No. 667,355. Patented Feb. 5, 1901.

# G. W. WILDIN.

## TRIPLE VALVE.

(Application filed May 31, 1900.)

(No Model.) 2 Sheets—Sheet 1.

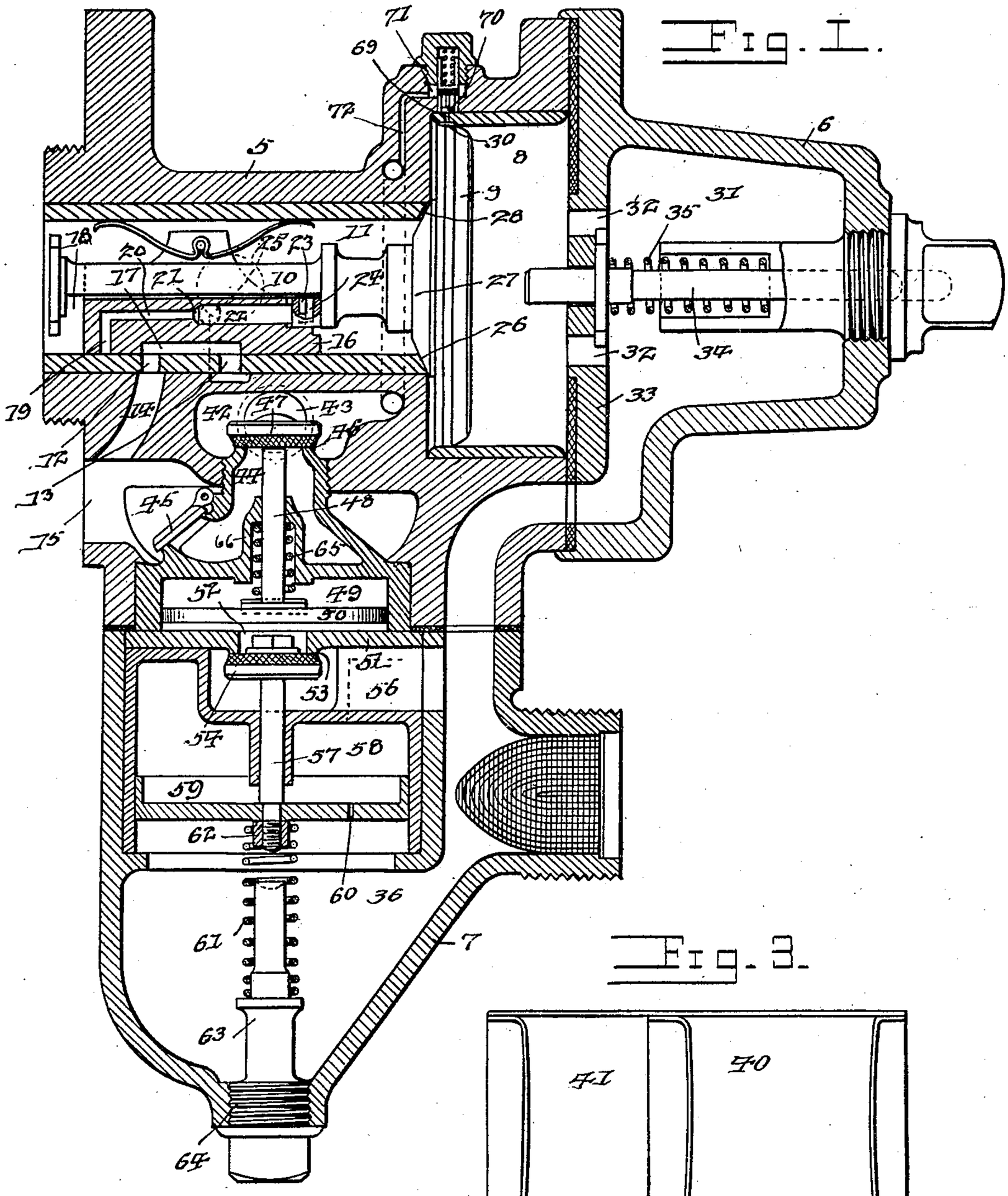


Fig. 1.

Fig. 3.




Witnesses
F. E. Alden
Geo. H. Chandlee.

George W. Wildin Inventor
by Church & Co.
Attorneys

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Fig. 2.

