

O. M. JONES.
VALVE.

APPLICATION FILED SEPT. 9, 1918.

1,303,801.

Patented May 13, 1919.

Fig. 1.

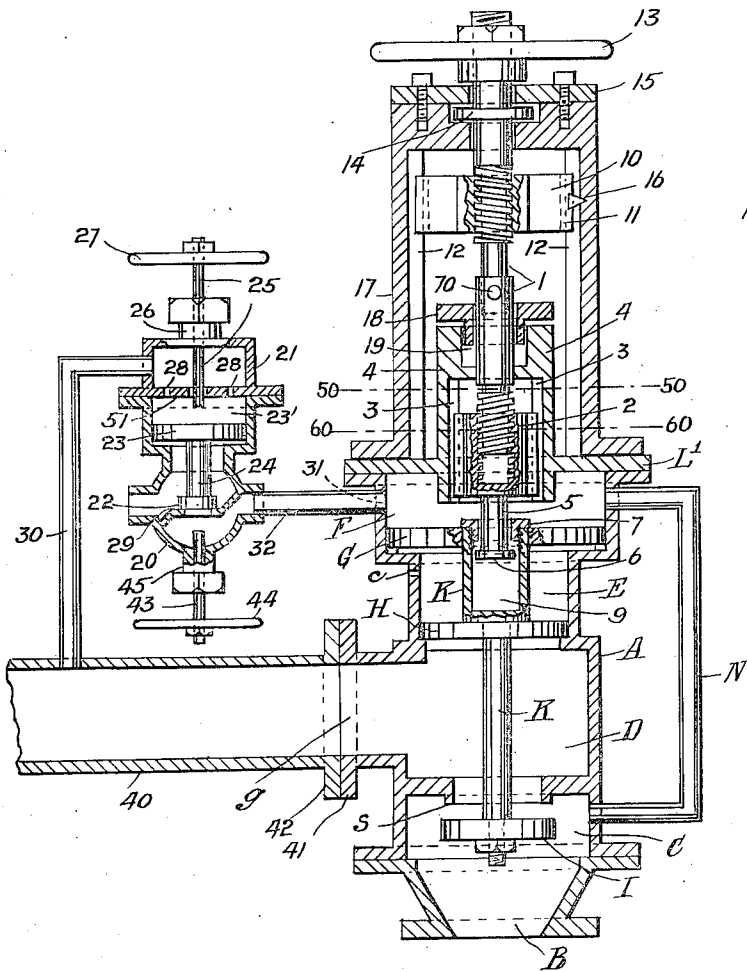


Fig. 2.



Fig. 3.

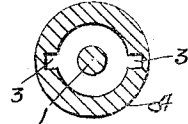
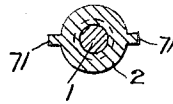


Fig. 4.



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OWEN MARSHALL JONES, OF NEW YORK, N. Y.

VALVE.

1,303,801.

Specification of Letters Patent.

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Application filed September 9, 1918. Serial No. 253,263.

To all whom it may concern:

Be it known that I, OWEN MARSHALL JONES, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, (whose post-office address is 601 West 149th street, New York city, New York,) have invented an Improvement in Valves, of which the following is a specification.

This invention relates to improvements in valves and particularly to the type of valves known as automatic emergency stop valves which are placed in the steam outlet from steam generators or boilers where two or more boilers are connected to a common steam header. This type of valve automatically closes when the boiler to which it is connected develops a leak by the bursting of a tube or otherwise, which reduces the steam pressure in the boiler, and thereby prevents the flow of steam from the steam header into the disabled boiler. This type of valve also is used to prevent the flow of steam from the boilers into the steam header when the steam header or any part thereof becomes ruptured. This invention is an improvement on my invention covered by Patent No. 1,205,898 granted me November 21, 1916. I have embodied in this present invention additional mechanism and devices and have eliminated some of the features embodied in the invention referred to, so that the valve can be used for and will perform the functions above stated. This invention may be used in any connection in which it is found applicable.

