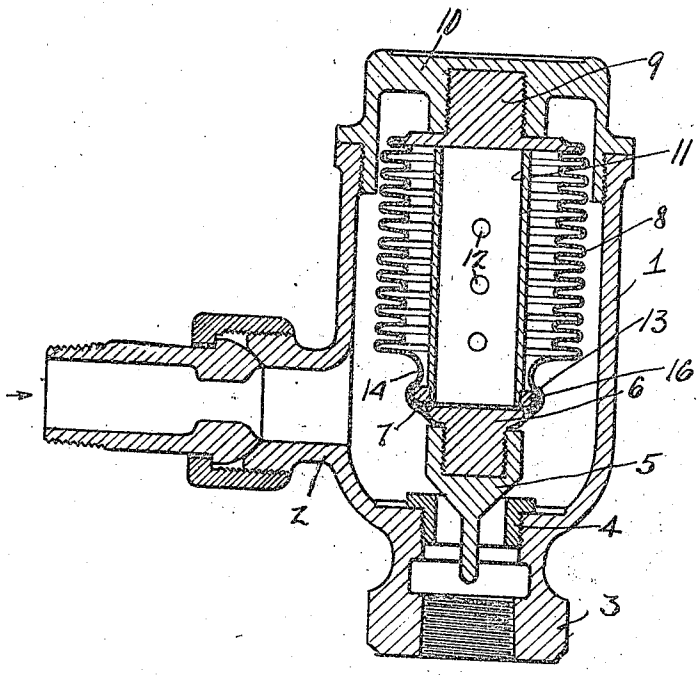
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M. P. MILLER ET AL

VALVE FOR STEAM SYSTEMS

Filed Jan. 29, 1920



Max P. Miller and Hal T. Patton — INVENTORS

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ATTORNEYS

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UNITED STATES PATENT OFFICE.

MAX P. MILLER, OF CLEVELAND HEIGHTS, AND HAL T. PATTON, OF CLEVELAND, OHIO, ASSIGNORS TO THE BISHOP & BABCOCK COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

VALVE FOR STEAM SYSTEMS.

Application filed January 28, 1920. Serial No. 354,343.

To all whom it may concern:

Be it known that we, MAX P. MILLER and HAL T. PATTON, both citizens of the United States, and residents of Cleveland Heights, county of Cuyahoga, State of Ohio, and of Cleveland, county of Cuyahoga, State of Ohio, respectively, have jointly invented a new and useful Improvement in Valves for Steam Systems, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention involves certain improvements in steam traps for use in steam heating systems. The device is particularly designed for use in a steam line and is intended for automatic operation, depending upon the conditions existing in the line. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

The single figure there appearing is a central vertical section through our improved valve.

Our improved valve consists of a suitable tubular casing 1, having a lateral extension 2 intended for connection to a steam line, and a bottom extension 3, also intended for suitable connection to a steam line. The casing of course includes an open passage between the parts 2 and 3 of the device, and in this open passage is mounted a valve seat 4. Directly above the valve seat 4, for operation in alignment therewith, is a conical valve 5 adapted to be seated against the edge of the seat under certain conditions. This valve 5 is removably attached to a plug or member 6 which is firmly held in a disk shaped connecting member 7 attached to the bottom of an expansible metal bellows 8. The metal bellows, which is provided with a series of encircling corrugations, permitting it to have a considerable expansive action, is connected to, and closed at its upper end by a plug 9, which is removably engaged with a member 10 which serves as a cap or cover for the casing 1. The metal bellows and the valve are thus removed, along with the cover, and may be inserted in the valve casing as a part of the cover, and are then brought into alignment with the valve seat 4.

The bellows is reduced in size and closed at its lower end having an annular rib or corrugation 13 formed on its lower outer periphery. The interior of rib 13 provides a groove in which is received a ring or collar 16 adapted to strengthen the lower end of the bellows. The upper end of the valve 6 is provided with an enlarged annular flange which is adapted to lie adjacent the rib 13. The connecting member or frusto-conical disk 7 is engaged with both the rib 13 on the bellows and with the flange on the valve in such a way as to hold the valve firmly against the flat lower end of the bellows.

Normally the valve 5 is spaced from the seat 4 and the steam line through the casing is open. Under these conditions water may drain from the connection 2, through the valve casing and out through the connection 3, but on any appreciable amount of steam entering the casing 1 it will act to expand the metal bellows member 8, which will move the valve 5 downwardly into engagement with the seat 4, and thus closes the line through the casing 1.

Mounted within the sylphon bellows, and upon the bottom end of the same is a spacer or tube 11, provided with openings 12 therethrough to permit of free circulation of the contents of the bellows, and this tube serves to maintain the valve 5, even when open, only a certain distance from its seat, and generally to stiffen the bellows and cause its contraction to proceed in a straight line and prevents any warping. The top of course contacts against the plug 9 when the bellows is contracted.

The bellows here operates as a thermostat and a small amount of volatile liquid is introduced into the bellows when assembled. A liquid is chosen which will operate under the conditions which make it necessary for a closing of the line, and for ordinary purposes we prefer to use a small amount of alcohol or similar material. The heat trans-

mitted to the alcohol through the corrugated metal walls of the bellows serves to raise the temperature of the alcohol and to volatilize it, producing a considerable expansive force which is exerted downwardly to press the valve 5 firmly against its seat 4. As soon as the steam which has entered the casing 1 condenses, or as soon as this chamber fills with condensation from the steam line, the change in the temperature liquefies the gas in the bellows, and the latter contracts, opening the valve and permitting the draining of the water from the steam line through the lower connection 3 of the valve.

The lower or closed end of the bellows is strengthened by being made of thicker material than the corrugated portion. While we have found that a wall thickness of about nine thousandths of an inch is sufficient for the corrugations, and in fact gives better flexibility than can be secured with a greater thickness, the end is desirably formed of material having a thickness of from thirty-five to forty thousandths. A bellows so constructed has been found to have longer life and to be less liable to breakage than one having the same wall thickness throughout.

A further improved feature is that this lower end is integral with the corrugated portion and the absence of joints also lessens the danger of leakage or breakage.

The advantages of our improved trap are its extreme simplicity of construction and sureness of proper operation, which can of course be initially determined by the amount and character of volatile liquid used. An additional advantage consists in the assembly of the thermostatic member as a part of the cover.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claim as our invention:—

1. In a device of the character described, the combination of an open casing having a passage therethrough; a cover therefor; a plug mounted on the inner side of said cover; an open ended, expansible bellows member mounted on and closed by said plug, said member extending into said casing, said bellows having a narrowed closed inner end, a reinforcing collar mounted within such closed end, a valve, and a frusto-conical disk shaped connection attached to said valve and engaging over the narrowed end of said bellows opposite such reinforcing collar therein.

2. In a device of the character described, the combination of an open casing having a passage therethrough; a cover therefor; a plug mounted on the inner side of said cover; an open ended, expansible bellows member mounted on and closed by said plug, said member extending into said casing, said bellows having an annular rib adjacent its inner end, a valve mounted against such inner end of said bellows, said valve having an annular flange, and a connecting member engaging such rib and flange on said bellows and valve and maintaining the same in rigid engagement.

3. In a device of the character described, the combination of an open casing having a passage therethrough, a cover therefor, a plug removably engaging said cover, an open ended expansible bellows member mounted on and closed by said plug, said member extending into said casing, a valve seat provided on the open end of the casing opposite the cover, and a valve member removably attached to said bellows member and adapted to seat on said valve seat.

Signed by us, this 23rd day of January, 1920.

MAX P. MILLER.
HAL T. PATTON.