

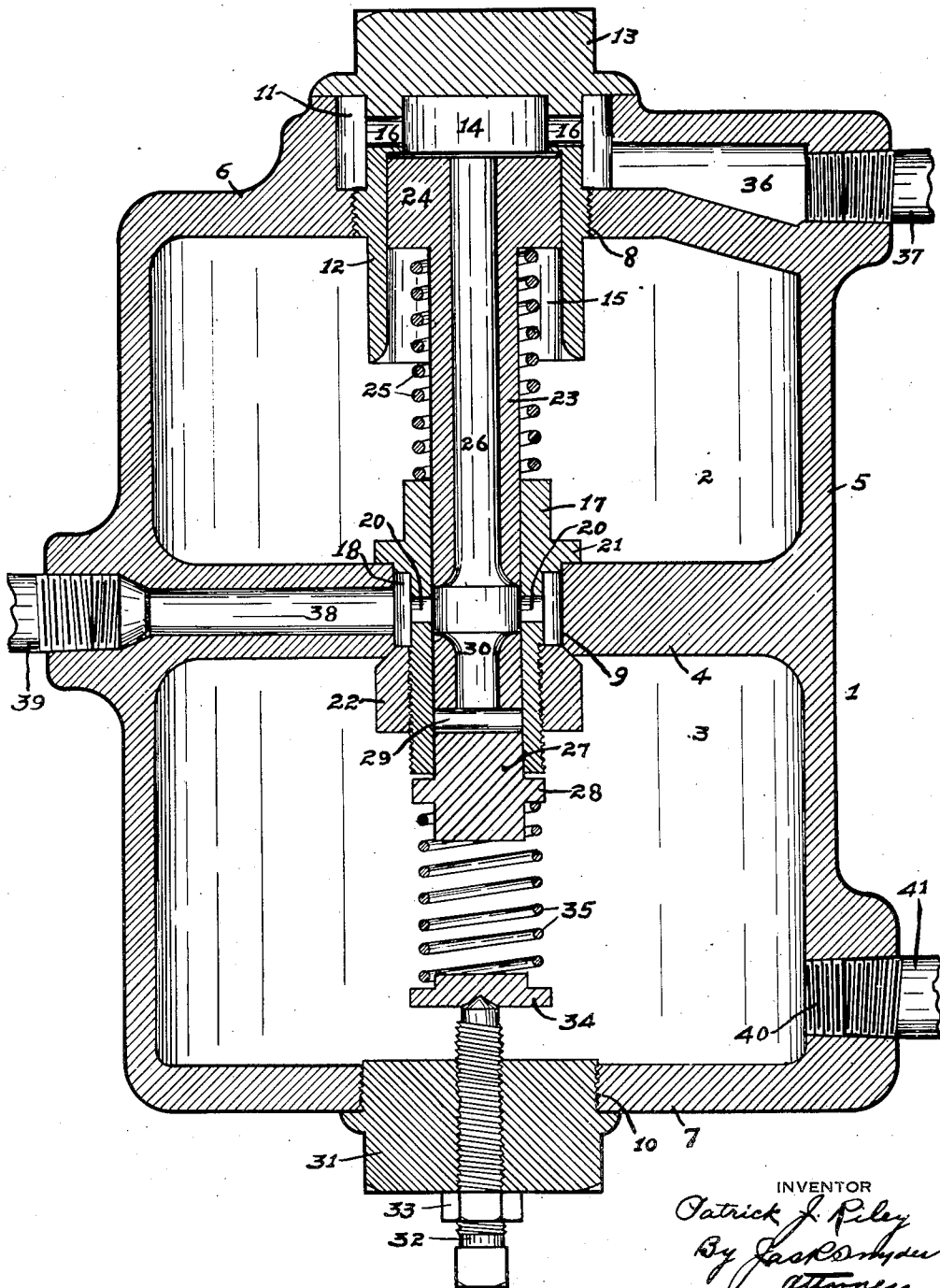
Aug. 20, 1929.

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1,725,539

COMBINATION PRESSURE REGULATING AND RELIEF VALVE

Filed Nov. 14, 1927



UNITED STATES PATENT OFFICE.

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COMBINATION PRESSURE REGULATING AND RELIEF VALVE.

Application filed November 14, 1927. Serial No. 233,049.

My invention relates to a combined pressure regulating and relief valve, and while primarily intended for maintaining a constant volume of water under a constant pressure in a hot water heating system, it will be obvious that the device may be employed for any other purposes wherein it is found to be applicable.

Important objects in the invention are to provide a combination regulating and relief valve, of the character described, which will function automatically for maintaining a hot water heating system properly filled with a constant volume and pressure of water; which comprises a single unit thereby entirely eliminating the multiplicity of parts embodied in intricate analogous devices now commonly in use for the purpose set forth; and which may be readily installed to any type of hot water system without the use of any additional materials except that embodied in the invention itself.

