

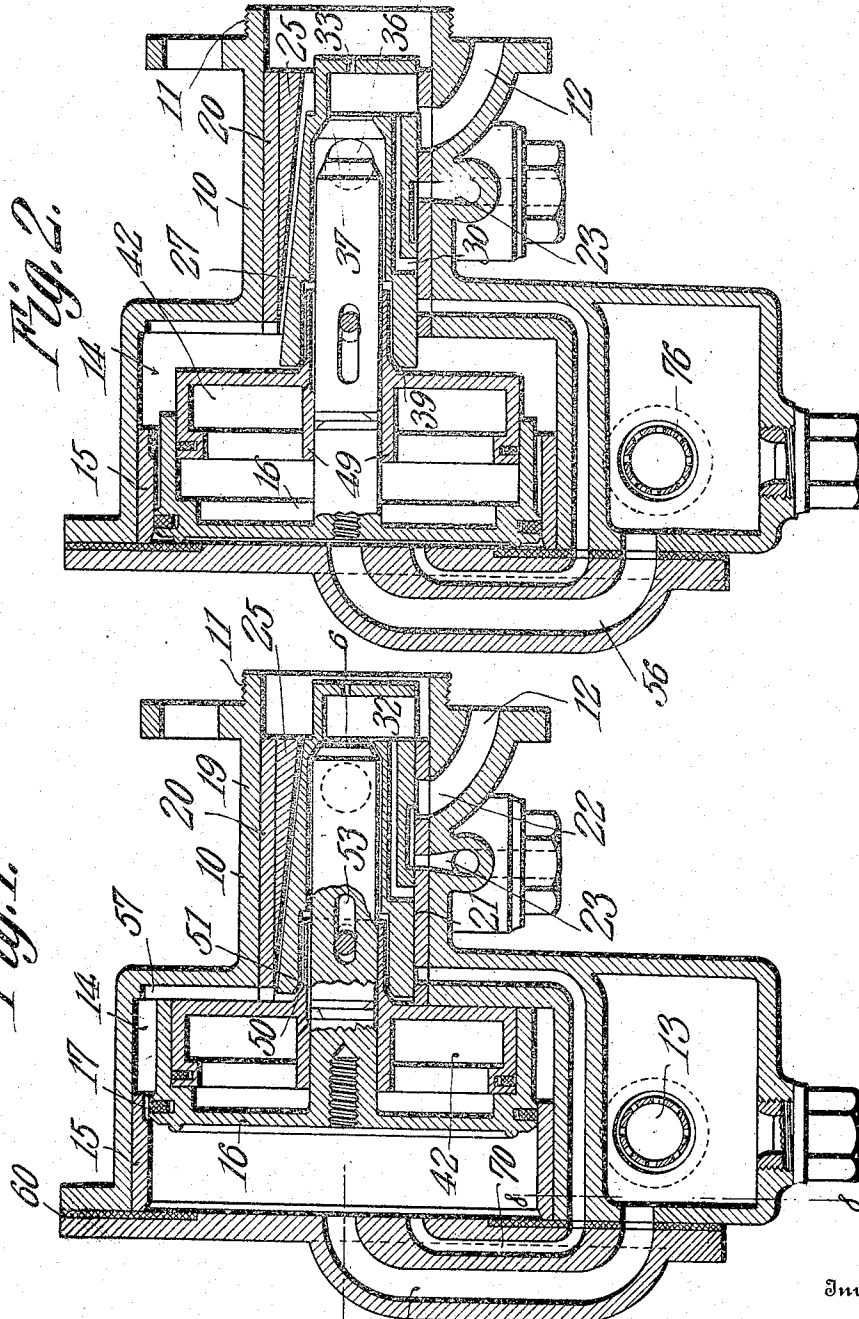
J. DILLANDER.
TRIPLE VALVE.

APPLICATION FILED SEPT. 23, 1908.

930,649.

Patented Aug. 10, 1909.

