June 10, 1941. P. S. BOGARDUS 2,244,759

VALVE

Filed Feb. 17, 1939

Fig. 1.

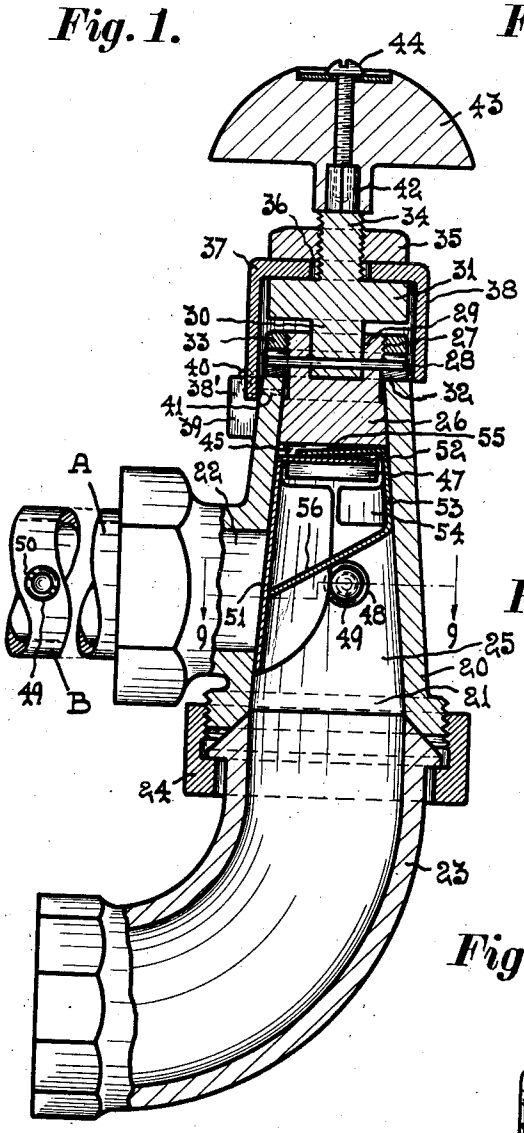


Fig. 3.

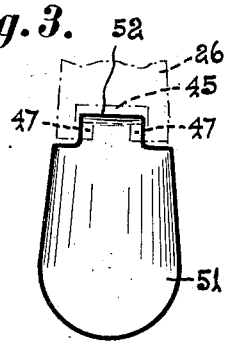
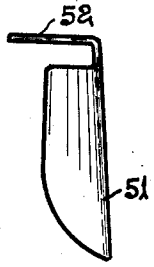


Fig. 4.



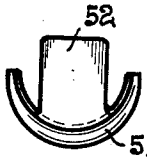


Fig. 5.

Fig. 6.

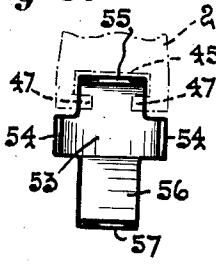


Fig. 7.

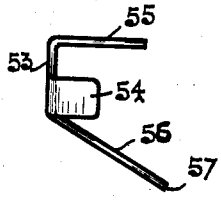


Fig. 8.

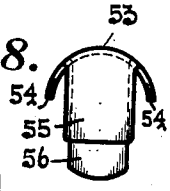


Fig. 9.

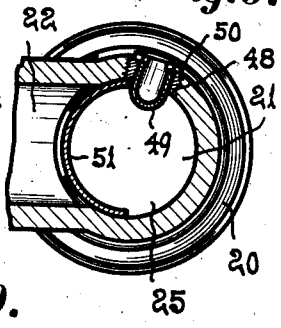


Fig. 2.

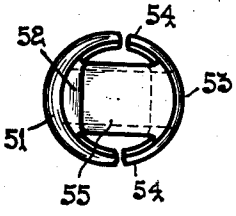




Fig. 10.

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Patented June 10, 1941 2,244,759

UNITED STATES PATENT OFFICE

2,244,759

VALVE

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Application February 17, 1939, Serial No. 256,933

1 Claim. (Cl. 251—96)

This invention relates to valves adapted for use in connection with low pressure steam, vapor and hot water heating systems and more particularly to closure gates for valve outlets.