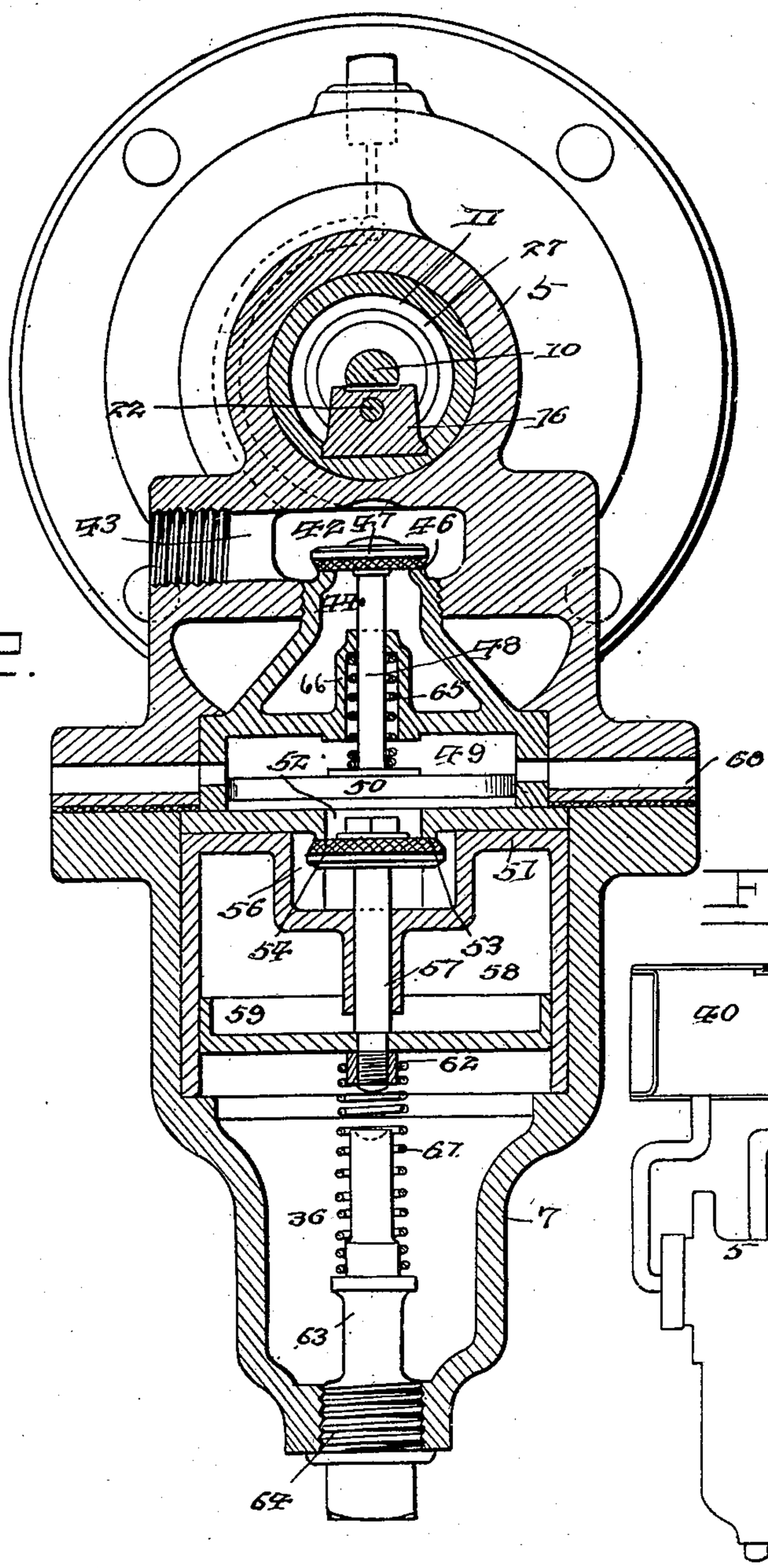
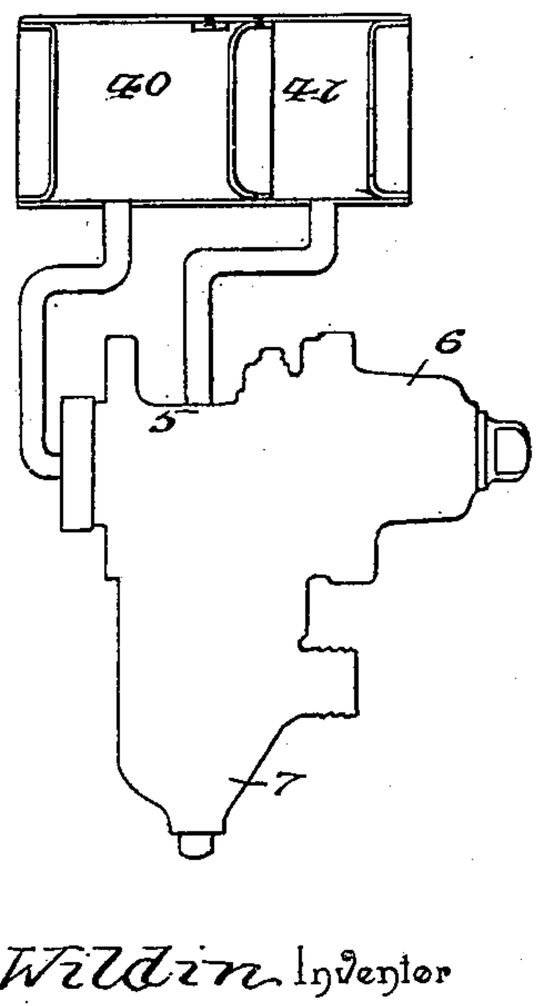



