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EQUALIZING NONREFLUX RETURN ELBOW

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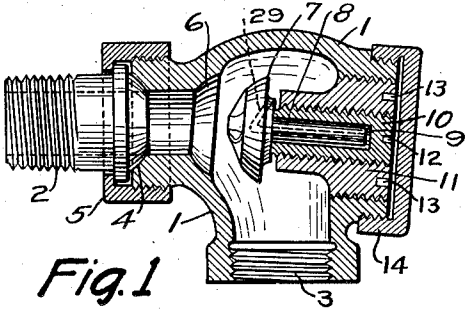


Fig. 1

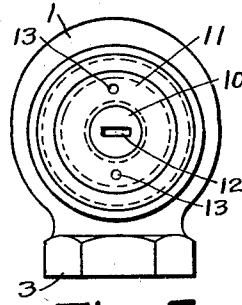


Fig. 5

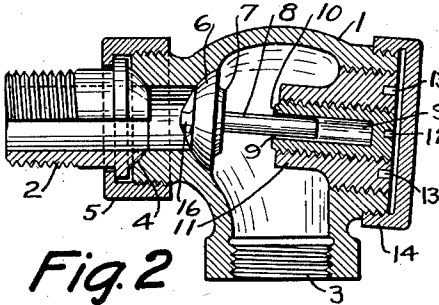


Fig. 2

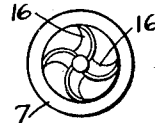


Fig. 6

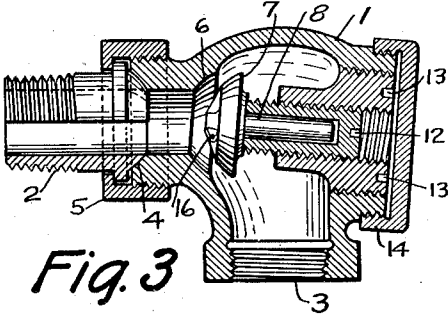


Fig. 3

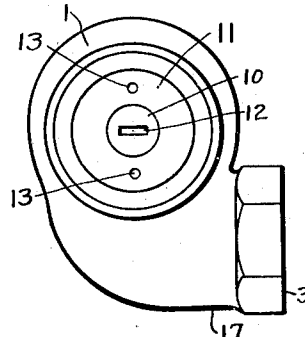


Fig. 7

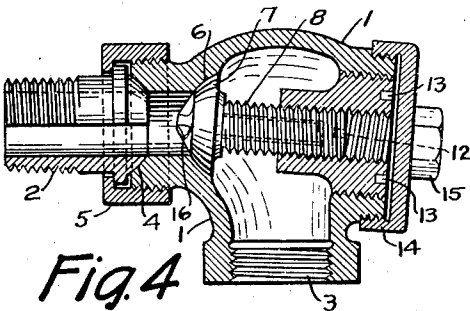


Fig. 4

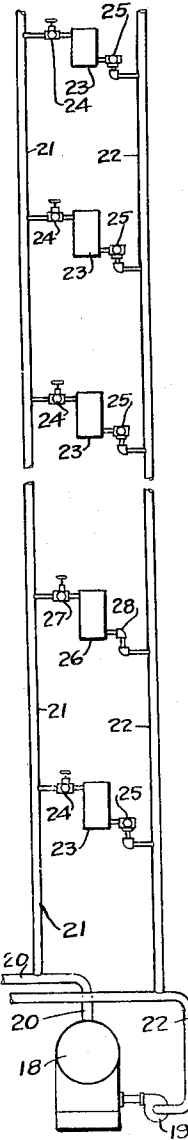


Fig. 8

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EQUALIZING NONREFLUX RETURN ELBOW

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2 Claims. (Cl. 251-139)

The invention is a combination valve comprising an equalizing valve, a shut off valve, and a check valve all embodied in one mechanism, to be used in systems of fluid distribution for equalizing the flow to the various units in the system, for shutting off said units at the return end, and for preventing a reverse flow of the fluid thru the units.

The invention may also be described as a check valve constructed in an elbow with the valve in an inclined position and with means for adjusting the distance the valve may open.

The device is particularly adaptable for hot water heating systems of the type having a boiler or other water heater, flow and return pipes, and radiators. The connections to the radiators have a valve at one end, usually the inlet, and a return elbow at the other end, usually the outlet. In such systems, to obtain an equal flow, or correctly proportioned flow, of water to each unit of radiation, it is necessary that the thermal head produced by the difference in weights of the columns of the warmer feed water and the cooler return water to and from each unit of radiation and the boiler shall equal the friction head produced by the flow of water from the boiler to each unit, in a gravity system. In a system under forced circulation the friction head from the boiler to each unit of radiation and back to the boiler must be equal in order that each unit shall receive its proper and adequate supply of water.

