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APPARATUS FOR THE DISCHARGE OF CONDENSATION WATER

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FIG. 1

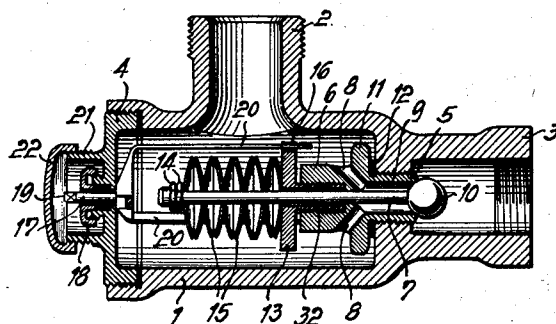
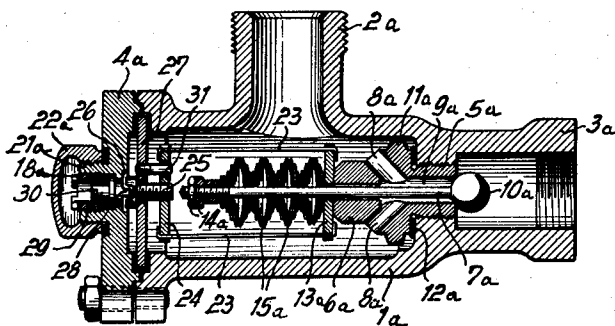


FIG. 2



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APPARATUS FOR THE DISCHARGE OF CONDENSATION WATER

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2 Claims. (Cl. 236—59)

This invention relates to an apparatus for the discharge of condensation water and refers more particularly to water-discharging devices provided with bimetallic expanding elements which are subject to the operating pressure and which are connected with a valve closing against the direction of flow of the condensation water through the apparatus.

An object of the present invention is the provision of an apparatus of the described type which is capable of operating with a very great valve stroke while cold.

Another object is the provision of a valve which will respond more quickly and more precisely to small variations in pressure and temperature than water-discharging devices having bimetallic elements and known in prior art.

Yet another object is the provision of a construction wherein by a preselected combination of bimetallic discs of different dimensions, the characteristic line of the bimetallic column can be most effectively adapted to all possible operational requirements.

Still another object of the present invention is the provision of an apparatus of the described type, the replacement of the various parts of which is considerably simplified due to the fact that all the parts of the apparatus, with the exception of the bimetallic elements are constructed uniformly for all possible operational requirements.

Other objects of the present invention will become apparent in the course of the following specification.

The objects of the present invention may be realized through the provision of an apparatus wherein two or more bimetallic discs or disc packages are mounted upon a valve rod or shaft connected with the valve rod, and are located between a stop consisting of a screw or the like, which is mounted upon one end of the supporting member carrying the bimetallic elements, and another bearing member located in the housing between the valve and the bimetallic elements. The bimetallic elements are mounted loosely upon the support and are so arranged in relation to each other that adjacent bimetallic discs or disc packages bend or curve in opposed directions as the result of variations in temperature.

The construction is preferably such that the valve and the operating means containing the bimetallic elements form a single structural unit which may be inserted as a whole into the housing, and which when required, can be easily removed and replaced by another unit.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing, showing, by way of example, preferred embodiments of the inventive idea.

In the drawing:

Figure 1 is a longitudinal section through an apparatus constructed in accordance with the principles of the present invention and shows the valve in the closed position.

Figure 2 is a similar section through a somewhat differently constructed apparatus.

The apparatus shown in Figure 1 has a housing 1 pro-

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vided with an inlet tube joint 2 and an outlet tube joint 3. The outlet 3 extends in the longitudinal direction of the housing while the inlet 2 may extend at right angles thereto. The housing 1 has an opening which is located opposite the outlet 3, and which is provided with inner screw threads. A cover 4 is screwed into the housing 1 and closes this opening.

The housing 1 has another threaded portion located within the housing close to the outlet 3 and a member 5 has a threaded portion which is screwed into the last-mentioned threaded portion of the housing. The member 5 constitutes the valve seat of the apparatus and has a hexagonal flange portion 11 as well as an inner cylindrical portion 6. The valve body 5 has an inner passage 9 which receives the valve rod 7. Furthermore, the valve body 5 is provided with a plurality of passages 8 uniformly distributed about the circumference of the body portion 6 and connecting the interior of the housing 1 with the annular space 9 enclosing the valve rod 7.

The outer end of the valve seat 5 is adapted to form a seat for a spherical valve body 10 which is carried upon one end of the valve rod 7, and which is located within the outlet 3.

