E. C. WILEY.

RADIATOR VALVE.

APPLICATION FILED JAN. 14, 1914.

1,200,676.

Patented Oct. 10, 1916.

Fig. 1.

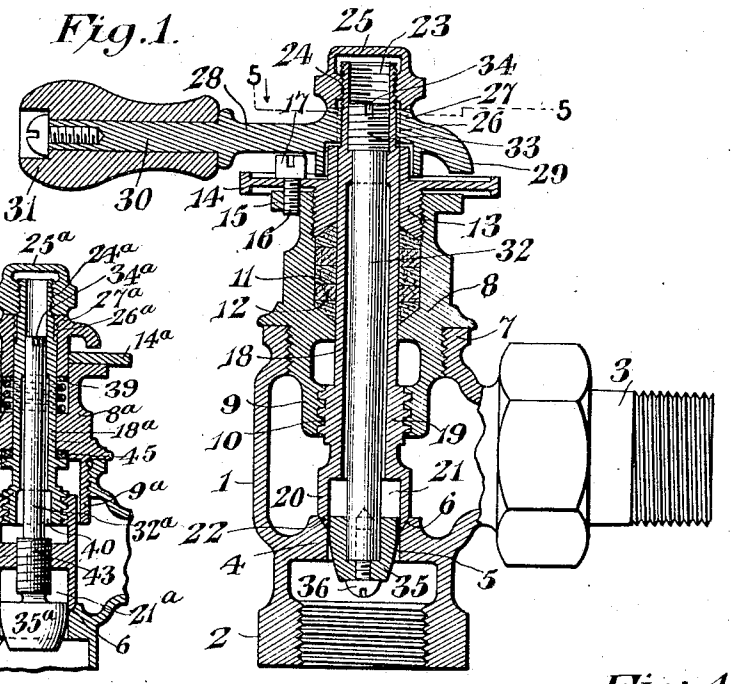


Fig. 6.

Fig. 3.

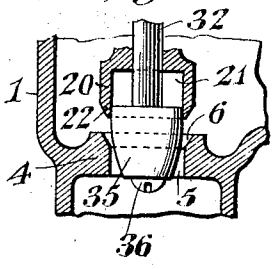


Fig. 5.

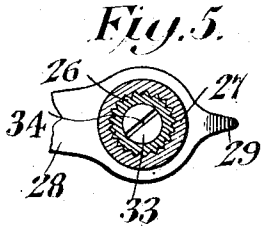


Fig. 4.

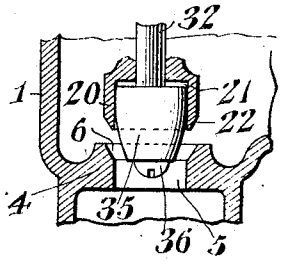
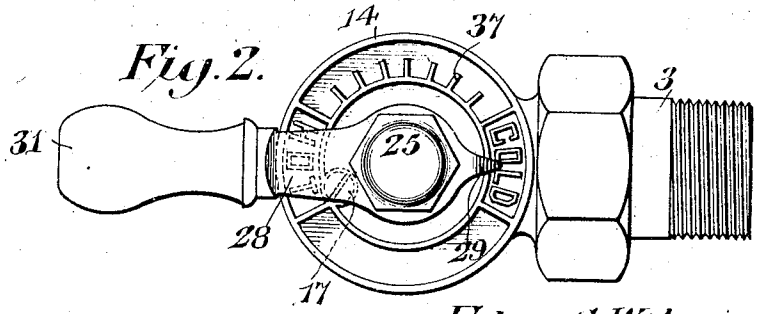


Fig. 2.



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EDGAR C. WILEY, OF LYNCHBURG, VIRGINIA, ASSIGNOR TO SIMPLEX HEATING SPECIALTY COMPANY, INCORPORATED, OF LYNCHBURG, VIRGINIA.

RADIATOR-VALVE.

1,200,676. Specification of Letters Patent. Patented Oct. 10, 1916.

Application filed January 14, 1914. Serial No. 812,102.

To all whom it may concern:

Be it known that I, EDGAR C. WILEY, a citizen of the United States, residing at Lynchburg, in the county of Campbell and State of Virginia, have invented a new and useful Radiator-Valve, of which the following is a specification.