Fig. 4.




Witnesses
F. E. Alden.
Geo. H. Strandlee.

George. W. Wildin. Inventor
by Church & Co.
Attorneys

# UNITED STATES PATENT OFFICE.

GEORGE W. WILDIN, OF SAVANNAH, GEORGIA, ASSIGNOR OF ONE-THIRD TO WILSON E. SYMONS, OF SAME PLACE.

## TRIPLE VALVE.

SPECIFICATION forming part of Letters Patent No. 667,355, dated February 5, 1901.

Application filed May 31, 1900. Serial No. 18,631. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. WILDIN, a citizen of the United States, residing at Savannah, in the county of Chatham and State of Georgia, have invented a new and useful Triple Valve, of which the following is a specification.

This invention relates to air-brake mechanisms in general, and has specific reference to the triple valve mechanism, one object of the invention being to provide a construction wherein the desired pressure for emergency stops may be retained irrespective of the frequency of the stops, and thus may the emergency apparatus be in condition for operation at all times.

A further object of the invention is to provide means for feeding the emergency-reservoir independently of the service auxiliary reservoir and also means for communicating the emergency-reservoir at the proper times with the brake-cylinder and for venting the train-pipe pressure to the atmosphere at the proper times.

Additional objects and advantages will be apparent from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a central longitudinal vertical section taken through the valve mechanism. Fig. 2 is a vertical transverse section taken at right angles to the section of Fig. 1 and showing the valves for operating the emergency apparatus. Fig. 3 is a longitudinal section of the two-part auxiliary reservoir. Fig. 4 is a diagram showing the arrangement of the reservoirs with respect to the valve mechanism.

Referring now to the drawings, the casing of the valve mechanism comprises three parts 5, 6, and 7, as usual and as shown in the drawings, the main portion 5 having a cylindrical chamber 8 therein, adjacent the portion 6, and in which chamber is slidably disposed the closely-fitting graduating-piston 9, the stem 10 of which extends into the valve-chamber 11. In the lower wall of the valve-chamber 11 are formed two ports 12 and 13, of which port 13 is an exhaust-port, while port 12 leads by way of passage 14 to the brake-cylinder passage 15, which communicates directly with the brake-cylinder. Against the lower wall of the valve-chamber 11 is disposed a slide-valve 16, having a channel 17 in its under face, which is adapted to communicate with ports 12 and 13, simultaneously connecting the brake-cylinder with the exhaust-port 13 through ports 15, 14, 12, and 17, this valve being reciprocated by the graduating-piston, said valve lying with its upper portion in the recess 18 in the under side of the stem of the graduating-piston and said recess being somewhat longer than the valve in order that the piston may have a slight degree of lost motion with respect to the valve to operate the graduating-valve in a manner hereinafter described. A service-port 19 is formed in the under side of the slide-valve and leads to the graduating-passage 20, formed longitudinally of the slide-valve and having a valve-seat 21 at its forward end adapted to receive the graduating-valve 22, the outer end of which is connected with the stem of the graduating-piston by means of a pin 23 upon the piston and which engages a slot 24 in the valve 22. Thus if the graduating-piston be moved forwardly from the position shown the graduating-valve will be first moved from its seat and the slide-valve will be then operated to communicate the graduating-passage 20 with the port 12 and therethrough with the brake-cylinder, and that further movement will cause the slide-valve to pass entirely beyond the port 12 and permit it to communicate directly with the valve-chamber 11. In the cylindrical passage in which the graduating-valve operates or communicating therewith is a service-port 25, which when the graduating-valve is unseated communicates the graduating-passage directly with the chamber 11, thus communicating the brake-cylinder with the valve-chamber 11 through port 12, the graduating-passage, the graduating-valve seat, and the service-port 25. During this operation the graduating-piston has a degree of lost motion with respect to the graduating-valve due to the length of the slot in the graduating-valve, with which the pin 23 slidably engages, this lost motion, however, being less than the lost motion between the end of the graduat-

