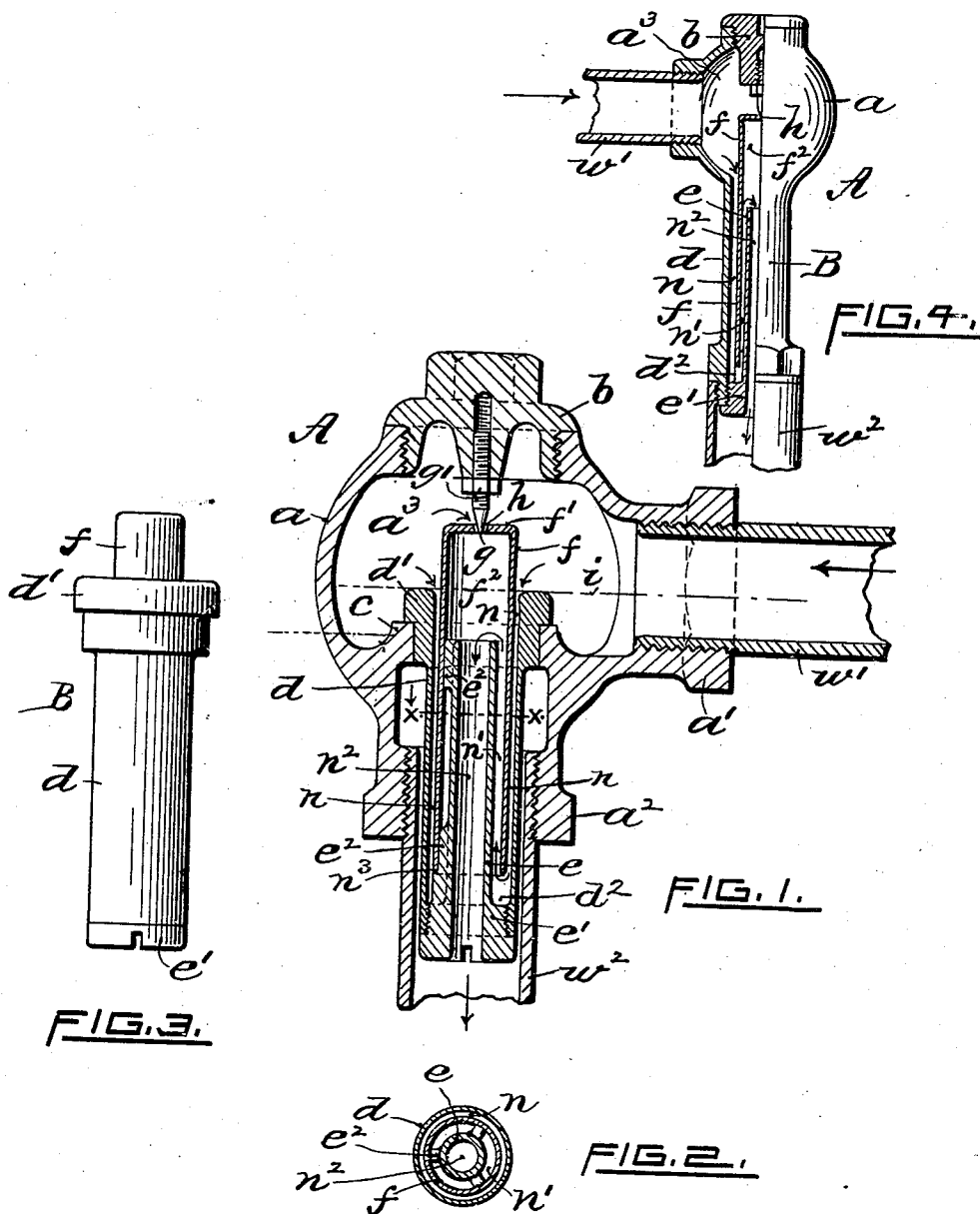


No. 869,884.

PATENTED NOV. 5, 1907.

T. F. DEXTER.
AUTOMATIC RELIEF DEVICE FOR STEAM RADIATORS.
APPLICATION FILED MAR. 13, 1906.



WITNESSES.

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AUTOMATIC RELIEF DEVICE FOR STEAM-RADIATORS.

No. 869,884.

Specification of Letters Patent.