4 SHEETS—SHEET 1.



Witnesses
E. H. Stewart
Wm. C. Parker

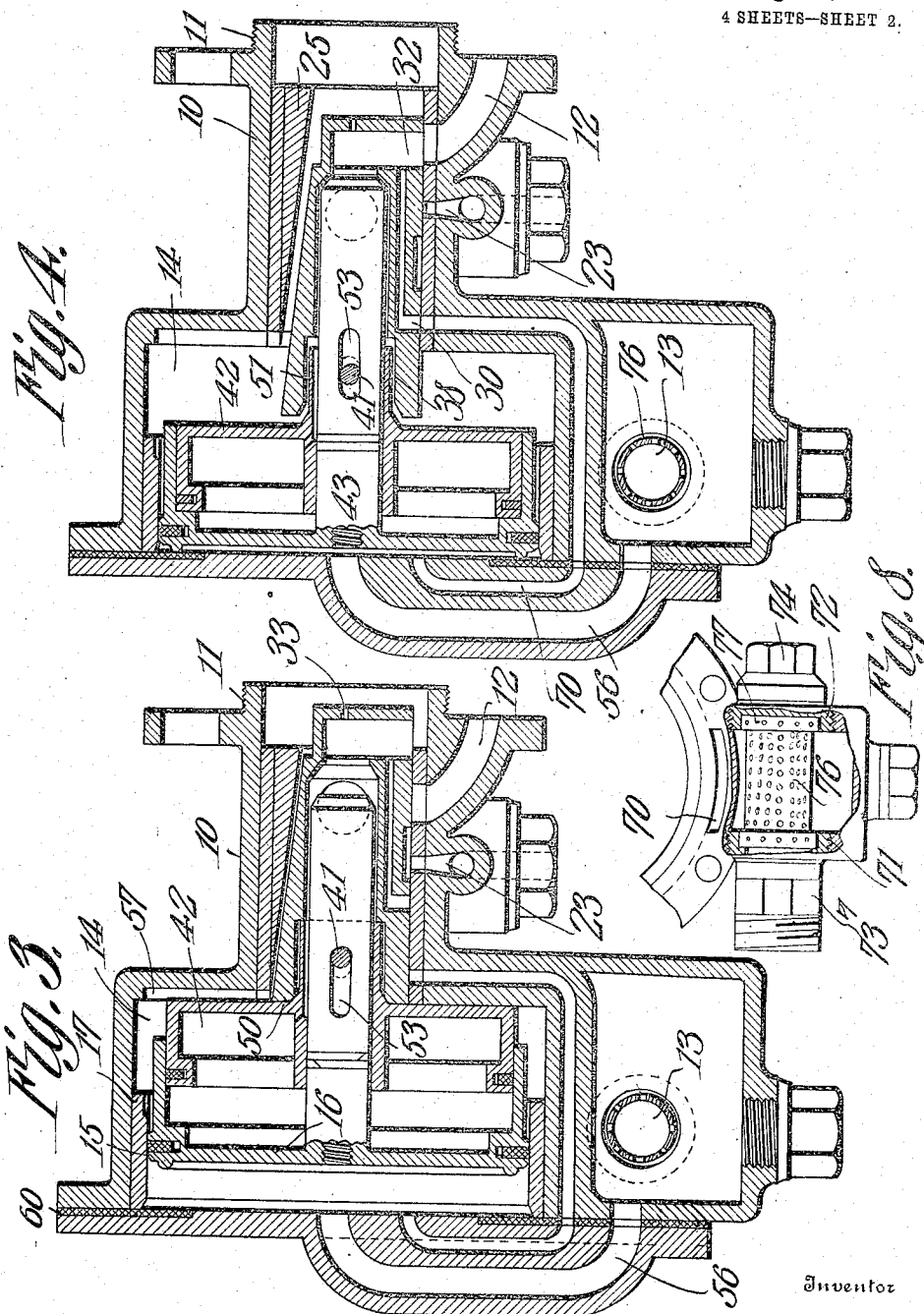
Inventor
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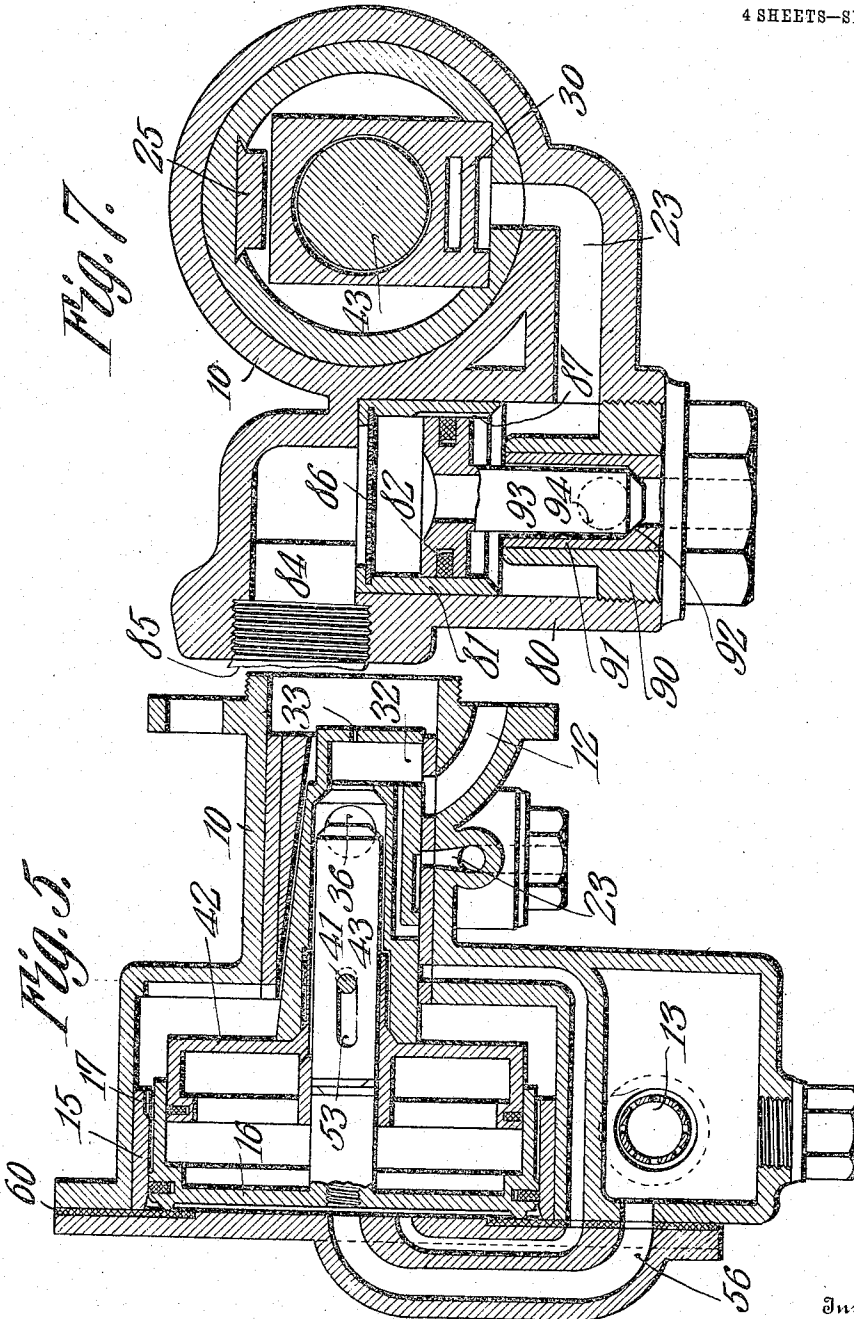
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Witnesses

