No. 731,620. PATENTED JUNE 23, 1903.

A. ROESCH.

THERMOSTAT.

APPLICATION FILED JAN. 2, 1902.

NO MODEL.

Fig. 1,

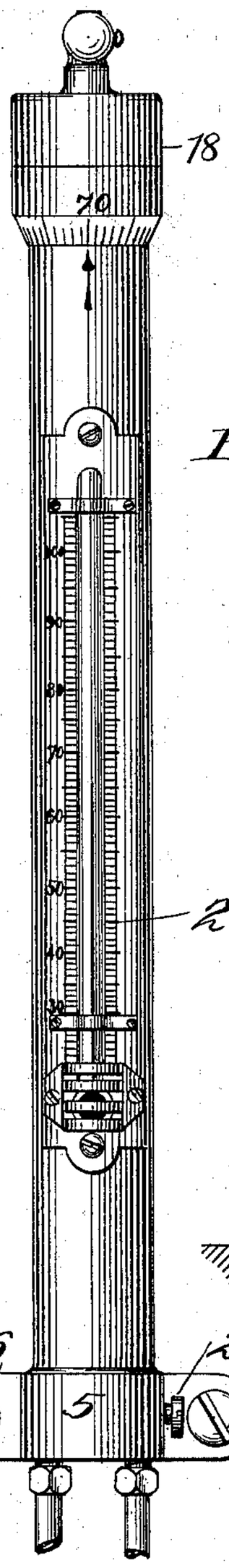



Fig. 2

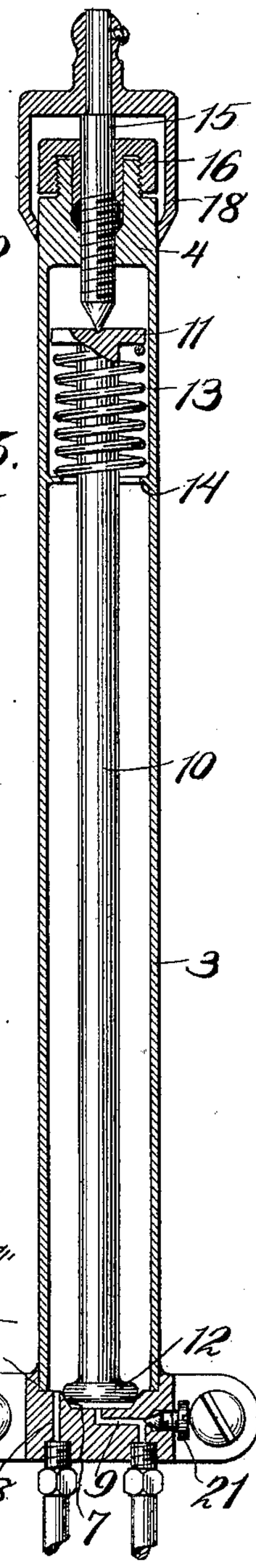



Fig. 4.

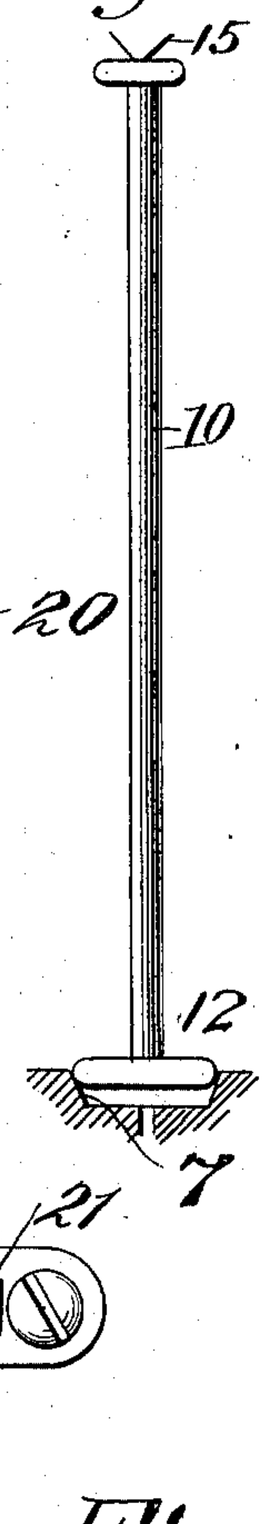



Fig. 5.