The objects of the invention are to improve upon and simplify the construction of such valves and to increase their ability and efficiency to automatically shut off the flow of steam or other fluids.

Other objects of the invention are to eliminate chattering of the valve and shock of the valve when seating.

Further objects of the invention are to produce a valve which will be sensitive to a very small variation in the drop of pressure in the boiler or the steam header.

Further objects of the invention are to insure a thorough cushioning so that the valve will quickly and softly seat when closing.

Other objects of the invention will be apparent from the following description.

An illustrative embodiment of the invention has been selected herein for the pur-

pose of description, same being shown in the accompanying drawings, wherein—

Figure 1 is a longitudinal section of the valve,

Figure 2 is a top plan view of part 10 of Fig. 1,

Figure 3 is a cross-sectional view through line 50—50 of part 4 of Fig. 1, and

Figure 4 is a cross-sectional view through line 60—60 of part 2 of Fig. 1.

Referring to the drawings, in Fig. 1 I have there illustrated an embodiment of the invention showing the valve body the parts therein and attached thereto, this view shows the valve open and the other parts in position for the automatic operation of the valve. A represents the valve body which may be of any suitable metal. I am not to be understood as limiting myself to this particular form of body, as other forms may be used in accordance with my invention. B is the inlet end which is suitably connected to the outlet of a boiler. C is the valve chamber in which the valve I travels longitudinally. D is the discharge chamber with the outlet *g* through which the steam is discharged to the header after passing around valve I and through the opening at the seat *s*. E is a piston chamber in which piston H travels longitudinally. F is a piston chamber in which piston G travels longitudinally. The piston G is employed to move the valve I from its seat and to hold it from its seat, and the piston H is employed to move the valve to its seat and to hold it against its seat. The two pistons are of the proper diameters to perform the functions for which they are designed, the piston G is of a diameter greater than the diameter of the piston H. K is a spindle or rod for rigidly connecting together the pistons G and H and the valve I in their respective positions and on a common axis so the spindle and the pistons and the valve will travel simultaneously upwardly and downwardly, and the spindle has a hollow enlargement at the top part which extends from the top of the piston H to the top of the piston G. The spindle may be a separate member with the pistons and the valve suitably and rigidly mounted on it or may be integral with the pistons. L' is a top cover or bonnet secured to body A by suitable means, and has a cylinder 4 a portion of which protrudes into the cham-

ber F. The cylinder has the two guide grooves 3 and 3 located in it and also has on the top of it the stuffing box 19 and the cap 18 for holding the packing in the stuffing box. 1 is a valve rod or stem composed of two sections, the sections are suitably engaged and held together by the pin 70 or by other suitable means, and the stem is held against longitudinal travel by the projection 14 which is engaged between the top of the yoke 17 and the plate 15, and the stem may be revolved by the handwheel 13 or by other suitable means. The bottom end of the stem 1 is threaded and enters the internally threaded traveling sleeve 2. The sleeve 2 is provided with two lugs 71 and 71 which slide in the grooves 3 and 3, the lugs are for holding the sleeve from rotation when the valve stem is revolved so that the sleeve will have a longitudinal travel upwardly and downwardly. The stem 5 is attached to or is a part of the sleeve 2 and has at its lower end the enlargement 6. The stem 1, the sleeve 2 and the stem 5 combined form means by which the valve can be closed or opened at will by revolving the stem clockwise or anti-clockwise. The chamber 9 in the enlarged portion of the spindle K is provided so that the stem 5 with the end projection 6 can travel upwardly and downwardly in the chamber and so that the pistons G and H can automatically travel upwardly and downwardly when the stem 5 is located at its central point of travel which is the position shown in the drawing. The plug 7 is screwed into the chamber 9 so that the end projection 6 of the stem 5 can bear against it when the valve is to be closed at will. N is a by-pass for furnishing pressure from the valve chamber C to the piston chamber F for performing a portion of the automatic operation of the valve. c is an air port for admitting air between the pistons G and H for a cushion. 31 is an exhaust outlet from the piston chamber F. 20 is the valve body of an automatic exhaust valve which is connected to the main valve at outlet 31 by the pipe 32 or other suitable means, the area of the opening in the outlet and the opening through the valve seat 29 are each at least equal to the area of the bore of the by-pass N. 21 is a bonnet or cover having a rigid diaphragm 51 with at least one port 28 through it, and has a stuffing box 26 on top of it through which the stem 25 passes. The diaphragm 51 acts as a ported cover for the piston chamber 23' and also as a guide for the lower end of the spindle 25 which passes through it, and the ports 28 admit the steam pressure from the chamber in the cover 21 to the top of the piston 23 and are made of small bore to create a cushion so that the piston can move upwardly and downwardly without shock. 30 is a by-pass connecting