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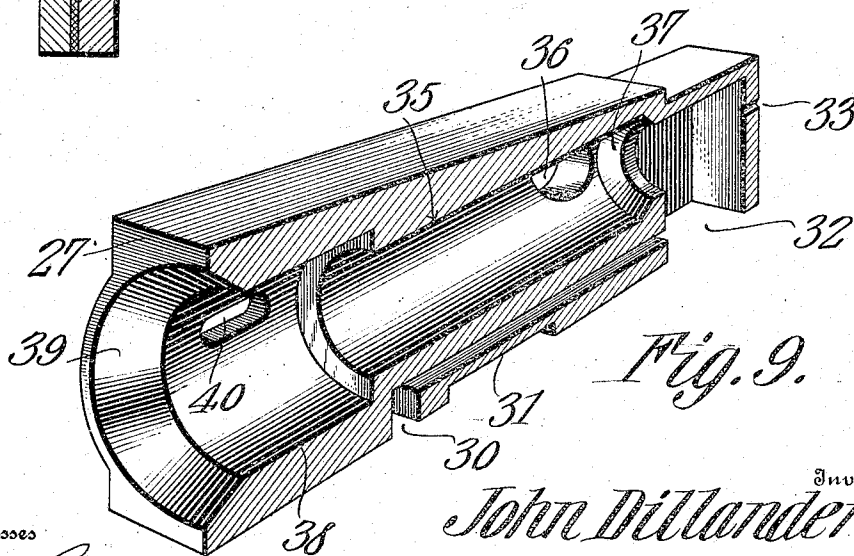
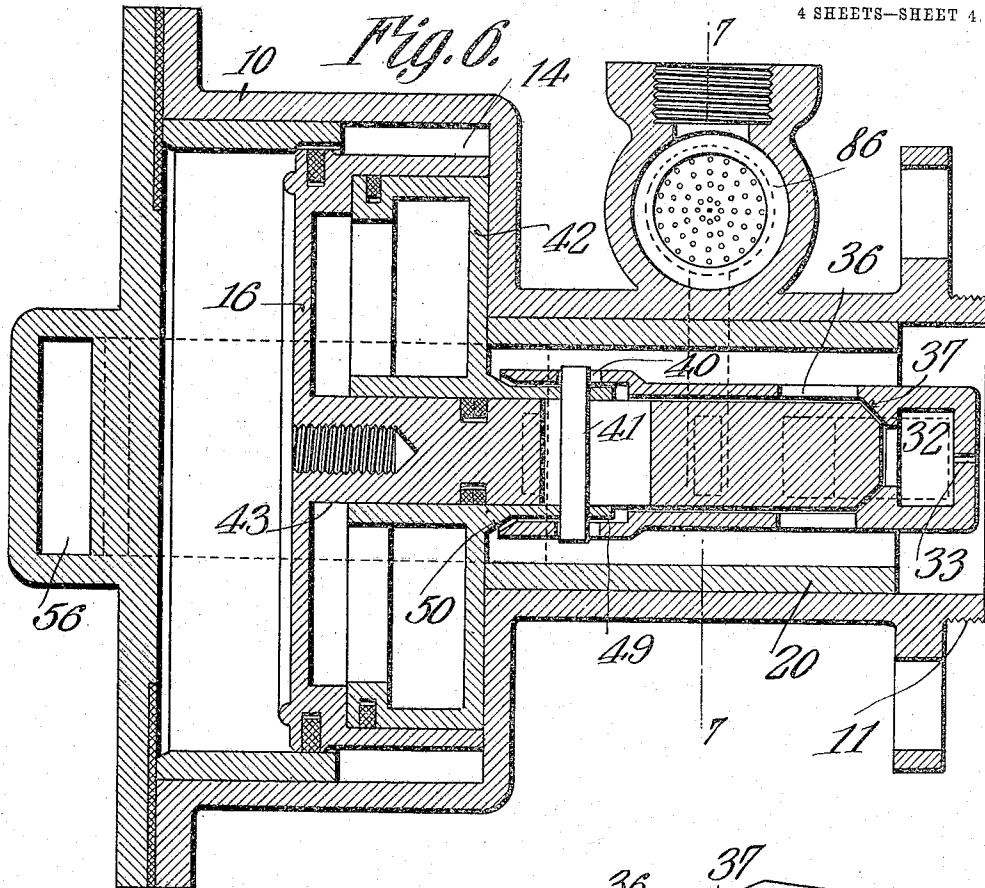
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Witnesses