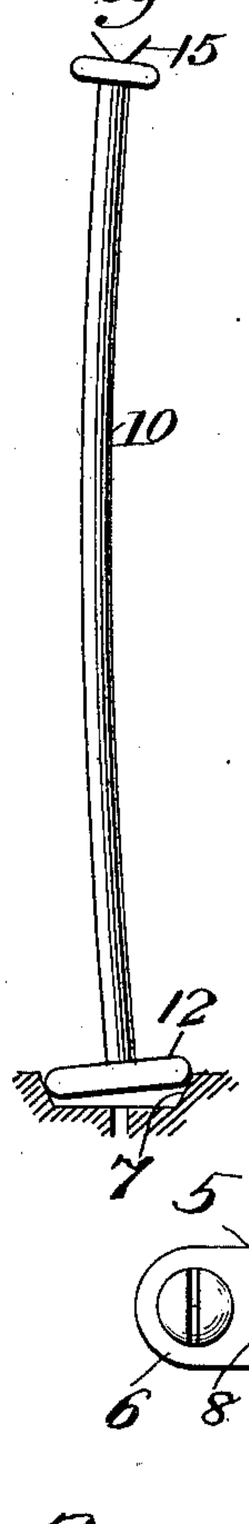
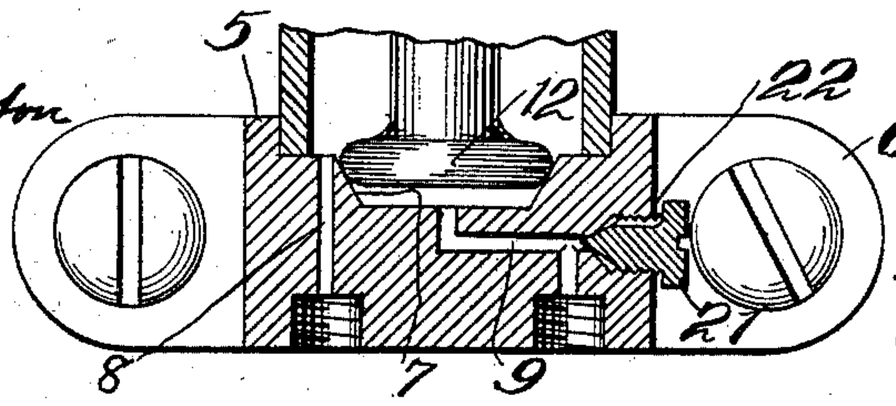



Fig. 3,




WITNESSES:

C. F. Carrington

M. M. Conover.

INVENTOR

Alfred Roesch

BY

James Bell

ATTORNEY

No. 731,620. Patented June 23, 1903.

# UNITED STATES PATENT OFFICE.

ALFRED ROESCH, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO DAVIS & ROESCH TEMPERATURE CONTROLLING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

## THERMOSTAT.

SPECIFICATION forming part of Letters Patent No. 731,620, dated June 23, 1903.

Application filed January 2, 1902. Serial No. 88,032. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED ROESCH, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Thermostats, of which the following is a specification.

My invention relates to improvements in thermostats, and particularly to improvements in thermostats adapted for use as temperature-regulators and which may be connected with a heating system.

In carrying out my invention I provide a tube or casing composed of a material having a relatively high coefficient of expansion, and within this shell I arrange a rod composed of a material which has a relatively low coefficient of expansion. I so construct and arrange this tube and rod, respectively, that they shall have when in operation substantially no movement longitudinally with respect to each other at their upper ends; but the lower end of the tube I provide with a valve-seat and the lower end of the rod with a valve. I arrange suitable ports in the valve-seat and provide that the valve in its movement shall control same. In this manner through suitable connections in a manner well known heat may be automatically turned on or off in a heating system. The opening and closing of the valve will be effected by variations of temperature, which, acting upon the outer tube or casing, will cause the same to expand or contract, and thereby move the valve up or down with relation to its seat. I also provide suitable means for adjusting the relatively fixed portion of the said rod within the said casing, so that the temperature at which the valve shall be opened may be accurately determined.

My invention further consists in certain details of construction and combination of parts, as will hereinafter more fully appear.

One of the main objects of my invention is to provide a thermostatic controlling device which will operate to directly seat and unseat a valve without the interposition of any jointed or movable parts other than the direct movement of the thermostatic member due to expansion or contraction, the result being an extreme delicacy of operation otherwise unattainable. In so doing I further provide means whereby extreme variations of temperature will not affect the valve after it has been operated to close communication.