ing-piston stem and slide-valve in order that the graduating-valve may be operated prior to the movement of the slide-valve. The valve-chamber 11 is bushed, as shown, and at the inner end of this bushing is formed a seat 26, which receives the frusto-conical hub 27 upon the rear face of the graduating-piston, and in this seat is formed a feed-passage 28, which leads from the valve-chamber 11 to the interspace between the graduating-piston and the rear end of the cylinder 8, this interspace being in communication with the forward portion of the cylinder 8 through the medium of the feed-port 30, formed in the upper wall of the cylinder and reaching just beyond the front and rear faces of the piston when the latter is in its rearward position. The cylinder 8 communicates with the chamber 31 in the portion 6 of the casing through openings 32 in the dividing-wall 33, and through this wall projects the usual graduating-pin 34, which is held normally projected into the cylinder by means of an encircling helical spring 35, of usual arrangement. The train-pipe is connected with the casing element 7 in the usual manner and communicates with the chamber 36 at the lower end thereof and also with the chamber 31, as shown. With this construction it will be seen that upon a slight reduction in train-pipe pressure the graduating-piston will be drawn rearwardly until it has moved a sufficient distance to cover the feed-port 30, after which the pin 23 will engage the end of the slot 24 and will move the graduating-valve to open the service-port, at which time the rear end of the stem 10 engages the end of the slide-valve and moves said valve to move the passage 17 from port 12 and to communicate the service-port 19 with port 12, at which time the pressure from the auxiliary reservoir 40 will pass through the slide-valve and thence through the brake-cylinder passage 15 to the brake-cylinder to set the brakes. To release the brakes, the pressure in the train-pipe is increased, when the piston 9 is moved rearwardly. During this rearward movement the graduating-valve is first closed, after which the slide-valve is moved to carry the service-port from alinement with the brake-cylinder port 12, and continued movement of the piston moves the slide-valve to the position shown in the drawings, with the brake-cylinder in communication with the exhaust-port through the slide-valve. The pressure in the brake-cylinder being then exhausted, the brakes are released. If the pressure in the train-pipe be then raised, air will pass through feed-port 30 and feed-passage 28, raising the auxiliary-reservoir pressure to the proper degree. In the making of an emergency application of the brakes the operation of this portion of the mechanism is similar to that of the usual construction. A sudden reduction in train-pipe pressure causes the graduating-piston to move forwardly quickly and with sufficient momentum to move the graduating-pin 34 against the tendency of its spring 35, this excessive movement carrying the slide-valve beyond the brake-cylinder port 12, which latter is thus brought into direct communication with the valve-chamber 11 and therethrough with the auxiliary reservoir, the entire pressure of which is thus brought suddenly to bear in the brake-cylinder to set the brakes. When the train-pipe pressure is raised, the slide and graduating valves are operated in the same manner as above described and the brakes are released.

In connection with the mechanism above described there is employed an emergency-reservoir and a system of valves, whereby when the train-pipe pressure is suddenly reduced to a degree sufficient to operate the slide-valve to an extent to communicate the brake-cylinder port 12 directly with the auxiliary reservoir through the valve-chamber 11 this emergency-reservoir will be automatically brought into communication with the brake-cylinder to contribute its pressure thereto to effect a quick and strong application of the brakes.