Due to the provision of hexagonal flange 11, an operator after removing the cover 4 can easily insert a socket wrench into the interior of the housing 1 and turn the flange 11, so that the valve seat 5 can be conveniently screwed into the housing 1 or replaced if necessary.

A disc 12 enclosing the valve seat 5 and located between the flange 11 and an inner wall of the housing 1, is used as a seal.

In the construction shown in Figure 1 the portion 6 of the valve seat 5 is provided with axially extending screw threads and a sleeve 32 provided with outer screw threads is screwed into the seat portion 6. The sleeve 32 is integral or firmly connected with a plate 13 constituting a bearing member which is located within the housing 1 beyond the seat portion 6.

The inner end of the valve rod 7 carries a stop 14 which, in the example illustrated, consists of a screw having nuts screwed upon the threaded end of the valve rod 7.

In accordance with the present invention round bimetallic discs 15 are loosely mounted upon the valve rod 7 between the nuts 14 and the plate 13. The bimetallic discs 15 are so arranged that when temperature is increased within the interior of the housing 1 the discs 15 will be curved in opposite directions as is indicated in the drawing. This increase in the curvature of the discs 15 will tend to move the valve rod 7 toward the interior of the housing and thus press the spherical valve body 10 against the valve seat 5.

As soon as the temperature within the housing 1 drops due to the presence of condensation water or the like, the curvature of the bimetallic discs 15 will decrease and the force with which the valve body 10 is pressed against the valve seat 5 will become smaller until the pressure of the condensate will open the valve, so that it will be able to leave the housing 1 through the passages 8 and 9, the space between the valve seat 5 and the valve body 10, and the outlet 3. However, as soon as steam again penetrates into the interior of the housing 1, the temperature within the housing 1 will increase and the curvature of the bimetallic discs will increase also, so that the valve body 10 will be pressed against the valve seat 5 and steam will be prevented from leaving the housing 1.

The plate 13, the diameter of which is larger than the outer diameter of the bimetallic discs 15, is provided with bore holes or similar recesses 16. In the example illustrated there are three bore holes 16 which are spaced one from the other by 120°, and which are located close to the outer circumference of the plate 13. The cover 4 carries a shaft 17 which extends through the cover 4 and

is in alignment with the valve rod 7. A stuffing box 18 encloses the shaft 17 and serves as a seal. The outer end 19 of the shaft 17 has the form of a square pin. The inner end of the shaft 17 is firmly connected with three rods 20 which are located within the housing 1. The rods 20 are shifted in relation to each other by 120° and extend parallel to the valve rod 7. The free ends of the rods 20 extend through the bore holes 16 provided in the plate 13.

It is apparent that by engaging a tool with the end 19 of the shaft 17, the shaft 17 will be rotated and due to the engagement of the rods 20 with the plate 13 the plate 13 will rotate along with the shaft 17. Thus, the sleeve 32 which is integral with the plate 13 may be screwed more or less deeply into the valve seat portion 6. Due to this arrangement the bimetallic elements 15 may be set to another outer temperature of the condensation water or to a different closing pressure while the apparatus continues to be operated, whenever such adjustment is found advisable or necessary.

The cover 4 carries or is integral with a cylindrical sleeve 21 which encloses the outer end 19 of the shaft 17 and the stuffing box 18. The sleeve or flange 21 has outer screw threads and is closed by a cap or cover 22 which is screwed upon the sleeve 21.

The operation of the described apparatus is apparent from the above description. The bimetallic elements 15 will open and close the valve 5, 10 automatically, depending upon the temperature conditions prevailing within the housing 1. The adjustment or setting of the apparatus while it is being operated, is greatly simplified through the use of the shaft end 19. The unit containing the bimetallic elements 15 can be conveniently removed as a whole whenever this is required.

Figure 2 shows a somewhat differently constructed apparatus having a housing 1a provided with an inlet 2a and an outlet 3a. In this construction the cover 4a is bolted to a flange of the housing 1a.

The valve rod 7a carries the valve body 10a which operates with the valve seat 5a. In this construction the bimetallic elements 15a consist of a plurality of discs of different diameters, each element being formed of three discs. These discs are arranged in such manner that when heated they will curve in the same direction. The concave surfaces of the largest bimetallic discs, as well as the convex surfaces of the smallest discs, are directed toward each other. Such or similar construction is advantageous whenever valve operating forces of substantial magnitude are required.

