(No Model.) 2 Sheets—Sheet 1.

# H. R. MASON.

## TRAIN SIGNALING APPARATUS.

No. 463,064. Patented Nov. 10, 1891.

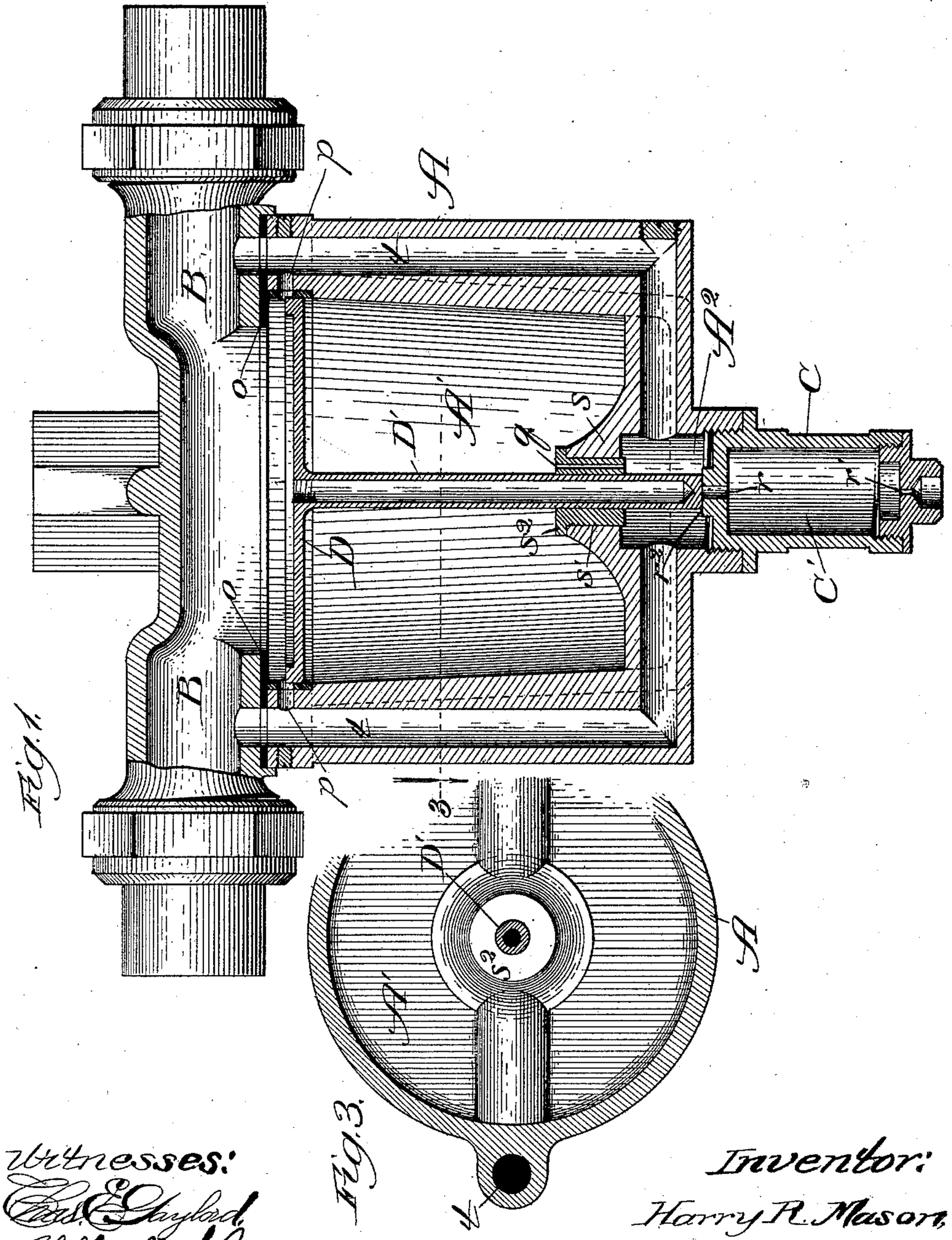


Fig. 1.

