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J. V. WELLS.

TRIPLE VALVE.

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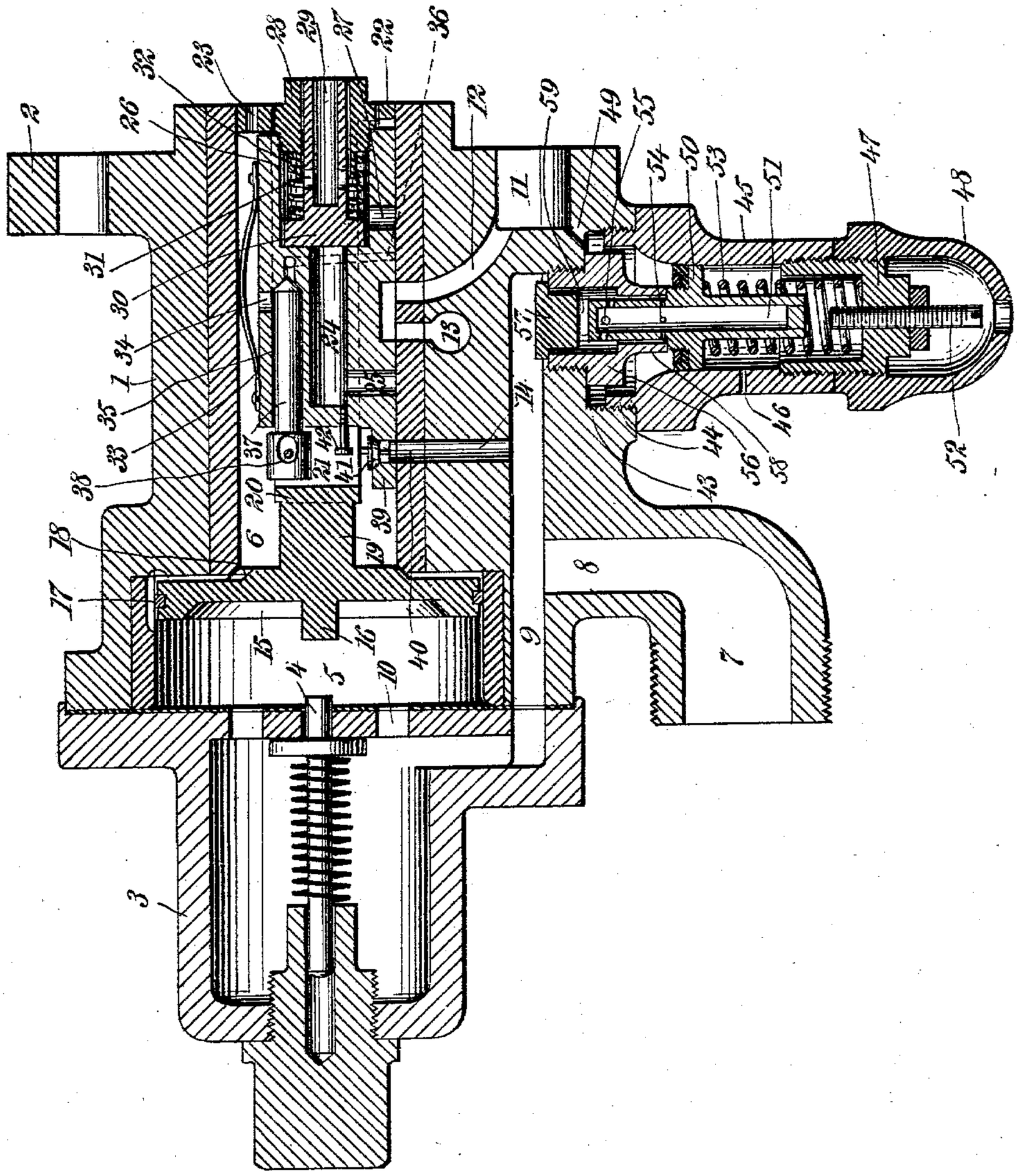
NO MODEL.



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UNITED STATES PATENT OFFICE.

JOHN V. WELLS, OF BRADDOCK, PENNSYLVANIA.

TRIPLE VALVE.