The emergency-reservoir is formed by dividing the auxiliary reservoir, which is of greater capacity than usual, into two compartments 40 and 41, of which the compartment 40 is what may be termed the "service" auxiliary reservoir and 41 is the emergency compartment or reservoir. The compartment 40 is connected directly with the end of the valve-chamber 11, while compartment 41 is connected directly with the emergency valve-chamber 42 through an opening 43 in the side of the latter. Leading from the chamber 42 is a passage 44, which communicates with the brake-cylinder feed-passage 15 and which is protected against back pressure by means of a check-valve 45, disposed at its end and swinging into the passage 15. At the end of the passage 44, which communicates with chamber 42, is formed a valve-seat 46, upon which is disposed a valve 47, which opens into the valve-chamber, this valve 47 having a stem 48, which is continued downwardly therefrom and passes through a box 66 in the lower wall of passage 44 and into a cylinder 49, where it is connected with a piston 50, which fits the cylinder snugly. This cylinder is normally air-tight and for this purpose has a head 51 at its lower end, provided with an opening 52, provided with a circumscribing valve-seat 53 at the lower side of the head, and which seat receives a valve 54, which is adapted to open from the cylinder. Leading to the valve-seat 53 is a passage 56 below the cylinder-head 51 and into which the valve 54 is adapted to open and which communicates directly with the train-pipe through the casing-section 7, whereby when the valve 54 is open direct communication is established between the train-pipe and the cylinder 49 below the piston 50 therein. The valve 54 has a stem 57, which passes through a box in the lower wall of passage 56

and projects into a cylinder 58 therebelow, where it has attached thereto a piston 59, which snugly fits the cylinder, said piston having an equalizing-port 60 therethrough for a purpose which will be presently described. The valve is held normally in its closed or raised position by means of a helical spring 61, which encircles the jam-nut 62 on the end of stem 57, which holds the piston 59 in place, the lower end of the spring being disposed upon the upper end of a stud 63, having a threaded lower portion engaging the threads of the drain-opening 64 at the lowermost point of the chamber 36 of the casing of the mechanism. The valve 47 is held normally closed by means of a helical spring 65, which encircles the stem 48 and bears at its lower end against the piston 50, while its upper end rests within and against the upper end of a recess 66 below the box in which stem 48 operates. Leading from the cylinder 49, which may be termed the "vent-cylinder," are vent-openings 68, below which the lower face of piston 50 normally lies, but which openings are uncovered when the piston rises under the influence of train-pipe pressure against the lower face of the piston. In order to feed the emergency-reservoir, an opening or duct 69 is formed through the wall of the cylinder 8 and communicates with the feed-port 30 and which duct is adapted to be closed at its upper end against pressure in the direction of cylinder 8 by means of a valve 70 in the valve-chamber 71, and leading from chamber 71 is a feed-passage 72, which communicates with the valve-chamber 42. Thus when the train-pipe pressure is raised to charge the service-reservoir 40 pressure also passes through duct 69 and passage 72 to chamber 42 and thence to the emergency-reservoir through pipe 43, return pressure being prevented by valve 70. With this construction the operation of the emergency application is as follows, it being understood that the service auxiliary reservoir is brought into operation for the emergency application at the same time with the emergency-reservoir and in the manner above described: Normally the parts are in the positions shown in the drawings, there being an equalization of pressure on both sides of piston 59 through port 60. If a sudden reduction in train-pipe pressure be then made, the pressure in chamber 36 will drop below that in cylinder 58 above the piston 59, and owing to the smallness of the port 60 this difference in pressure will not equalize with sufficient rapidity to prevent piston 59 from moving downwardly to unseat the vent-valve 54. When valve 54 is thus opened, the train-pipe pressure is applied to the lower face of piston 50, and owing to the excessive area of said piston over the valve 47 said valve is raised against the pressure from the emergency-reservoir, when the emergency-pressure passes through passage 44, raises check-valve 45, and acts directly against the piston of the brake-cylinder. As soon as the piston 50 has moved a sufficient distance to uncover the vent-passages 68 the pressure in cylinder 49 below the piston 50 drops, when the spring 61 acts to move the vent-valve 54 to its seat in order that the auxiliary reservoirs may be recharged, as above described, and the parts may be operated to release the brakes at the proper time, it being of course understood that the brakes are released before the recharging is effected. With this construction it will be seen that under ordinary conditions—that is, in service applications of the brakes, where the train-pipe pressure is gradually reduced—there is no operation of the piston 59 for the reason that port 60 permits equalization at both sides of the piston and prevents its movement, but that in emergency cases the emergency-reservoir is brought quickly and positively into operation, with the desired result.

In practice various modifications of the specific construction shown may be made and any suitable materials and proportions may be used for the various parts without departing from the spirit of the invention.