Further objects of my invention are to simplify the construction and operation of thermostatic controlling devices of this character, reduce the cost of manufacture, and increase their durability and effectiveness.

I will now proceed to describe a thermostat embodying my invention and will then point out the novel features in claims.

In the drawings, Figure 1 is an outside front elevation of a thermostat embodying my invention. Fig. 2 is a central longitudinal section of the same. Fig. 3 is a detail view and drawn to a larger scale than Figs. 1 and 2. Figs. 4 and 5 illustrate diagrammatically the movement of certain parts due to extreme variations in temperature.

Reference character 3 designates an outer tube or casing of very considerable length relatively to its diameter. The tube or casing is closed at its upper end by a head 4 and at its lower end by a base or supporting plate 5. The base or supporting plate has suitable lugs, as 6 6, by which the device may be secured to the wall or elsewhere, as desired. The base 6 has arranged therein a valve-seat 7, an inlet-port 8, and an outlet-port 9.

The tube or casing 3 is composed of a material which has a relatively high coefficient of expansion. It may conveniently be a brass tube, and the head 4 and base 5 may be secured thereto in any desired manner.

10 designates a rod, the top of which has a flange or head 11 and the bottom of which is provided with a valve 12. The valve 12, as shown, is preferably provided with a convex face, and therefore will seat itself and remain seated in spite of possible inaccuracies of adjustment. The rod 10 is composed of a material having a relatively low coefficient of expansion and may conveniently be an iron rod.

A spring 13 bears against the upper head or flange 11 of the rod 10 and against a flange

14 within the tube or casing 3. The spring is under tension at all times and tends to support the rod 10 or force same upwardly, and hence to hold the valve 12 off its seat.

15 designates an adjusting-screw which passes through the head 4 of the tube or casing 3 and bears at its lower end against the flange or head 11 of the rod 10. The adjusting-screw 15 has a screw-threaded connection with the head 4 and by adjusting it up or down the position of the rod 10, and consequently of the valve 12, carried thereby, will be adjusted as to the tube or casing 3 and the valve-seat 7 in the base or supporting plate 5 thereof. At the same time it will be noted that while the adjustment of the screw 15 imparts a similar adjustment to the rod 10 the rod 10 is in no way connected thereto or carried thereby.

A suitable gland 16 and packing may be provided for the purpose of making the screw-threaded connection between the adjusting-screw 15 and the head 4 tight, and a flanged cover 18 may be secured to the adjusting-screw 15 and arranged to inclose the end of the tube 3, its head 4, the gland 16, &c. This adjusting-screw may be turned for the purpose of adjusting the valve and rod, as before explained, by turning the flanged cover 18 itself. Degrees of temperature may be denoted upon the outside of this flanged cover 18, as shown in Fig. 1, and a suitable mark may be made upon the outside of the tube or casing with which the said degrees of temperature may register. A thermometer 20 may also, for convenience, be secured to the outer casing. (Shown in Fig. 1.)

The method of applying this device and its operation may be substantially as follows: The inlet-port 8, which opens into the interior of the chamber formed by the tube or casing 3, and its head 4 and base 5 may be connected with a suitable source of compressed air. (Not shown.) The compressed air passing through the said connection and through the port 8 will fill the interiorof the tube or casing 3 and will pass out beneath the valve 12, through the port 9, and from thence through a suitable connection to a heat-controlling device, such as the well-known pressure-operated valve of a steam-heating system. As the temperature gradually lowers the tube 3 will contract longitudinally and will contract to a greater extent than will the rod 10. The effect then will be to carry the rod 10 bodily downward and to close the valve 12 upon its valve-seat 7. This will close the compressed air to the discharge-port 9, and no more air will be permitted te pass from within the chamber inclosed by the tube or casing 3 to the heat-controlling device. The heat will now be turned on again and will remain turned on until a rise of temperature affecting the tube or casing 3 opens the valve 12 and again permits the compressed air to pass through the port 9.

I have found that the difference of a single degree of temperature is sufficient in one direction to unseat the valve and in the other direction to seat same. I make the valve and seat of relatively large area with respect to the port leading therefrom, so that the opening of the valve for an infinitesimal distance will be sufficient to permit a sufficient quantity of compressed air to pass to feed the said port. Further rising of the temperature will of course only serve to open the valve wider, and no further effect will be produced.

