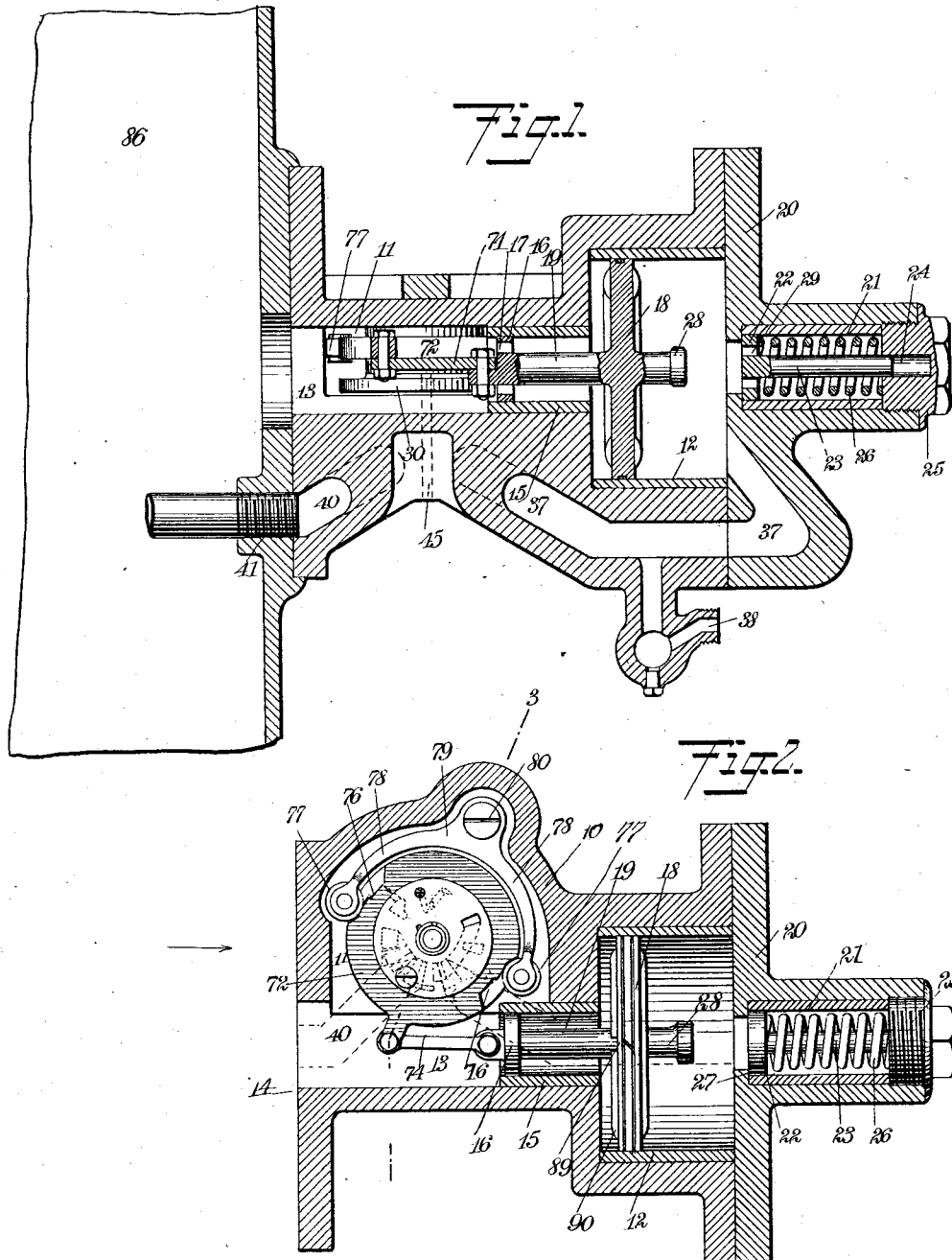


E. K. HUTCHISON.
 TRIPLE VALVE.
 APPLICATION FILED MAY 16, 1911.

1,052,342.

Patented Feb. 4, 1913.
 3 SHEETS—SHEET 1.



