No. 620,601. Patented Mar. 7, 1899.

H. R. MASON.

FLUID PRESSURE SIGNAL VALVE.

(Application filed June 17, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

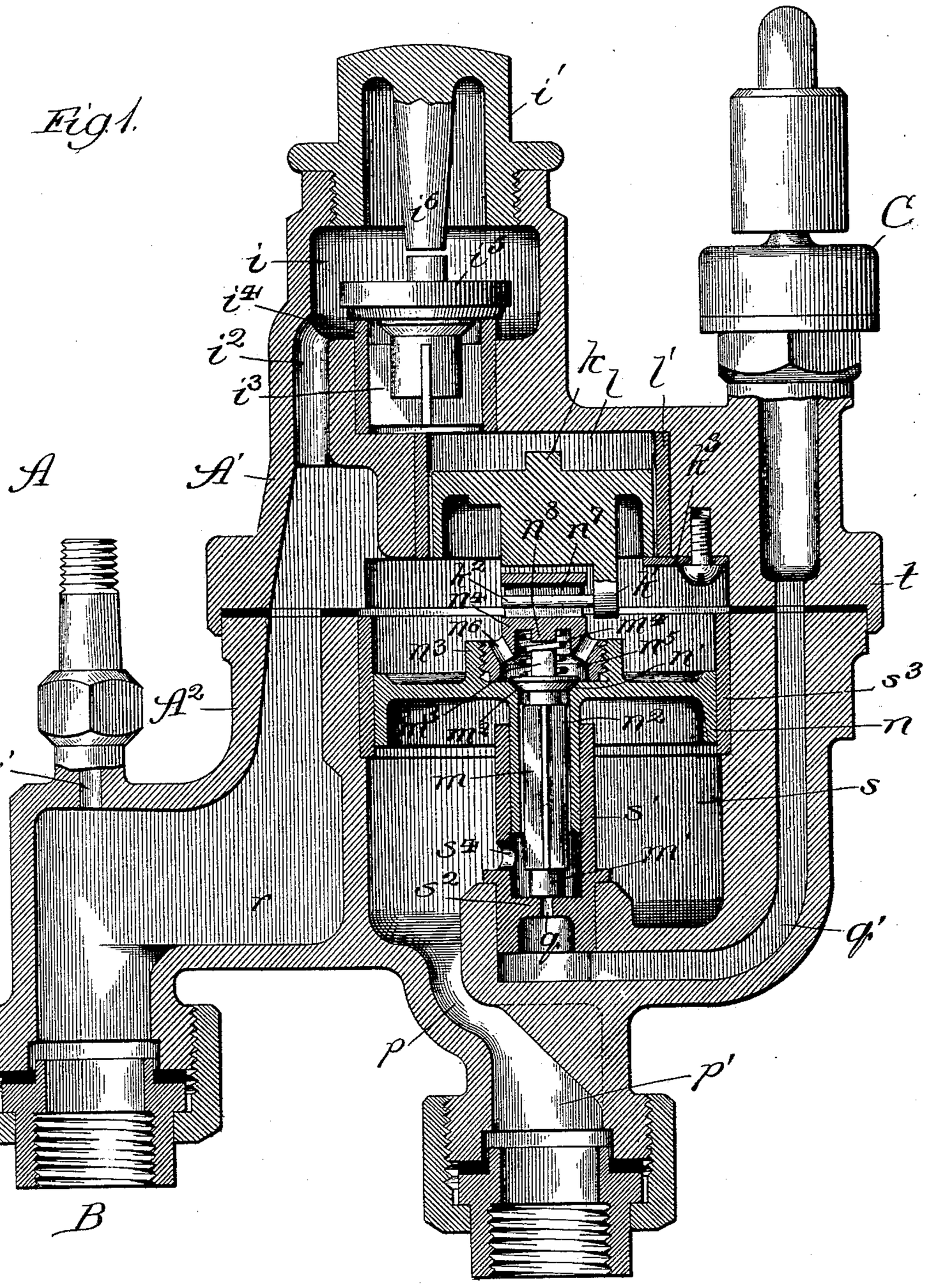

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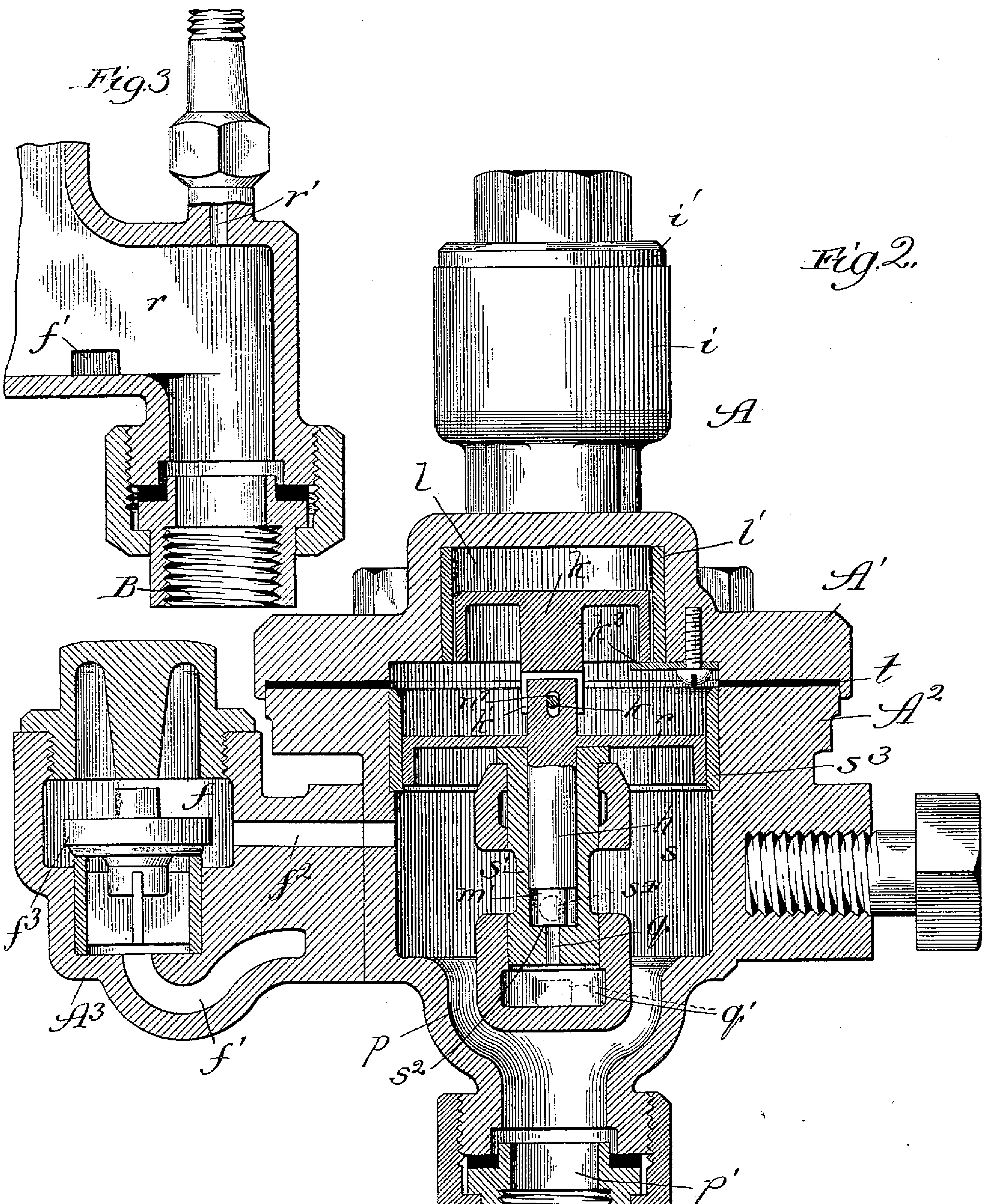
Fig. 3

Fig. 2.



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UNITED STATES PATENT OFFICE.

HARRY R. MASON, OF CHICAGO, ILLINOIS.

FLUID-PRESSURE SIGNAL-VALVE.

SPECIFICATION forming part of Letters Patent No. 620,601, dated March 7, 1899.

Application filed June 17, 1898. Serial No. 683,682. (No model.)

To all whom it may concern:

Be it known that I, HARRY R. MASON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Fluid-Pressure Signal-Valves, of which the following is a specification.

The signal-valve to which my invention relates forms part of a fluid-pressure signaling system particularly adapted for use upon railway-trains.

Broadly stated, the system involves a signaling or train pipe which is kept charged with air under pressure from the main reservoir of the air-brake system, conductor's signaling-valves on cars of the train, and a signal-valve device on the locomotive. The signaling is performed by operating a conductor's signaling-valve to produce the escape of a limited quantity of air, and thus generate a negative or signaling impulse which travels through the signaling-pipe to the signal-valve, causing the latter to vent air to a signal, preferably a whistle.

My present invention relates particularly to a signal-valve of the "non-interference" type and is in the nature of an improvement upon the construction shown, described, and claimed in Letters Patent No. 534,401, granted to me February 19, 1895. The said patented valve was constructed to operate upon trains of any length and, while sounding the whistle once under each direct impulse generated at a conductor's signaling-valve, prevent the undue repetition of signals under the fluctuations of pressure in the signaling-pipe following upon the direct impulse.

My object is to improve upon the said patented construction for the purpose of rendering the signal-valve more sensitive to operation under signaling impulses and for hastening the replenishment of the signaling-reservoir under rise of signaling-pipe pressure, so that the signals may be produced in more rapid succession.