SPECIFICATION forming part of Letters Patent No. 753,018, dated February 23, 1904.

Application filed December 18, 1902. Serial No. 135,738. (No model.)

To all whom it may concern:

Be it known that I, JOHN V. WELLS, a citizen of the United States, and a resident of Braddock, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Triple Valve, of which the following is a full, clear, and exact description.

This invention relates to a triple valve applicable to the ordinary air-brake apparatus and by which means service, emergency, and high-speed brake applications may be made more rapidly and effectively than heretofore.

The invention involves various novel features of construction and combinations of parts by which the above end is attained and all of which will be fully described hereinafter.

This specification is an exact description of one example of my invention, while the claims define the actual scope thereof.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure represents a longitudinal section of the invention, showing the parts in full release position.

1 indicates the main casing of the valve, which has a flange 2 at one end adapted to be bolted to the auxiliary reservoir or other supporting member and to the opposite end of which is fastened the usual cap 3 or any other equivalent device carrying the spring-pressed pin 4. Within the main casing 1 is formed the cylindrical piston-cavity 5, and this communicates with the valve-cavity 6, both of which cavities 5 and 6 are fitted with bushings in the usual manner.

7 indicates the train-line connection, which communicates by a passage 8 with a longitudinally-extending passage 9, formed in the bottom of the valve-casing, this passage running into the cap 3 and communicating with the cavity 5 through the ports 10. The passage 9 also extends toward and communicates with the high-speed blow-down device, which will be hereinafter fully described.

11 indicates the brake-cylinder connection, which communicates by a port 12 with the slide-valve cavity 6.

13 indicates the triple exhaust-port leading from the cavity 6.

14 indicates a passage which leads from the passage 9 into the cavity 6 and effects communication between the train-line.

15 indicates the triple piston, which works in the cavity 5 and has the usual stop 16, adapted to engage the spring-pressed pin 4. In the end of the cavity 5 adjacent to the valve-cavity 6 a by-pass groove 17 is formed, and the piston is formed with a groove 18, leading into the valve-cavity 6, all of which is the usual construction. Fastened to or formed integral with the piston 15 is a centrally-disposed stud 19, which carries a cross-piece 20, from each end of which pass longitudinally-extending side straps 21, terminating at the front end of the valve in an eccentric ring 22, which fits snugly in the valve-cavity 6 and is perforated, as indicated at 23, to allow the free movement of pressure through it in either direction.

The slide-valve is formed with a central or main cavity 24, having a port 25 leading therefrom and adapted to register with the port 14 upon the emergency or high-speed application of the brakes. The central cavity 24 of the valve opens into a cavity 26 in the end of the valve, and from this cavity 26 a port 27 leads, this port being adapted to communicate with the brake-cylinder port 12 on emergency application. In the outer end of the enlarged cavity 26 a nut 28 is screwed, and sliding loosely in this nut is a hollow stem 29 of a valve 30, which seats on the inner end of the cavity 26, as shown in the drawing. The hollow stem has openings 31 therein, these openings communicating with the cavity 26 when the valve 30 is in the position illustrated. When, however, the valve 30 is moved from its seat forward, or to the right in the drawing, the openings 31 are closed by the inwardly-disposed tubular extension of the nut 28.

32 indicates a weak spring which has only power to seat the valve 30 when pressures are equalized, and when the parts are in the position shown the pressure of the auxiliary reservoir, which communicates with the end of the valve-cavity 6, acts on the valve 30 to reinforce the spring. According to the adjustment here shown the openings 31 are half

uncovered when the valve 30 is seated. It is clear that by adjusting the nut 28 the relation of the orifices 31 to the nut may be regulated.