It is an object of the invention to provide a valve having a gate formed by punch press operations for minimizing the cost thereof, said gate being adjustable correspondingly with respect to differing degrees of temperature encountered throughout the piping of a hot water heating system and to provide cooperative means for ascertaining valve temperatures for regulating valve-gates accordingly.

Another object of the invention is to provide a valve-gate which may be readily interchanged with a like or similar gate at any desired time.

A further object of the invention is to provide a valve-gate so constructed that it is adapted to tightly close against its seat and which may be quickly opened and closed with a minimum of manual effort.

A still further object of the invention is to provide a valve-gate so constructed that it automatically cleans itself and its seat during an opening and closing of the valve whereby debris, pipe scale and the like does not become lodged between the gate and its seat during a closure of the valve outlet port of the present invention.

Other and further objects and advantages of the invention will be understood from the following detailed description thereof.

In the drawing:

Figure 1 is a vertical section, partly in side elevation, of a valve constructed in accordance with an embodiment of the present invention.

Figure 2 is a top plan view of the preferred form of valve-gate employed and a spring therefor.

Figures 3, 4 and 5 are, respectively, a front, and side elevation and a top plan view of said gate.

Figures 6, 7 and 8 are, respectively, a front and side elevation and a top plan view of said gate spring.

Figure 9 is a transverse section of a portion of the valve, the view being taken in line 9—9 of Figure 1.

Figure 10 is a plan view of a thermometer employed.

Referring to the drawing for a more particular description, 20 indicates a housing formed of any suitable material having an inlet port 21 and an outlet port 22.

The inlet port 21 is adapted to be connected or placed in communication with a source of supply of hot water, low pressure steam or the like by any suitable means, pipe and pipe fittings being employed which may include the elbow 23 and at times when the specific elbow shown in Figure 1 is employed, said elbow is connected to the valve housing 20 by means of a collar 24, the latter being threadedly attached to the housing for providing a union between said housing and said elbow.

The valve shown in Figure 1 is usually disposed closely adjacent a hot water radiator in use, said valve normally being vertically positioned, as shown in Figure 1.

The inlet port 21 of the valve is in communication with the interior of the housing 20, the latter having an elongated chamber or bore 25 which is annular in cross section, as shown in Figure 9, said bore or opening 25 extending through and longitudinally of the housing 20. If desired the wall of said annular chamber may be lined with baked porcelain in instances where the housing is made of iron for lessening the cost of providing a rustproof housing interior and in instances where said housing is made of brass, copper or the like said porcelain is omitted. Oppositely disposed portions of the elongated annular wall of the chamber 25 are preferably formed convergent towards each other from the wider end of the chamber adjacent the inlet 21 and toward the narrower upper end thereof and it will be understood that for certain types of uses the valve may be constructed with diametrically and oppositely disposed side wall portions which are in parallelism with respect to each other.

The conical bore of the chamber at and upon the narrower end thereof carries means for operating a later described valve-gate, said means preferably including a rotatable plug 26, the latter having an annular side wall which is of a convergent shape complemental to the shape of the wall of the chamber 25.

The plug 26 is initially inserted through the wider inlet port 21, said plug having a threaded portion 27 which protrudes through the upper end of the bore of the housing, said plug being prevented from completely passing through the upper open end of said bore by means of the complemental shape of the said plug and annular wall of the chamber whereby the chamber is substantially sealed and steam tight at its upper end and rotary movements of the plug 26 with respect to the housing 20 are permitted.

The threaded end portion 27 of the plug 26 received a keeper pin 28 which extends there-

through for purposes later described said end being provided with a recess 29 for the reception therein of an arm 30 of an apron guide 31, the latter being of cruci-form in cross section, as shown in Figure 1.

The keeper pin 23 also extends through said arm 20 for removably locking said arm and the plug 26 together. A metal ring or gasket 32 is provided between the upper narrower end of the housing 20 and the protruding ends of the keeper pin 28. The upper end of the plug 26 is provided with screw threads 27 which register with a detent nut 33 whereby the apron guide 31 is removably secured to the housing 20 for purposes later described.

