

G. A. WELD.
THERMOSTAT.

APPLICATION FILED OCT. 30, 1905.

934,116.

Patented Sept. 14, 1909.

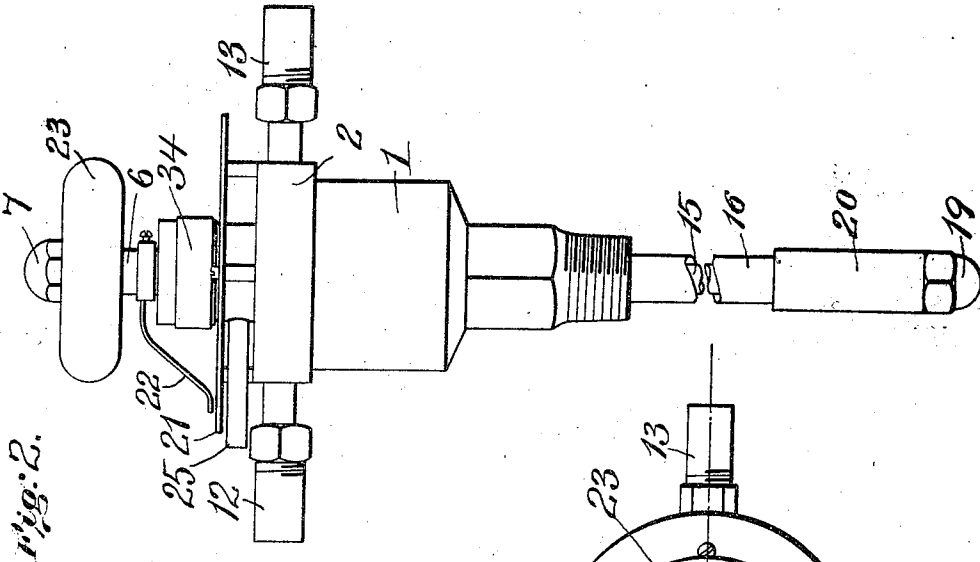


Fig. 2.

Fig. 3.

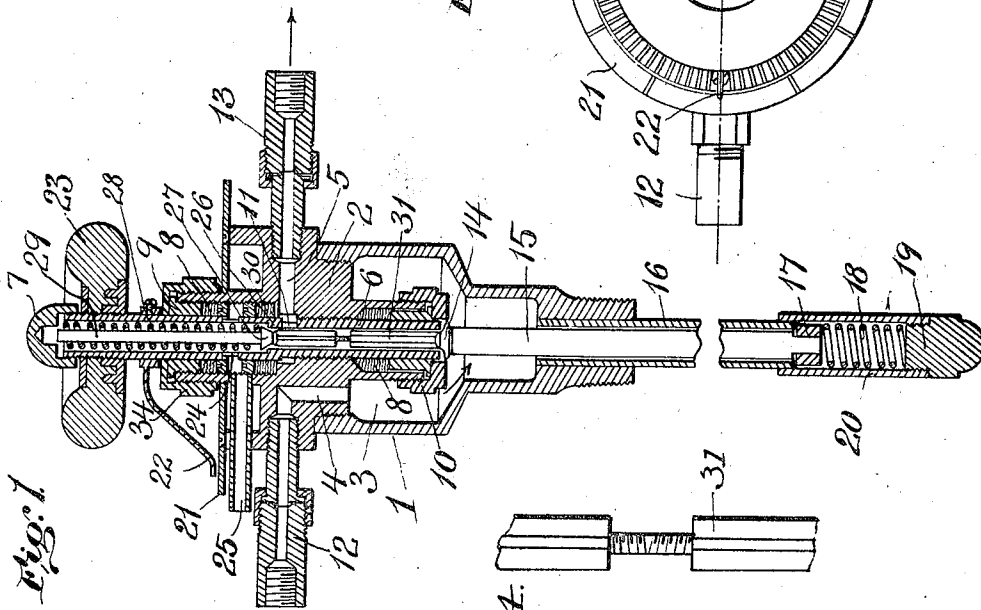
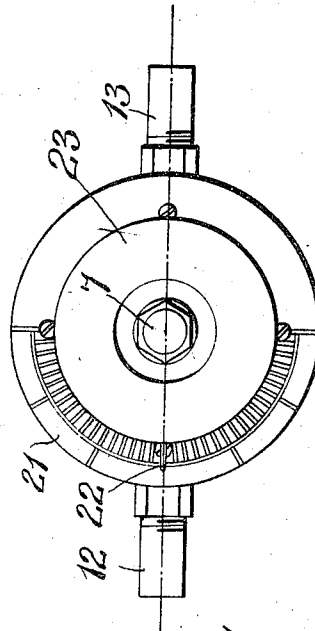
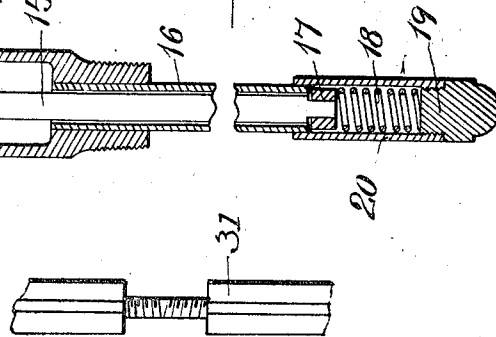