33 indicates the spring usually employed for pressing the slide-valve down to its seat, and 34 indicates a port formed in the top of the valve and communicating with the longitudinally-disposed passage 35 therein, which passage has two branches 36 leading to opposite sides of the central cavity 24 downward to the face of the slide-valve, these passages 36 being adapted to register with the cylinder-port 12 to effect a service application of the brakes. In the cavity 35 a pin-valve 37 works, this valve commanding the port 34, and said valve is connected directly to the piston 15 by means of the cross-pin 38. As usual in triple valves of this sort, the piston 15, with the parts 19, 20, 21, 38, 37, and 22, is allowed a slight movement independently of the slide-valve, and this relative movement serves to throw the pin-valve 37 to and from the position shown in the drawing. Formed on the inward extension or tail 39 of the slide-valve is a port 40, which is adapted to register with the port 14 when the parts are in release position, and this port 40 is commanded by an inwardly-opening check-valve 41, the opening movement of which is limited by a pin 42, fastened in the body of the slide-valve.

The right-hand end of the passage 9 communicates with a transversely-disposed passage 43, which according to the construction here shown is of two diameters, and into the larger or outer diameter screws the threaded nipple 44 of a case 45. Said case is preferably provided with a vent 46, and in the outer end of the case is screwed a nut 47. A pocket-nut 48 works over the outer end of the nut 47 and is adapted to bear when in fastening position against the outer end of the case 45. A port 49 is formed in the body or main case 1, and this port leads from the brake-cylinder into the case 45. In this case is mounted to move longitudinally of the case, and consequently transversely of the valve, a piston 50, to which is fastened or formed integrally therewith a hollow rod 51. Working in the outer end of the spring-nut 47 is an adjusting-screw 52, which serves to limit the outward movement of the rod 51, and 53 indicates a spring, which bears between the nut 47 and the piston 50 and keeps the same normally in the position shown in the drawing. The rod 51 projects inward beyond the piston 50 and is formed directly adjacent to the piston with a number of perforations 54, these perforations being in a true annular line, and in the extremity of the rod 51 a number of perforations 55 are formed, these latter perforations being arranged spirally around the rod or, in other words, at different points along the length thereof. Screwed in the minor diameter of the opening 43 in the valve-case 1 is a nut 56, which has a passage therethrough and which carries at its inner end a check-valve 57, this valve opening into the passage 9, but seating automatically against the movement of the fluid from said passage into the case 45. The nut 56 is provided with an outer tubular extension 58, through which the rod 51 passes, and the nut 56 is chambered in its interior, as indicated at 59, this chamber receiving the inner end of the rod 51 when the parts are in the position shown. It will be observed that in this position the openings 54 are covered by the outer end of the extension 58 and that the openings 55 all lie within the chamber 59 of the nut 56—that is to say, none of these openings 55 are covered by the extension 58 of the nut 56. It will also be observed that upon a slight movement of the piston 50, which movement is barely sufficient to uncover the openings 54, the openings 55 will lie within the chamber 59, and therefore not covered by the extension 58.

Such being the construction and assemblage of the apparatus, its operation may be traced as follows: Assuming that the parts are in the position shown in the drawing and that it be desired to charge the auxilary, the pressure passes through the passage 8 and to the left in the passage 9 until it enters the piston-cavity 5. The piston 15 if not in the position shown will be immediately thrown into this position, and then the pressure from the train-pipe will pass through the passages 17 and 18 and cavity 6 into the auxiliary, charging the same until the pressures in the auxiliary and train-line are equalized. To effect a service application, the pressure in the train-line is reduced sufficiently to move the stop 16 of the piston 15 into contact with the pin 4, but not sufficiently to move the piston beyond that position. This results in cutting out communication between the ports 12 and 13 in the valve-casing 1 and in placing the passage 36 in communication with the port 12. At the beginning of the movement of the piston the parts 19, 20, 21, 37, and 38 will move slightly independently of the valve, and thus the pin 37 will be drawn to the left from the position shown in the drawing, so as to uncover the port 34. Also it will be observed that the above-described movement of the piston 15 is sufficient to clear it from the by-pass 17. When these operations take place, the pressure from the auxiliary passes through the ports 34, 36, and 12 into the brake-cylinder, thus applying the brakes. The pressure in the auxiliary expands into the brake-cylinder equal to the amount of train-line reduction, when the piston 15 and pin-valve 37 will close the port 34, and the further passage of pressure into the brake-cylinder is prevented. This movement is not sufficient, however, to return the slide-valve to release position, and consequently the brake-cylinder pressure is

held. The brakes are released by increasing the train-line pressure, all of which will be understood. To recharge the auxiliary upon increasing the train-line pressure, the parts will assume the position shown in the drawing, and then the air will blow through the passages 17 and 18 and also through the passages 14 and 40, lifting the check-valve 41 in this operation. Now in this connection it will be observed that by providing the passage 40 and the valve 41 I am enabled very rapidly to recharge the auxiliary without in any way increasing the area of the by-pass 17, which increase, if made, would disastrously affect the operation of the apparatus.