WITNESSES:
Benedict J. Jaffe
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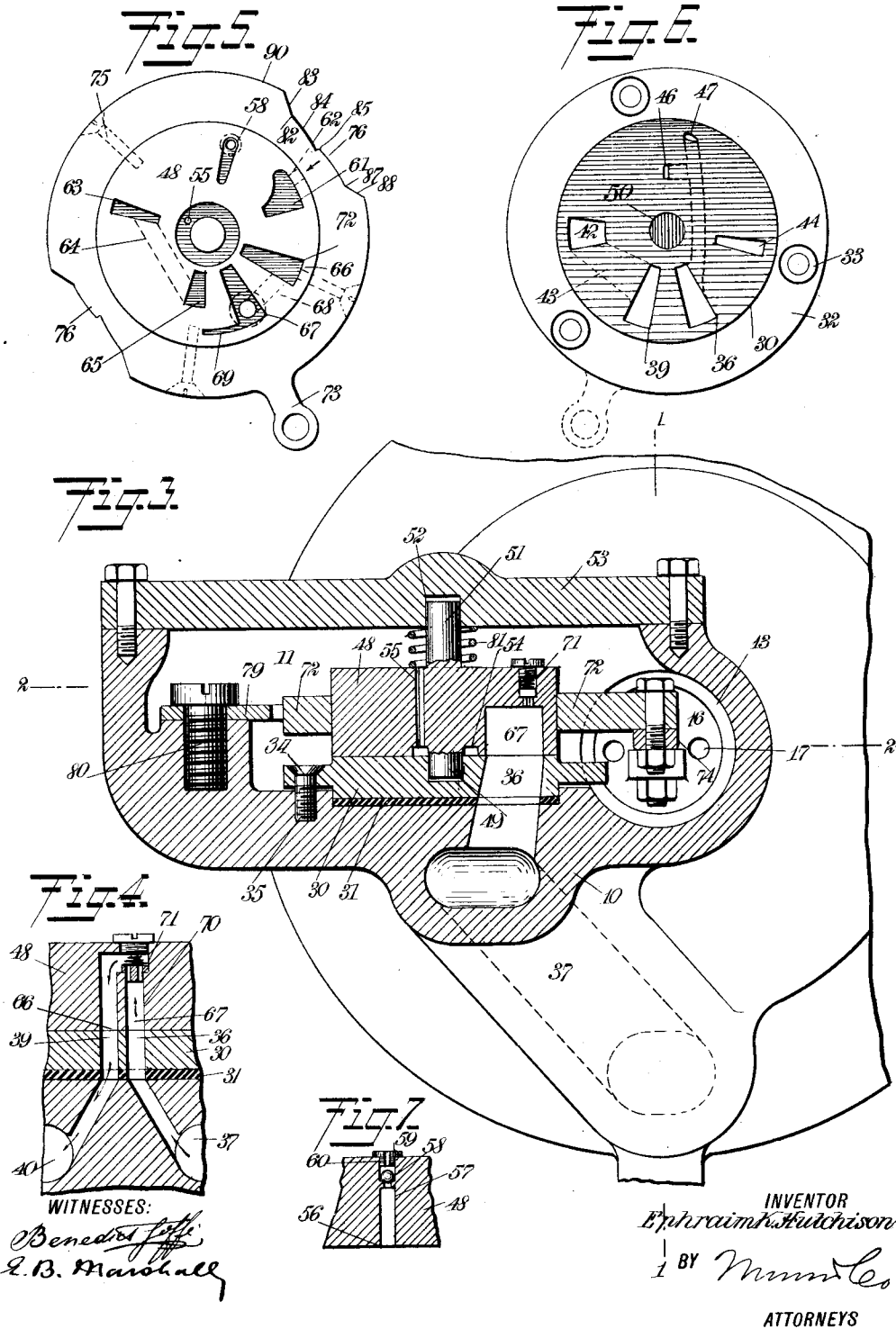
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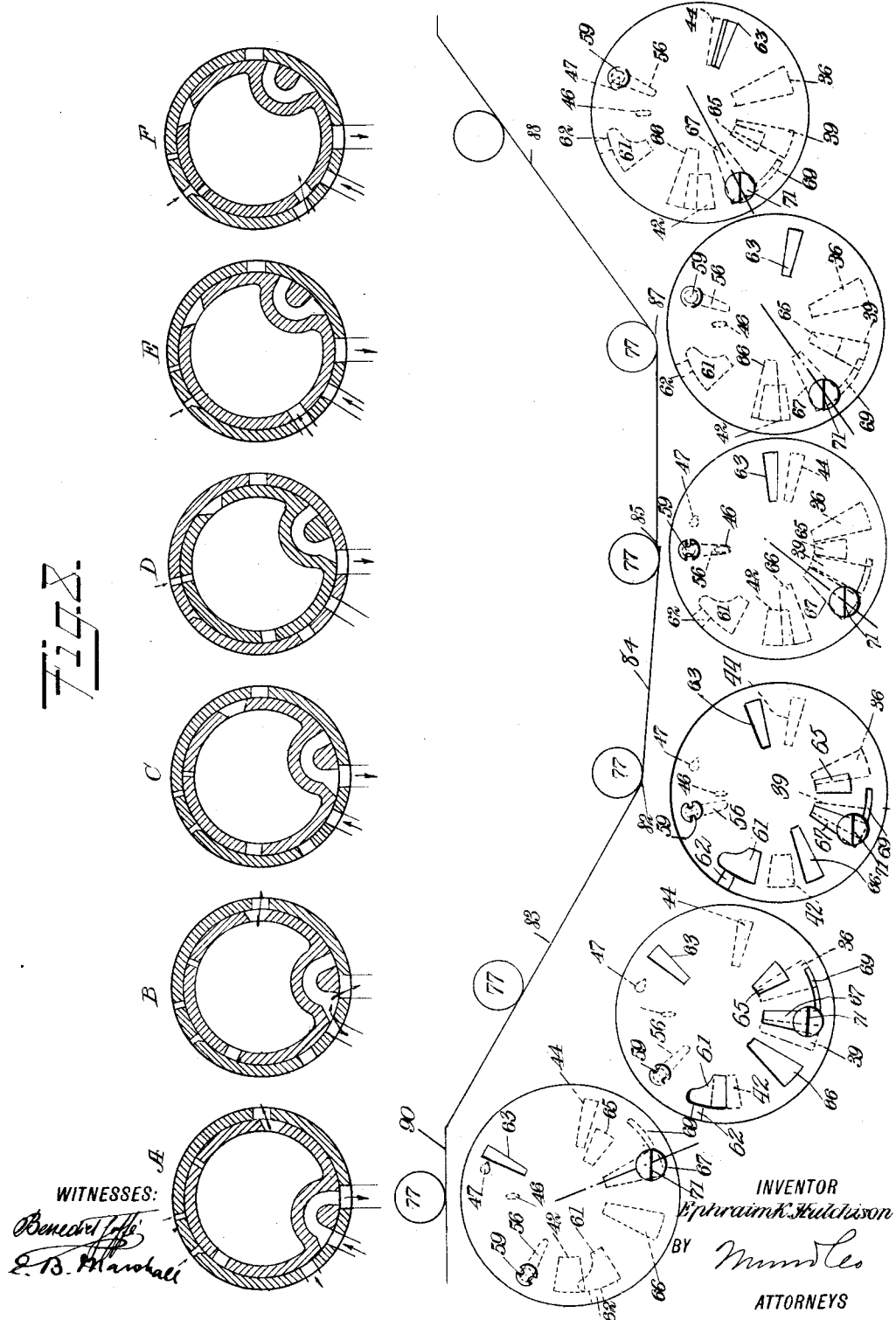


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UNITED STATES PATENT OFFICE.

EPHRAIM K. HUTCHISON, OF ELY, NEVADA.

TRIPLE VALVE.

1,052,342.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed May 16, 1911. Serial No. 627,543.

To all whom it may concern:

Be it known that I, EPHRAIM K. HUTCHISON, a citizen of the United States, and a resident of Ely, in the county of White Pine and State of Nevada, have invented a new and Improved Triple Valve, of which the following is a full, clear, and exact description.

My invention relates to triple valves and it has for its object to provide one which may be used to advantage either with similar valves or with triple valves of the Westinghouse or of the New York type, my triple valve being provided with a variable resistance device for retarding the action of the valve at predetermined points.

Another object of the invention is to provide a triple valve with means to retard the release of the brakes, and the filling of the auxiliary reservoirs at the front of long trains, so that on the rear cars of the train the brakes will in all cases be released and the auxiliary reservoirs will be recharged on or before the brakes are released and the auxiliary reservoirs are recharged at the front of the train.

Another object of the invention is to provide means in a service application of the brakes, to permit a limited supply of air to reach the brake cylinder direct from the train pipe, in addition to the air flowing from the auxiliary reservoir, to more quickly lower the train pipe pressure than is the case in present practice, where the reduction in train pipe pressure is obtained solely by the valve on the engine at the front of the train.

Another object of the invention is to provide means to permit only a limited supply of air to flow from the auxiliary reservoir to the brake cylinder when the triple valve is in the emergency position, so that a considerable flow of air from the train pipe to the brake cylinder on a car at the front of the train, will help to lower the train pipe pressure and assist to operate the triple valve on the rear cars.