Obviously, the design of such a distribution system is tedious and difficult. The introduction or omission of elbows and other fittings affects the friction head and the consequent equalization of flow, and being limited to commercial pipe sizes a correctly balanced design is quite impossible to obtain.

For the purpose of equalizing such systems, various types of equalizing supply valves are used on the inlet to the radiator and discs with orifices and lock shield valves on the outlet, the latter being adjusted to equalize the flow.

In a tall building the static head on a radiator on one of the lower floors is high and if a radiator ruptures, the supply valve may be shut off, but water still continues to enter thru the return connection and therefore leaks into the room. Where a lock shield valve is used on the return it may be shut off, but only after an attendant has found a suitable socket wrench.

Whenever a radiator must be disconnected for repair or other reasons, it is necessary to drain

the system except when lock shield valves are used on the return.

Equalizing supply valves are usually designed to operate by giving one complete turn from full "open" to full "closed". A disc with limit stops, which permits the valve handle to pass thru only a fraction of a revolution from its closed to its full open position after equalization, is provided for equalizing or throttling the valves on radiators having an excessive flow of water. Most persons operating such a regulated valve feel convinced that they have not opened or closed the valve after turning the handle thru only a fraction of a revolution, and they will continue to turn the handle often twisting it loose from the stem.

This invention has for its principal object a return mechanism, valve or elbow which can be used for regulating the flow of a fluid thru radiators or other units independent of the action of the supply valve on the flow end of such radiators or units.

Another object of the invention is to provide a means for rapidly and automatically closing the return opening to a radiator or other unit in case same ruptures and after the supply valve has been closed.

A further object of the invention is to permit of disconnecting a radiator or other unit by closing the supply valve and allowing a disc in a mechanism on the return to automatically seat itself and thus close off the water from the return branch when the radiator is disconnected without draining the system or portion thereof.

With these ends in view the invention embodies a valve or elbow adapted to be inserted in the return of a radiator and in which the valve member is similar to a check valve and mounted so that the length of the movement thereof may be adjusted and also so that it may be locked in a closed position.

Other features and advantages of the invention will appear from the following description taken in connection with the drawing in which like characters represent like parts. All elbows are shown with ground joint unions and nipples, as are customarily furnished with such devices.

Fig. 1 is a section thru an equalizing non-reflux return elbow, showing it in its full valve open position.

Fig. 2 is a similar section showing it in its full valve open position with the check disc closed to prevent a reverse flow of the fluid.

Fig. 3 is a similar section showing it in a partially valve closed or throttled position.

Fig. 4 is a similar section showing it in a full valve closed position, wherein the elbow is used as a shut off valve.

Fig. 5 is an end view of the elbow with cap removed.

Fig. 6 is an end view of the check disc showing the curved blades.

Fig. 7 is an end view of an elbow of the side outlet type, which may be right handed or left handed.

Fig. 8 is a conventional forced hot water heating system showing the application of the equalizing non-reflux return elbows.

In the drawing the valve is shown as it would be made wherein numeral 1 indicates the body, numeral 2 the inlet nipple, and numeral 3 the outlet connection.

The nipple 2 is held against the ground joint 4 by unit 5 at the inlet end of the valve and a valve seat 6 is located a short distance from the ground joint as shown. The valve disc 7 is positioned to engage the seat 6 and at the back of the valve is a stem 8 which is slidably mounted in the cylindrical opening 9 in a bushing 10 which is threaded in a nut 11 and the nut 11 is also threaded in the end of the body 1. The bushing 10 is provided with a slot 12 so that it may be turned with a screw driver to adjust its position in the nut and the nut is provided with recesses 13 by which it may be rotated with a spanner wrench. It will therefore be observed that the position of the bushing may be adjusted in the nut and the position of the nut adjusted in the body of the valve thereby providing double adjustment for the valve member, and as the diameter of the nut is greater than that of the valve disc the valve may readily be removed by removing the nut. These parts are covered by an outer cap 14 which is also threaded on the exterior of the valve body. The cap 14 may be provided with a nut 15 as shown in Figure 4, and if desired to facilitate the movement thereof, the valve disc 7 may be provided with spiral louvers 16 on the face thereof which will give the valve a rotary motion as a fluid passes through the valve casing or elbow which will insure continuous free movement of the valve.

In the design shown in Figure 7 the outlet connection 3 is formed at the right hand side as indicated by the numeral 17 instead of at the bottom as shown in Figures 1 to 5 inclusive. It will also be understood that this connection may be made on the left hand side or in any other suitable position.

