Aug. 14, 1923. 1,464,756

C. FEUSER ET AL

RADIATOR AIR VALVE

Filed March 5, 1921

Fig. 1.

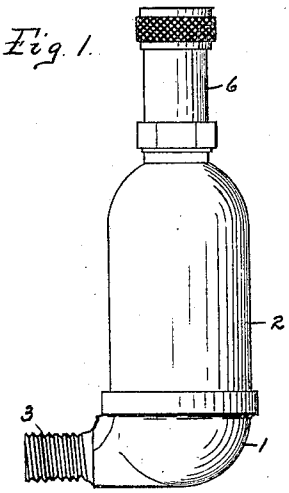


Fig. 2.

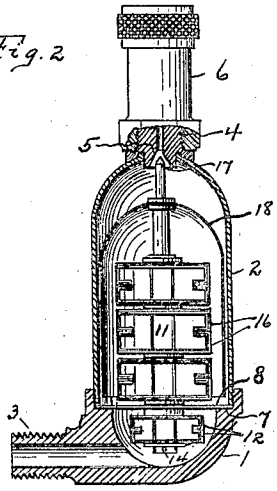


Fig. 3.

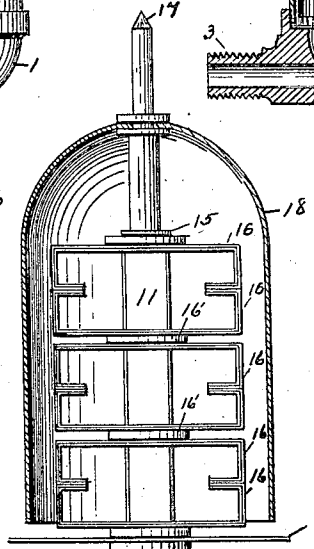


Fig. 4.

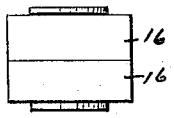


Fig. 5.

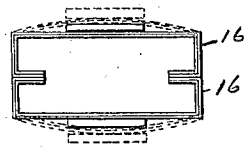


Fig. 7.

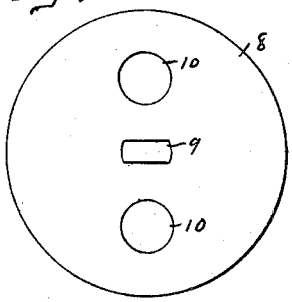


Fig. 8.



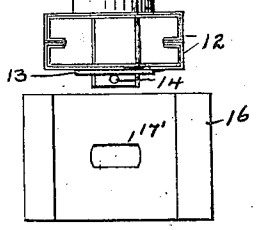


Fig. 6.

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UNITED STATES PATENT OFFICE.

CONRAD FEUSER AND ARTHUR C. FEUSER, OF BLOOMFIELD, NEW JERSEY; SAID ARTHUR C. FEUSER ASSIGNOR TO SAID CONRAD FEUSER.

RADIATOR AIR VALVE.

Application filed March 5, 1921. Serial No. 449,961.

To all whom it may concern:

Be it known that we, CONRAD FEUSER and ARTHUR C. FEUSER, citizens of the United States, residing in the town of Bloomfield, county of Essex, and State of New Jersey, have invented a new and useful Improvement in Radiator Air Valves, set forth in the following specification.

In the prior application of Conrad Feuser (one of the parties hereto), Serial No. 359,433, filed February 17, 1920, an improved device is disclosed for preventing the distortion, under the frequent changes of temperature, of the thermostatic element of the well-known radiator air valve. We have found the means therein set forth to be quite effective during the early life of the valve. However, the continued heating and cooling have the effect of so warping and distorting the element, entirely aside from the endwise pressure to which it is subjected in use, as to render it useless for the purpose intended in a comparatively short time.

The object of our present invention is to provide the air valve with an improved form of thermostatic element which is effective under all conditions to which the valve may be subjected without the liability to distortion, together with means for positively unseating the valve as and when the temperature and pressure in the heating system falls below a predetermined point.

Another object is to provide a radiator air valve with a thermostatic element of such a character that such element may be assembled with the valve stem and float as well as the unseating means as a single unitary structure, so that it may be removed from the valve case without the separation of its several parts.

In the accompanying drawings forming part of this specification,

Fig. 1 illustrates a form of radiator valve in common use.

Fig. 2 is a vertical section of the same, with the improved thermostatic element substituted for the usual carbon element.

Fig. 3 is an enlarged view of the thermostatic element detached from the valve case as an assembled unit.

Fig. 4 is an end view and Fig. 5 is a side view of a pair of juxtaposed members which form the thermostatic element.

Fig. 6 is a plan view of one of said members.

Fig. 7 is a plan view of the supporting disk or diaphragm.

Fig. 8 is a side of the valve unseating element.