Still another object of the invention is to provide a check valve in the passage leading from the train pipe through to the brake cylinder, to prevent the escape of air in the brake cylinder when the pressure in the brake cylinder which has been increased by pressure from the auxiliary reservoir, exceeds the pressure in the train pipe.

Still another object of the invention is to provide the triple valve with a check valve in the passage connecting the train pipe with the auxiliary reservoir, to prevent the air from feeding from the auxiliary reservoir to the train pipe at the rear of very long trains, at which point it is difficult to reduce the train pipe pressure immediately when the engineer's valve is moved to service position.

Still other objects of the invention will appear in the following complete specification, in which the preferred form of my invention is disclosed.

In the drawings similar characters of reference indicate corresponding parts in all the views, in which;

Figure 1 is a sectional view on the line 1—1 of Fig. 3; Fig. 2 is a sectional view on the line 2—2 of Fig. 3; Fig. 3 is an enlarged sectional view on the line 3—3 of Fig. 2; Fig. 4 is a fragmentary sectional view of the seat and valve members; Fig. 5 is an inverted plan view of the valve member; Fig. 6 is a plan view of the seat member; Fig. 7 is a fragmentary sectional view of the valve member; and Fig. 8 is a diagrammatic view showing the relative positions of the ports in the valve and seat members, and the relative positions of the resilient holding devices on the recessed side walls of the valve member, when the valve member is in the different positions relatively to the valve seat.

By referring to the drawings it will be seen that a casing 10 is provided, which has a compartment 11, a cylinder 12, and a passage 13, communicating with the compartment 11 and extending to the cylinder 12 at one end, and to the auxiliary reservoir port 14 at the other end. In this passage 13 there is a guideway 15, in which a guide member 16 is adapted to reciprocate, this guide member 16 being provided with orifices 17 which extend therethrough and being connected to a piston 18 by means of a piston rod 19. Secured to the casing 10 at the end of the cylinder 12 there is a head member 20, having a recess 21, in which a guide 22 is adapted to move, a rod 23 being secured to this guide 22, the said rod 23 projecting in a recess 24 in a nut 25, which is provided for closing the end of the compartment. A spring 26 is coiled around the rod 23 between the guide 22 and the nut

25, this spring 26 being adapted to hold the guide 22 yieldingly against the stop 27, which is formed in the head member 20. Secured to the piston 18 there is a stud 28, which is adapted to engage the guide 22.

As will be seen by referring to Fig. 1 of the drawings, the guide 22 is provided with orifices 29, which are provided for equalizing the pressure on opposite sides of the said guide.

Referring to Figs. 3 and 6 of the drawings, it will be seen that the seat member 30 is provided with an annular flange 32, having orifices 33, and that it is disposed at the bottom of the compartment 11 on a gasket 31, screws 34 being provided which are disposed in orifices 33, and mesh in threaded orifices 35 in the casing 10. This seat member 30 has a port 36 in communication with the passage 37, in the casing, which leads to the train pipe port 38. The port 39 in the seat member 30 communicates with the passage 40, which leads to the brake cylinder port 41. Connected with the port 39 by a passage 43 at the bottom of the seat member, there is a port 42. The port 44 in the seat member 30 connects with the passage 45, which leads to the exhaust. The ports 46 and 47 in the face plate 30 are connected at the bottom of the seat member with the port 36. While the port 46 is elongated and is radially disposed, it should be noticed that the port 47 is in the shape of an arc, and that it tapers toward the right.

On the seat member 30 the valve member 48 is disposed. This valve member 48 has a depending stud 49, which extends into a recess 50 in the seat member 30. The valve member 48 also has an upwardly-extending stud 51, which projects in a recess 52 in the detachable member 53, of the casing 10. Around the stud 49 there is a recess 54, in the bottom of the valve member 48, a passage 55 being made in the valve member 48, affording communication from the top of the valve member to the said recess 54. The said passage 55 and recess 54 are provided to reduce the seat friction and in a measure to counteract the downward pressure of the valve member 48, caused by the compressed air in the compartment 11. In the valve member 48 there is an elongated and radially disposed recharging port 56, which communicates with the passage 57 which extends through the top of the valve member 48, as best shown in Fig. 7 of the drawings. In this passage 57 there is a check valve 58, which permits the air to pass upwardly from the ports 46 and 47, in the seat member 30 into the compartment 11, and thence into the auxiliary reservoir, but prevents any air from passing from the said compartment 11 through the ports 46 and 47 and thence to the train pipe. A screw 59 with openings 60 is used to close

the top of the passage 57, and prevent the displacement of the check valve device 58. The port 61 in the valve member 48 has a lateral opening 62, which communicates with the compartment 11, this port 61 being adapted to communicate with the port 42 in the seat member 30, to permit air from the auxiliary and the compartment 11 to pass to the port 42, in the seat member 30, and through the passage 43 connecting the said port 42 with the port 39, leading to the brake cylinder. The port 63 in the valve member 48 is provided for communicating with the exhaust port 44, in the seat member 30, this port 63 being connected by a passage 64 in the valve member 48 with a port 65, which is adapted to connect with the port 39, leading to the brake cylinder. The port 66 in the valve member 48 is adapted to communicate with the port 39 in the seat member 30, the said port 39 leading to the brake cylinder, and this port 66 in the valve member 48 is connected with the port 67 in the valve member 48 by means of the passage 68, which is disposed in the valve member. This port 67 is provided for communicating with the port 36 in the seat member 30, the said port 36 being connected with the train pipe, as has been stated.

As will best be seen by referring to Fig. 5 of the drawings, the port 67 has a lateral extension 69, which will permit a restricted flow of air from the train pipe. In the vertical passage 70 in the valve member 48, leading upwardly from the port 67, there is a check valve 71, this check valve 71 being provided for permitting the air to flow from the port 67 through the passage 70 to the passage 68, but preventing the air from flowing back from the port 66 through the passage 70 to the port 67. Secured to the valve member 48 there is a ring 72, which has an arm 73, the said arm 73 being connected with the guides 16 by means of a link 74. I prefer to connect the said link 74 loosely with the guide member 16, and the arm 73, so that the piston 18 will move a short distance before it picks up its load.

As will be seen by referring to Fig. 5 of the drawings, the rings 72 which may be readily replaced, are secured to the valve member 48, by means of radially disposed screws 75. On opposite sides of the ring member 72 there are recesses with surfaces 76, which are adapted to be gripped by the rollers 77, journaled to the resilient arms 78 of the gripping device 79, this resilient gripping device 79 being pivoted at 80 to the casing 10. A spring 81 is disposed around the stud 51 between the detachable member 53 of the casing and the valve member 48.

