(No Model.) 2 Sheets—Sheet 1.

T. O. PERRY.

TEMPERATURE REGULATOR.

No. 528,645. Patented Nov. 6, 1894.

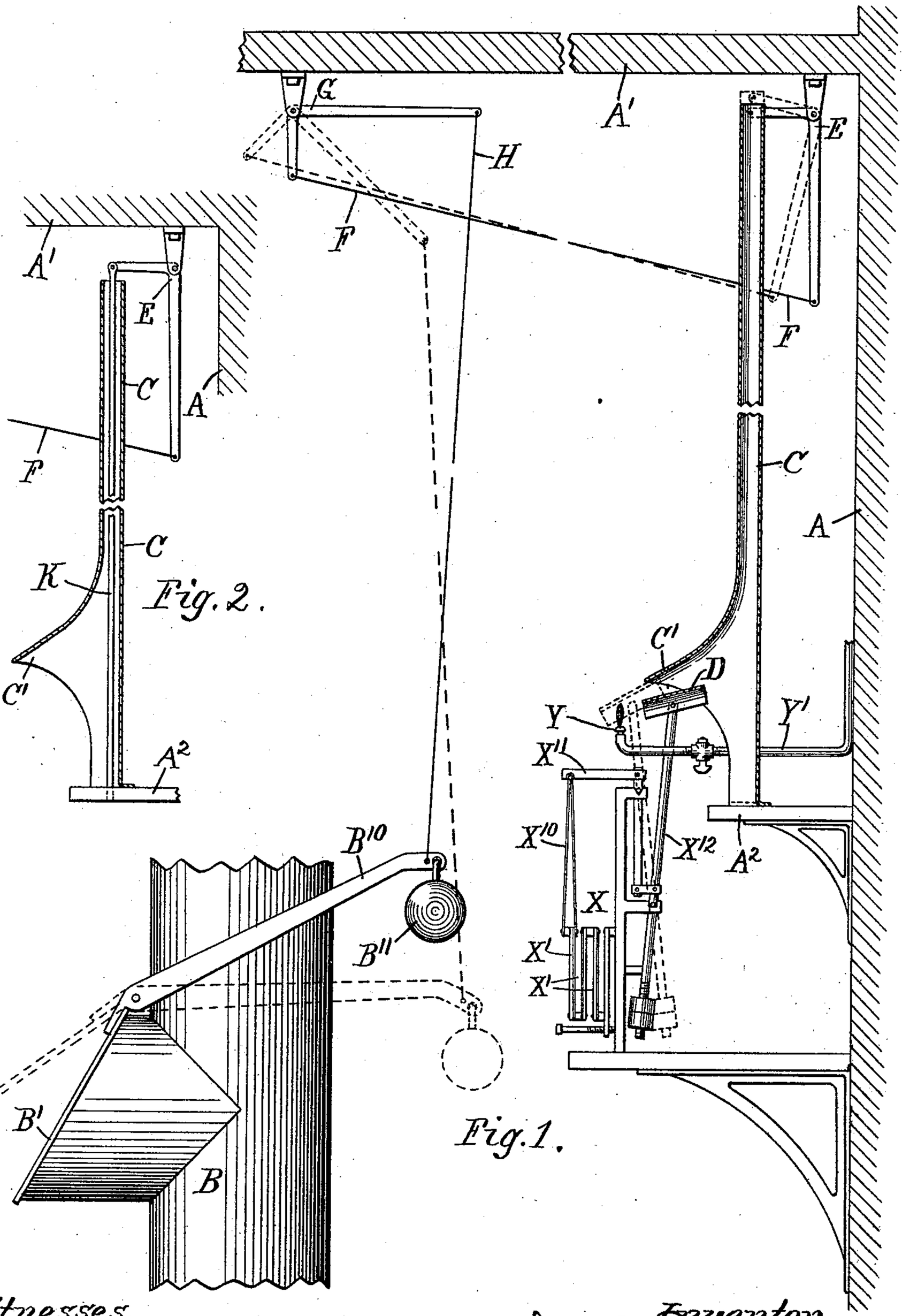

Fig. 2.