Further objects of the invention are to provide a device of the class stated, which is simple in its construction and arrangement, strong, durable and efficient in its use, compact, positive in its action, economical in its operation, and comparatively inexpensive to manufacture and install.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention hereinafter disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawing, wherein like numerals of reference designate corresponding parts throughout the several views; the figure is a vertical cross sectional view of a combined regulating and relief valve, constructed in accordance with the invention.

Referring in detail to the drawing 1 denotes a cylindrical casing, the interior of which is divided into an upper chamber 2 and a lower chamber 3 by a transversely disposed partition wall 4, which is formed integrally with the side wall 5, of the casing 1. The top 6, the partition wall 4, and the bottom 7, of the casing 1, are each formed with a circular aperture, respectively indicated at 8, 9 and 10. The latter are

vertically aligned, relatively to each other, and each is disposed in the diametric center of respective parts of the casing 1.

The lower end portion of the top aperture 8 is threaded, and the upper end portion thereof is enlarged and, in conjunction with the upper cylinder 12, constitutes a water inlet chamber 11. The upper cylinder 12 is threadedly connected in the top aperture 8, and depends into the upper chamber 2. The upper cylinder 12 has an open lower end, and the upper end thereof is closed by an integrally formed hexagon shaped flanged head 13, which facilitates the insertion and removal of the upper cylinder 12, and which further forms a closure top for the water inlet chamber 11.

The upper portion 14, of the upper cylinder bore 15, is reduced, and communicates with the water inlet chamber 11 through a pair of diametrically opposed ports 16, which are formed in the side wall of the upper cylinder 12.

A lower cylinder 17 open at its upper and lower ends, is mounted in the partition wall aperture 9, and the periphery of the former is spaced from the wall of the latter to provide a water inlet chamber 18 therebetween. The chamber 18 communicates with the lower cylinder bore, through a pair of diametrically opposed ports 20, which are formed in the side wall of the lower cylinder 17, approximately at the center of the length of the latter. The lower cylinder 17 is secured in position by an integrally formed, laterally disposed, annular flange 21, which overlaps the marginal top edge of the partition wall aperture 9, and by the securing nut 22, which is mounted on the exteriorly threaded lower portion of the lower cylinder 17 and which engages the lower marginal edge of the partition wall aperture 9, as clearly illustrated.

The water inlet chambers 11 and 18 surround respective cylinders 12 and 17, thereby assuring the constant communication of the same with the associated ports 16 and 20, regardless of the circumferential disposition of the upper cylinder 12 and the lower cylinder 17 in respective apertures 8 and 9.

A cylindrical water supply valve member 23 is mounted for vertical movement in the upper cylinder 12 and in the lower cylinder 17. The upper end of the valve member 23 is formed with an enlarged cylindrical head 24, which is disposed in the cylinder bore 15,

and the lower end of the valve member 23 extends into the upper end of the lower cylinder 17. A spiral spring 25 is mounted on the valve member 23. The upper end of the spring 25 abuts against the lower end of the head 24 and the lower end thereof is seated on the top of the lower cylinder 17. The normal action of the spring 25 forces the valve member 23 to its normal uppermost or open position with the top of the valve member head 24 positioned against the lower end of the reduced cylinder bore portion 14, while the lower end of the valve member 23 will be disposed above the ports 20 in the lower cylinder 17. The valve member 23 is provided with a passage 26, which extends throughout the length of the former. The upper end of the passage 23 communicates with the reduced cylinder bore portion 14, and the lower end thereof communicates with the bore of the lower cylinder 17.

A drain valve member 27 is mounted for vertical movement in the lower end of the lower cylinder 17. The valve member 27 is formed with an annular flange 28, which is disposed adjacent to the lower end thereof. The flange 28 limits the upward movement of the valve member 27 in said lower cylinder 17, so that the upper end of the valve member 27 is at all times disposed below the ports 20 formed in the lower cylinder 17.

The drain valve 27 is provided with a transversely extending passage 29, which is disposed above the flange 28. The drain valve 27 is further provided with a vertically extending passage 30, the lower end of which communicates with the transverse passage 29 and the upper end thereof with the bore of the lower cylinder 17.

A plug 31 is threadedly mounted in the casing bottom aperture 10, and carries a vertically extending, centrally disposed, and threadedly engaged adjusting screw 32, which is provided with a lock nut 33.

