No. 703,677. Patented July 1, 1902.

P. SYNNESTVEDT.

ENGINEER'S BRAKE VALVE.

(Application filed Nov. 25, 1901.)

(No Model.) 2 Sheets—Sheet 1.

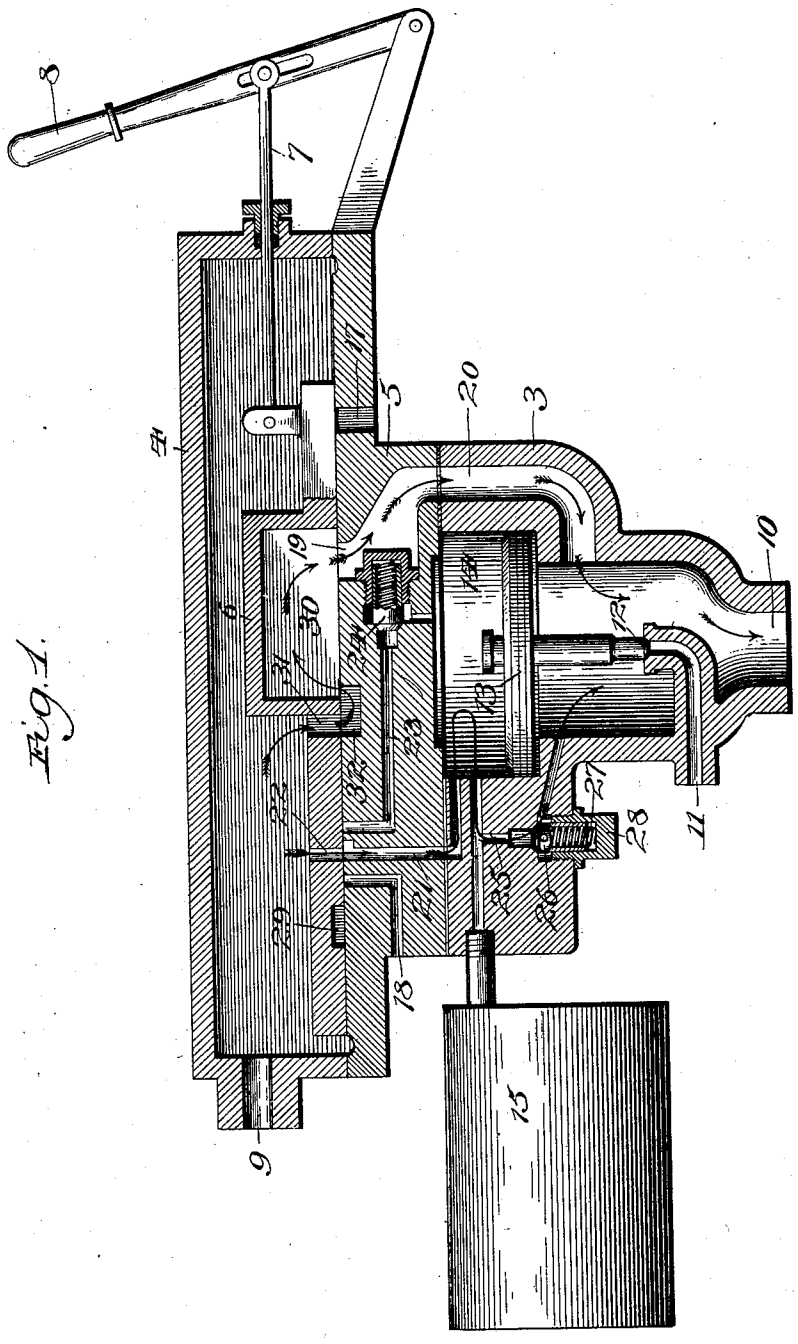

Fig. 1.

Witnesses:
Chas. E. Gaylord.
Geo. C. Dawson.