Lowering of temperature after the valve has been seated will first tend to seat the valve more strongly, and finally will tend to spring the rod 10. If provision were not otherwise made, the consequent tipping of the valve would unseat one edge thereof and would cause a leakage. The convex face between the valve and its seat will, however, permit slight tipping of the valve due to springing of the rod while holding same tight to its seat. This principle is illustrated in diagrammatic, Figs. 4 and 5 of the drawings.

I have shown a needle-valve at 21, having a discharge-groove 22 therein, and which valve may be regulated to permit a small quantity of compressed air to be discharged therethrough. Such arrangement will permit the discharge of compressed air which might otherwise remain in the port 9 and in the connection from thence to the heat-controller after the valve 12 had closed. The relationship of size of this needle-valve 21 and its escape-passage 22 with regard to the valve 12 is so small that the slightest opening of the valve 12 will permit a great deal more compressed air to pass than can possibly be discharged through the said needle-valve. The small opening therethrough will hence not destroy the pressure in the port 9 or the connections leading therefrom until the valve 12 is closed.

It will be understood that in describing the foregoing application of my device the same is merely one of many uses to which this invention may be applied and that I do not desire to limit myself to such use. Neither do I desire to limit myself to the exact details of construction as herein shown, as they may obviously be varied within wide limits within the spirit and scope of my invention.

By my arrangement and construction I have provided an extremely simple form of thermostat which is adapted for many purposes and which is particularly adapted for use in connection with temperature-regulators or heating systems. The device consists of but few parts, and those parts of simple and inexpensive construction and material. The device can readily be adjusted to operate at any desired temperature by the simple turning of the flanged cover at the upper end, the degrees of temperature marked thereon being arranged to register with the indicating-mark upon the casing, so that the valve will be

closed at the degree of temperature in such register.

The device will work with a high degree of sensitiveness, and yet there are no small or delicate parts to become deranged or broken.

What I claim is—

1. In a thermostat, the combination of a tube or casing and a laterally-flexible bar, arranged one within the other and in unyielding contact with each other at one end, the said tube and bar having different coefficients of expansion, and provided at their free ends and rigid therewith, the one with a valve-seat, and the other with a valve, the said valve-seat and valve having coacting faces, and one of the said faces being convex.

2. In a thermostat, the combination of a tube or casing and a laterally-flexible bar, arranged one within the other and in unyielding contact with each other at one end, the said tube and bar having different coefficients of expansion, and provided at their free ends and rigid therewith, the one with a valve-seat, and the other with a valve having a convex face.

3. In a thermostat, the combination of a tube or casing and a laterally-flexible bar arranged one within the other and in unyielding contact with each other at one end, the said tube having a greater coefficient of expansion than the said bar, and provided at its free end with a valve-seat rigid therewith, and the said bar provided at its free end with a valve also rigid therewith, the said valve-seat and valve having coacting faces, and one of the said faces being convex.

4. In a thermostat, the combination of a tube or casing and a laterally-flexible bar arranged one within the other and in unyielding contact with each other at one end, the said tube having a greater coefficient of expansion than the said bar, and provided at its free end with a valve also rigid therewith, said valve having a convex face.

5. In a thermostat, the combination with a tube or casing and a bar arranged one within the other, the said tube and bar having different coefficients of expansion, and provided at their lower ends and rigid therewith, the one with a valve-seat facing inwardly, and the other with a valve, of a spring, located within the tube and around the bar, said spring bearing at one end against the casing, and at its other end supporting the bar and tending to lift said valve away from its seat, and an adjusting-screw mounted in the upper end of the casing and bearing unyieldingly upon the rod, in opposition to the spring but unconnected with said rod.

6. The combination in a thermostatic controlling device, with a tube or casing and a bar arranged one within the other, the said tube closed to the external atmosphere at one end by a cap and at the other end by a base, of a cap for so closing one end of the tube, said cap carrying an adjusting-screw adapted to bear against one end of the said bar but unconnected therewith, the said bar provided at one end with a valve-disk and at the other end with a flange or head, and a spring between the said flange or head and a stationary abutment on the said casing, said spring tending to keep the said bar up against the said adjusting-screw, the said base having an inlet-port, an outlet-port and a valve-seat facing inwardly, the ports and tubes being included in a compressed-air control for heating systems, said rod and tube being made of materials having different coefficients of expansion, substantially as and for the purpose set forth.

ALFRED ROESCH.

Witnesses:
A. H. PERLES,
C. F. CARRINGTON.