In the drawings, Figure 1 is a vertical section of a valve device embodying my improvements in their preferred form; Fig. 2, a vertical central section of the valve device of modified form, the section being at a right angle to the section shown in Fig. 1; and Fig. 3, a broken section of that part of the valve shown in Fig. 2 which connects with the signaling or train pipe.

The valve device A is formed, preferably, in two sections A' A^2, with a gasket t between them. In the shell formed by the sections is a chamber s, communicating near its top through a cored passage r with the signaling or train pipe at B. Communicating with the passage r is a port or passage r', on which is mounted the usual train-pipe pressure-gage. (Not shown.) In the center of the lower part of the chamber s is a vertical tube or sleeve s', formed toward its lower end with a valve-seat s^2, surrounding a port q, leading to a cored passage q', which extends to the signal or whistle C. Partly surrounding that portion of the shell in which the tube s' is mounted is a port p, communicating with a passage p', which in practice leads to the signaling-reservoir. (Not shown.) In the upper part of the chamber s is an annular bushing s^3. Fitting closely against the said bushing and working therein is a movable abutment or piston n, which in the preferred construction has an opening through its center surrounded by a valve-seat n', a downward-extending tube n^2 around said opening, and an internally-threaded sleeve n^3 above said opening. The tube or stem n^2 fits and slides in the stationary tube s'. Screwed into the sleeve n^3 is a cap or plug piece n^4, forming in its under side a valve-chamber n^5, communicating with the chamber s through ports n^6. In the upper part of the plug-piece or cap n^4 is a horizontal opening n^7, elongated in the vertical direction. In the tubular stem n^2 is a winged pin m, formed at its lower end to produce a valve m', which seats upon the seat s^2 to close the port q, and formed toward its upper end with a valve m^2, which seats normally upon the valve-seat n'. Above the valve m^2 the pin is provided with an upward-projecting part m^3, which terminates normally a short distance below the surface of a stop n^8 in the plug or cap piece n^4. Surrounding the parts m^3 n^8 is a confined spring m^4, which tends normally to press the valve m^2 to the seat n'. In the side of the tube s', near the lower end thereof, is a port s^4.

It will be seen that the main difference between the present construction and the aforesaid patented construction lies in this that the piston n fits closely against the bushing

s^3, in a manner, however, to slide readily therein, and that the passage for air from the signaling-pipe to the signaling-reservoir is through the ports n^6, tube n^2, and port s^4 when the valve m^2 is open. The piston is shown in its normal position, which is the one it will occupy when pressure on opposite sides is substantially balanced. When the pressure above the piston from the train-pipe exceeds the pressure below the piston from the signaling-reservoir, the piston will be pressed downward against the resistance of the spring m^4 to move the seat n' downward from the valve m^2, thus opening the latter and permitting air to pass quickly from the train-pipe to the signaling-reservoir. When the pressures on opposite sides of the piston are substantially equalized, the spring m^4 will raise the piston to the balanced or normal position shown. The pin m is held in the position of closing the port q by the relative suction action at the port q.

Above the chamber s and in open communication therewith is a chamber l, provided with an annular bushing l'. Working in the chamber l is a piston k, provided on its under side with a downward-extending lug k', carrying a pin k^2, which extends through the slot or opening n^7 of the piston-cap. The piston k fits loosely in the bushing l' to permit air to pass between the chambers s l around the edge of the piston. A stop-plate k^3 is fastened by a screw in the top of the chamber s, as shown, and projects across the piston k to limit the movement of the latter in the downward direction.

On the shell-section A' is a chamber i, closed at the top by a screw-cap i'. A cored passage i^2 extends to the chamber i from the passage r. Between the chambers l and i is a vent-passage i^3, formed at its top in the chamber i with a valve-seat i^4 for a check-valve i^5, which may rise to a stop i^6 to open said passage.