Inventor:
Paul Synnestvedt

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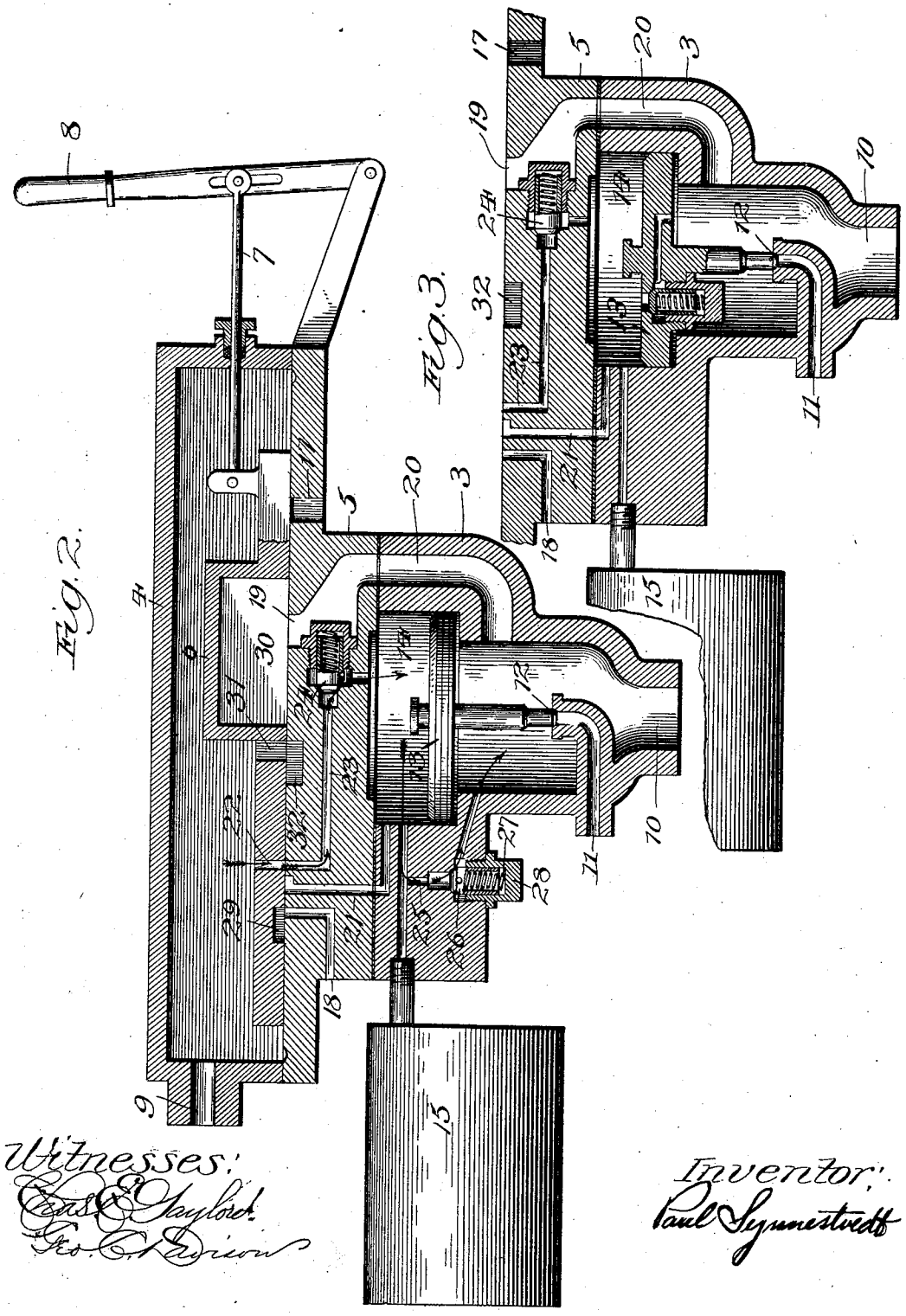

Witnesses:
Chas. E. Taylor
Geo. C. Davison

Inventor:
Paul Synnestvedt

UNITED STATES PATENT OFFICE.

PAUL SYNNESTVEDT, OF GLENVIEW, ILLINOIS, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ENGINEER'S BRAKE-VALVE.

SPECIFICATION forming part of Letters Patent No. 703,677, dated July 1, 1902.

Application filed November 25, 1901. Serial No. 83,681. (No model.)

To all whom it may concern:

Be it known that I, PAUL SYNNESTVEDT, a citizen of the United States of America, and a resident of Glenview, Cook county, Illinois, have invented certain new and useful Improvements in Engineers' Brake-Valves, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention has reference to improvements in engineers' brake-valves for use in controlling the operation of air-brakes on railroad-cars, particularly on trains of great length.

The first of the objects of this present invention is the provision of a device of the kind specified which while provided with a direct supply-port controlled by a main controlling-valve and arranged to be opened when the valve is in release position will have a second supply-port opened in the running position of the valve and provided with means for supplying the train with air at a less pressure than that stored in the main reservoirs, said second supply-port being disposed so as to allow the air to pass first to a chamber on one side of a piston controlling a train-pipe discharge-valve and thence past a spring-seated or other check-valve device to the train-pipe, the pressure whereof bears against the other side of said piston.