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UNITED STATES PATENT OFFICE.

JOHN DILLANDER, OF TEMPLE, TEXAS.

TRIPLE VALVE.

No. 930,649.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed September 23, 1908. Serial No. 454,313.

To all whom it may concern:

Be it known that I, JOHN DILLANDER, a citizen of the United States, residing at Temple, in the county of Bell and State of Texas, have invented a new and useful Triple Valve, of which the following is a specification.

This invention relates to automatic air brake systems, and has for its principal object to provide a novel construction of triple valve by which many of the disadvantages of the ordinary valve are overcome.

A further object of the invention is to provide a triple valve in which the valve operating piston has a uniform stroke, that is to say, it moves to precisely the same extent on both graduated or service reduction and on emergency reduction, while the degree of movement of the valve is governed by the extent of train pipe reduction.

A further object of the invention is to provide a triple valve in which all of the usual graduating and other stop springs are dispensed with.

A still further object of the invention is to provide a triple valve of such construction as to render it impossible for the valve to move accidentally to emergency position and to move accidentally to release position, all of the movements being positive and directly under the control of the engineer.

A still further object of the invention is to provide a triple valve of such construction that service reduction may be made by the engineer without exercising undue care in the manipulation of the engineer's brake valve and emergency reduction is possible only when the engineer's brake valve is moved to emergency position.

A still further object of the invention is to provide for the automatic cutting off of communication between the train pipe and the brake cylinder immediately after the emergency application, and leaving the brake cylinder in communication with the auxiliary reservoir only.