Fig. 3.

Witnesses:
Chas. E. Gaylord.
Clifford H. White.

Inventor:
Harry R. Mason,
By Dyrenforth & Dyrenforth
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(No Model.) 2 Sheets—Sheet 2.

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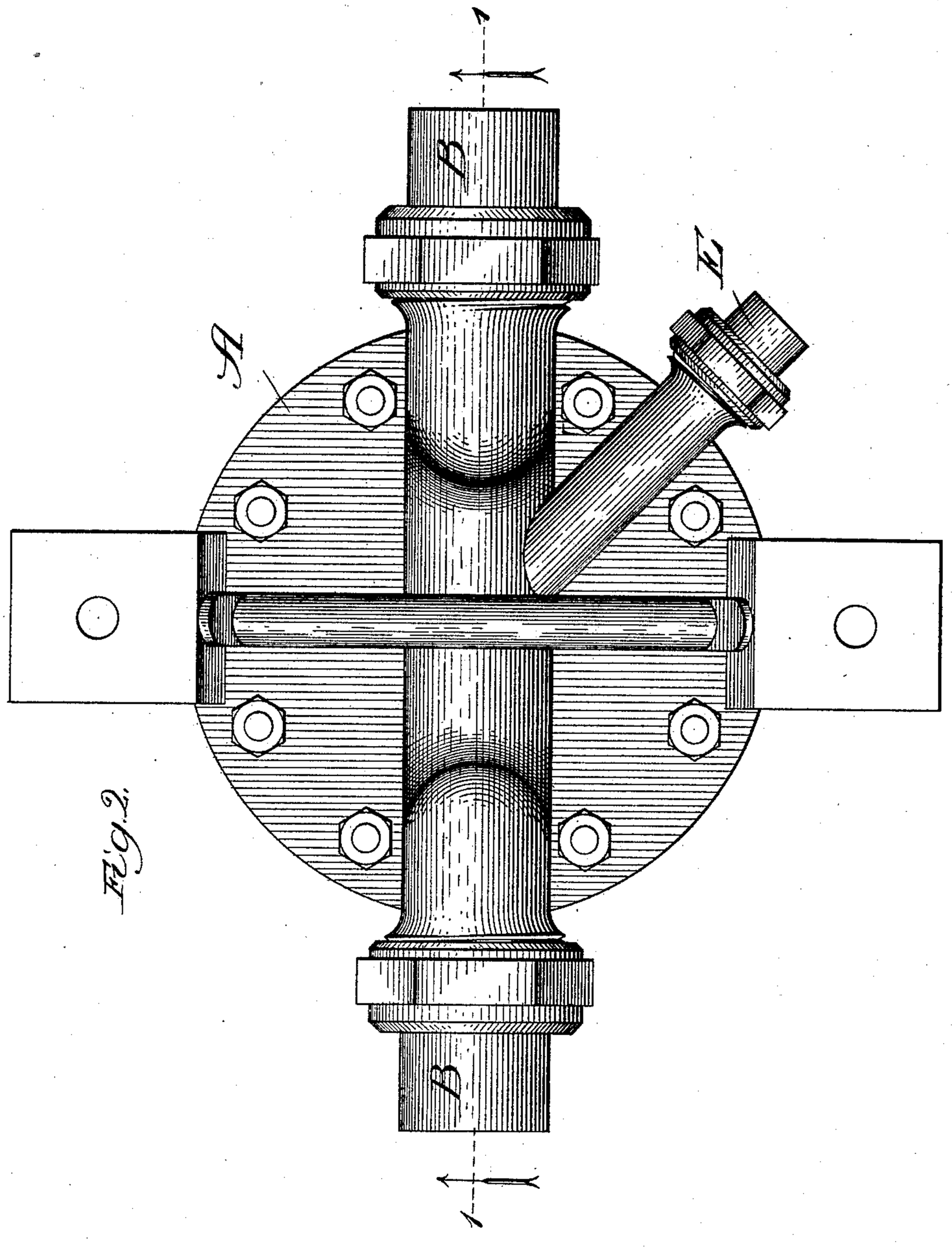


Fig. 2.