In operation the train-pipe air enters the chamber i and the top of the chamber s, whence it passes around the piston k into the top of the chamber l. As the pressure rises in degree above the piston n it presses the pin m to its seat upon the port q and presses the piston n downward against the resistance of the spring m^4 to open the valve m^2, whereby the air passes to the under side of the piston in the chamber s and thence through the port p to the signaling-reservoir until the latter is charged to approximately the same pressure as that of the signaling train-pipe. The conductor's signaling-valves which I employ operate when actuated to vent a certain predetermined volume or degree of pressure, whereby each direct impulse is initially the same. As explained by me in previous applications and now thoroughly understood in the art, a signaling impulse generated at a conductor's signaling-valve in a long train is necessarily weaker when it reaches the signaling-valve than it would be in a short train and the force of fluctuations is greater in a short train-pipe than in a long one. The means I provide in the present construction to prevent the operation of the signal under the fluctuations of pressure are, it will be seen, substantially the same as the means shown in my aforesaid patent. Each time a signaling impulse is generated at a conductor's signaling-valve it travels to the signal-valve A and momentarily lowers the pressure in the chamber s above the piston, causing the superior pressure in the signaling-reservoir to raise the piston, open the valve m', and permit air from the reservoir to pass through the port q and sound the whistle. When the signaling impulse, as in a long train, is comparatively weak, it will raise the piston until the lower edge of the opening n^7 strikes the pin k^2, after which it will descend again to close the port q. When the signaling impulse is strong, as in a short train, the piston will be raised and raise the return-retarding mechanism or piston k, forcing the air from the chamber l to the chamber i, and cause comparatively slow return of the valve m' to its seat, owing to the drag thereon produced by the piston k, all as explained in my aforesaid Letters Patent. The result of this operation is that in every case a somewhat prolonged and decided blast will be given to the whistle. As soon as the piston n is lowered by the predominating pressure from the train-pipe and the valve m' is closed the piston under any rise of train-pipe pressure will be moved still farther downward against the resistance of the spring m^4, thereby opening the comparatively large passage through n^6 n' n^2 s^4, whereby the signaling-reservoir is charged very quickly approximately up to the train-pipe pressure. In practice this recharging will take place in less than a second's time, while in my former construction the recharging took a materially longer time. Furthermore, as in the present construction the passage between opposite sides of the piston is normally closed instead of, as in my former construction, open, the piston is rendered more sensitive, which I find in practice to be a decided advantage.

In the modified construction the piston n fits the bushing s^3 as tightly as practicable, and instead of the tubular extension n^2 and pin m I provide the solid stem h, formed at its lower end with a valve m' to open and close the port q. On the side of the shell-section A^2 is a check-valve device A^3, comprising a chamber f, communicating at its lower side through a cored passage f' with the train-pipe passage r and communicating toward its upper side through a cored passage f^2 with the chamber s below the piston n. In the chamber f is a check-valve f^3, seating in the direction of the train-pipe. In other respects the valve device is like the preferred construction shown in Fig. 1.

The operation of the valve of the modified form is in every respect the same as that of the preferred form, except that the lower part

of the chamber *s* and the signaling-reservoir are charged through the passage $f' f f^2$ and retrogression of pressure from the reservoir to the train-pipe is prevented by the check-valve f^3.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a fluid-pressure signaling system, the combination with a signal-valve device provided with valve mechanism interposed between a signaling-pipe and a signaling-reservoir, and subject on its opposite sides to pressure therefrom, respectively, and normally closing an outlet from said reservoir to the signal, and movable from normal position to open said outlet under pressure from the said reservoir when the train-pipe pressure falls under a signaling impulse, and having return-retarding mechanism for the said valve mechanism following the action of the reservoir-pressure to afford yielding resistance to the return of the valve mechanism to normal position under predominating pressure in the signaling-pipe following said impulse, of a charging-passage through which the fluid passes from the signaling-pipe to the signaling-reservoir, and check-valve mechanism in said charging-passage for preventing retrogression of fluid from the signaling-reservoir to the signaling-pipe, substantially as and for the purpose set forth.

2. In a fluid-pressure signaling system, the combination with a valve device provided with a chamber, a piston fitting closely the wall of said chamber and interposed between a signaling-pipe and a signaling-reservoir and subject on opposite sides to pressure therefrom, respectively, and normally closing an outlet from the said reservoir to the signal, and movable from normal position to rise and open said outlet under pressure from the said reservoir when train-pipe pressure falls under a signaling impulse, and having return-retarding mechanism for the said piston following the action of the reservoir-pressure to afford yielding resistance to the return of the piston to normal position under predominating pressure in the signaling-pipe following said impulse, of a charging-passage forming the communication between the signaling-pipe and signaling-reservoir for charging the latter, and check-valve mechanism in said charging-passage for preventing retrogression of fluid from the signaling-reservoir to the signaling-pipe, substantially as and for the purpose set forth.

3. In a fluid-pressure signaling system, a signal-valve device having a chamber communicating at its upper side with the signaling-pipe, at its lower side with the signaling-reservoir and through an outlet-port at its lower side with the signal, a piston in the chamber exposed at opposite sides, respectively, to pressure from the signaling-pipe and signaling-reservoir, return-retarding mechanism for the piston following the action of the reservoir-pressure to afford yielding resistance to the return of the piston to normal position under predominating pressure in the signaling-pipe following a signaling impulse, a reservoir-charging passage through the piston, and a stem provided with a valve to seat upon said outlet-port, and a check-valve at said charging-passage, all arranged to operate substantially as and for the purpose set forth.

HARRY R. MASON.

In presence of—
M. J. FROST,
R. T. SPENCER.