A still further object of the invention is to provide a triple valve in which a single slide valve controls communication between the auxiliary reservoir and brake cylinder, and between the train pipe and the brake cylinder, thus dispensing with any auxiliary slide or check valve.

A still further object of the invention is to provide a novel form of triple valve in which provision is made for connecting from either side to the train pipe.

A still further object of the invention is to provide a novel form of strainer which may be readily placed in position in the lower portion of the valve casing and readily removed for cleaning or other purposes, without rendering it necessary to disconnect any of the piping.

With these and other objects in view, as will more fully hereinafter appear the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a vertical section of a triple valve constructed in accordance with the invention, the valve being shown in full release position. Fig. 2 is a similar view showing the position of the parts immediately after the service reduction. Fig. 3 is a sectional elevation showing the parts in lap position. Fig. 4 is a similar view showing the position of the parts immediately after an emergency reduction with the train pipe in communication with the brake cylinder. Fig. 5 is a similar view showing the second position after an emergency reduction with the train pipe communication cut off and the brake cylinder in communication with the auxiliary reservoir. Fig. 6 is a sectional plan view, on an enlarged scale, on the line 6—6 of Fig. 1. Fig. 7 is a transverse section on the line 7—7 of Fig. 6. Fig. 8 is a transverse section on the line 8—8 of Fig. 1. Fig. 9 is a sectional perspective view of the valve, detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The triple valve casing 10 is provided with the usual auxiliary reservoir connection 11, brake cylinder connection 12, and at the lower part of the main portion of the casing is a connection 13 for the train pipe. The main body of the casing is bored out to form a cylinder 14 which contains a bushing 15, and in this bushing is mounted the main piston 16, the latter being arranged to uncover the feed groove 17 when in the full release position shown in Fig. 1, so that air may

flow through to the auxiliary reservoir. The rear portion of the casing is in the form of a cylinder 19 which contains a bushing 20, the lower portion of which is grooved out and
 5 faced to form a valve seat 21. In this valve seat are two ports 22 and 23, the port 22 leading to the brake cylinder, and the port 23 to the exhaust, or, in the present instance, to a retaining valve which may be employed for
 10 the purpose of holding the pressure in the brake cylinder when the valve is in full release, and, therefore, auxiliary reservoir recharging position. The upper portion of the bushing 20 is provided with a dove-tailed
 15 groove for the reception of a correspondingly shaped wedge block 25 that is adapted to form a stop to prevent excessive inward movement of the main valve 27. The valve 27 is in the form of a generally rectangular
 20 block, the upper face of which is inclined to correspond to the inclination of the lower face of the wedge block 25, and in the lower portion of this valve are three ports 30, 31 and 32, the port 31 being in the form of a
 25 cavity through which the brake cylinder may exhaust to the port 23, while the ports 30 and 32 are in communication with each other and are utilized in the operation of the device as hereinafter described. The larger
 30 port 32 opens at the bottom of the valve and the rear wall of said port is provided with a small opening or port 33 through which auxiliary reservoir pressure may pass on both service and emergency reduction. The valve
 35 is further provided with a longitudinal bore 35 which communicates through lateral ports 36 with the open space at the side of the valve. At the inner end of the bore is a tapered seat 37, and at the opposite or outer
 40 end the bore is enlarged, as indicated at 38, and terminates in a tapered seat 39 which acts as a valve seat in several positions of the valve, as will be clear on reference to Figs. 3 and 5. The opposite sides of the valve are
 45 further provided with short horizontal slots 40 for the passage of a transverse pin 41.

The rear side of the main piston is hollow, and is bored out for the reception of an equalizing piston 42 that is free to slide within the
 50 main piston, which is also guided by a stem 43 projecting rearwardly from the main piston and having a tapered end portion that is arranged to engage against the tapered seat 37 at the inner end of the bore 35. The
 55 equalizing piston 42 is provided with a hub 49 that projects rearwardly in the direction of the auxiliary reservoir and enters the enlarged portion 38 of the valve bore, but the diameter of the hub is less than the diameter
 60 of the enlarged portion 38, so that the compressed air may freely pass between the two. At the point where the hub joins the equalizing piston, the base of such hub is tapered to form a valve 50 that is arranged to engage
 65 against the valve seat 39, and extending

partly through the hub is a port 51 communicating at one end with the space between the two pistons and opening at the opposite end at the extreme end of the hub. The hub
 70 carries the pin 41 which, as before stated, extends through the short slot 40 and the pin also extends through an elongated horizontal slot 53 that is formed in the stem 23.