The diagrammatic view in Fig. 8 of the drawings, shows the six positions of the

valve member 48 relatively to the valve seat member 30. When the triple valve is in lapped position, as shown at C, none of the ports in the valve member 48 permits the
 5 air to flow through any of the ports in the seat member 30. When the triple valve is in this position, the rollers 77 on the resilient arms 78 are disposed at the apexes 82 in the recesses in the ring member 72. When
 10 with a standard pressure of seventy pounds in the train pipe the engineer desires to check the speed of the train, he places his engineer's brake valve in service application, until a reduction of say five pounds is
 15 made in the train pipe. When this takes place the piston which is subject to train pipe pressure, as has been described, is moved to the right, until the stud 28 comes in contact with the head 22. The further
 20 movement of the piston 18 toward the right is prevented by the spring 26. When the piston 18 moves, as has been described, it will cause the valve member 48 to rotate against the gripping power of the resilient
 25 arms 78, until the ports are in the position shown at B in Fig. 8, with the rollers 77 disposed on the inclines 83 of the lateral recesses in the valve member 48. When the
 30 valve member is disposed in the service position as shown at B, air is permitted to flow from the auxiliary reservoir and the compartment 11, through the passage 62, and through the ports 61 to the port 42 in
 35 the seat member 30, which communicates with the brake cylinder, as has been described, and a limited supply of air is also permitted to flow up through the port 36 of the seat member 30 into the end
 40 of the lateral extension 69 of the port 67 and through the said lateral extension 69 to the port 39 of the seat member 30. In this position of the valve the lateral extension 69 is disposed over a
 45 portion of the port 36, and a portion of the port 67 of the valve member is disposed over a portion of the port 39 of the seat member. When the valve is in service, communication is not open between the ports 36 and
 50 39 of the seat member through the vertical passage 70 and the check valve 71 until the valve member 48 moves to a position, shown at A in Fig. 8, where the port 66 of the
 55 valve member 48 is disposed over the port 39 of the seat member 30. It will therefore be seen that when the triple valve is in service position, air will flow not only from the auxiliary reservoir into the brake cylinder, but also from the train pipe into the
 60 brake cylinder. When the pressure in the auxiliary reservoir has fallen to a trifle below the pressure in the train pipe, which now, after said reduction has been made, is at about sixty-five pounds, the rollers 77
 65 which are resting on the inclines 83, are pressed against the said inclines 83 of the

recesses in the ring member with nearly enough force to move the ring member, and with it the valve member 48, to that position shown at C in Fig. 8 of the drawings. It
 70 will therefore be seen that as soon as the pressure in the auxiliary reservoir falls a trifle under the pressure in the train pipe the grip of the rollers 77 will be sufficient to move the valve member 48 and the piston
 75 18 back to lapped position, which prevents any air from passing through the ports in the seat member 30. If the service application of the brakes which has been made is not sufficient to meet the requirements another reduction may be made in the train
 80 pipe pressure in a manner readily understood. But should the engineer desire, he may, with my triple valve, recharge his auxiliary reservoirs with his engineer's brake valve in running position. To do this, after
 85 making the necessary reduction in train pipe pressure, it is merely necessary to return the engineer's brake valve to running position, when air from the reservoir will begin to feed slowly into the train pipe, and will build the
 90 train pipe pressure from sixty-five pounds back to seventy pounds, which is normal pressure. As soon as the pressure in the train pipe reaches sixty-five pounds, the
 95 rollers 77 move down a slight incline 84, of the recesses in the ring member, until the rollers 77 abut against the niches 85 in the said recesses, and when the rollers 77 reach the said niches, the valve member will
 100 be disposed relatively to the valve seat as shown at D in Fig. 8 of the drawings. In this position the air will flow from the port 46 in the seat member 30, which communicates with the train pipe, through the port
 105 56, to the compartment 11, and from thence to the auxiliary reservoir 86.

It will be seen by examining Fig. 8 of the drawings that when the air passes from the said port 46 to the said port 56, the port 65
 110 does not communicate with the port 39, and that therefore the pressure is maintained in the brake cylinder. When the engineer's brake valve is in running position the auxiliaries throughout a long train will be
 115 slowly recharged from the train pipe, and provided that the difference in pressure in the train pipe and in the auxiliary does not exceed two and one-half pounds, the rollers
 120 will not move over the niches 85 and change the position of the valve member relatively to the seat member 30. Both the train pipe pressure and the auxiliary reservoir pressure may be slowly raised until seventy
 125 pounds, the normal pressure, is reached, when the engineer's brake valve may be closed, preventing any further escape of the air from the main reservoir into the train
 pipe. The auxiliary reservoirs on the train having been recharged the engineer may, if
 130 desired, make a second reduction in train

pipe pressure not from sixty-five pounds train pipe pressure but from seventy pounds train pipe pressure, the same as in the first case, and these reductions from the normal train pipe pressure may be made indefinitely should occasion require. When the engineer no longer desires to retard the movement of the train, by throwing the engineer's brake valve to full release, he opens communication through a very large port between the main reservoir and the train pipe, and the air flows quickly through the train pipe with great velocity. As soon as the difference in train pipe pressure over the auxiliary reservoir pressure rises to two and one-half pounds, the pistons are moved to release position, and the rollers 77 move over the niches 85 to the apexes 87 at the start of the inclines 88. When the rollers 77 reach the apexes 87, the ports in the valve member will be disposed relatively to the ports in the seat member as shown at E in Fig. 8 of the drawings. When in this position the port 65 in the valve member 48 will register with the cylinder port 39 in the seat member 30, so that the air from the brake cylinder may pass from the port 39 to the port 65 and from thence through the passage 64 to the port 63, the said port 63 communicating with the exhaust port 44 in the seat member 30. In this way the air will escape rapidly from the brake cylinder. At the same time the port 47 in the seat member 30 will communicate with the port 56 in the valve member 48, to permit the air to flow from the train pipe into the compartment 11, and from thence to the auxiliary reservoir 86.

With triple valves which are now in use on very long trains, there is great difficulty in quickly releasing the brakes and recharging the auxiliary reservoirs, inasmuch as while the pressure in the train pipe quickly operates the triple valves which are near the locomotive, the triple valves at the rear of the train are not operated until some time thereafter. This is so for the pressure at the rear of the train pipe is often very much less than at the locomotive. With my triple valve, while the pressure in all cases will be sufficient to move the valve member relatively to the seat member so that the ports therein will be positioned as shown at E in Fig. 8 of the drawings, any excess of pressure in the train pipe near the locomotive will move the piston 18 to the left, until it strikes against the head of the cylinder 12, which will cause the valve member 48 to move to a position where the rollers 77 will be disposed on the incline 88, and the ports in the valve member will be disposed relatively to the ports in the seat member as shown at F in Fig. 8 of the drawings. When in this position the valve member 48 is moved so far that the port 56 communi-

cates only with the tapered right end of the port 47, and the passage from the brake cylinder port 39 to the port 65 is greatly restricted. This will make it possible to recharge the auxiliary reservoirs throughout the train substantially at the same time, for with the greater pressure and with the restricted ports at the front of the train, and with the unobstructed ports and the reduced pressure at the rear of the train, the air from the train pipe will recharge the auxiliary reservoirs at about the same time. In any case the auxiliary reservoirs at the rear of the train will be recharged not later than at the time the auxiliary reservoirs are recharged at the front of the train. The restricted ports leading from the brake cylinder at the front of the train will make it certain that the brakes are not released at the front of the train before the brakes are released at the rear of the train. When the piston 18 has been moved to the left and rests against the head of the cylinder 12, the effective area of the piston is not changed, since the air may pass through the slots 89 in the abutting ring 90 on the piston 18.