A spring seat 34 is swivelly supported on the top or inner end of the adjusting screw 32. A spiral spring 35 is disposed between drain valve member 27 and the spring seat 34. The lower end of the spring 35 is mounted on the seat 34 and the upper end thereof surrounds the lower end of the drain valve member 27 and abuts against the lower face of the flange 28. The adjustment of the screw 32 permits of the adjustment of the spring 35 to tension required for the purpose to be described.

The action of the spring 35 normally maintains the drain valve member 27 in its normal uppermost closed position, with the transversely disposed passage 29 positioned within the bore of the lower cylinder 17.

The casing top 6 is formed with a horizontally extending passage 36, the inner end of which communicates with the water inlet chamber 11. The outer end of the passage

36 is threaded for connection with the conductor pipe 37 which latter is adapted for connection with the heating system. The partition wall 4 is formed with a horizontally extending passage 38, the inner end of which communicates with the water inlet chamber 18. The outer end of the passage 38 is threaded for connection with the conductor pipe 39 which latter is adapted for connection with the source of water supply.

The lower end of the casing side wall is formed with a threaded aperture 40, in which a conductor pipe 41, leading to a drain or sewer, is connected.

In practice, the operation of my improved combined pressure and relief valve is as follows:—Assuming that all parts of the device are in their normal positions shown in the drawing, the water, from the source of supply, will pass through the pipe 39, through the passage 38, into the chamber 18, through ports 20, through the passage 26 into the reduced bore portion 14, through ports 16 into the chamber 11, through the passage 36, and through the pipe 37 into the heating system, whereby the latter is then maintained in the filled condition. When the static head of water in the heating system expands in volume from heating, the excess pressure of the water created within the reduced bore portion 14 will overcome the action of and compress the spring 25 and force the water inlet valve member 23 downwardly until the lower end thereof passes and closes the ports 20 whereby the water supply is shut off.

As the water supply valve member 23 is forced downwardly, in the manner stated, the lower end thereof will engage the top of the drain valve member 27 forcing the latter downwardly until the horizontal passage 29 clears the lower end of the lower cylinder 17, thereby discharging the excess volume of water through the passage 29 from the heating system into the lower chamber 3, from which it is drained through the drain pipe 41.

As soon as the static head or pressure of the heated water is relieved, the action of the spring 25 will force the water supply valve member 23 upwardly to its normal position thereby opening the ports 20 and permitting the entrance of water from the source of supply to the heating system. The action of the spring 35 will also return the drain valve member 27 to its normal position in the lower cylinder 17 to close the entrance passage 29 to the drain chamber 3.

It will, of course, be obvious that the construction and rated resiliency of the spring 25 must be such that it will be compressed to allow the operation of the water discharge element when the heated static head of water in the heating system establishes or reaches a predetermined pressure, and so that the

discharge elements will automatically return to their normal closed positions when the water pressure has been reduced to normal after the discharge of the excess volume of water in the manner herein stated.

What I claim is:

In combination a combined water regulating and relief valve for a hot water heating system, comprising a casing, an upper cylinder fixed in said casing and having a closed top and an open lower end, a lower cylinder fixed in said casing and having an open upper and lower end, each of said upper and lower cylinders arranged in said casing to provide an upper and a lower water inlet chamber respectively surrounding said upper and lower cylinders and communicating with respective bores thereof, said upper water inlet chamber communicating with the heating system and said lower water inlet chamber communicating with the source of water supply, a vertically shiftable water supply valve member having its upper end disposed in the bore of said upper cylinder and its lower end in the bore of said lower cylinder, a spiral spring mounted on the top of said lower cylinder and engaging said water supply valve member for normally holding the latter in the open position to maintain the communication between said lower water inlet chamber and the bore of said lower cylinder in the open position, a drain valve member vertically shiftable in the bore of the lower end of said lower cylinder, said drain valve member formed with a flange engaging the lower end of said lower

cylinder to limit the upward movement of said drain valve member in said lower cylinder, said drain valve formed with a transversely extending passage and with a vertically extending passage, the latter establishing communication between said transversely extending passage and the bore of said lower cylinder, an adjustable spring engaging said drain member for normally maintaining said drain valve in its upward closed position in said lower cylinder, the upper end portion of said upper cylinder bore being reduced, the marginal edge of the wall of the lower end of said reduced upper cylinder bore portion providing a seat for the upper end of said water supply valve member when the latter is in the normal position, a drain conductor communicating with said casing, the expansion of the static head of water in the heating system forcing said water supply valve member and said drain valve member downwardly whereby the said water supply valve member will close the communication between said lower water inlet chamber and the bore of said lower cylinder and whereby the transversely disposed passage in the drain valve member will clear the lower end of the lower cylinder and cause the discharge of the excess volume of water from the heating system through said drain conductor, substantially as described and for the purpose set forth.

In testimony whereof I affix my signature.

PATRICK J. RILEY.