What is claimed is—

1. In a fluid-pressure brake apparatus, a service auxiliary reservoir, an emergency auxiliary reservoir, a brake-cylinder, a valve device for establishing communication between the service auxiliary reservoir and the brake-cylinder upon a reduction in train-pipe pressure and means movable independently of said valve device for communicating the emergency auxiliary reservoir with the brake-cylinder upon a further sudden reduction in train-pipe pressure.

2. In a fluid-pressure brake apparatus, a service-reservoir, an emergency-reservoir, a brake-cylinder, means for establishing communication between the brake-cylinder and service-reservoir upon reduction of train-pipe pressure, and independently-operable means for communicating the emergency-reservoir with the brake-cylinder, upon sudden reduction of pressure simultaneously with or subsequent to the reduction to effect the operation of the service-reservoir.

3. A fluid-pressure brake apparatus comprising a brake-cylinder, a service-reservoir, an emergency-reservoir, means for communicating the service-reservoir with the brake-cylinder upon reduction of train-pipe pressure and independently-operable means for communicating the brake-cylinder with the emergency-reservoir upon further sudden reduction of train-pipe pressure.

4. A fluid-pressure brake apparatus comprising a service auxiliary reservoir, an emergency auxiliary reservoir, a brake-cylinder, means for communicating the service auxiliary reservoir with the brake-cylinder upon reduction of train-pipe pressure, and means independent of the first-named means operable either simultaneously with or subsequent

to the operation of the first-named means, for communicating the emergency-reservoir with the brake-cylinder.

5. A fluid-pressure brake apparatus comprising a service auxiliary reservoir, an emergency auxiliary reservoir, a brake-cylinder, means for communicating the brake-cylinder with the service auxiliary reservoir and including a graduating-piston, means independent of the first-named means for communicating the emergency-reservoir with the brake-cylinder, both of said means being operable by reduction of train-pipe pressure, and independent feed-passages between the train-pipe and the auxiliary reservoirs and controlled by the graduating-piston.

6. A fluid-pressure brake apparatus comprising a service auxiliary reservoir, an emergency auxiliary reservoir, a brake-cylinder, a triple-valve device for communicating the service auxiliary reservoir with the brake-cylinder, means operable independently of the triple-valve device for communicating the emergency-reservoir with the brake-cylinder, said means being operable by reduction of train-pipe pressure, and a feed-passage for the emergency-reservoir controlled by a member of the triple-valve device, which communicates the service auxiliary reservoir with the brake-cylinder.

7. A fluid-pressure brake mechanism comprising a service auxiliary reservoir, an emergency auxiliary reservoir, a brake-cylinder, a triple-valve device operable by reduction in train-pipe pressure for communicating the service-reservoir with the brake-cylinder, a valve for communicating the emergency-reservoir with the brake-cylinder and operable by train-pipe pressure, and means operable independently of the triple-valve device by reduction in train-pipe pressure for exposing the valve to operation by the train-pipe pressure.

8. In a fluid-pressure brake mechanism, the combination with a brake-cylinder, a service auxiliary reservoir and means for operably communicating the reservoir and cylinder, of an emergency-reservoir adapted for communication with the brake-cylinder, a valve for controlling said communication and having an operating-piston for exposure to train-pipe pressure, a valve for controlling the exposure of said piston, a piston connected with the last-named valve and having an equalizing-port, said piston being operable in one direction by reduction in train-pipe pressure, and means for returning the piston when equalization has taken place.

9. A fluid-pressure brake mechanism comprising a brake-cylinder, an emergency-reservoir, and means operable by reduction of train-pipe pressure for communicating the reservoir with the brake-cylinder, said means including a controlling-valve, and a train-pipe vent controlled by said controlling-valve.

10. A fluid-pressure brake mechanism comprising a brake-cylinder, an auxiliary reservoir, a train-pipe and means for communicating the reservoir with the cylinder and for venting the train-pipe, said means including a valve for controlling the communication of the reservoir and cylinder, a piston connected with the valve for operating it and disposed to open and close the vent when the piston is exposed to train-pipe pressure, a vent-valve for controlling the exposure of the piston and having an operating-piston which is operable in one direction by reduction in train-pipe pressure, and means for returning the last-named piston to correspondingly move the vent-valve.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE W. WILDIN.

Witnesses:
W. ROSS. GRAVENER,
FRANK L. ANTHONY.