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# UNITED STATES PATENT OFFICE.

HOSEA K. KRIEBEL AND IRWIN Z. KRIEBEL, OF PHILADELPHIA, PENNSYLVANIA.

## AIR AND VACUUM CONTROLLING DEVICE.

No. 924,617.

Specification of Letters Patent.

Patented June 8, 1909.

Original application filed April 19, 1907, Serial No. 369,055. Divided and this application filed February 18, 1908. Serial No. 416,458.

*To all whom it may concern:*

Be it known that we, HOSEA K. KRIEBEL and IRWIN Z. KRIEBEL, both citizens of the United States, and residents of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have jointly invented a new and useful Air and Vacuum Controlling Device, of which the following is a specification.

This invention relates to an improved air and vacuum controlling device in which the expansion and contraction of a tube and its complemental valve casing, caused by the difference in temperature of the tube, so operates in connection with an adjustable and cushioned valve as to permit air and water of condensation to escape from the tube when in a state of contraction and when in a state of expansion to operate to abut against the said valve and is intended for use in connection with systems of steam heating such as is described in an application for Letters Patent serially numbered #369,055 and of which the present case is a divisional application; and the principal objects of the present invention may be said to be to provide apparatus for separating air and water of condensation from steam within a system of steam heating; expelling air at one place; delivering water of condensation at another place; retaining steam or vapor in the system; preventing cooling of the system from outside sources and to make provision for maintaining a vacuum in the system by excluding therefrom atmospheric air.

A further object is to provide simple, reliable, efficient and comparatively inexpensive apparatus for attaining the above enumerated objects.

Other objects relate to the providing of details of construction and the combination thereof with other adjuncts described hereinafter.

The invention consists of the improvements hereinafter described and finally claimed.

The nature, characteristic features and scope of the invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof and in which:—

Figure 1, is a top or plan view of an air and vacuum controlling device embodying the invention. Fig. 2, is a view in central section of the same and showing the position of the valve when the apparatus is in a state of

expansion. Fig. 3, is a similar view of the left-hand portion of Fig. 2, and illustrating the position of the valve when the apparatus is in a state of contraction; and Fig. 4, is a view in end elevation of the apparatus shown in Figs. 1 and 2.

In the drawings the device of the invention is shown to comprise a generally elongated expansion tube 1, preferably of brass, supported within a cast iron frame or hanger 2, as by arms 3 and 3<sup>a</sup>, from any convenient place. One end of this tube is screw threaded for attachment to the return pipe connection of a system of steam heating, and is clamped to the frame or hanger 2. As may be seen in Fig. 4, this hanger 2, is of semi-circular concaved cross section and is provided with a bracket or clamp 4, formed integral therewith and a second bracket or clamp 5, adapted to be removably secured to the former by means of bolts 6. The screw threaded end of the tube 1, is clamped between these two brackets or clamps which firmly hold the tube against displacement and at the same time center the tube with respect to the frame or hanger 2. The opposite end of the tube 1, is supported by means of a rib 7, arranged between the respective arms 3, of the hanger and is screw threaded for attachment to the hollow fitting or valve casing 8. The valve casing is shown as being located within an enlarged extension of the frame or hanger 2, and is provided with a valve seat 9<sup>b</sup>, and a removable cap 9, penetrating which is a longitudinally arranged valve stem 9<sup>a</sup>, having a valve disk 10, arranged in alinement with the tube 1, and the valve stem is suitably packed as at 11, with respect to the valve casing to provide a steam tight connection. The outer end of the valve stem is reduced in diameter, by reason of which a shoulder 12, is provided, and passes through and is supported by an adjustment nut 13, carried by the end piece 14, which is bolted to an angular extension 15, of the frame or hanger 2. A lock nut 16, is provided to fix the adjustment nut 13, with respect to the end piece 14, and between the shoulder 12, and said adjustment nut is interposed a coiled spring 17, constituting a cushion for a purpose hereinafter disclosed. The extreme outer end of the valve stem is equipped with a nut 18, and a washer 19, between which and the adjustment nut 13, and loosely surrounding the stem 9<sup>a</sup>, is a

section of tubing 20. This arrangement of parts is necessary in order that the valve disk 10, may be normally held free of its seat 9<sup>b</sup>, in the valve casing since if it were not for the fact that the tubing 20, abuts against the adjusting nut the tension of the spring 17, would tend to normally close the valve opening.

Having pivotal relation with a bracket 22, carried by the end piece of the frame or hanger 2, is a lever 23, having a forked portion 24, that straddles the section of tubing 20, of the valve stem and is adapted to abut against the nut 18, and washer 19, to provide means for dislodging dust and dirt from between the valve disk and its seat, when the lever 23, is reciprocated back and forth. In this connection the spring serves to return and keep in proper position the valve disk.