My retarded feed to the auxiliary reservoirs is a very valuable improvement in triple valves, two great benefits being obtained from its use. One of these is that in a long train it is necessary to leave the engineer's brake valve lever in release position a long while in order to build a pressure at the rear of the train for releasing the brakes and re-charging the auxiliary reservoirs, and that if the ports leading to the auxiliary reservoirs on the front car be opened wide with a greater pressure at the front of the train the auxiliary reservoirs on the front cars will be overcharged. When such is the case when the engineer's brake valve lever is placed again in running position, many of the triple valves on the front cars will operate to re-set their brakes. The other benefit obtained by this retarded feed to the auxiliary reservoirs is to reduce the feed to the auxiliary reservoirs at the front of the train to permit the engineer to build up more rapidly a high pressure at the rear of the train for a more effective release. My triple valves in their release position will be disposed from a full release position at the rear of the train, where the train pipe pressure is the lowest, to a retarded release position at the front of the train, where the train pipe pressure is the highest, this being so for the greater the pressure in the train pipe above a predetermined point, the more retarded their release position, until they are at their greatest retarded release position.

I wish to call attention to the fact that the port 47 tapers toward the right, and that when the triple valve is in retarded recharging and retarded release position, only a small area of the port 47 will communi-

cate with the port 56. I wish also to call attention to the fact that when my triple valve is in service position with the ports in the valve member disposed relatively to the valves in the seat chamber, as shown at B in Fig. 8 of the drawings, the lateral extension 69 of the port 67 will be disposed over the train pipe port 36 in the seat member 30, with a portion of the port 67 disposed over the brake cylinder port 39, so that a little air may flow from the train pipe into the brake cylinder in addition to the air which flows into the brake cylinder from the auxiliary reservoir. This little reduction in train pipe pressure by each triple valve along the train of cars helps to reduce the train pipe pressure more quickly than is the case where the reduction of train pipe pressure is obtained solely by the air passing from the rear of the train to the engineer's brake valve.

When the engineer desires to make an emergency application of the brakes he moves the brake valve lever to emergency position, whereupon all the air in the train pipe rushes ahead and as the triple valves in the direction of the rear of the train successively feel the reduction in pressure the studs 28 on the pistons 18 move the heads 22 against the pressure of the springs 26, and the piston, by means of the mechanism described, moves the valve member 48 so that its ports are disposed relatively to the ports in the valve seat 30, as shown at A in Fig. 8 of the drawings. In this position the port 67 in the valve member 48 communicates with the train pipe port 36 in the seat member 30, and the port 66 in the valve member 48 communicates with the brake cylinder port 39 in the seat member 30, which permits the air to flow from the train pipe directly into the brake cylinder. A portion of the port 61 in the valve member 48 communicates with a portion of the port 42 in the seat member 30, so that a little air is permitted to flow from the auxiliary reservoir into the brake cylinder. While the air will feed into the brake cylinder from the train pipe as long as the train pipe pressure is above the pressure in the brake cylinder, when the pressure in the train pipe is reduced below the pressure in the brake cylinder, by the operation of the engineer's brake valve, the check valve 71 operates to prevent the air in the brake cylinder from escaping into the drain pipe. The air in the brake cylinder and in the auxiliary reservoir will then quickly equalize.

When my improved triple valve is used in connection with other types of triple valves the operation is the same in all particulars, except that since the other triple valves do not recharge while the brakes are on, it is useless to work that feature, unless there are sufficient of my triple valves in use

on the train to hold the train while the others are released for recharging the auxiliary reservoirs.

When my triple valves are used in connection with other types of triple valves and the engineer desires to make a series of service applications of the brakes, he proceeds by placing his engineer's brake valve lever in lap position after each reduction, instead of in running position. If seven-pound reductions are made in the train pipe pressure, three of such reductions will bring the train pipe pressure down to about forty-nine or fifty pounds, which is at about the point where the auxiliary reservoirs and the brake cylinder pressures will equalize. It is therefore useless to make any further service applications of the brakes until the auxiliaries have been recharged.

When my triple valves are used in connection with triple valves of other types, and the engineer desires to recharge the auxiliary reservoirs, he throws his engineer's brake valve lever into full release position, whereupon the pressure in the train pipe will increase rapidly, and all the auxiliary reservoirs will be recharged, and the air in all the brake cylinders will be permitted to escape. However, if desired, the engineer may move the brake valve lever into running position, which does not build up the pressure in the train pipe so rapidly, and when this is done, the auxiliary reservoirs connected with the Westinghouse, New York, and other similar types of triple valves, will be recharged, and communication will be afforded between the brake cylinders connected therewith and the atmosphere, while my triple valves will be in position to prevent the escape of the air from the brake cylinders, while permitting the air to recharge the auxiliary reservoirs.

It will be understood that when the rollers 77 reach the level 90 on the ring member 72, and in consequence the power of the resilient arms 78 to rotate the valve member 48 has ceased, the spring 26 takes up the work, and with the head 22 and the stud 28, tends to move the piston 18 to the left, on any slight increase in train pipe pressure. The spring 81 is only needed when the pressure in the auxiliary reservoir is greatly diminished for when the auxiliary reservoir has been charged, the air contained therein which communicates with the compartment 11, will tend to force the valve member 48 on its seat.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a triple valve having a seat member with openings for communicating with the train pipe, the brake cylinder, the exhaust, and the auxiliary reservoir, a valve member movable relatively to the seat member for

co-acting therewith and having a passage for connecting the openings in the seat member which lead to the brake cylinder and to the exhaust, a passage for connecting openings in the seat member which lead to the brake cylinder and the train pipe, an opening for connecting the auxiliary reservoir with the brake cylinder, and an opening for connecting with the auxiliary reservoir an opening in the seat member which communicates with the train pipe.

2. A triple valve having a passage connecting a train pipe port with an auxiliary reservoir port, a check valve in the passage for permitting air to pass to the auxiliary reservoir but preventing the air from passing from the auxiliary reservoir to the train pipe, an additional valve for commanding the passage, the said valve having a side with a recessed portion, and resilient means for engaging the said recessed portion of the side when the valve is in position to open the passage.