It has been heretofore proposed to construct an engineer's brake-valve in which the pressures on opposite sides of the train-pipe discharge-valve piston were capable of equalization in the running position of the valve-handle by means of a port controlled by the main controlling-valve and commonly known as an "equalizing-port," said port being normally open in running position of the valve-handle. In devices of the kind referred to there has also been provided a direct supply-port, which in release position of the brakes would permit the air from the main reservoir to pass to the train-pipe directly—that is, without passing first through any intermediate piston or valve chamber or valvular contrivance whereby it might be interfered with or with which the dust carried by the air might interfere.

In carrying out my improvement I provide a train-pipe discharge-valve subject to the control of a piston exposed to train-pipe pressure on one side and the pressure of a chamber on the other side, and in conjunction with said valve and piston I provide a main controlling-valve arranged to open a direct supply-port between the main reservoir and the train-pipe in release position of the valve-handle and with a secondary supply-port arranged to be opened in the running position of the handle, said secondary supply-port permitting the air to pass first to one side of said piston and thence past a check-valve seated by spring or other equivalent means to the other side of said piston, the check-valve being constructed to seat on any attempt of the air to go backward, whereby to cut off communication between the chambers on opposite sides of the piston when it is desired to cause the device to make an application of the brakes.

Another object of my present invention is to provide a non-return check-valve of the character referred to which will be novel in construction and location as applied for the purposes intended and which can be readily taken out and cleaned and again replaced, as occasion may require, without disarranging the other parts of the apparatus.

The above as well as such other objects as may hereinafter appear I attain by means of a construction which I have illustrated in preferred form in the accompanying drawings, in which—

Figure 1 is a vertical section through a valvular device embodying my improvement, showing the handle of the main controlling-valve in release position. Fig. 2 is a like vertical section showing the handle in running position, and Fig. 3 is a partial sectional view showing a modification of the device with the non-return check-valve located in the piston itself instead of controlling a passage around the piston.

Referring now more particularly to Fig. 1, it will be seen that in carrying out my invention I provide first a valve-casing composed of a lower portion 3, a cap portion 4, and an intermediate valve-seat portion 5, upon which

operates a main controlling-valve 6, adapted to be moved by means of the stem and handle 8 to the various degrees of movement required in application and release of the brakes. The main-reservoir connection is made at 9 and the train-pipe at 10, while at 11 there is a train-pipe-service discharge-port controlled by means of a valve 12, actuated by a piston 13, which has train-pipe pressure upon one side of it and pressure in a closed chamber 14 upon the other side, such chamber being enlarged by means of the drum 15, which is in open communication therewith.

The controlling valve-seat portion of the valve-casing is provided with a number of ports and passages, among which are the emergency exhaust-port 17, the preliminary exhaust-port 18, the port 19, leading around by way of the passage 20 to the train-pipe, the passage 21, which registers with the opening 22 in release position, which is the position shown in Fig. 1, the passage 23, which is closed in release position, but open in running position by the registry therewith of the port 22 in the main controlling-valve 6, which port is provided with some device, such as the excess-pressure valve 24, which controls the flow of air between the passage 23 and the chamber 14, the excess-pressure valve shown being of a type which acts to hold a back pressure in the reservoir, commonly of an amount equal to about twenty pounds to the square inch more than is allowed to flow into the chamber 14 or from thence into the train-pipe. From the chamber 14 to the train-pipe there is a passage 25, through which the air may flow around the piston 13, said passage being provided with a non-return or check valve 26, adapted to be closed by a spring 27, held in place by means of a cap 28 and so disposed as to seat on any attempt of the pressure to flow backward from the train-pipe into the chamber 14. The spring 27 should be of a strength just sufficient to hold the valve 26 normally shut when there is no pressure passing the same and to just cut off the backflow of air when it is desired to operate the device and to cause the actuation of the piston 13 necessary to secure the service application of the brakes and the gradual closing of the train-pipe discharge-valve 12 necessary to prevent a reflux or overflow of pressure in the forward part of the long train-pipe and prevent the release of the forward brakes of the train which would result from such overflow of reflux.