The frame or hanger 2, is provided in its base with a slot 25, and an opening 26. Depending from the valve casing 8, and through the last mentioned opening is a hollow casting or fitting 27, having a vertically arranged water of condensation passage 28, therethrough, the lower portion of which is screw threaded for attachment to a pipe adapted to return water of condensation to the boiler of a heating system. Arranged crosswise of the fitting and having communication with the passage 28, is another passage 29, which acts as an air vent and communicates with atmospheric air. Normally closing this vent is a flap or disk 30, having a stem 31, penetrating an arm 32, pivotally carried by the fitting, the said stem having a nut 33, to hold the flap or disk to the arm 32. The function of the flap or disk 30, is to serve as a valve that readily permits of the escape of air from the system and prevents the admission of atmospheric air to the system thereby maintaining within the system a vacuum. In this connection it may be remarked that the slightest pressure in the system above that of the atmospheric air is sufficient to cause the flap or disk 30, to move outward and thus relieve the system of air. Baffle plates 34, are positioned in the passage 28, to deflect water of condensation from the air passage 29, during the egress of water of condensation from the controller.

The operation of the above described apparatus is as follows:—Assuming that the controller is cool and that the radiating system to which the controller is connected is being heated the controller is in the position shown in Fig. 3, and air and any water of condensation that may be present in the expansion tube 1, pass along together in advance of the exhaust steam and are caused to pass through the valve opening, air passing out by way of the air vent 29, and water of condensation passing through the passage 28, from which it may pass to the boiler of the

heating system. As the controller heats up the tube 1, will gradually expand together with its valve casing and close the space between the valve seat 9<sup>b</sup>, and the valve disk 10, and thus causes the system being heated to retain its full capacity of heat by confining steam within the system as is shown in Fig. 2. Obviously when the system cools off the tube 1, contracts sufficiently to provide an air space between the valve seat and the valve.

A vacuum is maintained within the system above referred to and in this respect the door or flap prevents such vacuum from sucking atmospheric air into the apparatus through the air passage. The valve being cushioned prevents buckling or straining of the parts during the expansion of the tube 1.

What we claim is:—

1. A device of the class described comprising an expansion tube, a valve casing at one end thereof having a valve seat arranged in juxtaposition to and in alinement with said tube, a cushioned valve within said casing said valve being provided with a valve stem projected through said casing, means operatively connected with said valve stem for normally keeping the valve free of its seat and means carried by the valve casing for separating air and water of condensation in their egress from the device.

2. A device of the class described comprising an expansion tube suspended within and one end of which is fixed to a hanger, the other end of said tube carrying a valve casing having a valve seat, an adjustable and spring controlled valve having an elongated valve stem arranged in alinement with said tube, means carried at the outer end of said valve stem for normally keeping the valve free of its seat and means depending from the valve casing for separating air and water of condensation in their egress from the device.

3. A device of the class described comprising an expansion tube, a valve casing at one end thereof having a valve seat arranged in juxtaposition to and in alinement with said tube, a cushioned valve within said casing said valve being provided with a valve stem projected through said casing, means operatively connected with said valve stem for normally keeping the valve free of its seat, means carried by the valve casing for separating air and water of condensation in their egress from the device and means operatively connected therewith for preventing ingress of atmospheric air to the device.

4. In combination a hanger, an expansion tube within said hanger, means for clamping one end of said expansion tube to the hanger, a valve casing carried by the opposite end of said expansion tube, said valve casing being provided with a valve seat, a cushioned valve normally held free of said seat, said valve being provided with a stem projected through said casing, adjusting and reciprocating

mechanism carried by the hanger and operatively connected with said valve stem, a fitting depending from said valve casing having air and water of condensation passages there-  
5 through and a valve for normally closing the air passage.

5. In combination a hanger, an expansion tube within said hanger, means for clamping one end of said expansion tube to the hanger,  
10 a generally spherical valve casing having a valve seat carried by said expansion tube, a cushioned valve within said casing provided with a valve stem projected through a packing connected with said valve casing, adjust-

ing and reciprocating means carried by the 15 hanger and operatively connected with said valve stem, a generally L-shaped fitting depending from said valve casing and projected through the hanger having air and water of condensation passages therethrough and a 20 valve for normally closing the air passage.

In testimony whereof we have signed our names to this specification.

HOSEA K. KRIEBEL.

IRWIN Z. KRIEBEL.

In the presence of—

WILLIAM J. JACKSON,

HOWARD E. LINDERMAN.