This invention has reference to improvements in radiator valves, and its object is to provide a valve for the purpose which may be readily adapted to different radiator capacities, so that a single size of valve will answer for many different sizes of radiators.

In accordance with the present invention the movable member of the valve is so constructed that it may be fully opened or fully closed by a short movement of the customary handle, and it is desirable that this movement should not exceed an arc of more than about one hundred and eighty degrees, while a fractional rotation of the valve stem between the two extremes causes corresponding graduation of the supply. With such a valve steam or other heating fluid may be admitted to the radiator in large or small quantities to suit weather conditions, and this is accomplished by turning the valve stem accordingly. Where a lever handle is provided it is customary to arrange the opening and closing movement of the valve so that when the lever handle stands away from the radiator the valve is closed, and when it stands toward the radiator the valve is fully open, thus apprising the observer at a glance as to whether the steam is turned on or off, and by a suitable index fractional positions are readily indicated. In addition to this graduating function of the valve, the present invention contemplates an independent adjustment whereby the caliber of the steam port, assuming the valve to be a steam valve, may be permanently increased or diminished to adapt the valve to a large or a small radiator, this being equivalent to making the valve large or small to meet the requirements of large or small radiators, but bringing this desirable condition about with a single size of valve. This avoids the necessity of carrying the valves in a multitude of sizes. It is impossible to determine just the proper size of port to feed any given radiator, as this will vary with the pressure and other conditions, such as friction in pipes, etc., resulting from the proximity to or remoteness of the radiator from the boiler or other source of supply. In practice it is found necessary in order to get accurate results, to adjust the caliber of the valve to the radiator under practical working conditions after it is installed, and such permanent adjustment must be made in such a way that the graduating action of the valve is maintained throughout the arc of the handle movement, whether such permanent adjustment be made for a large or a small radiator, and, moreover, it is desirable that the lever movement be always the same whether the valve is applied to a large or a small radiator.

In accordance with the present invention the opening and closing movement of the valve with respect to the port it controls is constant for all sizes of radiators to which the valve is adapted, but the permanent adjustment is brought about by the employment of an auxiliary calibrating plug carried by the movable member of the valve and so related thereto that it can be adjusted with relation to the steam port to vary the same.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming a part of this specification, with the further understanding that while the drawings show a practical form of the invention, the latter is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention.

In the drawings:—Figure 1 is a longitudinal diametric section of the valve with some parts shown in elevation. Fig. 2 is a plan view of the valve structure. Fig. 3 is a fragmentary section of a portion of the valve as shown in Fig. 1, but showing the movable member of the valve in the open position. Fig. 4 is a view similar to Fig. 3 but showing a different position of the calibrating plug from that shown in Fig. 3. Fig. 5 is a detail section on the line 5—5 of Fig. 1, distant parts being omitted. Fig. 6 is a view similar to Fig. 1, showing another form of valve operating mechanism.

Referring to the drawings there is shown a valve casing 1 provided with angle necks 2,

3, respectively, suitably threaded for attachment to a steam pipe and to a radiator. Adjacent to the neck 2 the casing 1 is formed with an interior web 4 having a port or passage 5 therethrough terminating at the end remote from the neck 2 in a flaring valve seat 6. The portion of the casing 1 remote from the neck 2 is formed into an interiorly threaded neck 7 for the reception of a bonnet 8 having a hollow axial extension 9 provided with interior screw threads 10 of long pitch. The bonnet 8 is provided with a cavity 11 designed for the reception of packing 12 and adapted to the bonnet so as to engage the packing 12 is a packing gland 13 on which is formed a radially extended disk-like flange 14, while the corresponding end of the bonnet 8 is formed with a radial flange 15 to which the disk-like flange or disk 14 is secured by a screw 16 passing through the disk 14 and threaded into the flange 15 and provided with a head 17 having a purpose to be described. Extended through the gland 13, packing 12, and axial extension 9 is a tubular valve stem 18 laterally enlarged and threaded, as indicated at 19, to match the screw threads 10 and terminating within the casing 1 in a valve head 20 formed with a counterbore 21 in alinement with the bore of the tubular stem, the head 20 having a terminal portion 22 shaped to fit the valve seat 6. The valve stem 18 has the end passing through the gland 13 extended beyond the latter and also counterbored and internally threaded, as indicated at 23. The terminal portion of the last-named extended part of the valve stem is exteriorly threaded, as shown at 24, to receive a cap nut 25, and adjacent to the exteriorly threaded portion 24 the extended portion of the valve stem is exteriorly serrated, as indicated at 26, to receive a similarly serrated boss 27 on a lever 28 having a short nose extension 29 on one side of the boss 27 and a stem 30 on the other side of the boss, said stem carrying a manipulating handle 31 which may be formed of wood or some suitable substance of small heat conductivity and shaped to be readily grasped by the hand of the operator. The serrated portions 26 and 27 permit the placing of the manipulating lever upon the valve stem in the desired position within very close adjustment and the nut 25 serves to hold the lever or handle to the valve stem against accidental removal.