In the design shown the axis of the valve disc 7 is in a slightly inclined position so that the valve will have a tendency to open and the pressure of the fluid against it will therefore be assisted by gravity in moving it to the open position. It will also be understood that the valve may be mounted in a horizontal position or any other position desired.

The diagram shown in Figure 8 illustrates the position of the device in a hot water heating system in which the system is provided with a boiler 18 and a circulating pump 19 and a flow main 20 extends from the upper side of the boiler and is connected to a supply riser 21. A return 22 is also provided which extends to the pump 19. Between the supply riser and the return are blocks 23 which indicate radiators or other heating devices and between the supply riser 21 and the radiators 23 are inlet connections in which are valves 24 and the device as described in this application is located in the connection between

the radiators and the return 22 and is indicated by the numeral 25. In one instance in which the radiator is indicated by the numeral 26, a type of inlet valve as is normally used is shown and indicated by the numeral 27 and the common outlet connection, which is indicated by the numeral 28, is also shown to illustrate the method of connecting radiators which is in common use at present.

A relief opening 29 may be provided in the valve member and stem as shown in dotted lines in Figure 1 to permit fluid to pass to the interior of opening 9 to break a vacuum that may form therein.

The use of the equalizing non-reflux return elbow may be understood from the following description of the operation of the heating system as shown in Figure 8. Water heated in the boiler 18 passes thru the flow main 20, up the supply riser 21 and thru the valve 24 to the radiator 23 and from the radiator thru the equalizing non-reflux return elbow as indicated by the numeral 25, thru the return 22 to the pump 20 and from there into the boiler 18.

As the flow of water to the various units will not be completely balanced, the final balancing of the system is accomplished by adjusting valve 24 and the valve in the elbows 25. The latter are adjusted by screwing bushing 10 into or out of the nut 11, thus decreasing or increasing the clearance between valve seat 6 and the disc 7 and thereby regulating the flow of water therethru.

To disconnect radiator 26 it is necessary to drain the entire system as, even though valve 27 is closed, the water will flow back thru elbow 28. To disconnect radiator 23 it is not necessary to drain the system, as if valve 24 is closed and the radiator is disconnected, then the reverse flow of water thru elbow 25 will automatically seat the disc 7 on seat 8 and close off the reverse flow of water from the return main.

In case radiator 26 breaks and valve 27 is shut off, water will still continue to enter thru return elbow 28 and will leak into the room until the system is drained, or if a lock-shield valve is used on the return connection in place of 28, then water will continue to leak until a socket wrench has been found to close the lock-shield valve. In case radiator 23 breaks and valve 24 is shut off, then the reverse flow of water thru elbow 25 will automatically seat the check disc 7 on seat 6, close off the reverse flow from the return main and thus terminate the leakage.

Disc 7 is provided with curved projecting blades 16 to give a slight rotation to the disc and stem 8 when water is flowing. This rotation will prevent 8 and 10 from adhering.

Stem 8 is shown set at a slight angle, so that the action of rotation together with the force of gravity will tend to keep the rear face of disc 7 snugly against the end of bushing 10 and thus keep the elbow normally open and also avoid ingress of dirt into opening 9. It is of course understood that this invention also contemplates an equalizing non-reflux return elbow in which the stem 8 is not set at an angle.

While the equalizing non-reflux return elbows are shown in use in a forced hot water heating system, it is of course understood that they may be used in any system of fluid distribution where the amount of flow requires regulation and where a reversal of flow is not desired.

It will be understood that other changes may be made in the construction of the device without departing from the spirit of the invention.

One of which changes may be in the design or arrangement of the valve body, another may be in the use of a valve of a different type, and still another may be in the arrangement or design of the connections to the valve body inlet and outlet.

Having thus fully described the invention what I claim as new and desire to secure by Letters Patent, is:

1. In a combination valve of the character described, a body having inlet and outlet connections, said inlet connection having a valve seat formed therein, a valve member cooperating with said seat having spiral louvers on the face thereof and a stem extending from the opposite side, a bushing in which said stem is slidably mounted, a nut threaded in said body and in which said bushing is threaded, and a cap threaded on said body forming a closure for said nut and bushing,

said bushing adapted to be adjusted to regulate the travel of said valve member.

2. In a combination valve of the character described, a body having inlet and outlet connections, one of said connections having a valve seat formed therein, a valve member cooperating with said seat, said valve member having a stem extending from the back thereof, a bushing in which said stem is slidably mounted, said bushing positioned to support said valve member in a position slightly inclined relative to the longitudinal axis of said body, a nut threaded in said casing and in which said bushing is threaded, the position of said bushing adapted to be adjusted in said nut to regulate the travel of said valve member, and a cap enclosing said nut and bushing.

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