3. A triple valve having a seat member with openings for communicating with a train pipe port, a brake cylinder port, an exhaust port, and an auxiliary reservoir port, the said seat member having a passage for connecting the openings in the seat member communicating with the auxiliary reservoir port and the brake cylinder port, and a valve movable relatively to the seat member for co-acting therewith and having a passage for connecting the ports in the seat member which lead to the brake cylinder and to the exhaust, a passage for connecting the ports in the seat member which lead to the brake cylinder and to the train pipe port, and an opening for connecting the auxiliary reservoir port in the seat member with an auxiliary reservoir.

4. A triple valve having a passage between a train pipe port and an auxiliary reservoir port, a valve commanding the passage for opening the passage when the pressure in the train pipe reaches a predetermined point, and for restricting the passage when the pressure in the train pipe exceeds the predetermined point, means operable by the pressure in the train pipe for actuating the valve, said valve having a side with a recessed portion provided with an inclined end, and a resilient device engaging the said inclined end when the valve is in position to restrict the passage.

5. A triple valve having a passage between a brake cylinder port and an exhaust port, a valve commanding the passage for opening the passage when the pressure in the train pipe reaches a predetermined point and for restricting the passage when the pressure in the train pipe exceeds the predetermined point, the said valve having a side with a recessed portion provided with an inclined end, means operable by the pres-

sure in the train pipe for actuating the valve, and a gripping device engaging the side of the valve at the recessed portion when the valve is in position to open the passage, and engaging the said inclined end when the valve is in position to restrict the said passage.

6. A triple valve having a passage between a train pipe port and an auxiliary reservoir port, and a second passage between a brake cylinder port and an exhaust port, a valve member for commanding the passages for opening the same when the pressure in the train pipe reaches a predetermined point, means operable by pressure in the train pipe for actuating the valve member, the said valve having a side with a recessed portion provided with a niche, and a resilient member for engaging the side, the said resilient member engaging the niche when the valve is in position to open the first mentioned passage, and engaging the recessed portion of the said side beyond the niche when the valve member is in position to open the second passage.

7. A triple valve having a seat member with a port leading from the train pipe, a port leading to the brake cylinder, and a port connected by a passage with the last mentioned port, and a valve member adapted to coöperate with the seat member and having two ports connected by a passage for affording communication between the port in the seat member leading from the train pipe and the port in said seat member leading to the brake cylinder, the said valve member also having a port for connecting the auxiliary reservoir with the port in the seat member connected with the brake cylinder port, one of the first-two-mentioned ports in the valve member being provided with an extension adapted to be disposed over the port in the seat member leading from the train pipe to afford a restricted communication between the train pipe and the brake cylinder when the port in the valve for connecting the auxiliary reservoir with the brake cylinder port is in communication with the port in the seat member connected with the brake cylinder port.

8. A triple valve, having a seat member with a passage for connecting a train pipe port with an auxiliary reservoir port, a valve member adapted to slide in opposite directions on the said seat member for commanding the passage, the valve member being adapted to open communication through the passage when in a predetermined position and to restrict the passage when moved in either direction, the said valve member having a recess in its side, means operable by the pressure in the train pipe for actuating the valve member, and a resilient member for engaging the said recess when the valve is in position to open said passage.

9. A triple valve having a seat member provided with a brake cylinder port and a port connected with a passage leading to an exhaust, a valve slidably disposed on the said seat member and adapted to move in opposite directions, the said valve having a side with a recessed portion, the said valve being provided with ports connected by a passage, one of said ports when the valve member is in a predetermined position registering with the brake cylinder port in the seat member, and the other of said ports registering with the port in the seat member communicating with the exhaust for opening the communication between the brake cylinder and the exhaust, the said valve when moved in either direction restricting said communication, and a resilient member for engaging the side of said valve at the recessed portion.

10. A triple valve having a passage leading from an auxiliary reservoir port to a brake cylinder port, a passage leading from a train pipe port to a brake cylinder port, a rotary valve member for commanding the passages for automatically restricting one passage as the other passage is opened to permit air to flow more freely therethrough, and a resilient member for engaging the sides of the valve.

11. A triple valve having a passage leading from an auxiliary reservoir port to a brake cylinder port, a passage leading from a train pipe port to a brake cylinder port, a valve member for commanding the passages for automatically restricting the first passage as the second passage is opened widely to permit air to flow more freely therethrough and for restricting the second passage as the first passage is opened to permit air to flow more freely therethrough.

12. A triple valve having a passage leading from an auxiliary reservoir port to a brake cylinder port, a passage leading from a train pipe port to a brake cylinder port, and valve mechanism for automatically partially opening the passage from the train pipe port to the brake cylinder port when the valve is in service position with the auxiliary reservoir port communicating with the brake cylinder port for reducing the pressure in the train pipe to hasten the action of neighboring valves.

13. A triple valve having a seat member with a port leading from the train pipe and a port leading to the brake cylinder, and a valve member adapted to cooperate with the seat member and having two ports adapted to communicate respectively with the train pipe port and the brake cylinder port in the seat member, the said ports in the valve member being connected by a passage for affording communication between the train pipe and the brake cylinder, a portion of the port in said valve member for communica-

tion with the train pipe port being adapted to be disposed over the brake cylinder port and having an extension disposed over the train pipe port to afford a restricted communication between the train pipe and the brake cylinder when the other port in the valve member is out of registry with the brake cylinder port in the seat member.

14. A triple valve having a passage leading from an auxiliary reservoir port to a brake cylinder port and a passage leading from the train pipe port to the brake cylinder port, a rotary valve member for commanding the passages for automatically opening the second passage to reduce the pressure in the train pipe port when the first passage is opened for a service application, a check valve in the second passage, and a resilient member engaging the sides of the valve member.

15. In a triple valve, a valve seat having ports, a valve member commanding the ports and having a face with an indentation adapted to be engaged by a resilient member, and a pivoted resilient member engaging the face of the valve member for retarding the movement of the valve member.

16. In a triple valve, a valve seat having ports, a rotary valve member for commanding the ports and having a ring surrounding the same and provided with a face adapted to be engaged by a resilient member, and a resilient member for engaging the face of the ring of the valve member.

17. In a triple valve, a valve seat having ports, a valve member commanding the ports having a face with surfaces disposed at an angle to each other, and a resilient member engaging the surfaces of the valve member.

18. In a triple valve casing, a seat member having ports, a rotary valve member pivoted to the seat member for commanding the ports, and a resilient member mounted in the casing and having arms for engaging the opposite sides of the rotary valve member.

19. In a triple valve casing, a seat member having ports, a rotary valve member having a face with surfaces at angles to each other and pivoted to the seat member for commanding the ports, and a resilient member mounted on the casing and having arms for engaging opposite sides of the rotary valve member.

