

My invention relates to fluid-pressure brake systems, more especially to that type in which the brakes are applied and released by the action of a triple valve whose traverses control the admission of air from the auxiliary reservoirs to the brake-cylinders to set the brakes and the exhaust of air from the said brake-cylinders to release the brakes.

The principal object of my invention is to produce a simple efficiently-operating structure by which the brakes may be set and applied by reduction of the train-line pressure and while so applied the auxiliary reservoirs may be recharged. At the same time the equalization of pressure between the train-line system and auxiliary reservoirs and the main reservoir will not occur. This recharging takes place when the valve-lever of the engineer's valve is put on "lap" position and all the triple-valve-operating parts are blanked, an extra recharging part being then in action.

In the accompanying drawings I have shown an air-brake system illustrating one embodiment of my invention.

In the drawings, Figure I is a sectional elevation of a form of engineer's brake-valve for manipulating the air-supply, the section being taken on line $x\ x$ of Fig. VI. Fig. II is another section through the said engineer's valve, the section being taken at right angles to the section shown in Fig. I, the section being taken on line $y\ y$ of Fig. VI. Fig. III is a plan view of the valve-body. Fig. IV is a sectional diagrammatic view showing the system applied to a single car, it being understood, however, that the drawings are illustrative merely and are intended to show, by way of example, one embodiment of the invention. Fig. V is a plan view of the lower part of the valve-casing and the rotary valve-body, the valve being on lap; and Fig. VI is a plan view of the top of the valve with the various positions of the handle indicated.

In the drawings, A indicates the casing of the controlling-valve, having a chamber B communicating by chamber B′ with a pipe B^2, leading to the main reservoir. The controlling-valve is likewise provided with a chamber C, which is adapted to communicate, through the passage or port a in the valve-seat, with the valve-chamber B through a suitable port b in the valve-body D. The valve-body D is shown herein as provided with a recess d in its lower face and with ports b and e, extending therethrough. The lower portion of the valve-casing is provided with an exhaust-port f and is recessed to receive a bushing g, provided with a port h, adapted to register with a port i in the side of the chamber or cavity C, which communicates with the train-line pipe E.

Seated in the bushing G is a screw-threaded plug j, in which a valve-stem k works, which stem is provided with a head l, adapted to close a port m, communicating with the chamber B of the valve-casing. A spring o bears at one end against the head h and at the other end against the bushing j. The entire structure, of which l is the head, will be hereinafter referred to as the "recharging-valve."

The valve-body D is provided with a suitable valve-stem F, to which an operating-handle G is attached. This operating-handle serves to rotate the valve-body D in order to effect various functions in manipulating the air to effect the operations of applying and releasing the brakes. The handle is shown as provided with a spring-pin H, adapted to engage in one or more recesses I to maintain the valve in its various set positions. A suitable stud p or other support may be provided to support the engineer's valve.

In Fig. I the valve is shown in its release position. In operation the valve-handle is turned so as to connect the train-pipe with the exhaust-port through the cavity d in the lower part of the valve-body. When it is desired to release the brakes, the port b is brought into registry with the port a in the line-pipe, thereby connecting the main reservoir and pump with the line-pipe E. The port

e in the valve-body D is adapted to connect the main reservoir with the line-pipe through the ports *m* and *i* against the tension of the recharging-valve *o*. When the port *e* is in position to connect chamber B with port *m*, all the other ports in the valve-body described are blanked—that is, blocked—and the handle of the valve is in the position marked "Lap." This is the lap position of the valve.

The line-pipe E is adapted to communicate with a number of triple valves and auxiliary reservoirs. In Fig. IV, I have shown the train-pipe as connected to but one triple valve and auxiliary reservoir; but it will be understood that the train-pipe is usually connected to a number of triple valves and reservoirs, one under each car of the train.

The triple valve shown herein is of the type illustrated in United States Letters Patent No. 580,843 to Bothwell.

