(No Model.)

T. O. PERRY.

TEMPERATURE REGULATOR.

No. 528,799. Patented Nov. 6, 1894.

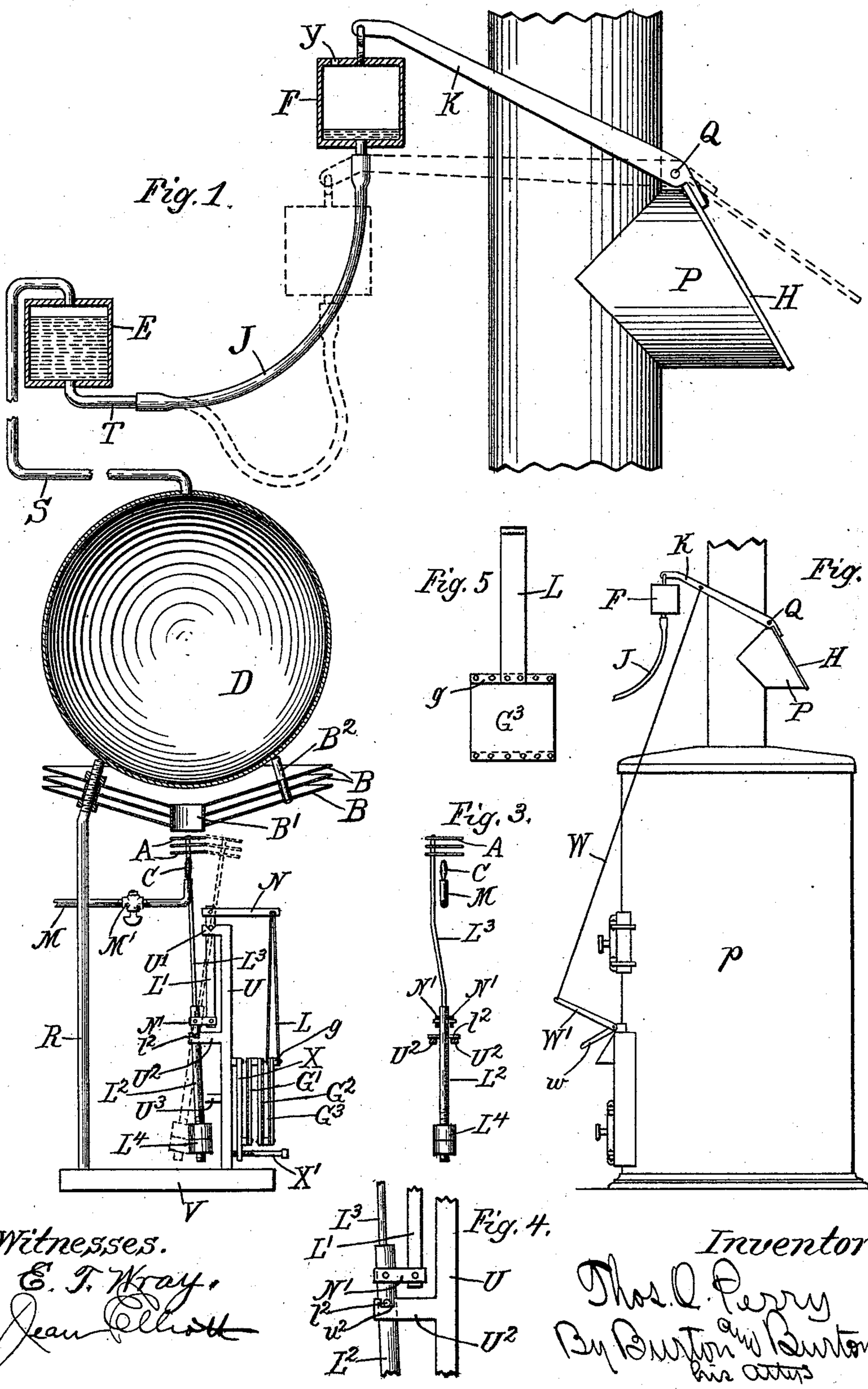

Fig. 1.

Fig. 5

Fig. 2.

Fig. 3.

Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

THOMAS O. PERRY, OF CHICAGO, ILLINOIS.

TEMPERATURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 528,799, dated November 6, 1894.

Application filed October 2, 1893. Serial No. 486,988. (No model.)

To all whom it may concern:

Be it known that I, THOMAS O. PERRY, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Temperature-Regulators, which are fully set forth in the following specification.

This invention is an improvement upon details of a temperature regulator for which my application, Serial No. 476,160, was filed in the United States Patent Office May 31, 1893.

The improvements relate to the character of the devices for shielding the air chamber, and also to the form of the thermostat and the connection by which it operates the shields.