Witnesses:
Chas. E. Gaylord,
Clifford M. White.

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# UNITED STATES PATENT OFFICE.

HARRY R. MASON, OF CHICAGO, ILLINOIS.

## TRAIN SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 463,064, dated November 10, 1891.

Application filed September 8, 1891. Serial No. 405,131. (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 Train Signaling Apparatus, of which the following is a specification.

My present invention is in the nature of an improvement upon a certain valve for use in fluid-pressure signaling apparatus upon railway-trains, and described in an application for Letters Patent of the United States filed by me July 9, and bearing Serial No. 398,927. The valve in question is interposed in the signaling-pipe between the signal upon the engine-cab, which is actuated by a reduction of pressure in the signaling-pipe, and a signaling-valve called the "conductor's signaling-valve," located upon a car of the train and operating when actuated to effect a limited venting of the signaling-pipe to create an impulse, which when transmitted to the signal will actuate the latter. The valve forming the subject of this specification is actuated by the impulse created by opening the conductor's signaling-valve to vent a further limited degree of pressure from the signaling-pipe for the purpose of repeating the said impulse or to generate a new impulse. In practice one of these "propagating" or "repeating" valves, as I call them, is interposed in the signaling-pipe (which may also be the main train or brake pipe) on each car of the train, whether freight or passenger. The conductor's signaling-valve when actuated will vent sufficient pressure from the signaling-pipe to effect an impulse or reduction of pressure in the signaling-pipe to actuate the nearest propagating or repeating valve, and this in turn by effecting another reduction of the pressure in the signaling-pipe will create a new impulse to actuate the next propagating or repeating valve, and so on until the impulse is felt at the signal to actuate the latter. The effect of the propagating or repeating valve is to produce a substantially equal and nearly simultaneous venting throughout the signaling-pipe between the conductor's signaling-valve actuated and the signal. As stated in my aforesaid pending application, a conductor's signaling-valve should be provided upon each car of a passenger-train, while in freight-trains one only need be provided upon the caboose.

The object of my present invention is to provide a propagating or repeating valve of the nature defined of a construction which will render it more simple and inexpensive to manufacture than the one shown in my said pending application, and at the same time render its operation equally if not more certain.

In the drawings, Figure 1 is a broken central section of my improved propagating or repeating valve, the section being taken on line 1 1 of Fig. 2; Fig. 2, a top plan view of the same valve, and Fig. 3 a broken section taken on line 3 of Fig. 1 and viewed in the direction of the arrow.

A is the valve, containing a chamber A′, which opens at its top into the direct line of the train or signaling pipe B. Cored in opposite sides of the shell A are passages *t t*, which are in open communication with the train-pipe and extend to a small chamber $A^2$ in the lower part of the shell and centrally of the latter. The chamber $A^2$ is closed by a screw-cap C, which contains a chamber C′. The chambers A′ and $A^2$ are divided from each other by a diaphragm *s*, having a central opening *s′* through it. The chamber C′ communicates with the chamber $A^2$ through an opening *r*—say one-eighth of an inch in diameter—and with the outside air through an opening *r′*—say one-thirty-second of an inch in diameter.

D is a valve or movable abutment fitting and sliding at its circumference against the wall of the chamber A′ at the top of the latter and closing communication between said chamber and the train or signaling pipe B. The valve D is provided with a stem D′, which extends through the opening in the diaphragm *s* and rests at its end normally upon a seat $r^2$, formed on the upper or inner end of the screw-cap C around the opening *r*. When seated, the stem D′ closes the opening *r* and prevents the passage of air from the chamber $A^2$ to the chamber C′. In the opening *s′* in the diaphragm *s* is a perforated plug or bushing $s^2$, which operates as a stuffing-box around the stem D′ to prevent the passage of air at that opening between the chambers A′ and $A^2$ without interfering with the movement of the

said stem. A small constanly-open passage $q$ extends between the chambers A′ and A², and this passage may be through the plug $s^2$, as shown, or in any other suitable location. At the valve D in the upper part of the chamber A′ are equalizing-passages $p$ $p$, which communicate, respectively, with the passages $t$ $t$. When the valve D is in its normal position shown, it closes communication between the train-pipe B and chamber A′ except through the small passage $q$, and, as described, its stem also closes communication between the chambers A² and C′. When the valve D is raised to the seat $o$ at the top of the chamber A′, it opens communication between the train-pipe B and the chamber A′ through the equalizing-passages $p$ $p$, and also causes its stem by rising from its seat $r^2$ to open communication between the chambers A² and C′ through the passage $r$.