Extending lengthwise through the hollow or tubular valve stem 18 is a rod 32 extending into the threaded portion 23 of the valve stem 18 and there screw threaded, as indicated at 33, to fit the interior threads of the portion 23, the corresponding end of the rod 32 being notched, as shown at 34, or otherwise suitably formed for the application of a tool whereby the rod 32 may be screwed along the valve stem 18 where the part 33 engages in the threaded bore 23. At the other end of the rod there is secured thereto a plug 35, a screw 36 passed axially through the plug into the corresponding end of the rod 32 forming a convenient means of fastening the plug to the rod, and the rod may be axially inset into the plug, as shown, or any other means may be provided for the purpose. The plug is of such diameter as to enter the port 5 and also enter into the counterbore or chamber 21 in the valve head 20, and the plug may be drawn into the chamber 21 to any desired extent by turning the rod 32 about its longitudinal axis, the screw threads of the end 33 and within the counterbore 23 coacting to cause the longitudinal movement of the rod 32.

The plug 35 is shown as frusto-conoidal in shape and may quite closely approach a parabolic form in longitudinal section. The greatest diameter of the plug is very nearly the same as the diameter of the port 5, which latter is of circular or cylindrical shape in the showing of the drawings.

It is advantageous from a manufacturing standpoint and economical for the installation of steam or hot water heating plants to have the controlling valves all of one size irrespective of the size of the radiators employed, and it is further highly advantageous to have the controlling valves so that a single valve may be readily adjusted to properly control the fluid supply to the radiators irrespective of their capacity.

One size of valve made in accordance with the present invention will supply a large radiator, say, one of one hundred and fifty feet radiating surface, or a small radiator, say, one of five feet radiating surface, with substantially equal efficiency throughout the range of adjustments from fully closed to full open positions, in accordance with the adjustment of the calibrating plug. This is due to the shape of the calibrating plug and its relation to the port controlled by the main valve, as well as the shape of the port. It is of importance that the port where it coacts with the calibrating plug be straight or cylindrical, while the plug itself has at its larger end a very slight taper within the range of movement of this part of the plug with respect to the end of the port it enters when the plug is in the projected position, and consequently in position to supply the smallest radiator with steam. For the remainder of the length of the plug toward the smaller end thereof the taper is progressively greater, so that the plug is substantially conoidal or parabolic in shape. The result of this is that considering the plug 35 as in its full projected position, it begins on the opening of the valve to supply steam in progressively increasing quantities as the valve moves toward the fully open position, until when

the last-named position is attained the steam supply is that suited to a five foot radiator, considering such a radiator as of the minimum size for which the valve is designed. Moreover, the slight taper of the plug as it moves through the port 5, and more particularly that end of the port where it joins the valve seat 6, regulates the supply of steam, so that such supply shall be in progressively increasing quantities as the valve opens conforming to the degree of opening of the valve. If, now, the plug 35 be drawn into the valve head 20, say, to an extent to correspond to a fifty foot radiator, then the taper of the walls of the plug 35 with relation to the outlet end of the substantially cylindrical port 5 is such as to supply steam proportionate to the opening of the valve until at fully open position the steam supplied is sufficient for a fifty foot radiator without appreciable waste. With the same valve and with the calibrating plug fully drawn into the head 20, the supply of steam is sufficient for a one hundred and fifty foot radiator, and the same positions of the valve stem lengthwise of the valve structure provide the same proportionate amount of steam to radiators of different sizes provided the plug 35 be properly located for such sizes.