When the parts are in the position shown in Fig. 1, train pipe pressure entering at 13
 75 passes up through the passage 56 to the cylinder 14 and operates on the main piston tending to thrust all of the parts to the right and retain the same in the position shown in Fig. 1. The air feeds through the leakage
 80 groove 17 and thence down the radial groove 57, passing through the casing on opposite sides of the valve to the auxiliary reservoir, and a portion of the air also passing down between the hub of the equalizing piston and
 85 wall of the portion 38 of the bore to the groove 51 and into the space between the two pistons, so that the latter becomes filled with air under auxiliary reservoir pressure.

To apply the brakes gently or secure what
 90 is known as a graduated or service application, the engineer reduces the train pipe pressure by operating the engineer's brake valve. The train pipe pressure being weakened in the cylinder 14 causes the auxiliary
 95 reservoir pressure to start all the parts moving to the left. The frictional resistance of the slide valve will cause pistons 16 and 42 to separate as shown in Fig. 2. The main piston continues its stroke and makes the full
 100 stroke against the packing ring 60. The parts are all carried to the left and port 32 is placed in communication with the port 22 leading to the brake cylinder, while the stem 43 opens the side ports 36, so that air may
 105 flow in through the sideports and the bore of the valve to the port 32 and a small quantity of air will, also, enter through the port 33. This air passes to the brake cylinder and applies the brakes gently.

It will be noted on reference to Fig. 1 that when the parts are in full release position the pin 41 is at the outer or left hand end of the slot 40 of the valve and near the left hand end of the long slot 53 of the stem, so that as
 115 the equalizing piston moves to the left with the main piston, the pin will operate against the left hand end wall of the slots 40 and pull the valve over to the position shown in Fig. 2, while the elongated slot 53 permits traveling of the main piston to the limit of its stroke without working engagement between the end of the long slot and the pin.

When the auxiliary reservoir air has passed into the brake cylinder to the amount
 125 of the train pipe reduction, the equalizing piston strikes against the rear wall of the cylinder. The valve will then stand in what is known as lap position with all of the ports blank, the auxiliary reservoir pressure being
 130

cut off from the brake cylinder and the pressure retained within the brake cylinder, while it is important to note that the space between the two pistons being now filled with air under full auxiliary reservoir pressure prevents the main piston from moving to the right and consequently assuming release position. The air between the two pistons cannot now escape, for the reason that the valve 50 at the end of the hub has moved into contact with the valve seat 39, so that the port 51 is closed. The weakened train pipe pressure cannot compress the higher auxiliary reservoir pressure between the two pistons, so that it is impossible to move the pistons close together, and, therefore, move the valve to release position, this being accomplished only by raising the train pipe pressure either by placing the engineer's brake valve on full release, or on running position. This feature of the invention is of the utmost importance in that it eliminates all auxiliary springs or stops, and, at the same time, positively prevents accidental movement of the valve from lap to release position.

Should the engineer wish to release the brake from lap position, which is the position shown in Fig. 3, he does so in the usual way by increasing the train pipe pressure, and the parts will then assume the running position shown in Fig. 1, permitting recharging of the auxiliary reservoir in the usual manner.

If the engineer wishes to apply the brakes in the emergency, a very quick and heavy train pipe reduction is made by proper movement of the engineer's brake valve. The train pipe pressure is suddenly weakened in the cylinder 14, and the high auxiliary reservoir pressure suddenly acts on the main and equalizing pistons, forcing both of them quickly to the left, the main piston making its full stroke as before. The reduction in train pipe pressure is so great and the movement of the pistons is so quick that there is no opportunity for the escape of the high pressure air from the space between the two pistons, therefore both pistons move as a unit and the valve will be carried back to the position shown in Fig. 4. When in this position, train pipe pressure passes from the lower portion of the casing through passage 56 to the cylinder 14, thence through the passage 70 to the port 30, to port 22, and the brake cylinder. As soon as the auxiliary reservoir pressure can feed through the small port 33 and reduce below the high pressure in the space between the two pistons, this body of air under pressure will force the equalizing piston to the right, or to the position shown in Fig. 5, moving the slide valve in such manner as to cut off the port 70 and stop the further flow of air from the train pipe, while allowing the auxiliary