In Fig. IV the line-pipe or train-pipe is connected to a suitable connection or nipple in the casing of the triple valve J. This triple valve is provided with a piston *q*, having a stem *r*, kerfed or recessed at *s* and adapted to bear against the spring-actuated collar *t*. The inner face of the valve-casing is provided with a passage *u*, leading to a port *v*, controlled by a freely-oscillating check-valve *w*, which controls the inlet of air to a passage *x*. The casing of the triple valve is provided with an annular passage *y*, surrounding a suitable lining *z*, which lining is apertured at 1, the aperture being adapted to be covered by the valve-piston *q* when the valve has made its initial or preliminary traverse to admit air to the brake-cylinder. Located above the passages 1 is a check-valve 2, provided with passages 3 4 and adapted when in position to simultaneously admit air to the brake-cylinder and to the auxiliary reservoir.

K is the auxiliary reservoir, and L is the brake-cylinder, these two being herein shown as integral with each other. The auxiliary reservoir leads by pipe 5 to a passage 6, containing a check-valve 2, which passage communicates with the passage 7, communicating by a passage 8 with the chamber 9 of the triple valve.

The triple valve is provided with a valve-seat 10, adapted to coöperate with a slide-valve 11, which may be suitably recessed at 12 and apertured at 13. The exhaust-port of the triple valve is indicated at 14, and the port communicating with the brake-cylinder is indicated by 15. The check-valve *w* comes into operation when the auxiliary reservoirs are recharging on application of the brakes. This check-valve is adapted to be seated by such reduction of pressure in the train-pipe system as will operate to apply the brakes. It will be observed that the check-valve is entirely under the control of the air-pressure and is not in any manner influenced mechanically by the movement of the triple valve and that the air-pressure has at all times access to the said check-valve by reason of the fact that the valve-stem *r* is slotted or kerfed at *s*.

The detailed operation of the device is as follows: The handle G is swung into the service position, so that the recess *d* opens communication between the train-line pipe E and the exhaust-port *f* of the engineer's valve. This has the effect of reducing the pressure in the train-pipe and effecting a preliminary traverse of the valve-piston *q*, thereby opening communication between the auxiliary reservoir and the brake-cylinder through the port 13. The handle 19 may now be immediately turned to "lap," so that the port *e* will register with the port *m* in the valve-casing. The other parts are now blanked. The air-pressure will now be exerted only through the ports *e* and *l* upon the recharging-valve, which will be depressed against the pressure of its spring, and air-pressure will pass through the port *i* into the train-pipe E. This pressure passes through the train-pipe E, through the kerfed portion *s* of the piston of the triple valve, and thence through the passages *u* and *v*, raising the check-valve *w*, and thence passes to the auxiliary reservoir and brake-cylinder through the check-valve 2. As all of the other ports of the engineer's valve are blanked when the parts are in this position, no movement of the triple-valve piston will take place and the supply of air in the auxiliary reservoir will be replenished. This recharging will take place no matter whether the application of the brakes be a service application or an emergency application, as air-pressure has access at all times to the check-valve *w*.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a fluid-pressure brake system the combination of an engineer's valve having ports for an application and release of the brakes, a spring-actuated recharging-valve, a port in the engineer's controlling-valve for regulating the admission of air to the port of the recharging-valve, all arranged so that when the engineer's valve is on "lap" the recharging-valve is receiving air-pressure and the brake application and release-ports in the engineer's valve will be blanked; a train-pipe in communication with the recharging-valve and with one or more triple valves, brake-cylinders and auxiliary reservoirs and a check-valve governing the flow of air to an auxiliary reservoir when the triple valve is in position to apply the brakes, the said check-valve being mechanically disconnected from the triple valve and in constant communication with the train-pipe.

2. In a fluid-pressure brake system, the combination of an engineer's valve having ports for an application and release of the brakes, a spring-actuated recharging-valve, a port in the engineer's valve for regulating the admission of air to the port of the recharging-valve, the recharging-valve receiving air only when

the lever of the engineer's valve is in the lap position and the other ports are blanked, whereby equalization cannot be effected and consequently the brakes can be released by throwing the lever to the release position; a train-pipe in communication with the recharging-valve and with suitable brake apparatus embodying in its structure a check-valve mechanically disconnected from the triple valve and in constant communication with the train-pipe, said check-valve governing the influx of air to the auxiliary reservoir.

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