Fig. 1.

Witnesses.
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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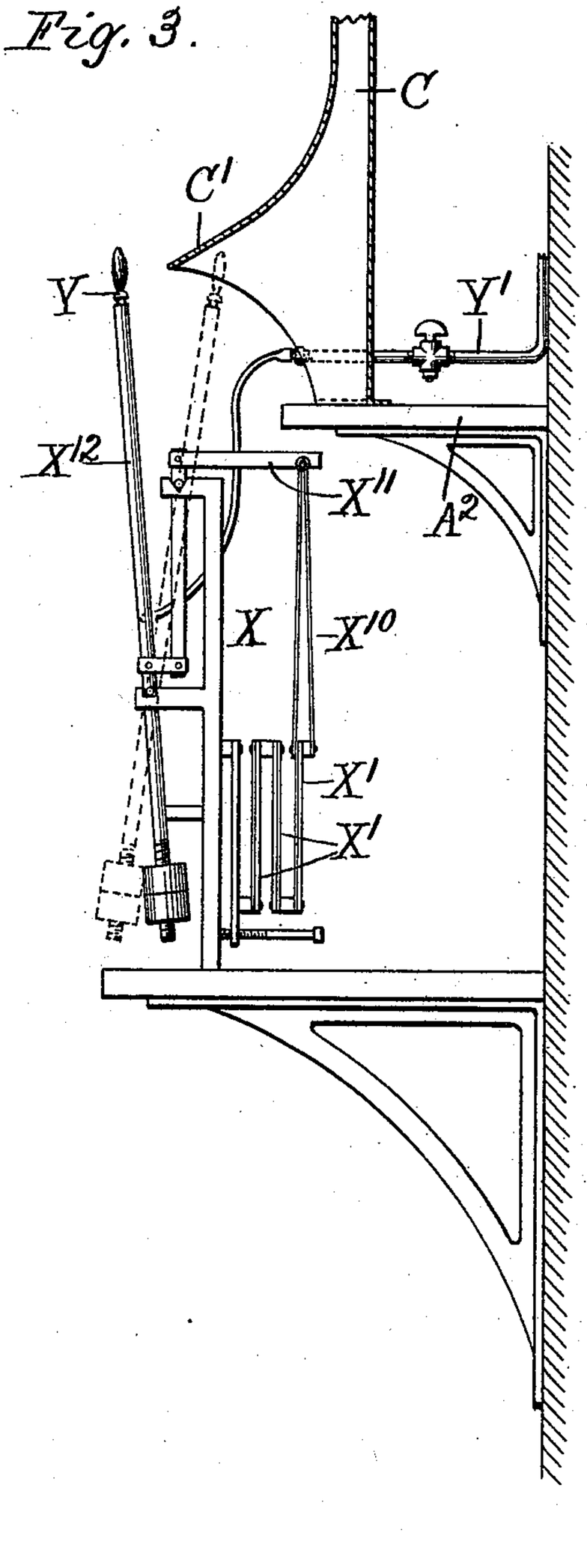
Fig. 3.



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UNITED STATES PATENT OFFICE.

THOMAS O. PERRY, OF CHICAGO, ILLINOIS.

TEMPERATURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 528,645, dated November 6, 1894.

Application filed November 6, 1893. Serial No. 490,092. (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, reference being had to the accompanying drawings, forming a part thereof.

The regulation of a heater, or of ventilation to cool an apartment, when it is to be effected by the change of temperature in the apartment, is usually accomplished by the expansion and contraction of some substance exposed to the changing temperature, such expansion and contraction affording the initial motion which is utilized to operate a check or ventilating damper. Change of temperature so slight as that which it is desirable to prevent in apartments, produces so little expansion or contraction of substances suitable for the purpose in question that usually such slight expansion and contraction have been utilized by means of some intermediate element, and not made to operate directly upon the damper. Among the more familiar means may be mentioned an electrical device in which the circuit is opened and closed by the slight expansion and contraction. Other intermediate devices have also been suggested.