the steam from the steam header or the steam header connection 40 to the chamber in the cover 21. 22 is a valve which is held against the seat 29 by the piston 23 when full steam pressure from the steam header is supplied against the top of the piston, the diameter of the piston being greater than the diameter of the valve. The spindle 25 is for closing the valve 22 at will, the spindle is brought into engagement with the piston 23 by the handwheel 27 mounted on its outer end, or the spindle may be operated by any suitable means. 24 is a spindle or rod connecting the valve 22 with the piston 23. 43 is a spindle operated by the handwheel 44 and passes through the stuffing box 45. This spindle is for unseating the valve 22 at will when desired. 10 is a traveling indicator with the indicating point 16 and is employed in connection with an indicator plate on the side of the yoke (plate not being shown on the drawing) to indicate when the valve is open or closed when the stem 1 is operated, and also to indicate when the end of the stem 5 is at its central point of travel to permit the valve to automatically operate. The indicator is held from rotation by the grooves 11 and 11 which engage the guides 12 and 12 on the inner sides of the yoke 17.

The operation of the valve is as follows when the traveling sleeve 2 and the stem 5 are at their central point of travel and when the automatic exhaust valve is closed as shown in the drawing. The steam pressure enters the valve body at B and passes into the chamber C and through the by-pass N into the chamber F and forces the piston G downwardly which moves the valve from its seat and holds it away from its seat. The steam then flows around the valve and through the opening in the seat and through the discharge chamber and out through the outlet g into the steam header through the pipe or fitting connecting the valve to the header. Should a rupture occur in the boiler thus reducing the steam pressure in the boiler and correspondingly reducing the pressure on top of the piston G the pressure in the steam header created by steam from the other boiler or boilers attached to it will exert pressure against the under side of the piston H and force the piston H upwardly which closes the valve and holds it closed as long as steam pressure in the header is in excess of the pressure in the ruptured boiler, as the piston H is designed of an area suitable to move the valve upwardly when there is a drop of pressure in the boiler. The steam pressure from the header enters the chamber in the top cover of the automatic exhaust valve through the by-pass 30 and passes through the ports 28 and 28 and exerts pressure on the piston 23 which holds the valve 22 against its seat. This cuts off