Fig. 1.

Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE A. WELD, OF WINCHESTER, MASSACHUSETTS.

THERMOSTAT.

934,116.

Specification of Letters Patent. Patented Sept. 14, 1909.

Original application filed December 22, 1902, Serial No. 136,154. Divided and this application filed October 30, 1905. Serial No. 284,957.

To all whom it may concern:

Be it known that I, GEORGE A. WELD, a citizen of the United States, and a resident of Winchester, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Thermostats, of which the following is a specification.

This invention relates to thermostatic controllers to be used in connection with a system of heating and ventilating, or for other purposes, for controlling the flow of an operating fluid to a motor, which may be connected to regulate the heating and the supply of air to such a system.

The particular device of this invention has passages for conducting an operating fluid and valves operated through variations in temperature to control the amount or to shut off entirely the flow of such fluid.

The device is illustrated and described in my pending application for heating and ventilating apparatus, filed December 22, 1902, Serial No. 136,154, of which case this present application is a division.

The accompanying drawings illustrate the preferred embodiment of my invention, and therein,—

Figure 1 represents a longitudinal section. Fig. 2 represents a side elevation. Fig. 3 represents a plan view of this device. Fig. 4 is a detail.

The same reference characters indicate the same parts in all the figures.

The thermostat comprises essentially a casing 1 which is formed as a shell or cup open at one end and into which is screwed a head 2, this head completely closing the casing and leaving therein an open space 3. In one side of the head is formed a passage 4 which opens into the interior space 3 and in the other side is a passage 5 opening into a central bore in the head. The central bore has a threaded portion into which is screwed a tubular shell or member 6, the upper end of which projects externally of the casing and is closed by a cap 7, while the inner end extends into the open space of the casing through the head. The ends of the shell or member which project through the head are surrounded by packing 8 secured and compressed by stuffing-box mechanisms 9, 10 of any suitable construction, for preventing leakage of fluid under pressure from the interior to the exterior of the casing. In the

side of the shell or member 6 adjacent passage 5 is formed a port 11. The passages 4, 5, port 11, interior bore of the shell or member, and the space 3 of the casing constitute a communicating passage or channel through which air, water or other fluid may flow from an inlet tube 12 attached in the inlet 4 to an outlet tube 13 attached in line with the passage 5. As the device is arranged in the drawings, 12 indicates the inlet tube and 13 the outlet, the direction of flow of the fluid being indicated by the arrows, but it is to be understood that the parts and direction of flow might be reversed.

The lower end of the shell or member 6, which as before stated is open to the interior of the casing, is formed with an annular valve-seat and coöperating therewith is a valve 14 which has a long stem 15 projecting out through the end of the casing. This stem may be of steel or other metal having a definite coefficient of expansion. Surrounding the stem 15 is a tube 16 of a different metal having a definite coefficient of expansion which is different from and preferably greater than that of the stem. One end of the tube is fixed with a tight joint in the casing, while the other end is carried out a considerable distance from the casing and connected with the end of the stem. The length and material of which the tube 16 is made are preferably such that the outer end where the tube is attached to the valve stem will have a considerable range of movement under moderate variations of temperature, and thereby the valve will be moved toward and away from its seat.