20. In a triple valve having a cylinder, a seat member having ports, a rotary valve member for commanding the ports, a piston disposed in the cylinder and exposed on one side to the pressure in the train pipe, means connecting the piston with the rotary valve member, and resilient means for engaging the valve member.

21. In a triple valve having a cylinder, a seat member having ports, a rotary valve member for commanding the ports, a piston

disposed in the cylinder, a link connecting one side of the piston with the rotary valve member, a stud projecting from the other side of the piston, an extension member in which a compartment is formed for communication with the cylinder, a head in the compartment adapted to be engaged by the said stud, a spring for holding the head yieldingly in position, and resilient means for engaging the side of the rotary valve member.

22. In a triple valve, a casing having a cylinder on one side and an auxiliary reservoir port on the other side, a valve seat having ports disposed between the cylinder and the auxiliary reservoir port, a rotary valve member mounted on the valve seat, a piston for reciprocating in the cylinder and exposed on one side to the pressure of the auxiliary reservoir and on the other side to pressure in the train pipe, and means for connecting the piston with the rotary valve for operating the latter, and a resilient member engaging the side of the rotary valve to retard its movement.

23. A triple valve having a passage, with a valve seat between a train pipe port and an auxiliary reservoir port, a valve member having a side provided with a face having inclined ends and a recess between the ends, the said valve member having a sliding engagement with the valve seat for opening the passage when the valve member is in a predetermined position relatively to the valve seat and for restricting the passage when the valve member is moved in either direction relatively to the valve seat, and resilient means for engaging the side of said valve member at said face for retarding its movement.

24. A triple valve having a passage, with a valve seat between a train pipe port and an auxiliary reservoir port, a rotary valve member having a sliding engagement with the valve seat for opening the passage when the valve member is in a predetermined position relatively to the valve seat and for restricting the passage when the valve member is moved in either direction relatively to the valve seat, and resilient means for engaging opposite sides of the valve member for retarding its movement.

25. A triple valve having a passage, with a valve seat between a train pipe port and an auxiliary reservoir port, a valve member with an indenture in its side and having a sliding engagement with the valve seat for opening a passage when the valve seat is in a predetermined position relatively to the valve seat and for restricting the passage when the valve member is moved in either direction relatively to the valve seat, and a resilient member for engaging the side of the valve member for seating in the said

indenture when the valve member is in the said predetermined position.

26. A triple valve having a passage, with a valve seat between a brake cylinder port and an exhaust port, a valve member having a side provided with a face having inclined ends, the said valve member having a sliding engagement with the valve seat for opening the passage when the valve member is in a predetermined position relatively to the valve seat, and for restricting the passage when the valve member is moved in either direction relatively to the valve seat, and a resilient member engaging the side of said valve member at said face for checking the movement of the valve member when the valve member is in the said predetermined position.

27. A triple valve having a passage connecting an auxiliary reservoir port with a brake cylinder port, a passage connecting a train pipe port with the brake cylinder port, a rotary valve member for commanding the passages adapted to move from a position in which it closes both passages, to a position opening wide the first passage and on to a position opening wide the second passage, and resilient means engaging opposite sides of the rotary valve member for retarding the movement of the valve member when it is at a point between the positions where it opens wide the first and second-mentioned passages.

28. A triple valve having a seat member provided with a passage connecting a train pipe port and an auxiliary reservoir port, and a passage leading from a brake cylinder port, a rotary valve member commanding the passages for opening the first passage as the second passage is closed, the said valve member being provided with recesses, and a resilient member for engaging the said recesses in the valve member.

29. A triple valve having a passage leading from an auxiliary reservoir port to a brake cylinder port, a passage connecting a train pipe port with an auxiliary reservoir port, and a passage for connecting the brake cylinder port with an exhaust port, a valve member for opening the first passage as the other two passages are closed and for opening the second passage as the other two passages are closed, and a resilient gripping member engaging predetermined points on the valve member when the latter is in position for opening the said passages.

30. A triple valve having a passage connecting a train pipe port with an auxiliary reservoir port, a passage leading from a brake cylinder port, a valve member commanding the passages and having a recess in its side, and a resilient member for engaging the recess when the valve is in a position to open the first-mentioned passage.

31. A triple valve having a passage connecting a train pipe port with an auxiliary reservoir port, a passage leading from a brake cylinder port, a valve member for commanding the passages provided with a recess and resilient means for engaging the said recess for checking the valve member when it is in a position to open the first-mentioned passage.

32. A triple valve having a passage connecting an auxiliary reservoir port with a brake cylinder port, a passage connecting a train pipe port with the brake cylinder port, and a valve member for commanding said passages and adapted to be moved to a position to open the same, the said valve member having a recess provided with an inclined end, and a resilient member for engaging the inclined end of said recess to move the valve member to a position in which it closes said passages.

33. A triple valve having a passage leading from a brake cylinder port, a passage leading from a train pipe port to an auxiliary reservoir port, and a valve member for commanding the passages and adapted to move in one direction to a predetermined position to open the passages, and on in the same direction to restrict the passages, the said valve member having a side with a cut-away portion having an inclined end, and resilient means engaging the cut-away portion of the side of the valve member for retarding the movement of the valve beyond the said predetermined point.

34. A triple valve having a passage leading from a brake cylinder port, a valve member for commanding the passage adapted to move in one direction to a predetermined point to open the passage and on in the same direction to restrict the passage, the said valve member having a side with a cut-away portion having an inclined end, and resilient means engaging the cut-away portion of the side of the valve member for retarding the movement of the valve member beyond the said predetermined point.

35. In a triple valve, a passage leading from a train pipe port to an auxiliary reservoir port, a valve member for commanding the passage and adapted to move in one direction to a predetermined point to open the passage, and on in the same direction to restrict the passage, the said valve member having a side with a cut-away portion having an inclined end, and resilient means engaging the cut-away portion of the side of the valve member for retarding the movement of the valve member beyond the said predetermined point.

36. In a triple valve having a passage leading from an auxiliary reservoir port to a brake cylinder port and a passage leading from a train pipe port to an auxiliary reservoir port, and a passage leading from the

brake cylinder port, a valve member commanding the passages having a side with an inclined face, one end of which is at an angle relatively to the central portion of the face in which there is a recess, and a resilient member for engaging the side, the resilient member engaging the end of the said surface when the valve member is in a position to open the first-mentioned passage, the resilient member engaging the recess when the valve member is in a position to open the second-mentioned passage, and the resilient member engaging the surface beyond the recess when the valve member is in a position to open the second and third passages.