the flow of steam from the piston chamber F from passing through the opening in the valve seat 29. Should the steam main become ruptured and the pressure in it is thereby reduced, then the pressure in the piston chamber F entering the automatic exhaust valve body through the pipe 32 forces the valve 22 and piston 23 upwardly thus opening the valve to allow the steam entering the chamber F to exhaust freely to atmosphere through the outlet end of the automatic exhaust valve body, thereby the pressure in the chamber F is killed and the pressure from the boiler on the under side of the valve I forces the valve to its seat and holds the valve against its seat which shuts off the steam from the boiler to the steam header. If it is desired that the automatic exhaust valve is not to automatically operate then the stem 25 is screwed down against the piston 23 thus bringing the valve 22 against its seat and holding it closed. It will be necessary to thus close the automatic exhaust valve when starting up steam in the boiler and leave it closed until the full steam pressure is obtained in the steam header. When there are two or more boilers connected to a common steam header, an automatic exhaust valve for each emergency valve can be dispensed with. The emergency valves can be connected in a battery to a common exhaust line of proper bore by branches run from the outlets 31 of the chambers F and an automatic exhaust valve placed between the outlet end of the exhaust line and the steam header, thereby all the emergency valves would close through the operation of the one automatic exhaust valve, the exhaust valve would have an opening through its seat equal to the combined area of the several exhaust outlets from the emergency valves. By manual or other suitable means the lower stem 43 in the automatic exhaust valve can be moved upwardly until it engages and opens the valve 22, by this means both the main valve and the exhaust valve can be tested to see if they are in automatic operating condition. For operating the emergency valve by means other than the automatic operation so as to hold the valve closed or open the stem 1, the traveling sleeve 2 and the stem 5 combined are employed. By revolving the stem 1 clockwise the threads at the end engaged in the sleeve 2 raise the sleeve and the stem 5 upwardly and the enlarged end 6 of the stem 5 is engaged against the plug 7 and pulls the pistons G and H and the valve I upwardly, thus seating the valve and holding it closed. To open the valve and hold it open the stem 1 is revolved anti-clockwise which forces the sleeve downwardly against the plug 7 and forces the two pistons and the valve downwardly, thus opening the valve and holding it open. When the traveling sleeve and the stem 5 are in the position

shown in the drawing, as before stated, the valve will then operate automatically as the enlarged end of the stem 5 at that position will not engage the bottom of the plug nor will the traveling sleeve engage the top of the plug. The operation of the sliding indicator is performed by the left hand thread on the stem which passes through it. The position of the indicator as shown in the drawing is at its central point of its alternating travel. When the stem is revolved clockwise the indicator travels upwardly until the valve is closed; when the stem is revolved anti-clockwise the indicator will move downwardly until the valve is open.

The valve without the automatic exhaust valve can be used where only the steam from the header is to be prevented flowing into the boiler.

It is to be understood where I have shown a piston or pistons and where the words "piston" or "pistons" are used that I do not limit myself to the use of a piston or pistons as it might be desirable to use a flexible diaphragm or other structure performing functions similar to the functions performed by a piston, as in accordance with common understanding a flexible diaphragm is the equivalent of a piston.

Obviously, some features and parts of this invention may be used without others, and my invention may be embodied in widely varying forms. I am not to be understood as limiting myself to the construction and arrangement and combination of parts as shown and described, and do not limit myself to any particular form or type of the parts forming the combination, as other combinations and equivalents of the parts may be used to variously modify my present invention within the scope of the subjoined claims.

Therefore, without limiting myself to the construction shown and described, nor enumerating equivalents, I claim as my invention—

1. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective

positions, a by-pass connecting the two end chambers in the casing, and means for opening or closing the valve at will as may be desired and for holding the valve open or closed, as and for the purpose set forth.

2. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, and a stem in combination with suitable means for opening or closing the valve at will as may be desired and for holding the valve open or closed, as and for the purpose set forth.

3. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a longitudinally traveling sleeve with a stem attached to the bottom of it, a stem for raising or lowering the said sleeve and the stem attached to it for opening and closing the valve at will as desired and for holding the valve open or closed, and suitable means for operating the stem, as and for the purpose set forth.

4. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the cas-

ing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, means for opening or closing the valve at will as may be desired and for holding the valve open or closed, and an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, as and for the purpose set forth.

5. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a stem in combination with suitable means for opening or closing the valve at will as may be desired and for holding the valve open or closed, and an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, as and for the purpose set forth.

6. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on

which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a longitudinally traveling sleeve with a stem attached to the bottom of it, a stem for raising or lowering the said sleeve and the stem attached to it for opening and closing the valve at will as desired and for holding the valve open or closed, suitable means for operating the stem, and an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, as and for the purpose set forth.

7. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, means for opening or closing the valve at will as may be desired and for holding the valve open or closed, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, and a by-pass connecting the said automatic exhaust valve with a steam header supplied with steam through the first said valve, as and for the purpose set forth.

8. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a stem in combination with suitable means for opening or

closing the valve at will as may be desired and for holding the valve open or closed, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, and a by-pass connecting the said automatic exhaust valve with a steam header supplied with steam through the first said valve, as and for the purpose set forth.

9. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a longitudinally traveling sleeve with a stem attached to the bottom of it, a stem for raising or lowering the said sleeve and the stem attached to it for opening and closing the valve at will as desired and for holding the valve open or closed, suitable means for operating the stem, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, and a by-pass connecting the said automatic exhaust valve with a steam header supplied with steam through the first said valve, as and for the purpose set forth.

10. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, means for opening or closing the valve at will as may be desired and for holding the

valve open or closed, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, means for closing the exhaust valve at will and holding it closed as desired, and means for opening the exhaust valve at will and holding it open as desired, as and for the purpose set forth.

11. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a stem in combination with suitable means for opening or closing the valve at will as may be desired and for holding the valve open or closed, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, means for closing the exhaust valve at will and holding it closed as desired, and means for opening the exhaust valve at will and holding it open as desired, as and for the purpose set forth.

12. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a longitudinally traveling sleeve with a stem attached to the bottom of it, a stem for raising or lowering the said sleeve and the stem attached to it for opening and closing the valve at will as desired and for holding the

valve open or closed, suitable means for operating the stem, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, means for closing the exhaust valve at will and holding it closed as desired, and means for opening the exhaust valve at will and holding it open as desired, as and for the purpose set forth.

13. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, means for opening or closing the valve at will as may be desired and for holding the valve open or closed, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, means for closing the exhaust valve at will and holding it closed as desired, means for opening the exhaust valve at will and holding it open as desired, and a by-pass for connecting the said automatic exhaust valve with a steam header supplied with steam through the first said valve, as and for the purpose set forth.

14. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a stem in combination with suitable means for opening or closing the valve at will as may be desired and

for holding the valve open or closed, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, means for closing the exhaust valve at will and holding it closed as desired, means for opening the exhaust valve at will and holding it open as desired, and a by-pass for connecting the said automatic exhaust valve with a steam header supplied with steam through the first said valve, as and for the purpose set forth.

15. In a valve, the combination of a casing or body having an inlet and an outlet, a valve chamber, a valve in the valve chamber opening toward the inlet, a valve seat extending into the valve chamber with the surface of the face of the valve seat located transversely to the common axis of the casing, a discharge chamber on the opposite side of the valve seat from the valve chamber, two piston chambers located above and in direct line with the discharge chamber, two pistons each of a diameter greater than the diameter of the valve operatable within their respective chambers, the said chambers and the said valve and the said valve seat are located in

the order mentioned and in a direct line on a common axis, a spindle on which the said valve and the said two pistons are rigidly mounted in their respective positions, a by-pass connecting the two end chambers in the casing, a longitudinally traveling sleeve with a stem attached to the bottom of it, a stem for raising or lowering the said sleeve and the stem attached to it for opening and closing the valve at will as desired and for holding the valve open or closed, suitable means for operating the stem, an automatic exhaust valve connected to the steam exhaust outlet of one of the said piston chambers, means for closing the exhaust valve at will and holding it closed as desired, means for opening the exhaust valve at will and holding it open as desired, and a by-pass for connecting the said automatic exhaust valve with a steam header supplied with steam through the first said valve, as and for the purpose set forth.

In testimony whereof, I have signed my name to this specification this 7th day of September, 1918.

OWEN MARSHALL JONES.