The upper arm 34 of the apron guide 31 is provided with screw threads which register with a nut 35, said upper arm extends through an aperture 36 which is axially disposed with respect to the horizontal cover portion 37 of an annular apron 38. The apron extends from the cover portion thereof to the upper end of the housing 20, being provided with a lug 39'. The lug 39' extends below the upper end of the housing 20 and below a stop 39 against which said lug is adapted to abut at times.

The stop 39 is formed integral with the housing 20 and the upper end thereof is flush with the top of the housing. An oil conduit is provided through the top 39. One end of said conduit is normally sealed by means of a removable screw 40 and the other end of the conduit 41 is in communication with the interior of the chamber 25 whereby oil admitted to said conduit is supplied between the plug 26 and the annular side wall of the chamber 25 for lubricating said parts.

The arm 34 of the apron guide 31 is provided with an end 42 which is rectangular in plan for the reception thereon of a hand wheel 43. The wheel 43 is prevented from detachment with respect to said end 42 by means of a screw 44 which extends through the wheel 43 and into said end 42 and it will be understood that at times when the wheel 43 is manually rotated in either direction that a corresponding movement is imparted to the plug 26 and to a later described valve-gate.

As best shown by the dotted lines in Figure 3, the lower or wider end of the plug 26 is provided with a transversely disposed kerf 45, the latter being substantially T-shape in end elevation, whereby oppositely disposed shoulders 47 are provided at the lower end of the plug 26.

As best shown in Figure 9, the side wall of the housing 20 is provided with a threaded bore which received a detent-plug 48, the latter carrying a comparatively thin tube 49 of copper or the like. The tube is brazed or otherwise suitably secured to the plug 48, having a closed end which extends into the chamber 25 a desired distance and an open end which is in communication with the exterior of the housing, said tube being adapted to receive an end of a thermometer 46 for ascertaining the thermal condition of the interior of the housing 20. The detent-plug is provided with a transversely disposed slot 50 for the reception of a screw driver bit whereby it may be readily removably secured to the housing 20.

The main body portion of the gate for the outlet port 22 of the valve is preferably spade-shaped in plan, as shown in Figure 3, semi-circular in cross section and tapered longitudinally to conform to the contour of the inner annular wall of the chamber 25 against which it is adapted to snugly abut during rotary movements thereof for the purpose of closing the port 22 at times. The gate 51 may be formed of sheet metal by punch press operation or by casting and moulding.

The upper end of the gate 51 is provided with a tang 52 which is disposed substantially at a right angle with respect thereto, said tang being received in the kerf 45 of the plug 26 whereby the gate is adapted to have slight swinging movements with respect to its tang 52.

The spring for the gate is formed of a resilient material such as stainless spring steel, spring brass or the like having a main body portion 53 from which a guide wing 54 extends at each side thereof, said guide wings having an arcuate shape complemental to the annular wall of the chamber 25 against which said wings abut.

From the upper end of the spring 53 a tang 55 extends which is similar to the tang 52, said tang 55 being also received in the kerf 45, as shown in Figure 1.

The lower end of the spring 53 is provided with a tongue 56 having an end 57 which bears against the gate 51 for urging said gate toward and against the annular wall of the chamber 25 at all times.

To assemble the several described parts the tangs 55 and 52 are placed within the kerf 45 at a time when the plug 26 is detached from the apron guide 31 and is exteriorly positioned with respect to the housing 20; whereupon the plug 26 is inserted through the port 21, the threaded end thereof projecting through the open end of the bore of the housing at which time the members 28, 32 and 33 are placed in position and it will be noted that by adjusting the detent nut 33 with a wrench or the like that the plug 26 is drawn into a position of use and tightly fitting between opposite side wall portions of the chamber 25. By means of tightening the nut 35 the heretofore mentioned tangs 52 and 55 become compacted towards each other and into the position shown in Figure 1, whereby the gate 51 and spring 53 of the gate are snugly seated against opposite wall portions of the chamber 25, resultant from the urge of the spring portion 56. The tube 49 is then positioned through the side wall of the housing, as shown in Figure 9, the members 35 and 38 are then disposed as shown in Figure 1 and the hand wheel 43 attached.