reservoir pressure to continue to enter through the ports 36, bore 35, and port 32 to the brake cylinder. All parts will stand in this position, (Fig. 5), until the brakes are released in the usual way. It will be noticed that this operation is accomplished, that is, the reduction of the train pipe to quicken the action of the next brake and the application of the auxiliary reservoir air in both graduated and emergency applications of the brake, also the equalizing of the train pipe pressure with the brake cylinder pressure by means of the single slide valve, there being no auxiliary valve, either slide or check, and no stopping or cushioning springs or other devices to limit the movement of the parts. The opposite sides of the lower portion of the main casing are provided with threaded openings 71, 72, in either of which may be screwed a coupling sleeve 73 for connection to the train pipe, while the opposite opening is closed by a plug 74. This permits of connection of the train pipe to either side of the triple.

The strainer 76 is in the form of a short piece of tubing provided with numerous perforations and having a small band 77 riveted to each end. The ends of the strainer are seated in recesses formed in the sleeve 73 and plug 74, so that the strainer is available for air entering at either side, and, furthermore, it is possible to remove the strainer for cleaning or other purposes without the necessity of disconnecting any of the piping, it being only necessary to remove the plug 74.

At one side of the main valve casing, and preferably formed integral therewith, is a cylinder 80 having a bushing 81 in which is mounted a piston 82. The upper end of the casing communicates through a lateral port 84 with a pipe 85 leading to the engine, and through which air under any predetermined pressure may be forced. A small strainer 86 is preferably introduced at the top of the bushing to prevent the entrance of dirt, and at the side of the bushing is formed a small leakage groove 87. The lower end of the cylinder communicates with the port 23 which constitutes the exhaust of the triple valve, so that the piston 82 will be raised by the pressure of air escaping from the brake cylinder and will be forced downward by the pressure of air entering through the pipe 85, as well as by its own weight. The lower end of the cylinder is threaded and receives a plug 90. This plug is centrally bored and provided with a bushing 91 near the lower end of which latter there is formed a tapered valve seat 92 for the reception of a valve stem 93 that is carried by the piston 82. The bore of the bushing communicates with the interior of the cylinder through lateral ports 94. If there is no pressure in the pipe 85, the exhaust passing from the brake cylinder through the port 23 will raise the piston 82 and the air will escape through the ports 94

and the bore of plug 90 to the outer air, thus releasing the brakes, but if the engineer wishes to retain the brake cylinder pressure he forces air through the pipe 85, so as to hold the piston down and thus prevent the escape of air from the brake cylinder even after the triple valve has been moved to release position. This is of importance in that it permits the holding of the braking pressure while the auxiliary reservoir is being recharged in the ordinary manner, although it requires an extra pipe 85 leading throughout the train and provided with suitable means under the control of the engineer for connecting it to a suitable source of air supply.

Should the engineer wish to increase the pressure in the brake cylinder over and beyond the initial braking pressure which he applied, he may force air under high pressure through the pipe 85 and this air will keep the piston 82 down and will feed through the groove 84 into the lower portion of the cylinder and thence pass through the port 23, the port 31 of the slide valve and down through the port 22 to the brake cylinder, so that if desired pressure may be maintained in the brake cylinder for any desired period of time, and the operation will be wholly independent of the automatic braking system, while the latter may be held in reserve with its auxiliary reservoir fully recharged and ready for use. Provision may, also, be made for slightly reducing the pressure in the pipe 85 in case the braking power is in excess of that required, so that the air passing from the brake cylinder may slightly raise the piston 82 and partly open the valve to permit the escape of a portion of the pressure from the brake cylinder. It will thus be seen that the pressure in the brake cylinder may be maintained and may be varied as desired, while the triple valve is in full release position and the auxiliary reservoirs are being recharged in readiness for further applications.

What is claimed is:—

1. A triple valve piston having a uniform stroke; a main valve having a variable stroke, an open-ended hollow equalizing piston for which the main piston forms a cylinder and into which the open end of the hollow piston is movable, and a port through which air may enter between the pistons and the connecting means between the equalizing piston and the valve.

2. A triple valve piston having a uniform stroke and bored to form a cylinder with one end closed, an open-ended hollow equalizing piston mounted in the cylinder with its open end directed toward the closed end of the cylinder, a port for the admission of air between the two pistons, a main valve having a variable stroke, and a pin and slot connection between the equalizing piston and the valve to permit slight independent movements of the equalizing piston.