Patented Nov. 5, 1907.

Application filed March 13, 1906. Serial No. 305,855.

To all whom it may concern:

Be it known that I, THOMAS F. DEXTER, a citizen of the United States of America, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Automatic Relief Devices for Steam-Radiators, of which the following is a specification.

In a patent issued to me January 1, 1907, No. 840,304, I have shown and described certain novel improvements in devices for automatically controlling the passage of water of condensation flowing from the heaters or radiators into said controlling means, and thence into the return circulation of the steam-heating system. In such systems there are suitable exhaust or vacuum pumps, by reason of which the pressure on the inlet side of the device exceeds that on the outlet or discharge side, the latter being in continuous open communication with the vacuum pump.

My present invention also relates to improvements in devices of the class just referred to, the construction and arrangement being such, however, that floats and other moving parts heretofore employed are dispensed with.

The device is simple in construction and manner of operation and is adapted to be readily adjusted or set according to the volume of water passing through it. Its interior is easily and conveniently accessible, the device as a whole being comparatively inexpensive to manufacture.

In the appended drawing illustrating my invention, Figure 1 represents a vertical central sectional view thereof, the parts being shown in the normal operative position. Fig. 2 is a horizontal sectional view, taken on line xx of Fig. 1. Fig. 3 is a side elevation of the device detached from the casing, and Fig. 4 shows a modification.

While devices for automatically controlling the flow of water from steam heaters or radiators are usually termed vacuum or relief-valves the one herewith, designated A, has no moving parts whatever, such for example, as a valve proper or even a float member.

The following is a more detailed description of my present invention:—The shell or casing a is provided with main inlet and outlet, a^1 , a^2 , respectively, arranged at right angles to each other, and the screw-cap b . Within the casing's chamber, a^3 , is formed a suitable central seat c vertically supporting the three concentric tubular members which essentially constitute the improved device proper, B, about to be described.

As shown in Fig. 1 the enlarged upper portion d^1 of the outer plug or barrel member d is adapted to be snugly fitted in said seat c ; the shank or barrel portion extends downwardly and, as drawn, is screwed to the lower enlarged end e^1 of the upwardly extending concentric central tube e , the latter being open throughout its entire length; the arrangement thus forming an an-

nular space between the adjacent walls of members d and e , said space being continuously open at the upper end and closed at the lower end. I prefer to have the upper end or mouth of the center or outlet-tube e somewhat below that of the member d .

The exterior surface of member e is provided with a plurality of integral upper and lower laterally extending lugs e^2 ; these are turned off true and form a guide and support for the inverted vertical tube member f interposed in said annular space, its lower end being open and resting on the shouldered portion n^3 of said lower lugs, thereby forming a continuously open passage n downwardly from the inlet-end of member d and at the same time being in open communication at the bottom d^2 (under the edge of tube f) with the intermediate passage or space n^1 lying between the adjacent walls of tubes e and f . Said passage n^1 is open at the top into the chamber f^2 and from the latter directly into the mouth or upper end of the continuously open center passage n^2 into the discharge-pipe w^2 , adapted to be connected with a vacuum or circulating-pump.

The upper end of tube f extends above the top of member d , and has a small vent-opening h in its end f^1 , which opening may be adjustable by means of a registering pointed member g screwed into the center of the cap b of the casing, a check-nut g^1 serving to maintain the parts in the adjusted position or relation. The assembled device B may be readily positioned in the seat c of the casing and removed therefrom after first detaching the cap b .

Now, assuming the previously adjusted device B to have been mounted in the seat c of the casing a and the latter then connected with the main inlet-pipe w^1 and discharge-pipe w^2 of the circulation, the operation may be described as follows:—Water from a heater coupled to said pipe w^1 flows by gravity into the latter say until the level i is attained, at which instant it (the water) overflows, see arrows, into the open outer passage n to the bottom thereof, thence upwardly therefrom via the open intermediate communicating passage n^1 and overflows into the open central passage n^2 in open communication with the main discharge-outlet w^2 . The continuously open vent h permits a circulation of air or vapor from the casing chamber into the discharge-passages, thereby preventing siphoning action; and since the member f extends above the mouth of the inlet-opening in d water will not rise to the top of tube f , nor will water accumulate in the latter higher than the mouth of tube e . After the relief-action has thus automatically taken place, the water then being at or below the level i , the passages n and n^1 remain sealed by water therein at the level of the mouth of center outlet-tube e .