In accordance with this embodiment the bimetallic elements 15a are enclosed in a cage-like structure which includes plate 13a, a second plate 24, and rods 23 interconnecting the two plates. The plate 13a is located between the inner portion 6a of the valve body 5a and the bimetallic elements 15a. The rods 23 extend parallel to the longitudinal axis of the valve rod 7a. The plate 24 has a threaded central opening which receives the end of a bolt 25, the head of which is provided with a transverse slot 26. The bolt 25 is supported by a plate 27 which is held tightly upon its outer circumference between the cover 4 and the adjacent flange of the housing 1.

The slot 26 of the bolt 25 receives a narrow elongated end 28 of a shaft 29, which is enclosed by the stuffing box 18a, which is carried by the cover 4a. The outwardly projecting end of the shaft 29 carries a transverse slot 30 which is adapted to receive the end of a screwdriver.

A pin 31 is located parallel to the bolt 25 and to the side thereof. The pin 31 is mounted in the disc 27 and projects into a correspondingly located bore hole of the plate 24 so as to prevent the rotation of the plate 24 within the housing 1a.

This construction operates as follows:

When the operator turns, by means of a screwdriver, the shaft 29, the end 28 which is located within the slot 26 of the screw 25, will cause the screw 25 to rotate along with the shaft 29. The pin 31 will prevent the ro-

tation of the plate 24. However, due to the rotation of the bolt 25, the cage-like structure consisting of the plates 24 and 13a and the rods 23, will be shifted in the longitudinal direction of the valve rod 7a, so that the position of the bimetallic elements 15a can be conveniently adjusted.

In this construction the outer end of the shaft 29 and the stuffing box 18a are enclosed by a cylindrical flange 21a of the cover 4a, and are closed by a cover or cap 22a.

It is apparent that in this construction, as well as in the previously described one, the steering device containing the bimetallic elements forms with the valve a single structural unit which may be inserted as a whole into the valve housing 1, and if necessary may be quickly removed and replaced by a different one.

It is apparent that the examples shown above have been given solely by way of illustration and not by way of limitation. For example, it is possible to mount the bimetallic discs not directly upon the valve rod 7 but upon a separate shaft connected with the valve rod. All such and other variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. An apparatus for the discharge of condensation water, said apparatus comprising a housing having an inlet, an outlet and a threaded portion between said inlet and said outlet and adjacent said outlet, a member having a front portion threaded into said threaded portion of the housing and further having formed therein a rearwardly extending passage communicating with said inlet, said front portion constituting a valve seat, a spherical valve body located in said outlet and adapted to close said valve seat, a valve rod having one end carrying said valve body, said valve rod extending through said passage and being movable longitudinally in said passage in a direction opposed to the direction of flow from the inlet to the outlet to cause said valve body to close said valve seat, a stop upon the other end of said valve rod, a bearing member enclosing said valve rod and located intermediate the ends thereof, a plurality of bimetallic elements, each of said bimetallic elements consisting of at least two round centrally perforated bimetallic discs, said bimetallic elements being loosely and freely mounted upon said valve rod between said stop and said bearing member and being in engagement with each other, said bimetallic elements bending in opposite directions during increase in temperature, a cover carried by said housing, a shaft carried by said cover and extending in axial alignment with said valve rod, said shaft having an outer square end, and calibrating rods connected with the opposite inner end of said shaft and extending through bore holes formed in said bearing member, said bearing member having an integral sleeve portion threadedly connected with the first-mentioned member, whereby a turning of said rods adjusts the setting of the apparatus.

2. An apparatus for the discharge of condensation water, said apparatus comprising a housing having an inlet, an outlet and a threaded portion between said inlet and said outlet and adjacent said outlet, a member having a front portion threaded into said threaded portion of the housing and further having formed therein a rearwardly extending passage communicating with said inlet, said front portion constituting a valve seat, a spherical valve body located in said outlet and adapted to close said valve seat, a valve rod having one end carrying said valve body, said valve rod extending through said passage and being movable longitudinally in said passage in a direction opposed to the direction of flow from the inlet to the outlet to cause said valve body to close said valve seat, a stop upon the other end of said valve rod, a bearing member enclosing said valve rod and located intermediate the ends thereof, a plurality of bimetallic elements, each of said bimetallic elements consisting of at least two round centrally perforated bimetallic discs, said bimetallic elements being loosely and freely mounted

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upon said valve rod between said stop and said bearing member and being in engagement with each other, said bimetallic elements bending in opposite directions during increase in temperature, a cover carried by said housing, a plate engaging an inner surface of said cover, a bolt supported by said plate and extending in axial alinement with said valve rod, said bolt having an outer slotted head, another plate having a threaded central opening receiving an end of said bolt, and a plurality of calibrating rods operatively interconnecting the second-mentioned plate and said bearing member, whereby a turning of said rods adjusts the setting of the apparatus.

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