In the main controlling-valve 6 there is a small cavity 29, designed to come into play in service applications of the brakes to establish communication between the passages 21 and 18 in permitting escape of pressure from the chamber 14. There is also in the main controlling-valve 6 a large recess or cavity 30, which in release position of the brakes forms a portion of the passage-way between the main reservoir and the train-pipe, which I have termed the "direct supply-port," and which in emergency position of the brakes establishes communication from the port 19 to the port 17 and permits a direct exhaust of pressure from the train-pipe in making quick-action applications of the brakes.

The operation of my improvement is as follows: The position of the handle 8 being, as shown in Fig. 1, known as "release" position, the air from the main reservoir comes through the connection 9 and flows down through the port 31 and cavity 32 and by way of the large cavity 30 and the passage 20 through the train-pipe, this forming what I have termed the "direct supply-port" and providing a large channel through which the air may freely pass without obstruction or hindrance of any kind to the train-pipe and effect the release of the brakes and the recharging of the pipes and reservoirs under the cars. While in this position the small port 22 is in communication with the passage 21, leading to the chamber 14, and allows the air to flow into the chamber 14 and from thence into the reservoir 15, which is but an enlargement of said chamber, and so far as the check-valve 26 will not interfere to flow from the chamber 14 to the train-pipe through the passage 25. When the handle 8 is moved to running position, which is that shown in Fig. 2, the direct supply-port is cut off, and the port 22 of the main controlling-valve registers with the passage 23, permitting the main-reservoir air to flow past the excess-pressure valve 24 to the chamber 14 and from said chamber past a non-return or check valve 26 to the train-pipe. The excess-pressure valve 24, which is of usual construction, retains a pressure in the reservoir in excess of that in the train-pipe, which is the common condition in this position of the handle, and in the specific embodiment of the improvement shown all the air which passes said excess-pressure valve in the running position first enters the chamber 14 and thence passes around the piston to the train-pipe past the non-return or check valve 26, and thus feeds the train-pipe and supplies any leakage that may occur therein, so as to maintain the proper degree of pressure throughout the train. The pressure will be as nearly balanced on opposite sides of the piston 13 under these conditions as will be permitted by the strength of the spring which holds the valve 26 shut, and if, as is desirable, the spring 27 is made very light there will be but a small difference—say a pound or two—of pressure between the upper and lower side of the piston 13, and the area of the upper side being larger than that of the lower side by the amount of the size of the stem or valve 12 the valve 12 will be held in closed position, as shown in Fig. 1, preventing the escape of air through the train-pipe exhaust-port 11 in such position. The flow of air in this position is shown by the arrows of Fig. 2, the valves 24 and 26 being shown in this figure as slightly opened by the passage of the fluid.

If now it be desired to make an applica-

tion of the brakes, the handle is moved a little farther to the right than the position shown in Fig. 2, cutting off the passage 23 and establishing communication between the passages 21 and the preliminary exhaust-port 18, permitting some of the air in the chamber 14 to escape to the atmosphere, the check-valve 26 in the meanwhile seating and automatically preventing any backflow of air from the train-pipe to the chamber 14 and causing the train-pipe pressure to lift the piston and the attached valve 12 and allow some of the train-pipe air to escape through the train-pipe exhaust-passage 11. After the handle is moved a slight distance backward to the left sufficient to close off the preliminary exhaust-port 18 the flow of air from the chamber 14 will cease, that remaining being confined in said chamber, and the train-pipe pressure will then continue to discharge out of the exhaust-port 11 until the valve gradually and slowly settles back to its seat and cuts off such discharge, thus preventing the sudden rush and surge of air in the forward end of the pipe which results from a sudden closure of the exhaust-port in service applications of the brakes. This operation of venting air in this manner may be repeated as many times as may be desired to get a full service application. The check-valve 26 in such service applications thus affords the means for controlling the communication between the chambers on opposite sides of the piston 13, and the said control of the flow of air between opposite sides of said piston is not in any wise subject to direct regulation by movement of the main controlling-valve, as has been the case in certain devices of the prior art known to me.

To make an emergency application of the brakes, the handle is moved to the extreme position at the right, shutting off all communication between the reservoir and train-pipe and then opening a port through the cavity 30, so that the pressure from the train-pipe may pass around the passage 20 and out at the emergency exhaust-port 17 and being thereby rapidly vented, so as to cause quick-action application of the brakes throughout the train.