E, Fig. 2, is a pipe, which communicates at the top of the valve with the train-pipe B and extends to the conductor's signaling-valve on the car, which is not shown, but may be of the construction described in my aforesaid pending application. The valve, as illustrated in Fig. 2, is intended more especially for passenger-coaches, each of which, as before stated, should be provided with a conductor's signaling-valve. For freight-cars the valves may be constructed without the pipe E, as they would be unprovided with conductors' signaling-valves, with the exception of the caboose of the train.

In operation the pipe B, which extends to the signal will be charged with pressure from the main air-reservoir on the locomotive in the usual manner, and as the pipe B is charged the pressure will pass through the passages $t$ $t$ to the chamber A², and thence through the small open passage $q$ to the chamber A′ and fill the latter, so that the pressures exerted against opposite sides of the valve D will be substantially equal. When pressure exceeding the weight of the valve D and its stem D′ is vented from the pipe B, the superior pressure in the chamber A′ will lift the valve D to the seat $o$. In its rise the valve D will pass the openings $p$ $p$, and the opening of the latter thus effected will cause the pressure in the chamber A′ to reduce very rapidly to that in the pipe B, so that the valve D and its stem may drop of their own weight to their normal position again. In the meantime, the passage $r$ having been momentarily opened, pressure will pass from the pipe B through the channels $t$ $t$ and chamber A² to the chamber C′ and fill the latter. When the valve D is returned to its normal position, the chamber C′ will be cut off from the pipe B and its pressure will escape through the opening $r'$, and the pressures in the pipe B and chamber A′ will be quickly equalized through the open passage $q$. The amount of pressure escaping from the train-pipe to the expansion-chamber C′ will be equal to the capacity of that chamber with the addition of what can escape through the small opening $r'$ to the outside air in the limited time that the passage $r$ is open.

In practice with each impulse created at a conductor's signaling-valve the reduction of pressure over the valve D of the nearest propagating or repeating valve will cause the latter to operate as described, and by the additional venting of the pipe B thus effected a new impulse will be generated, which will actuate the next repeating or propagating valve, and so on to the signal.

In fluid-pressure signals of the character to which my invention relates it is necessary for the perfect working of the same that the propagating-valves shall be capable of withstanding such slight gradual reductions of pressure as would be effected in the train-pipe by ordinary leakage. It must, however, be sufficiently sensitive to be moved by any sudden impulse of reduction of pressure in the pipe B. A great deal thus depends upon the weight of the valve D and stem D′, and in the drawings the said stem is shown to be cored out to nearly its entire length to decrease its weight.

The object of the equalizing-passages $p$ $p$ is to permit an almost instantaneous equalization of the pressures in the chamber A′ and pipe B to take place when the valve D is raised, so that the valve D will drop immediately to its normal position of closing the opening $r$. While I prefer to construct the valve with two equalizing-passages, the valve would be operative if one only were provided. The presence of the expansion-chamber C′ renders it more easy to properly limit the amount of air escaping through the port $r$ than were the size of that port alone depended upon, and the small open passage $r'$ from the chamber C′ is in effect equal to having a much larger chamber C′ than it is now necessary to provide, besides permitting me to dispense with valve mechanism for opening the passage from the expansion-chamber to the outside air when the port $r$ is closed and closing said passage when the port $r$ is opened.

Where the impulse propagating or repeating valves are employed upon the main train or brake pipe they will also be found useful in effecting quick reduction of pressure in the brake-pipe when the engineer's brake-valve is opened for service stops without, however, increasing the force of the application of the brakes beyond the control of the engineer.