My present invention consists fundamentally in the use of a constant heating device,—as a gas jet or other small flame,—whose heat is directed toward or away from some expanding medium by the slight contraction or expansion of any thermostatic device exposed to the temperature which is to be regulated. By this means, I am able to multiply to any extent the movement produced by the expansion or contraction due to slight change of temperature in the apartment; for a small flame whose heat may be directed against an expanding medium by a movement which a change of one degree of temperature in the thermostat will cause, may increase the temperature of the object against which it is thus directed a hundred degrees or more.

In my applications pending in the United States Patent Office,—Serial No. 476,160, filed May 31, 1893, and Serial Nos. 486,988, and 486,989, both filed October 2, 1893,—I have shown and claimed specific forms of this broad invention. The present application shows a still further specific form, but I intend in this application to claim the fundamental invention above stated, which in certain other species is involved in my above-mentioned applications.

In the drawings:—Figure 1 is a view in the nature of a diagram, sectional with respect to certain specific devices involving the invention in question, showing my improved regulator connected to a valve or damper which may be considered as either a check damper of a heater or of a ventilating flue connected with the apartment to be regulated. Section is made vertically through a tube whose expansion and contraction operates the damper. Fig. 2 is a detail vertical section of a modification in respect to the expanding and contracting element which operate the damper. Fig. 3 is a detail elevation of a modification involving a transposition of the parts of the thermostatic device and its adaptation to shift the heating device instead of the heat-deflecting device.

A represents the wall of a house or room; A′, the ceiling; though these parts may be considered as any fixed parts which may support the regulating devices.

B is a pipe which may be the smoke pipe of a heater or a ventilating pipe from the apartment or apartments to be regulated.

B′ is a check damper connected with such pipe, its lever arm B^{10} carrying the weight B^{11} heavy enough to overbalance the damper, and tending to hold it normally open, as shown in dotted lines.

X represents a thermostatic device which is more particularly described in my pending application, Serial No. 486,988, filed October 2, 1393, but which may be here described briefly as comprising the plates X′ adapted to be flexed by change of temperature, and so connected that their flexure is accumulated and produces a movement of the lever arm X^{10} on the outermost plate, which, through the link X^{11}, operates the lever X^{12}, which is poised so as to normally hang approximately vertical, and is easily tilted away from such vertical position in either direction by the thermostatic plates connected to it as described.

Y represents any constant source of heat, as a small gas jet, Y′ being the gas pipe.

C is a tube which, in the form shown in Fig. 1, has two functions, the first to form a conduit for the ascending heat from the heating device Y, and the second to expand and contract under the changes of temperature due to the presence or absence of such ascending current to operate mechanism which operates the check damper B′. When it is intended for both of these functions it is preferably made of some substance which has a high coefficient of expansion, and I prefer to employ hard rubber. This tube is supported fixedly at the lower end, as on a shelf A^2, and it is provided with the hood or downwardly open funnel mouth represented at C′, said funnel extending nearly to the vertical line of the heating device Y, but not quite overhanging the latter in the position shown in Fig. 1.

D is a heat deflector in the form of a hood, shield or duct which is carried by the lever X^{12} at the upper end of the latter, and is thereby oscillated to and fro, the extreme positions occupied being indicated by the full line and dotted line positions in Fig. 1. At the dotted line position it overhangs the heating device Y at one end, while the other end is overhung by the margin of the funnel C′. At this position it tends to deflect the heat from the heating device under the funnel, causing the hot current to pass up through the tube C. At the full line position it does not overhang the heating device, and has no influence upon the heat current, which therefore rises directly from the heating device past the margin of the funnel without entering thereunder and without materially affecting the temperature of the pipe C, and without causing any action of the operating devices except such as may be caused by the cooling of the parts by reason of the absence of the heated current after it has been present.

The thermostatic device X is calculated, by its construction which is generally explained above, to operate the lever X^{12}, to carry the heat-directing hood or shield D into operative position, as seen in dotted lines, when the temperature rises in the apartment in which the thermostat is located.

The upper end of the tube C is pivotally connected to the short arm of the bell-crank lever E, whose fulcrum is supported from the ceiling, and the longer arm is connected by the wire F with the shorter arm of the bell-crank-lever G, whose fulcrum is also supported from the ceiling, and the longer arm of the lever G is connected by a wire H to the lever arm B^{10} of the damper B′.