It will be observed that by the placing of the check-valve 26 in the position shown in Figs. 1 and 2 the same can be removed by simply removing the cap 28 and springs and then put back again without serious inconvenience or trouble. If it be desired, however, the check-valve 26 can be placed in the piston itself, and such construction I have clearly shown in Fig. 3, the operation whereof is substantially the same in all respects as the operation of the devices shown in the other figures, the only difference being that in this arrangement the check-valve 26 is not as readily accessible as it is in the other views and such air as passes through from the chamber 14 to the train-pipe must pass through the piston and may be more liable to deposit dirt or foreign matter even around the parts of the piston and its attached valve than would be the case were the air carried around the piston.

It will be further observed by an examination of the accompanying drawings and study of the aforesaid descriptive matter that there is provided in my improved valve a direct supply-port free from obstruction for permitting the main body of the air to flow from the main reservoir to the train-pipe, the said port being the one open in release position of the valve, as shown in Fig. 1, and that by means of said direct supply-port the main body of the air carried through to the train-pipe will not pass through the chamber 14 or by the said valve 26, but around the same, thus obviating any difficulty that might arise from the passage of the air through the chamber 14 or past the check-valve through the lodgment of dirt and foreign matter carried by the air in and around the piston or chamber 14 or check-valve 26. Thus by the provision of this direct supply-port for carrying the main portion of the air I am enabled to obviate a difficulty encountered in some of the prior-art devices, which had a check-valve passage between the upper and lower sides of a piston of a size and disposition to permit the main body of the air to pass through said check-valve passage in the release of the brakes. By providing the direct supply-port referred to in conjunction with such check-valve passage as I have shown I am also enabled to make the check-valve passage and the check-valve seat very much smaller, which minimizes the effect of any failure of the check-valve to seat absolutely tight, since a check-valve having a small seat will work in many cases with satisfactory results, while a check-valve which must necessarily be of large capacity and have a large seat would be seriously interfered with by the lodgment of dirt or other foreign substance in and around said check-valve or other operative parts.

While I have shown and described my improvement as applied to a valve in which a certain specific arrangement of mechanism is employed for procuring the opening movement of the service discharge-valve from the train-pipe, it is obvious that the essential features of the invention are applicable to devices employing other means for producing the opening movement of the service discharge-valve from the train-pipe, since the precise manner of opening the same is not material, so long as proper means for procuring gradual or slow closure thereof are provided. It is also obvious that my invention could be modified in other respects without departing from the spirit thereof, and I desire it to be understood as including all such equivalent modifications as within the scope of my claims.

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

1. An engineer's brake-valve comprising in combination, a train-pipe-service discharge-port, a valve controlling said port, a piston arranged to produce gradual closure of said valve in service applications of the brakes, a passage establishing communication of pressures on opposite sides of said piston, a check-valve in said passage, a direct supply-port, and a main controlling-valve controlling said direct supply-port, said direct supply-port being arranged to establish direct communication between the main-reservoir and train-pipe pressures, without causing said pressure flowing through said direct supply-port to pass said check-valve, substantially as described.

2. An engineer's brake-valve comprising in combination, a train-pipe connection, a main-reservoir connection, a train-pipe-service discharge-port, a train-pipe-service discharge-valve controlling said service discharge-port, a piston for producing slow or gradual closing of said valve, a pressure-chamber on the side of said piston opposite the train-pipe side thereof, a direct supply-passage for establishing communication between the main-reservoir and train-pipe pressures, said direct supply-passage leading around said chamber, a main controlling-valve controlling the said direct supply-passage, a passage for establishing communication between said chamber and the train-pipe, and a check-valve in said last-named passage, substantially as described.

3. An engineer's brake-valve comprising in combination, a train-pipe-service discharge-valve, a piston for producing slow closure of said valve, exposed on one side to train-pipe pressure, and on the other side to pressure of a chamber, a direct supply-port for establishing communication between a main reservoir and a train-pipe, and a secondary supply-port provided with means for maintaining a higher pressure in the reservoir than in the train-pipe, said last-mentioned port passing through the chamber and thence to the train-pipe past a check-valve, substantially as described.

4. An engineer's brake-valve comprising in combination, connections from a main reservoir and to a train-pipe, a train-pipe-service discharge-port, a valve controlling said port, a piston arranged to produce gradual closure of said valve in service applications of the brakes, a passage for establishing communication between the fluid-pressures on opposite sides of said piston, means for automatically controlling the opening and closing of said passage, a passage for establishing direct communication between said main-reservoir and train-pipe connections, and means for controlling the opening and closure of said direct connecting-passage, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PAUL SYNNESTVEDT.

Witnesses:
PAUL CARPENTER,
H. W. SMALLEY.