3. A triple valve piston bored to form a cylinder, an equalizing piston mounted in said cylinder, a main valve having a loose connection with the equalizing piston, and a port under the control of the equalizing piston for the admission and exhaust of air between the pistons.

4. A triple valve piston bored out to form a cylinder, an equalizing piston mounted in the cylinder, a main valve having a recess to receive the hub of the equalizing piston, there being a port leading through the hub to the space between the two pistons, the base of the hub and the adjacent end of the valve being shaped to form a valve for controlling said port, and a loose connection between the piston hub and the main valve.

5. A triple valve piston bored to form a cylinder, an equalizing piston mounted in said piston and provided with an extended hub the base of which is conical, a pin carried by the hub, a port extending through the hub to the space between the two pistons, a main valve recessed to receive the hub and provided with an elongated slot for the reception of the pin, the end of the recessed portion of the valve being tapered to form a seat for the reception of the conical face of said hub.

6. A triple valve piston bored to form a frame, an equalizing piston mounted in said frame and provided with a projecting hub tapered at the base, said hub having a port through which air may pass to the space between the pistons, a main valve recessed to receive the hub and provided with a tapered seat arranged to engage the tapered portion of the hub, a pin and slot connection between the hub and valve, and a stem extending from the main valve and entering the recess, said stem serving to impart direct movement to the valve in one direction.

7. In a triple valve, a main piston bored to form a cylinder, an equalizing piston mounted in said cylinder and provided with a projecting hub, the base of the hub being tapered, a port extending through the hub and permitting the admission of air to the space between the cylinders, a main valve having a longitudinal recess terminating in valve seats at both the inner and outer ends, the seat at the outer end being arranged to engage the tapered portion of the hub, a pin extending from the main valve and arranged to engage against the inner valve seat, and a pin and slot connection between the hub and valve.

8. In a triple valve, a main piston bored to form a cylinder, an equalizing piston mounted in said cylinder and provided with a projecting hub, the base of the hub being tapered, a port extending through said hub and communicating with the space between the two pistons, a stem extending from the main piston through the hub, a main valve having

a central recess for the reception of the stem and hub, the end of the recess being tapered to form a seat for the tapered portion of the hub and the side walls of the valve being provided with elongated slots, a pin carried by the hub and extending through said slots, the stem having an elongated slot to permit free working of the pin, and a pair of ports leading through the sides of the valve and under the control of said stem.

9. In a triple valve, a main piston bored to form a cylinder with one end closed, an open-ended hollow equalizing piston arranged in the cylinder with its open end toward the closed end of the cylinder, said pistons being movable under variations in train pipe and auxiliary reservoir pressure, a valve having a working connection with the equalizing piston, and a port through which auxiliary reservoir pressure may pass to the space between the pistons, whereby a body of air under pressure is confined between the pistons to operate said pistons and effect a movement of the valve on reductions of auxiliary reservoir pressure.

10. In a triple valve, a pair of pistons one of which is mounted within the other, a port through which the space between the pistons may be placed in communication with auxiliary reservoir pressure, and a main valve having a working connection with the innermost piston, the port being under the control of said valve in order to confine the air between the pistons in certain positions of the valve.

11. In a triple valve, a pair of pistons arranged one within the other, a port through which the space between the pistons may be placed in communication with auxiliary reservoir pressure, a single valve having a working connection with the innermost pis-

ton and movable on an emergency reduction to establish communication between the train pipe and brake cylinder and between the auxiliary reservoir and brake cylinder, the confined body of air between the two pistons serving on reduction of auxiliary reservoir pressure to force the valve to a position cutting off communication between the train pipe and the brake cylinder.

12. In a triple valve, a pair of pistons arranged one within the other, a port through which the air space between the pistons can be placed in communication with auxiliary reservoir pressure, a valve having communicating ports one in constant communication with auxiliary reservoir pressure and the other movable on emergency reduction into communication with train pipe port whereby both train pipe and auxiliary reservoir air may enter the brake cylinder, the confined body of air between the two pistons acting by expansion to operate said pistons after reduction of auxiliary reservoir pressure to thereby force the valve to position to cut off train pipe communication and retain the connection between auxiliary reservoir and the brake cylinder.

13. A triple valve casing having train pipe connections arranged opposite each other, a plug for closing either of said connections, and a removable strainer comprising a perforated tube removably mounted between one of the connections and the plug.

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

JOHN DILLANDER.

Witnesses:

CHAS. C. JONES,
F. L. DENISON.