In the drawings,—Figure 1 is a partly sectional elevation of my regulating device, shown connected to a damper in a pipe which may be a ventilating pipe, or a draft pipe from a heater. Certain vessels containing air or water and the fixed shield below the air chamber are shown in vertical section. Fig. 2 is an elevation representing conventionally a heater, to whose draft pipe check damper my regulating device is connected, the same letter being applied to the damper and pipe in this figure as to the damper and pipe in Fig. 1, although the latter may represent equally well a ventilating pipe and its damper. Fig. 3 is a detail sectional side elevation of the device for heating the air chamber and the movable shield for the same, the pivotal supports and connections of said shield being shown in vertical section. Fig. 4 is a detail elevation upon an enlarged scale of the pivotal support and connections of the shield, the direction of view being the same as in Fig. 1. Fig. 5 is a detail side elevation of one of the compound plates of the thermostat.

P is a ventilating flue from the room whose temperature is to be regulated, or a draft pipe or flue from the heater which heats such room.

H is a check damper or valve pivoted at Q, controlling the admission of air through the flue P.

K is a rigid arm of the check damper.

F is a vessel hung freely at the free end of the arm K, having an air vent Y at the top, and connected by a flexible tube J, which leads into the bottom, with the bottom of a fixed vessel E, which contains water and is connected by a pipe S, entering it at the top, with the top of the air chamber D.

Thus far, the construction is the same as that shown in my former application above mentioned.

B B B are three shields of thin metal located one above another with slight interval or air space, all being underneath the chamber D, and of such horizontal extent as to completely shield it below. These shields B B B are supported by a post R, extending up from a base V. The chamber D may be supported by the shields, suitable studs, one of which, B^2, is shown, co-operating with the end of the post R, which projects through the shields, serving to hold the chamber D out of immediate contact with the upper shield B; or the chamber D may be suspended by its connections with the vessel E, or both means of support may be simultaneously used. The shields B B B are connected by a tubular hub B′ at the center, and in vertical line below the opening through this hub there is located any suitable heat-producing device,—as a gas tip, whose flame is represented at C, M being the gas pipe and M′ the controlling valve. Any device for producing a small and substantially constant heat will perform the function of the gas jet.

L^3 is a vertical lever which carries at its upper end the shield A, composed of three horizontal disks secured at slight intervals on the lever arm $L^2 L^3$, and of sufficient area to cover the opening through the hub B′. The lever $L^2 L^3$ is fulcrumed upon the arm U^2 of the upright bracket U, which is fixed to the base V, and said lever has at its lower end a counterpoise weight L^4 very slightly overbalancing it, so that it has a barely observable tendency to remain upright, its position, when upright, being such as to hold the shields A in position between the flame C and the tubular opening through the hub B′, by which the heat of the flame might reach and effect the chamber D. Preferably, in order to provide for any vertical adjustment of the shields A, which may be found desirable, the lower portion L^2 of the lever $L^2 L^3$ is tubular, and the upper portion L^3 is adapted to telescope within it, fitting

tightly if it is desired to avoid the necessity of a set screw.

L′ is a lever fulcrumed at U′ upon a bracket U, its shorter arm being above the fulcrum and its longer arm extending down alongside the lever L^2 L^3, and being connected at its lower end by the link N′ to the lever L^2 L^3 at a very short distance above the fulcrum of the latter.

The thermostat comprises a plurality of bars made up each of two elements having different coefficients of expansion under changes of temperature. Said bars are represented by G′, G^2 and G^3, the innermost of which is fastened at the lower end to the bar X, said bar being made fast at one end to the bracket U, and having the other end adjustable by the screw X′ toward and from the bracket. To the upper or otherwise free end of the first bar G′ of the thermostat, the second bar G^2 is made fast, the order of its elements being the reverse of that in the first bar; and to the lower end of the second bar the third bar G^3 is made rigid, the order of the elements being again reversed. To the free end of the last bar G^3, a rigid arm L is secured, and projects upward in the direction of said bar, being the final lever arm of the thermostat, which, it will be understood, attains a range of movement for a given range of temperature multiplied in proportion to the number of bars of which it is composed, so that both as to range of movement and power to operate mechanism the device may be adapted to the work to be done by increasing or diminishing the number of bars in the thermostat. The upper end of the lever arm L is connected by the link N to the upper end of the lever L′, and the thermostat thereby operates the latter lever, which, through the link N′, operates the lever L^2 L^3, causing the latter lever to carry the shield device A from the position shown in full lines, where it shields the chamber D from the flame C, to the position shown in dotted lines where it ceases to shield the chamber from the flame when the thermostat is exposed to any temperature above that for which it is primarily set, which is determined by adjusting the screw X′. The plurality of disks comprising the shield A, with the air spaces between them, insures complete protection of the chamber from the flame when the shield is interposed, making it possible, therefore, to use a flame sufficient to very promptly heat the chamber when the shield is removed, without danger of heating it through the shield when it is interposed. The hollow hub B′ operates to some extent as a flue, tending to draw the products of combustion from the flame up directly against the chamber D when the shield is withdrawn, and thereby further insures the prompt operation in the manner intended. The plurality of the shields B B B with the air spaces between them also tends to insure the protection of the chamber D from the heat of the products of combustion produced by the flame C, when they are deflected by the shield A, and pass off under the shield B.