To effect an emergency application, the train-line pressure is reduced to such an extent as to cause the piston to move up tightly against the diaphragm 10. This places the port 25 in communication with the port 14 and the port 27 in communication with the port 12. The instant that the ports 14 and 25 communicate the air from the train-line passes into the main cavity 24 and unseats the valve 30 and covers the openings 31, so that a portion of the train-line pressure blows through the ports 14, 25, 24, 27, and 12 and into the brake-cylinder. The valve 30 is unseated by the train-line pressure, owing to the relatively large area which is exposed to the train-line pressure. This continues until the train-line pressure is reduced, when the valve 30 is returned to its seat by the pressure from the auxiliary, whereupon the openings 31 are uncovered and the auxiliary pressure rushes in through the hollow stem 29, openings 31, and ports 27 and 12, thus completely charging the brake-cylinder and effecting an emergency application. In this connection it will be observed that in effecting an emergency application pressure is drawn both from the train-pipe and auxiliary.

In effecting a high-speed application of the brakes—which is to say, when introducing into the brake-cylinder an abnormal fluid-pressure—the operation of the slide-valve and piston 15 is the same as that which takes place during an ordinary emergency application of brakes. At this time, however, the devices associated with the case 45 come into action. Let it be assumed, for example, that the high-speed brake is operated with one hundred pounds pressure in the auxiliary, which may be said to expand down to eighty pounds in the brake-cylinder. Let it also be assumed that sixty pounds pressure in the brake-cylinder is the ordinary working pressure for emergency applications. If the train is running at high speed, eighty pounds may be charged into the brake-cylinder without danger of sliding the wheels; but it is necessary to cut this pressure down as the speed of the train decreases, so that when the train reaches a comparatively slow speed the brake-cylinder will contain but ordinary emergency pressure—say sixty pounds. To do this, the spring 53, through its cap-nut 47, is adjusted so that the piston 50 will be moved up into the position shown in the drawing against all pressure at or under sixty pounds. Pressures over this will throw the piston 50 down. The spring 53 therefore regulates the amount of pressure which is to be retained in the cylinder. The adjusting-pin 52 should also be moved so as to limit the outward movement of the parts 50 and 51 to the desired degree—that is to say, to prevent outward movement of the hollow rod 51 sufficient to close all of the openings 55. Assuming, for example, that the pin 52 is adjusted so that if the piston 50 were moved outward under eighty pounds pressure in the brake-cylinder one of the openings 55 would be uncovered, the others being covered by the extension 58 of the nut 56. When, therefore, eighty pounds are introduced into the brake-cylinder, the brakes will be instantly applied with great force, and simultaneously this pressure will be communicated through the port 49 into the case 45 and the piston 50 will be thrown down until its movement is stopped by the pin 52. This uncovers all of the openings 54, and it closes, let me say, all but one of the openings 55. The air then passes from the case 45 above the piston 50 through the openings 54 into the hollow stem 51 and out of the exposed opening 55, after which it raises the check-valve 57 and passes back into the train-line. This relieves the pressure in the brake-cylinder, and consequently in the case 45, and the spring 53 then acts slowly to return the piston 50 to its seat on the extension 58. As this return movement begins the several openings 55 will be successively uncovered, and consequently the moment the piston 50 begins to move upward the discharging capacity of the blow-down device will gradually increase, and pressure from the brake-cylinder will be therefore gradually relieved until the spring 53 completely returns the piston 50 and closes the openings 54. This will take place, owing to the above-referred-to adjustment of the cap-nut 47, exactly when sixty pounds pressure is reached in the brake-cylinder. Of course the amount of pressure may be varied at will, the above figures being given merely for illustration. Therefore by this mechanism the high-speed application may be made under great pressure, and this will be automatically blown down to normal pressure in a certain predetermined time, which normal pressure may be retained the same as the usual emergency application until the train-line pressure is increased to throw the slide-valve back into release position. The pin 52 limits the time which the device takes to blow the brake-cylinder pressure down from the high speed to the ordinary

