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J. A. BROMAN

1,907,145

STEAM TEMPERATURE REGULATOR

Filed Sept. 15, 1930

Fig. 1.

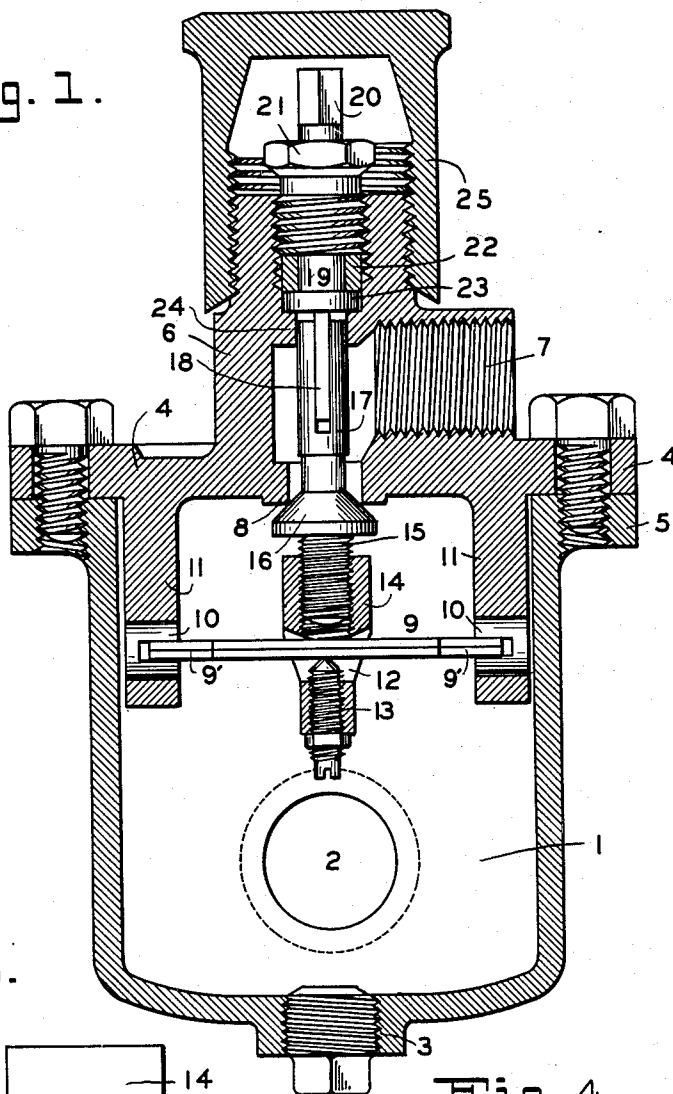


Fig. 2.

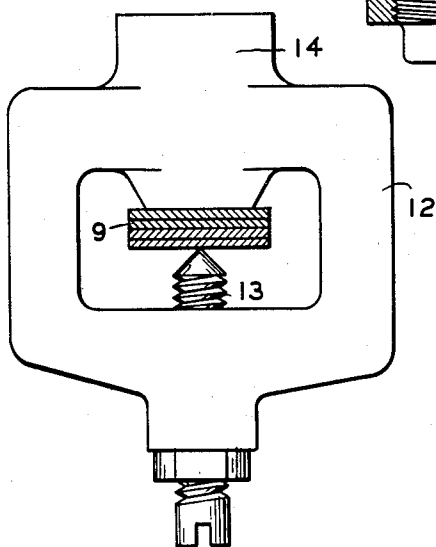


Fig. 4.

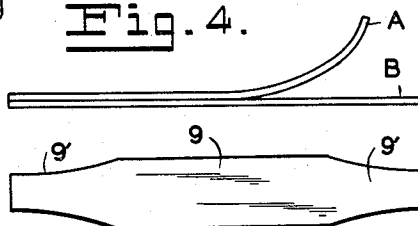


Fig. 3.

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STEAM TEMPERATURE REGULATOR

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This invention relates to improvements in steam temperature regulators, and more particularly to thermostatic valves.

The principal object of the invention is to automatically discharge condensation from steam lines.

Another object is to automatically regulate steam temperature by the discharge of condensate therefrom.

Another object is to provide a simple and effective manual control for regulating the thermostatic control with respect to the desired steam temperature.

Other objects and advantages will appear as the description progresses.

In this specification and the accompanying drawing the invention is disclosed in its preferred form. But it is to be understood that it is not limited to this form, because it may be embodied in other forms. It is also to be understood that in and by the claims following the description it is desired to cover the invention in whatsoever form it may be embodied.

In the one sheet of drawing:

Fig. 1 is a vertical section of a steam temperature regulator constructed in accordance with this invention.

Fig. 2 is a side elevation detail of the clamp for attaching the valve to the thermostatic couples.

Fig. 3 is a plan view of one of the leaves of the thermo-couple.

Fig. 4 is an edge view of the same with one of the laminations partly separated.

In detail the construction illustrated in the drawing, referring to Fig. 1, comprises the reservoir 1, having the steam inlet 2. A spud 3 is provided for attaching a drain cock.

The top of this reservoir is closed by the cover 4 screwed to the top flange 5. The neck 6 has the threaded side outlet 7 for discharging condensate accumulating in the reservoir. The valve seat 8 is provided in the bottom of the neck, between the reservoir 1 and the outlet 7.