37. In a triple valve having a passage leading from an auxiliary reservoir port to a brake cylinder port, a passage leading from a train pipe port to an auxiliary reservoir port, and a passage leading from the brake cylinder port, a valve member for commanding the passages and having a side with a cut-away portion having inclined ends and a recess therebetween, and a resilient member for engaging the side, the resilient member engaging one of the inclined ends of the cut away portion when the valve member is in position to open the first-mentioned passage, the resilient member engaging the recess when the valve member is in position to open the second mentioned passage, the resilient member engaging the side of the valve member at the cut away portion beyond the recess when the valve member is in position to open the second and third mentioned passages, and the resilient member engaging the inclined end of the cut away portion of the valve member when the valve member is moved on to restrict the second and third mentioned passages.

38. In a triple valve a seat member having a port, a rotary valve member for commanding the port, and resilient means engaging the valve member for moving the valve member relatively to the seat member.

39. In a triple valve a valve member having a side and a resilient arm for engaging the side for retarding the movement of the valve member.

40. In a triple valve a valve member having opposite sides and a pair of resilient arms spaced from each other and engaging the sides for retarding the movement of the valve member.

41. In a triple valve a valve member having opposite sides with inclined faces, and a pair of resilient arms spaced from each other and engaging the sides.

42. In a triple valve, a valve seat having ports, a rotary valve member for commanding the ports and having cut-away portions at opposite sides, the cut-away portions having inclined ends and a recess between the ends, and a resilient member having arms engaging the said cut-away portions to re-

tard the action of the valve at predetermined points.

43. In a triple valve, a valve seat having ports, a rotary valve member for commanding the ports and having cut-away portions at opposite sides, the cut-away portions each having inclined ends and a recess between the ends, means operable by pressure in the train pipe for actuating the valve member, a gripping device having resilient arms, and rollers journaled to the said arms for engaging the cut-away portions of said valve.

44. A triple valve having a passage leading from a brake cylinder port, a passage leading from a train pipe to the auxiliary reservoir port, a rotary valve member for commanding the passages adapted to move in one direction to a predetermined position to open the passages, and on in the same direction to restrict the passages, and resilient means engaging opposite sides of the valve member for moving the same.

45. A triple valve having a seat member with ports, a rotary valve member with an uneven surface, and ports for cooperating with the seat member, and a resilient member for engaging the uneven surface of the valve member.

46. A triple valve having a seat member provided with a port leading from the train pipe, a port leading to the brake cylinder, and an auxiliary reservoir port connected by a passage with the port leading to the brake cylinder, and a valve member having two ports connected by a passage, one of said ports being adapted to communicate with the port in the seat member leading from the train pipe and the other port being adapted to communicate with the brake cylinder port, the said valve member having a port communicating with the auxiliary reservoir, a portion of said port being adapted to communicate with a portion of the auxiliary reservoir port in the seat member, and a check valve in the passage connecting the two first mentioned ports in the valve member to prevent the air from the brake cylinder escaping into the train pipe.

47. A triple valve having a seat member provided with a port leading from the train pipe, a port leading to the brake cylinder, and an auxiliary reservoir port connected by a passage with the last mentioned port, and a valve member adapted to cooperate with the seat member and having a port for connecting the auxiliary reservoir with the auxiliary reservoir port in the seat member, the said valve member having a port provided with an extension, a portion of said port being adapted to be disposed over the brake cylinder port, and the extension of said port being adapted to be disposed over the train pipe port to afford a restricted communication between the train pipe and the brake cylinder, when the port in the valve

member communicating with the auxiliary reservoir is in communication with the auxiliary reservoir port in the seat member connected with the brake cylinder port.

48. In a triple valve a casing having an auxiliary reservoir port opening into the same, a valve seat in said casing provided with a port leading from the train pipe, and a port in said valve seat connected by a passage with said train pipe port, and a valve member having a port adapted to communicate with the last mentioned port in the valve seat, the said valve member having a passage leading from said port through the top of said valve member and opening into said casing and a check valve in said passage for permitting air to pass upward into the casing and then into the auxiliary reservoir.

49. A triple valve having a seat member provided with a brake cylinder port, an exhaust port connected with a passage leading to the exhaust, a port leading from the train pipe, and a port connected by a passage with the train pipe port, and a valve member having a port adapted to register with the brake cylinder port in the seat member, a port communicating with the exhaust port in the seat member, and a passage connecting said ports, the said valve member also having a port for communication with an auxiliary reservoir, the said port being adapted to communicate with the last mentioned port in the seat member, so that air will flow from the train pipe to the auxiliary reservoir at the time the brake cylinder is connected with the exhaust.

50. A triple valve having a seat member provided with a brake cylinder port, an exhaust port connected with a passage leading to the exhaust, a port leading from the train pipe, and a port connected by a passage with the port leading from the train pipe, and a valve member having a port adapted to have a restricted communication with the brake cylinder port, a port adapted to have a restricted communication with the exhaust port, the said ports being connected by a passage, the said valve member having a port for communicating with an auxiliary reservoir, the said port being adapted to communicate with only a small area of the port in the seat member connected with the train pipe port.

51. In a triple valve, a valve seat having ports, a valve member for commanding the ports and having oppositely-arranged portions provided with an uneven surface, and a resistance device for engaging the said surfaces of the valve member to retard the action of the valve at predetermined points.

52. A triple valve having a seat member provided with a port leading to the brake cylinder, a passage leading from an auxiliary reservoir port to the brake cylinder

port, and a port leading from the train pipe, and a valve member having two ports connected by a passage and adapted to communicate respectively with the train pipe
5 port and the brake cylinder port of the seat member, the said valve member automatically restricting the passage leading from the auxiliary reservoir port to the brake cylinder port, as the communication between
10 the train pipe port and the brake cylinder port is opened widely, and a check valve in the said passage connecting the said ports of the valve member for preventing the escape of air from the brake cylinder.
15 53. A triple valve having a seat member provided with a port leading from the train pipe, a port in said seat member connected by a passage with said train pipe port, a valve member having a port adapted
20 to communicate with the second-mentioned port, the said valve member having a passage leading from said port and communicating with an auxiliary reservoir port, and a check valve in said passage.
25 54. In a triple valve, a casing having a

cylinder on one side and an auxiliary reservoir on the other side, a valve seat having a passage connecting an auxiliary reservoir port with a brake cylinder port, and a passage connecting a train pipe port with the
30 brake cylinder port, and a valve member for commanding the passages, a piston reciprocating in the cylinder and connected with the valve member, the piston being exposed on
35 one side to pressure in the train pipe and on the other side to the pressure of the auxiliary reservoir, and a resilient gripping member engaging the valve member and adapted when the pressure in the auxiliary reservoir falls below the train pipe pressure, to
40 move the valve member to a position in which it closes said passages.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EPHRAIM K. HUTCHISON.

Witnesses:

MARGARET UPEVALL,
G. S. HOAG.