In lieu of a casing having the device B removably mounted therein as shown in Fig. 1, the outer or barrel member d may have a chambered head a integral there-

with provided with cap *b* and main-inlet opening, as represented in the combined sectional and side elevation, Fig. 4. In this arrangement the novel features of the invention are retained, the manner of operation
5 being practically the same as described with respect to the other figures.

I claim as my invention:—

1. As an improved article of manufacture, an automatic relief device for steam-heating systems, said device having
10 a chambered casing provided with main inlet and outlet-passages, a downwardly extending tubular plug or outer barrel member open at the top and seated in the last-named passage, a central inner tube or member open throughout
15 its length and surrounded by said barrel, thereby forming between them an annular space closed at the bottom, and a suitably supported intermediate tube arranged in said annular space so that the latter is converted into a plurality of spaces in continuous open communication with one another and with said inlet and outlet-passages, the
20 upper end of said intermediate tube extending above the top of the outer and inner tubes and having a vent-opening therethrough.

2. The combination with a casing having inlet and discharge-openings and adapted to be connected with the return piping of a steam-heating system, of a self-contained
25 automatic or self-sealing relief device *B* seated in said casing, said device comprising central, intermediate and outer non-movable concentric tubular members, arranged substantially as described and forming continuously open
30 intercommunicating passages, *n*, *n*¹ and *n*², communicating with said main inlet and discharge-openings, and having the upper end of the said intermediate tube vented and extending above the corresponding ends of the other tube members, constructed, arranged and adapted for operation substantially as hereinbefore described.

3. As an improved article of manufacture, an automatic relief device of the character described, the same comprising a suitable casing provided with main inlet and discharge-openings adapted to be connected with the return
40 piping of a steam-heating system, a vertical stationary barrel member *d* mounted in the casing and communicating with said openings, a continuously open stationary central tube *c* located in said barrel member and forming between them an annular space closed at the bottom, and a suitably supported fixed vertical tubular member *f*
45 having a vented top, said element *f* being disposed in said annular space so as to convert the latter into a plurality of spaces in continuous open communication with each other below the lower end of member *f*, the upper end of the
50 latter extending above the corresponding portions of said barrel and tubular members, *d* and *e*, all constructed and

arranged so as to form a self-sealing valveless passage for the flow of the water of condensation through the device by gravity.

4. In an automatic valveless relief device for steam-heating systems, the combination with a chambered casing having main inlet and discharge-openings, a capped central opening and an integral apertured partition formed within the casing and interposed between said openings, of a tubular or barrel member removably seated in said
55 partition, a continuously open central tube *e* detachably secured to the lower end of the barrel and extending upwardly therefrom thereby when in use forming an annular water-holding space between them closed at the bottom, and an intermediate tubular member *f* removably though
60 stationarily supported in said space and adapted to form a water-seal, its upper end being closed with the exception of a small vent and extending above said tubes, constructed, arranged and adapted for use substantially as hereinbefore described.

5. In a device of the character described, the combination with a chambered casing having main inlet and outlet-openings, of an open central tube disposed in said casing, a tubular member joined to and surrounding said tube and forming a space between them closed at the bottom, and a
75 stationarily supported inverted cup-shaped member having its lower portion extending downwardly in said space to form a water-seal and at the same time permitting a free passage at the bottom for the water, substantially as described and for the purpose set forth.

6. An automatic valveless relief device, for steam-heating systems, comprising an outer tubular member having inlet in its upper portion, an inner tubular member spaced from said outer member and connected at its lower
85 portion thereto in such fashion as completely to close the bottom of the space between the members, said inner member being open at both ends, its open lower end constituting the outlet of the device and its open upper end being disposed lower than the inlet-level of said outer member, and a non-buoyant intermediate tubular member having its
90 upper end vented and extended above said outer member, said intermediate member being mounted stationarily in said space in such fashion as to form an outer downtake passage and an inner uptake passage permanently in communication with each other, said uptake passage being in
95 free communication at its upper end with the open top of said inner member.

Signed at Providence, R. I., this 12th day of March, 1906.

THOMAS F. DEXTER.

Witnesses:

GEO. H. REMINGTON,
C. E. INCE.