To guide the user of the valve, the disk 14 has suitable indicia displayed thereon which in the particular showing of the drawings convey the information to the user by the words "Hot" and "Cold" that the valve is either fully open or fully closed, while intermediate positions are represented by intermediate marks 37. Other indication may, of course, be used for the same purpose.

It has been the custom to supply valves of different capacities for radiators of different sizes. With the present invention but one size of valve is needed for all the different sizes of radiators within very widely separated limits. The valves may be adjusted before installation to an approximation of the proper adjustment, and then after installation each valve is more accurately adjusted by removing the cap nut 25 and turning the stem 32 of the calibrating plug 35 by means of a screw driver, thus projecting the calibrating plug or withdrawing it into the head 20, as the case may be. Such operation is needful to bring the valve into proper final adjustment, but when once this adjustment is attained a half revolution of the operating handle means the full opening or the full closing of the valve irrespective of the size of the radiator, and furthermore intermediate positions of the handle mean that the radiator is receiving the proper supply of steam for the particular size of radiator to which the valve has been adjusted by the longitudinal movement of the calibrating plug 35 with reference to the valve head 20. The calibrating plug does not close the steam supply, but regulates it and the peculiar relation of the calibrating plug 35 and port 5 brings about a very close approach to accuracy in the supply of steam for the radiator to which the valve is adjusted by the same degree of turning of the valve handle for any or all sizes of radiators. This means that the movements of the valve aside from the calibrating plug are the same for all radiators, while the adjustments of the calibrating plug with respect to its position with relation to the port 5 brings about the proper supply of steam for radiators of different sizes, while the proportionate supplies irrespective of the size of the radiator for the different positions of the valve are automatically accomplished by the shaping of the calibrating plug or head with respect to the port 5 and also the shape of the latter.

Experience has shown that the port 5, or at least that portion of it coacting with the calibrating plug, must be cylindrical, that is, it shall neither taper nor diverge where in coactive relation with the plug 35, and this plug must taper very slightly at its large end and then more rapidly toward its small end, so that the conoidal or parabolic form is either attained or very closely approximated.

The screw 16 while primarily serving to hold the index disk 14 in proper relation to the body of the valve structure, has its head 17 in the path of the nose 29 so as to determine the full open position of the valve and prevent overriding of this position. While the calibrating plug 35, has been described as substantially conoidal, it will be understood that other forms of plug may be employed so that the invention is not necessarily confined to any particular shape of plug.

Instead of employing the type of valve shown in Fig. 1 and associated figures, where the stem of the main valve has the operating handle directly connected thereto, the structure may be made on the lines of the so-called packless valve, as shown in Fig. 6. In this construction there is a valve casing 1 which may be in substantially all respects similar to the structure shown in Fig. 1, and this casing carries a bonnet 8^a provided with a skirt 9^a within the casing 1 and with a chamber 11^a at that end of the bonnet remote from the skirt 9^a. The bonnet is provided with an outstanding flange 15 similar to the flange 15 of the structure of Fig. 1, and this flange carries a plain disk 14^a secured thereto by a screw 16^a having a head 17^a as in the structure of Fig. 1. A handle lever 28^a in the main similar to the lever 28 of Fig. 1 is provided and this handle has a hub portion 27^a of an axial length to extend