pressure, and the spring 53, with its adjusting-nut 47, regulates the amount of pressure which is to be retained in the brake-cylinder. Several advantages are obtained by blowing down the high pressure of the brake-cylinder into the train-line. When an emergency application is made by tight or sticking pistons, broken graduating-valve pins, or unnecessarily by the operator, the pressure thereby wasted can be retained in the train-line and used to release and recharge and does not hinder the emergency application when made by the operator or by a broken train. It also permits of a greater amount of train-line pressure to enter the brake-cylinder when the operator merely discharges sufficient pressure to start the brakes.

Various changes in the form, proportions, and minor details of my invention may be resorted to at will without departing from the spirit and scope thereof. Hence I consider myself entitled to all such variations as may lie within the intent of my claims.

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

1. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a valve proper or slide-valve having passages therein placing the auxiliary and train-line in communication with the brake-cylinder, and a means located in said passages for alternately opening and closing the same.

2. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a valve proper or slide-valve having passages therein placing the auxiliary and train-line in communication with the brake-cylinder, and a means for alternately establishing and closing said communication, said means being operated by the train-line and auxiliary pressures when blowing through said passages in the slide-valve.

3. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a valve proper having ports therein placing the auxiliary and train-line in communication with the brake-cylinder, and a valve for alternately opening and closing said ports, said valve being operated by the train-line and auxiliary pressures when blowing through said passages of the slide-valve.

4. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a valve proper or slide-valve having passages therein placing the auxiliary and train-line in communication with the brake-cylinder, and a valve mounted in the slide-valve for alternately establishing and closing said communication, said valve being operated by the train-line and auxiliary pressures, when blowing through said passages of the slide-valve.

5. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a slide-valve having communicating ports adapted respectively to register with the train-line and brake-cylinder communications, and also having a chamber communicating with said ports, a valve located in said chamber and serving to close the train-line port, and a hollow stem attached to the valve and having communication with the cylinder-port and auxiliary, said communication with the cylinder-port being cut off when the valve is open.

6. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a slide-valve having communicating ports adapted respectively to register with the train-line and brake-cylinder communications, and also having a chamber communicating with said ports, a valve located in said chamber and serving to close the train-line port, and a hollow stem attached to the valve and having communication with the cylinder-port and auxiliary, said communication with the cylinder-port being cut off when the valve is open, the said valve in the slide-valve chamber opening under train-line pressure and closing under auxiliary pressure, for the purpose specified.

7. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a slide-valve having communicating ports adapted respectively to register with the train-line and brake-cylinder communications, and also having a chamber communicating with said ports, a valve located in said chamber and serving to close the train-line port, a hollow stem attached to the valve and having communication with the cylinder-port and auxiliary, said communication with the cylinder-port being cut off when the valve is open, the said valve in the slide-valve chamber opening under train-line pressure and closing under auxiliary pressure, for the purpose specified, and a spring normally sealing the valve.

8. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a slide-valve having communicating ports adapted respectively to register with the cylinder and train-line ports and also having a chamber extending from the auxiliary connection to the said ports, an orificed member fastened in the auxiliary end of said chamber, a hollow stem communicating with the auxiliary and sliding in said orificed member, the stem being orificed within the chamber, and a valve attached to the stem and serving to close the train-line port, said valve opening under train-line pressure and closing under auxiliary pressure.

9. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a slide-valve having communicating ports adapted respectively to register with the

cylinder and train-line ports and also having a chamber extending from the auxiliary connection to the said ports, an orificed member fastened in the auxiliary end of said chamber, a hollow stem communicating with the auxiliary and sliding in said orificed member, the stem being orificed within the chamber, a valve attached to the stem and serving to close the train-line port, said valve opening under train-line pressure and closing under auxiliary pressure, and a spring bearing between the said orificed member and the valve, normally to seat the latter.