The expansion of the tube C, it will be seen, slacks all the wires in the train of connection, and permits the damper to be opened by the overbalanced weight B^{11}. Upon the removal of the hood or shield D from operative position by the cooling of the thermostat, the tube C contracts and transmits to the lever connections movement the reverse of that first described, causing the arm B^{10} of the damper to be operated in a direction to close the damper and so either check the cooling of the room if the pipe B is a ventilating flue or stimulate the fire and heat the room if it is a smoke pipe of the heater with which the damper is connected.

In practice, the levers and connecting wires between the pipe and the damper will commonly be located between ceilings or in partitions, and the wires may extend long distances and be guided in any suitable manner around angles when the situation requires, and in view of their length, their own expansion and contraction under changes of temperature may become an important element, and it will be observed that expansion and contraction operate in the same way as the expansion and contraction of the tube C, and at the same time,—that is, the heating of the apartments, by which the wires may become heated and elongated, will of itself tend to open the damper, this effect being added to the effect of the expansion of the pipe C by the heating device Y, and it is desirable, though not absolutely essential, that the lever and wire connections should be so related to the damper and the regulating device that the elongation of the wires will assist and not diminish the effectiveness of the device.

Instead of utilizing the tube C as the expanding and contracting element to operate the damper, such tube may be made of cheaper material and merely serve as a duct to confine the heat current from the device Y about and in close proximity to the rod, wire or strip K, which may be located within the tube and connected to the lever E, the tube being free from such connection. Such construction is shown in Fig. 2.

It will be obvious that the heating device might be moved under or out from under the funnel mouth of the tube C, and that, in that case, the funnel mouth-piece C′ constitutes a deflector to direct the heat current into the tube, and the deflector D might be dispensed with, the heating device being carried by the arm X^{12} instead, but arranged to move in the opposite direction from that in which the deflector is moved in Fig. 1. Such modification is shown in Fig. 3. It will be apparent also that the funnel-shaped mouth of the tube is a part of the device for directing the heat current to the expansible element, whether the tube C, itself, or the internal strip K be the device employed for that purpose.

I claim—

1. In a temperature regulator, in combination with a regulating valve or damper, an expanding and contracting element and connections therefrom by which its expansion and contraction may operate the damper; a heater other than that whose heat is to be regulated, and a deflector for directing the heat current therefrom to the expanding and contracting element; a thermostatic device exposed to the temperature to be regulated,

and mechanism by which it operates the deflector; substantially as set forth.

2. In a temperature regulator, in combination with a regulating valve or damper; a tube adapted to expand and contract with changes of temperature, and connections therefrom by which its expansion aud contraction operate the damper; a heater other than that which produces the heat to be regulated; a deflector by which the heat current of such heater may be deflected into the tube to heat the latter; a thermostatic device exposed to the temperature to be regulated, and mechanism by which it controls the relative positions of the heating device and the deflector to cause the latter to overhang or not to overhang the former: substantially as set forth.

3. In a temperature regulator, in combination with the regulating valve or damper; a heater other than that which produces the heat to be regulated; a deflector for directing the heat current from such heater; a tube having at the lower part an open mouth into which the heat current is directed by such deflector, the tube being freely open at the upper part, such tube being fixed at one end and free to move by expansion and contraction at the other end, and connections from the end which is free to move by which the regulating valve or damper is operated: substantially as set forth.

4. In a temperature regulator, in combination with a regulating valve or damper tending normally to take a position to check the heat; an element adapted to be expanded by heat and connections therefrom to the valve or damper adapted to be put under tension and to put said expansible element under tension by said tendency of the damper; a constant heating device; mechanism to direct its heat against or away from said expansible element, and a thermostat exposed to the temperature to be regulated, and connections therefrom to the heat-directing devices, whereby said devices are operated by changes of the thermostat: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 1st day of November, 1893,

THOMAS O. PERRY.

Witnesses:
CHAS. S. BURTON,
JEAN ELLIOTT.