through the disk 14ª into the chamber 11ª where it is engaged by a spring 38 bearing at one end against the inner end of the chamber 11ª and at the other end against the hub 27ª where entering the chamber, through an interposed wear washer 39. The bonnet is traversed by a tubular stem 18ª extending into the interior of the casing 1 and terminating in an exteriorly threaded portion 19ª counterbored or enlarged, as indicated at 40. That end of the tubular stem 18ª remote from the threaded end 19ª extends through the hub 27ª and beyond the same where it is exteriorly threaded, as indicated at 24ª, to receive a cap 25ª which in the main may be similar to the cap 25 of Fig. 1 and moreover, the stem 18ª where encircled by the hub 27ª may be toothed or serrated, as indicated at 26ª, similarly to the like parts of Fig. 1. Within the casing 1 is a hollow valve head 20ª having an internal chamber 21ª and an engaging end 22ª adapted to the valve seat 6 of the casing 1 about the port 5. The valve head 20ª is provided at the end remote from the engaging portion 22ª with a hollow extension 41 interiorly threaded for the reception of a threaded end 19ª of the stem 18ª. The valve head 20ª has an intermediate interior web 42 axially threaded for the passage of a threaded portion 43 of a stem 32ª which enters the stem 18ª and extends throughout the greater portion of the length thereof, this stem having at the end remote from the threaded portion 43 a notch 34ª for the reception of a manipulating tool and rendered accessible on the removal of the cap 25ª. The stem 32ª at the end adjacent the screw-threaded portion 43 carries, or has formed thereon a plug 35ª which may be similar to the plug 35 of Fig. 1 and performs the same function. The space inclosed by the skirt 9ª may be of non-circular cross-section and the portion 41 of the valve may conform to the interior of the skirt, so that the valve may be moved lengthwise without turning by a turning movement of the stem 18ª, the meshing of the threaded portion 19ª with the threaded portion 41 bringing this movement about. Where the stem 18ª enters the skirt 9ª it is formed with an exterior flange 44 bearing against a packing ring 45 lodged in the corresponding part of the bonnet, and this flange is maintained in contact with the packing ring by the expansive action of the spring 38. The stem of the plug 35ª is maintained in any adjusted relation to the valve 20ª by the threaded connection 43 and participates in all movements of the valve, the stem 32ª sliding lengthwise with the stem 18ª, so that the same result is brought about by the structure of Fig. 6 as is accomplished by the structure of Fig. 1, the principal differences being in the packing arrangements and the variations in structure caused by the changed packing. The plug 35ª may be in one piece with the stem 32ª or may be separate therefrom and connected thereto as indicated in Fig. 1.

What is claimed is:—

1. A radiator valve having a substantially cylindrical port with a flaring valve seat at one end, and a valve movable into and out of the valve seat for closing and opening the port, and an adjustable auxiliary calibrating plug carried by and movable with the valve and of substantially conoidal form, whereby the proportional amount of steam flowing through the port for different degrees of opening of the valve is substantially the same in any and all positions of adjustment of the calibrating plug with reference to the port controlling valve.

2. A radiator valve provided with a substantially cylindrical port with a flaring seat at one end and a controlling valve therefor movable into and out of the valve seat to close and open the port, said valve being provided with a calibrating plug participating in the movements of the valve and adjustable in the direction of the movements of the valve, said plug tapering in a direction away from the valve carrying it by progressively greater degrees and proportioned to regulate the effective size of the port for like extents of movement of the valve to the same degree for all the longitudinal adjustments of the plug with respect to the valve.

3. A radiator valve provided with a substantially cylindrical port with a flaring valve seat at one end, a valve movable into and out of the valve seat to close and open the port, and a substantially conoidal calibrating plug carried by the valve in telescoping relation thereto and movable with the valve to different degrees into and out of the port in accordance with the degree of telescoping of the plug in the valve, the conoidal form of the plug being such as to coact with the cylindrical port to provide the same proportionate opening of the port for any position of the valve irrespective of the effective size of the port as provided for by the telescoping movement of the calibrating plug into or out of the valve.

4. A radiator valve provided with a substantially cylindrical port and a valve member for opening and closing the port, an auxiliary calibrating plug of substantially conoidal form in telescoping relation to the valve member, and a stem for the plug carried by the valve member in the longitudinal center line thereof and in turn carrying the plug, said stem having a screw threaded connection with the valve member, and said stem being in shouldered relation to the valve member near one end of the stem and the plug being in shouldered relation to the valve member at the other end of the stem to provide stop means limiting the telescop-

ing movements of the plug in both directions.

5. A radiator valve provided with a substantially cylindrical port, a valve member for said port, and a substantially conoidal auxiliary calibrating plug carried by the valve member in telescoping relation thereto, said plug having means for its telescoping adjustment and provided with positive stop means for both limits of its telescoping movement.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EDGAR C. WILEY.

Witnesses:
KATIE E. JENNINGS,
GRACE H. MAHOOD.