As stated in my application, Serial No. 398,927, before mentioned, my improved propagating or repeating valves are distinct from the train-pipe release-valves employed in so-called "quick-action automatic brake systems." The propagating or repeating valves will not of themselves, when actuated from a conductor's signaling-valve, vent sufficient pressure from the brake-pipe to apply the brakes. They will, however, hasten the application of the brakes for a service stop, without changing the character of the stop to an emergency stop. The names impulse-propagating or "repeating" as applied to my

valves and employed in the claims are intended to distinguish my valve from the train-pipe release-valves, which latter are only brought into action when an emergency stop is to be made and which operate to exhaust the brake-pipe.

The valve constructed as described is the one I prefer to employ. It may, however, be modified in respect to details of the construction without departing from my invention as defined by the claims.

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

1. The combination, with a pipe charged with artificially-created fluid-pressure, of an impulse propagating or repeating valve communicating with the said pipe and actuated by an impulse created by a limited reduction of pressure in the pipe to vent a further and limited extent of pressure therefrom and comprising a shell containing a chamber normally charged with pressure from the said pipe, valve mechanism exposed on opposite sides to pressure from the pipe and said chamber, a passage from the pipe to the outside air, and an equalizing-passage between the said chamber and pipe, both said passages being normally closed by said valve mechanism and opened by movement of the valve mechanism when the pressure in said pipe is reduced, substantially as and for the purpose set forth.

2. The combination, with a pipe charged with an artificially-created fluid-pressure, of an impulse propagating or repeating valve comprising a shell containing a chamber A′, normally charged with pressure from the said pipe, valve mechanism exposed on opposite sides, respectively, to pressure from the pipe and chamber A′, an expansion-chamber, a passage from the said pipe to the expansion-chamber, and an equalizing-passage between the pipe and chamber A′, both said passages being normally closed by said valve mechanism and opened by movement of the valve mechanism when the pressure in said pipe is reduced, substantially as and for the purpose set forth.

3. The combination, with a pipe charged with artificially-created fluid-pressure, of an impulse propagating or repeating valve device containing a chamber A′, charged with pressure from said pipe, an expansion-chamber, a passage $r$ between the said pipe and expansion-chamber, and a passage $r'$, smaller than the passage $r$, extending from the expansion-chamber to the outside air, and valve mechanism normally closing the passage $r$ and exposed on opposite sides to pressure from the said pipe and chamber A′ to open the passage $r$ when the pressure in said pipe is reduced, substantially as and for the purpose set forth.

4. The combination, with a pipe B, charged with artificially-created fluid-pressure, of a valve-casing containing a chamber A′, a passage $t$, extending from the pipe B along the chamber A′, a passage $q$, affording open communication between the chamber A′ and passage $t$, a passage $r$, affording communication between the passage $t$ and outside air, valve mechanism between and exposed on opposite sides, respectively, to pressure from the chamber A′ and pipe B, and an equalizing-passage $p$ between the said chamber and pipe, the said valve mechanism normally closing the passages $r$ and $p$ and operating when the pressure in the chamber A′ exceeds that of the pipe B to open said passages, substantially as and for the purpose set forth.

5. The combination, with a pipe B, charged with artificially-created fluid-pressure, of a valve-casing containing a chamber A′, having an opening $q$ communicating with the pipe B and filled with pressure from said pipe, an expansion-chamber C′, normally exhausted of pressure, a passage $t$, extending from the pipe B and between the chambers A′ and C′, an equalizing-passage $p$ from the chamber A′ to the pipe B, a passage $r$ from the passage $t$ to the chamber C′, and valve mechanism between and exposed on opposite sides, respectively, to pressure from the chamber A′ and pipe B, normally closing the passages $p$ and $r$, and operating when the pressure in the chamber A′ exceeds that of the pipe B to open said passages, substantially as and for the purpose set forth.

HARRY R. MASON.

In presence of—
J. W. DYRENFORTH,
J. N. HANSON.