The thermostat unit comprises a transverse laminated bar or bars 9, composed of thermo-couple material. Such bars consist of two joined layers A and B, see Fig. 4. These lay-

ers have different coefficients of expansion under heat. This causes the thermo-couple to curve or bow toward the plane having the greater coefficient of expansion, such as A.

The ends of the thermo-couple bar 9 engage the swivel blocks 10—10, rotatable in sockets in the extremities of the lugs 11—11, extending downward from the cover 4.

The clamp 12 encircles the bar 9 and is fixed to the central portion thereof by the set screw 13, which forces the bar against the end of the hub 14. Thus clamping the bar 9 does not interfere with its normal thermal deflection.

This hub 14 is internally threaded to receive the threaded stem 15 of the valve 16. This valve cooperates with the valve seat 8 to regulate the discharge through the side outlet 7.

At neutral temperatures the bar 9 is straight and the valve 8—16 open. When steam is introduced into the reservoir 1 through the inlet 2, the thermo-couple bar 9 is deflected upward and restricts or closes the valve 8—16 as the temperature rises. As condensate accumulates in the steam line and drains into the reservoir 1, the temperature drops in the reservoir and the thermo-couple bar 9 straightens and opens the valve 8—16 and the condensate is blown from the reservoir 1, by the incoming steam. In this manner the steam is kept "dry" and a high temperature maintained in the steam line.

These conditions of the steam may be regulated to a nicety by the micrometric control of the height of the valve 16 with respect to the seat 8. This is accomplished by turning the threaded stem 15 in the hub 14. This adjustment must be made without interfering with the normal action of the bar 9. For that reason the stem 17 of the valve guided in the neck 6 is split transversely to receive the feather 18 to form a spline joint by means of which the stem 17 may be turned without interfering with its vertical movement.

This feather 18 is formed on the end of the stem 19 having the squared head 20, projecting through the gland 21, threaded in the neck 6, and adapted to compress the packing 22 against the annular flange 23, on the stem 19, and seated against the shoulder 24, in the

neck 6. This effectually seals the stem 19 in the neck 6, but leaves it free to rotate when manually turned to regulate the exact period of the opening or closing of the valve 8—16 as actuated by the thermostatic action of the bar 9, as described. This manual adjustment is protected by the cap 25 screwed on top of the neck 6.

The ends of the bar 9 are reduced in width as at 9'—9' to permit them to move laterally in the blocks 10—10, which in turn swivel in the lugs 11—11, to insure the necessary freedom of the valve 16 to make a perfect seating of the valve, centrally guided by its stem 17.

In the smaller sizes a single thermo-couple bar 9 is sufficient. In the larger sizes of regulators these bars may be duplicated to handle the larger valves 16 and still maintain the thermostatic responsiveness to temperature variations.

It is better commercial practice to duplicate the number of regulator assemblies installed on a given steam line, than to increase the size of the regulator to handle a larger steam volume, for reasons obvious to those skilled in this art.

The regulators should be installed at a low point in the steam line so that the condensate will drain into the reservoir 1.

Having thus described this invention what I claim and desire to secure by Letters Patent is:

1. A steam temperature regulator comprising a condensate reservoir having an inlet and an outlet; a valve in said outlet; and a thermo-couple bar having its ends mounted in swivels at a fixed level within said reservoir and its center portion engaging said valve.

2. A steam temperature regulator comprising a condensate reservoir having an inlet and an outlet; a valve in said outlet; swivel blocks within said reservoir; a thermo-couple bar engaging said blocks and said valve.

3. A steam temperature regulator comprising a reservoir, having an inlet and an outlet, a valve in said outlet, a thermo-couple bar having its ends mounted within said reservoir, and a clamp member operatively engaging said valve and encircling said thermo-couple bar and secured to the central portion thereof.

4. A steam temperature regulator comprising a reservoir, having an inlet and an outlet, a valve in said outlet, a thermo-couple bar within said reservoir and having its ends mounted in swivels at a fixed level and its central portion engaging said valve, a clamp member operatively engaging said valve and encircling said thermo-couple bar and secured to the central portion thereof and external manually operable means for regulating said valve.

5. A steam temperature regulator comprising

a reservoir, having an inlet and an outlet, a valve in said outlet, a thermo-couple bar having its ends mounted at a fixed level within said reservoir, a clamp member encircling said thermo-couple bar and secured to the central portion thereof, a hub integral with said clamp member for receiving a valve stem and external manual means for regulating said valve stem.

6. A steam temperature regulator comprising a condensate reservoir having an inlet in its lower portion and an outlet; a valve arranged to close said outlet; and a straight thermo-couple bar having its ends mounted at a fixed level within said reservoir above said inlet and having its center portion operatively connected to said valve.

7. A steam temperature regulator comprising a condensate reservoir having an inlet near its lower end and an outlet at its top; a valve arranged to close said outlet; a thermo-couple bar having its ends mounted at a fixed level within said reservoir, and a clamp member operatively engaging said valve and secured to the central portion of said thermo-couple bar.

In testimony whereof I have hereunto set my hand this 6th day of September, 1930.

JOHN A. BROMAN.