10. A triple valve having a main casing with train-line, auxiliary and brake-cylinder connections, a slide-valve having communicating ports adapted respectively to register with the cylinder and train-line ports and also having a chamber extending from the auxiliary connection to the said ports, an orificed member fastened in the auxiliary end of said chamber, a hollow stem communicating with the auxiliary and sliding in said orificed member, the stem being orificed within the chamber, and a valve attached to the stem and serving to close the train-line port, said valve opening under train-line pressure and closing under auxiliary pressure, and the said orifice in the hollow stem being passed into the said orificed member to close the stem-orifice as the stem slides toward the auxiliary.

11. A triple valve having a train-line connection, a piston and valve cavity communicating therewith and with the auxiliary, and a passage leading from the valve-cavity to the brake-cylinder connection and also having a direct passage from the train-line connection to the brake-cylinder connection, a piston in the piston-cavity, a valve device in the valve-cavity, and a pressure-blow-down device located in and commanding the said passage from the train-line connection to the brake-cylinder connection.

12. A triple valve having a train-line auxiliary and brake-cylinder connections, valve devices and their appurtenances, and a pressure-blow-down device having its discharge leading back to the train-line connection for the purpose specified.

13. A triple valve having communicating train-line and brake-cylinder connections, and a pressure-blow-down device interposed therein, said blow-down device comprising a perforate hollow rod, a sleeve in which it slides for the purpose specified, a piston connected to the rod, and means for yieldingly holding the rod and piston in position.

14. A triple valve having communicating train-line and brake-cylinder connections, a pressure-blow-down device interposed therein, said blow-down device comprising a perforate hollow rod, a sleeve in which it slides for the purpose specified, a piston connected to the rod, a spring pressing the rod and piston, and an adjustable stop in the path of the rod.

15. A triple valve having communicating train-line and brake-cylinder connections, a pressure-blow-down device interposed therein, said blow-down device comprising a perforate hollow rod, a sleeve in which it slides for the purpose specified, a piston connected to the rod, means for yieldingly holding the rod and piston in position, and an adjustable stop in the path of the rod.

16. A pressure-blow-down device, comprising the combination with a case and a tubular part or sleeve, of a piston working in the case, a perforate hollow rod attached to the piston and sliding in said sleeve, for the purpose specified, and means for yieldingly holding the rod and piston in position.

17. A pressure-blow-down device, comprising the combination with a case and a tubular part or sleeve, of a piston working in the case, a perforate hollow rod attached to the piston and sliding in said sleeve, for the purpose specified, means for yieldingly holding the rod and piston in position, and an adjustable stop for said rod and piston.

18. A pressure-blow-down device, comprising the combination with a case and a tubular part or sleeve, of a piston working in the case, a tubular rod having separated perforations and fitting in the sleeve with the peforations at opposite ends thereof when the blow-down device is open, and means for yieldingly holding the piston and rod in closed position.

19. A pressure-blow-down device, comprising the combination with a case and a tubular part or sleeve, of a piston working in the case, a tubular rod having separated perforations and fitting in the sleeve with the perforations at opposite ends thereof when the blow-down device is open, means for yieldingly holding the piston and rod in closed position, and an adjustable stop for the piston-rod.

20. A pressure-blow-down device, comprising the combination with a case and a tubular part or sleeve, of a piston working in the case, a tubular rod having separated perforations and fitting in the sleeve with the perforations at opposite ends thereof when the blow-down device is open, and means for yieldingly holding the piston and rod in closed position, the said perforations at the discharge end of the rod being at different positions along the length, for the purpose specified.

21. In a fluid-pressure brake system, the combination with communication train-line and brake-cylinder connections, of a pressure-blow-down device interposed therein and discharging back into the train-line.

22. A triple valve having a train-line, auxiliary and brake-cylinder connections, a slide and its operating means, the slide having intercommunicating passages leading respectively from the train-line and auxiliary-res-

ervoir connections, and a brake-cylinder connection and a pressure-operating valve seated in said intercommunicating passages of the slide and commanding the same, said valve serving alternately to open and close communication of the train-line and auxiliary connections with the brake-cylinder.

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

JOHN V. WELLS.

Witnesses:
ISAAC B. OWENS,
JNO. M. RITTER.