With the parts constructed and arranged as herein shown and described, a rising temperature will cause a greater expansion of the tube 16 than of the valve stem and will therefore carry the valve 14 away from its seat on the end of the stem, while a falling temperature will produce the reverse effect, contracting tube 16 and seating valve 14 to close the passage through shell or member 6. The connection between stem 15 and tube 16 consists of a collar 17 on the stem, forming an abutment which coacts with the end of the tube, a spring 18 being provided for holding the collar against the tube. One end of the spring bears against the collar, while the other is held by a head 20 in a sleeve 19 surrounding the spring and fixed to the tube 16. By this construction expansion

sion of tube 16 positively moves the valve away from its seat, while there is a yielding pressure to seat the valve. This allows for compression of the spring 18 and prevents injury either to the valve or its seat when contraction of tube 16 continues after the valve has become seated.

From the foregoing it will be seen that when the temperature rises beyond a certain predetermined amount, valve 14 is opened and a flow of operating fluid permitted from inlet 12 through outlet 13 to the controlling motor for a heating or ventilating system to shut off or diminish the heat, while when the temperature falls, the flow is shut off and the motor permitted to produce a reverse action of whatever mechanism may be provided.

In order to regulate the degree of temperature at which valve 14 will open or close, the tubular shell or member 6 may be rotated whereby its threaded engagement with the head 2 causes its inner end to be either advanced farther into or withdrawn from the casing, whereby its proximity to the valve 14 is altered. A graduated plate 21 is fixed upon the exterior of the casing and therewith coöperates a pointer 22 fastened upon the shell or member 6. The plate or dial and pointer together form an indicator which shows the adjustment of the valve and indicates in which direction the shell or member should be turned to cause actuation of the mechanism at a high or low temperature. A hand-wheel 23 is fixed upon the shell or member for rotating it. The thermostat also has provisions whereby the fluid in the motor may be released when the supply is cut off by closing of valve 14. This consists of a port or vent 24 in the shell or member which opens into an outlet tube 25 through which the fluid may escape when permitted. Between the ports there is formed on the interior of the shell or member a valve seat 26 with which there coöperates a valve 27 that is normally pressed upon the seat by means of a spring 28 confined within the shell or member 6 and abutting at its other end against the cap 7. A stem 29 is connected to the valve 27 and guides the latter, being held in position by the spring while the latter is itself retained by the shell or member. A stuffing-box 30 prevents leakage from the passage 5 to the outlet 25 around the tube 6.

Interposed between the valves 14 and 27 is a stem 31 within the shell or member 6 which is engaged at opposite ends by the valves and is of such a length as to prevent both valves being closed at once. I have shown the stem 31 as formed of two members adjustably connected by a threaded shank, whereby the stem may be adjusted should the same be necessary. When valve 14 is moved toward its seat, it engages the stem

31 and brings the latter into engagement with valve 27, forcing said valve from its seat in opposition to the pressure of spring 28. On the other hand, when valve 14 is retracted by expansion of tube 16, spring 28 causes valve 27 again to seat. Spring 18 is of greater force than spring 28 so that the action described may take place. Valve 27 and vent-opening 24 are provided to serve as a relief for the operating fluid trapped in the motor controlled by the thermostat when the supply thereto is cut off by closing of valve 14. Thus, supposing the thermostat were to control admission of compressed air to a cylinder for operating a piston against spring pressure to actuate a heating or ventilating valve, the flow of air, when the valve is opened, would move the piston in one direction. When, however, valve 14 is closed, the actuation will be stopped and simultaneously with closing of valve 14, valve 27 controlling the vent-outlet is opened, allowing the air in the motor cylinder to escape and the latter to be actuated in the opposite direction by the spring or other device provided for that purpose.

The advantages of my improved thermostat are apparent. It is particularly obvious that by interposing the relief spring between the thermostat member and the main valve stem, an effective provision is made to prevent injury to the parts due to careless handling and manipulation of the valve, or exposure to sudden and extreme changes of temperature. In other words the use of such a cushioning means renders it impossible under any condition to project the valve seat to such an extent as to cause the valve to press thereagainst with injurious force. This quality gives my improved thermostat a wide range of usefulness and renders it capable of use in connection with all classes of apparatus in which it is necessary or desirable to employ instruments of this character.