The valve comprises the base 1, and the case or shell 2, fitted together by screwing the parts together as shown. The base 1 has the screw threaded spud 3, by which the valve is secured to the coil of a steam radiator. The upper end of the case is dome-shaped and provided with an externally threaded head 4, to receive the cover cap 6, and forms the valve seat 5. Instead of the usual cover cap, we have shown the commercial form of the check valve cap of the patent to Conrad Feuser, No. 1,340,439, dated May 18, 1920. The purpose of the cap 6 is to prevent the return of air to the heating system when once excluded therefrom by the generation of steam, making what is known as a vacuum system.

Supported upon the ledge 7 of the base 1 is a disk or diaphragm 8, which is firmly held in place by the lower edge of the case 2. The disk is centrally slotted as at 9, and provided with apertures 10, through which latter, free communication is had between the upper and lower chambers of the valve case. The valve stem 11, flatted upon two sides, is inserted through the slot 9, with the unseating element 12, the washer 13 and pin 14 in place as shown, to hold the parts together. Above the disk 8 and upon the stem 11, is the series of thermostatic members 16 arranged as shown between the fixed collar 15 and the disk 8. The pairs of members 16, 16 may be separated by the washers 16′, so as to expose a greater portion of their surfaces to the steam as it enters the interior of the valve case.

The stem is coned at its upper end to form the valve 17, for co-operation with the seat 5. The usual float 18 may be attached to the stem, to prevent flooding of the case by condensed steam.

The members 12 and 16 are each composed of a special thermostatic metal, or rather of two metals in sheet form, and united to-

gether by soldering or brazing into a single sheet or strip. These metals are selected from materials having widely differing coefficients of expansion, as brass and steel. The property of the composite strip is such that a straight strip when subjected to temperature higher than normal will be curved, with the brass upon the convex side; at temperatures lower than normal, it will be curved in the opposite direction. We have found that the members 12 and 16 are most efficient when bent into rectangular form as shown, with their ends bent toward each other, so that a pair of such members will have their ends bearing upon each other. Since the members 16 are to be utilized to close the valve 17 upon the seat 5 upon a rise of temperature in the heating system, the brass face of the metal strips of which they are made is upon the outside, so that upon expanding with a rise of temperature, they will belly outwardly, as shown in Fig. 5. The members 12 are formed with the brass face upon the inside, so that the rise of temperature will change their shape so that their sides will belly inwardly, as shown in Fig. 8. Since the members 16 are loosely confined upon the stem 11, their contraction to normal shape would not be effective to unseat the valve 17, if for any reason it should become set or stuck upon the seat 5. The members 12, being just oppositely formed, will serve by their expansion to positively unseat the valve, as and when the members 16 contract under a fall of temperature.

The valve stem 11, the thermostatic elements 12 and 16 and the disk 8, together with the float 18, are assembled as a single unitary structure, which may be removed from the valve case for adjustment and repair by simply unscrewing the case 2 from the base 1. It may be as readily put together. All of the parts being made of metal, the valve as a complete article is not liable to deterioration, as when the thermostatic element is made of the usual materials as carbon, rubber, or any organic substance.

The valve seat 5 is usually formed upon a separate adjustable piece which is screw-threaded into the head 4. We find that with our improved form of thermostatic element, the adjustable valve seat is unnecessary, since the range of movement of the valve 17 is such that until steam comes in contact with the members 16, the valve will remain unseated; but as steam enters the case 2, the expansion is very quickly effected, and the valve will be seated. This construction very materially simplifies the device and correspondingly reduces cost of manufacture.

We claim:—

1. In a radiator air valve, the combination of a valve case having a valve seat therein, a supporting base for said case, a foraminous disk secured between said case and base, a valve stem slidably mounted in said disk, a valve upon said stem for co-operation with said valve seat, a thermostatic element associated with said stem above said disk for positively seating said valve upon a predetermined rise of temperature, and a second thermostatic element connected with said stem below said disk for positively unseating said valve upon a predetermined fall of temperature.

2. In a radiator air valve, the combination of a valve case having an apertured valve seat at its upper end, a supporting base for said case, a disk secured between said case and said base, a vertically sliding valve stem guided in a central aperture in said disk, and thermostatic elements secured to said stem respectively above and below said disk, one of said elements being actuated by a rise of temperature within said case to positively seat said valve and the other element being actuated by a fall of temperature in said case to positively unseat said valve.

3. A thermostatic valve operating device, comprising a valve and its stem, a supporting disk through a central aperture in which said stem may slide in the direction of its length, a thermostatic element connected to said stem and bearing upon one face of said disk, and actuated by rising temperature to move said stem in one direction, and a second thermostatic element connected to said stem and bearing upon the other face of said disk, and actuated by a falling temperature to move said stem in the other direction.

4. A thermostatic device for operating air valves, comprising a suitably supported disk having a central aperture therein, a valve stem passing through said aperture, two thermostatic elements respectively connected to said stem, and adapted to bear respectively upon opposite faces of said disk, one of said elements being actuated by rising temperature to positively move said stem in one direction and the other element being actuated by a falling temperature to positively move said stem in the other direction.

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