It will be understood that primarily the herein described valve is disposed in use adjacent the side and base of a hot water radiator of a heating system and that the elbow 23 is in communication with a source of supply of hot water and that the outlet port 22 of the valve is in communication with a return elbow A, the latter being provided with a tube B which is like the tube 49.

In operation the heretofore described valve being installed in communication with the piping of a hot water, vapor or low pressure steam heating system and with other similar valves, the procedure for adjusting the valves is as follows:

Assuming that said hot water or low pressure steam is circulating through said system and valves the temperature of the hot water at any selected valve is first ascertained for adjusting the valve accordingly by first inserting the bulb end of the thermometer 46 into the tube 49 and noting a reading of the scale of said thermometer.

Assuming that the normal temperature in the boiler of said heating system is 200 degrees Fahrenheit, it is well known that there is usually a drop in temperature of about 10 degrees between the boiler and the inlet 21 of the valve of a

radiator, whereby normally the thermometer inserted in the tube **49** should read approximately 190 degrees.

Assuming that a reading at the outlet of said radiator by means of a thermometer inserted in the tube B reads 180 degrees, no adjustment would be further required for the valve of the instant invention. Conversely, and assuming that the reading at B is 170 degrees, then the gate **51** is adjusted by the hand wheel **43** to a more open position until the thermometer reading at B is 180 degrees for maintaining said temperature. If too high a temperature at B is noted the gate is then adjusted so that it will not open as fully as in the first mentioned example and whenever the desired adjustment has been consummated the lock nut **35** is permanently set after adjusting the apron lug **38'** against the stop **39** of the housing. As is the conventional practice the temperature of the water in the boiler is permanently controlled by an automatically operating regulation means to maintain 200 degrees Fahrenheit in the boiler or whatever temperature is desired and the valves of the present invention forming a part of the above mentioned system are adjusted accordingly.

It is well known to the conventional practice that the hot water within a conventional heating system will short circuit since as is well known the hot water from the boiler will return to the boiler following the path of least resistance, said path being provided by differences in the sizes and arrangement of piping within the system and the exposure of said pipes to thermal conditions. Among other advantages of the present invention and through the employment of the instant valve it will be noted that a desired degree of temperature may be maintained in each radiator throughout a system employing said valve.

To adjust the valve-gate correspondingly with respect to the thermal condition of the bore of the housing **20**, the lug **38'** is correspondingly locked and disposed a greater distance away from the stop **39** whereby at times when the gate is rotated by means of the hand wheel **43** a corresponding movement is imparted to said gate for governing the degree of opening of the port **22**, it being limited in one direction by a side of the gate **51** striking against the tube-detent **49**, as shown in Figure 9, and is adjustably limited in the other direction by means of the stop **39** and lug **38'**.

As thus described it will be noted that at times when the reading of the thermometer is below normal that the gate **51** may be so adjusted that a greater amount of hot water may pass through the outlet port **57** in accordance with said temperature reading.

It will be understood that in said hot water heating system, there may be a comparatively large number of radiators and that the temperature of each individual valve for each individual radiator may be ascertained and said valves adjusted accordingly whereby the temperature of the hot water at the several points of said system is equalized for consumating a desideratum and object of the invention.

Among other advantages of the invention and a hot water heating system equipped with specimens thereof, it may be stated that it is possible to provide a predetermined degree of temperature at each individual radiator by means of the adaptability of the instant valve which may be adjusted to compensate for inequalities of the sizes and arrangement of piping used in different parts of a system and for a lack of proper insulation of said piping.

From the foregoing description it is thought to be obvious that a valve constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish it to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as claimed.

I claim:

A valve comprising a housing having a conical bore and an outlet extending through a wall of said housing from said bore, a rotatable plug having a wedge shape in cross section complemental to the shape of said bore, means for drawing said plug toward the narrower end of said bore for sealing said end, a gate for said outlet pivotally carried by said plug within said bore, a leaf spring carried by said plug for urging said gate toward the wall of said bore and outlet during rotary movements of said plug, and means disposed exteriorly of said housing having a connection with said drawing means and plug for rotating the latter in said bore for opening and closing said outlet.

PHIL S. BOGARDUS.