In order to make the movement of the lever L^2 L^3 as easy as possible, I give it a rolling pivot, the arm U^2 of the bracket U having a flat-bottomed notch u^2, in which the pivot stud l^2 of the lever arm rolls as the lever tilts, as seen best in Fig. 4.

In Fig. 2 I have shown the vessel F adapted to operate H,—which is, in this view, a check damper of the draft flue in the heater,—and to operate also the draft damper W of the furnace, the connection being such that the same operation of the regulating device which tends to open the check damper, tends to close the draft damper; and it is obvious that the operation might be limited to the draft damper, if preferred.

The particular mode of connection illustrated is by means of a link W from the lever arm K to the lever arm W′ of the draft damper W.

In a thermostat of this construction,—that is, operating by the curvature produced by the different rate of expansion of the two elements,—the force by which the mechanism must be operated is derived from the portion of the compound bar or plate near its fixed end, so that little is gained by increasing the length of the device disproportionately to its width, because, so far as mere multiplication of the motion is concerned, this is better accomplished by an arm or finger extending rigidly from the free end in the direction of the length of the compound bar, which will take a position substantially tangential to a curve at the point at which it is thus attached and multiply the deflection proportionately to its length. Such rigid finger or arm is the part L, the compound plates or bars G′, G^2 and G^3 being preferably comparatively short and wide, so that the greatest effectiveness in proportion to the amount of material which they contain will be developed, the finger L being extended for the purpose of multiplying movement only. This finger should therefore be made as rigid as possible in its plane of vibration due to the curvature of the compound plate, and for this purpose, it may be constructed by folding a strip of metal upon itself, making the two arms stride the free end of the compound bar, to which it is there made fast, the apex or fold being the point of attachment to the link N. In order that full advantage may be had of the width of the compound plate or bar,—that is, that all the force developed by its curvature may be transmitted through the lever arm or finger L to the mechanism, a rigid arm or bar *g* is riveted across the free end of the last plate G^3. This bar, as it were, gathers up all the force developed by the curvature of the compound bar or plate, and transmits it to the finger.

I claim—

1. In a temperature regulator, in combina-

tion with a valve or damper to control the temperature of the apartment to be regulated, and an element adapted to expand and contract with changes of temperature; connections from such expanding and contracting element to the damper; a heater for heating the expanding and contracting element, and a shield A, adapted to be interposed between the heater and the expanding and contracting element consisting of a plurality of disks located one above another with intervals between them: substantially as set forth.

2. In a temperature regulator, in combination with a damper which controls the temperature of the apartment; an element adapted to expand and contract with changes of temperature, and connections by which its expansion and contraction operate the damper; a heater to act upon said expanding and contracting element, and the fixed shield comprising a plurality of disks B B B, or plates located one above the other with air intervals between them, and having respectively apertures in vertical line, and the movable shield located below the fixed shield and adapted to be shifted to and from a position vertically below said apertures: substantially as set forth.

3. In a temperature regulator, in combination with a damper which controls the temperature of the apartment, an element adapted to expand and contract with changes of temperature and connections by which its expansion and contraction operate the damper; a heater to act upon such element, and the plurality of disks or plates B B B, constituting a shield below the chamber; a tubular hub B which connects said shields and constitutes a flue leading through them; a heating device located in line vertically below said hub, and the movable shield A adapted to be interposed vertically above the flame, and mechanism for removing it from that position, and the thermostat and connections by which it operates the shield A: substantially as set forth.

4. In a temperature regulator, in combination with the damper which controls the temperature of the apartment, an element adapted to expand and contract with changes of temperature, and connections by which its expansion and contraction operate the damper; a heater to act upon such expanding and contracting element, the movable shield A, a vertical stem upon whose upper end it is carried, having a counterpoise at the lower end whereby it tends to remain vertical; the bracket upon which said vertical arm is fulcrumed, the lever being provided with a rolling pivotal support upon said bracket: substantially as set forth.

5. In a temperature regulator, in combination with the valve or damper, an expanding and contracting element and mechanism by which its expansion and contraction operate the valve or damper; a tube whose upper end opens underneath the expanding and contracting element; a heating device located at the lower end of said tube, and a shield adapted to be interposed between the same and the tube; and a thermostat exposed to the temperature which the opening and closing of the damper regulate, and connections therefrom to operate the shield: substantially as set forth.

In testimony whereof I have hereunto set my hand, at Chicago, Illinois, this 22d day of September, 1893.

THOMAS O. PERRY.

Witnesses:
CHAS. S. BURTON,
JEAN ELLIOTT.