I claim:—

1. A thermostat comprising a casing having an inlet, an outlet and a vent, a tubular shell or member adjustably fitted in said casing and having a passage connecting said inlet and outlet with said vent, a valve between the inlet and outlet, a stem carrying said latter valve, a thermostat member operating to close said valve by contraction, a cushion interposed between said thermostat member and said valve stem to compensate for abnormal contraction of the former, a valve for said vent, and adjustable means located within said tubular member and interposed between said valves for opening the relief valve as the other valve is closed.
2. A thermostat comprising a casing having an inlet and an outlet, a tubular shell or member extending into the casing, and opening into the interior thereof and into the

outlet, said shell having a vent opening, a valve for closing the end of the tube, a stem upon which said valve is mounted, a thermostat member arranged to close said valve by contraction, a cushion interposed between said thermostat member and said valve stem to compensate for abnormal contraction of the former, a valve for closing said vent opening, a spring within the tube tending to seat said valve, and a stem within the tube interposed between the two valves for raising the vent valve from its seat against the pressure of the spring when the thermostat controlled valve is closed.

3. A thermostat comprising a casing, a head tightly engaged therewith and having passages formed therein, one of which is open to the interior of the casing, a tubular shell or member threaded through the head into the interior of the casing, being open at its inner end and closed at its outer end, said shell or member having a port opening into one of the passages in said head, and a second port opening externally of the casing, a valve within the tube arranged when seated to close the communication between the ports, a spring within the tube holding said valve normally to its seat, a second valve arranged to close the inner end of said shell or member, a thermostat member for operating the latter valve, and a stem in the shell or member and interposed between said valves for opening one when the other is closed.

4. A thermostat comprising a casing, a thermostatic tube extending from said casing, a valve stem contained in said tube and extending into the casing, a valve mounted directly on the inner end of said stem, a tubular member extending into the casing opposite to, and in line with said stem, its inner end forming a seat for said valve, the casing having a passage communicating directly with the interior of said tubular member and another passage opening into the space in the casing exterior to said member, one of said passages constituting an inlet and the other an outlet for the controlling fluid, and a relief spring engaged with said thermostatic tube and valve stem arranged to close the valve upon contraction of said tube and to yield upon further contraction of the tube after the valve has been seated.

5. A thermostat comprising a casing, a tubular member extending thereinto and adjustable to vary the amount by which it extends into the casing, its inner end being open and serving as a valve seat, said casing having passages communicating respectively with the interior of said member, and with

the space in the casing external to said member, a thermostatic element extending from the casing, a valve stem contained in said thermostatic element in line with said tubular member, a valve mounted on the end of said stem and movable by the movement thereof against and away from the valve seat on the end of said member, and a relief cushion between said thermostatic element and valve stem arranged to cause seating of the valve yieldingly upon contraction of the thermostatic element and to permit adjustment of the tubular member while the valve is seated against the end thereof.

6. A thermostat comprising a casing having an inlet and an outlet, a tubular shell or member extending into the casing, and opening into the interior thereof and into the outlet, said shell having a vent opening, a valve for closing the end of the tube, a stem upon which said valve is mounted, a thermostat member arranged to close said valve by contraction, a cushion interposed between said thermostat member and said valve stem, to compensate for abnormal contraction of the former, a valve for closing said vent opening, a spring within the tube tending to seat said valve, and an adjustable stem within the tube interposed between the two valves for raising the vent valve from its seat against the pressure of the spring when the thermostat controlled valve is closed.

7. A thermostat comprising a casing, a thermostatic tube extending from said casing, a valve stem contained in said tube and extending into the casing, a valve mounted directly on the inner end of said stem, a tubular member extending into the casing opposite to, and in line with, said stem, its inner end forming a seat for said valve, the thermostat having a passage communicating directly with the interior of said tubular member and another passage opening into the space in the casing exterior to said member, one of said passages constituting an inlet and the other an outlet for the controlling fluid, and a relief spring engaged with said thermostatic tube and valve stem arranged to close the valve upon contraction of said tube and to yield upon further contraction of the tube after the valve has been seated.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GEORGE A. WELD.

Witnesses:

A. C. RATIGAN,
ARTHUR H. BROWN.