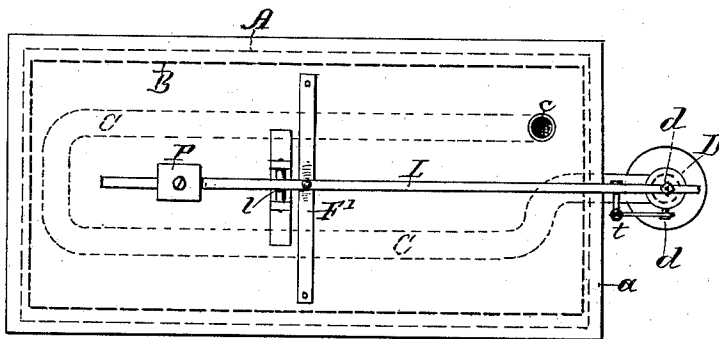
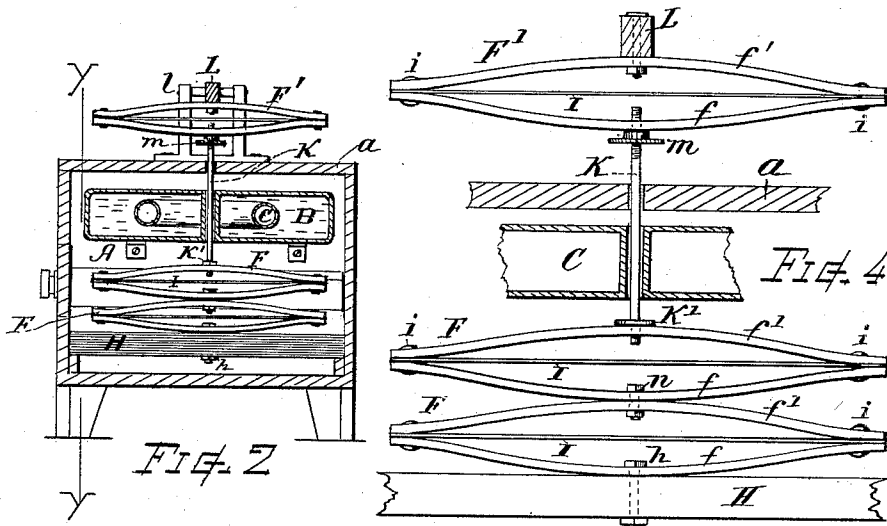
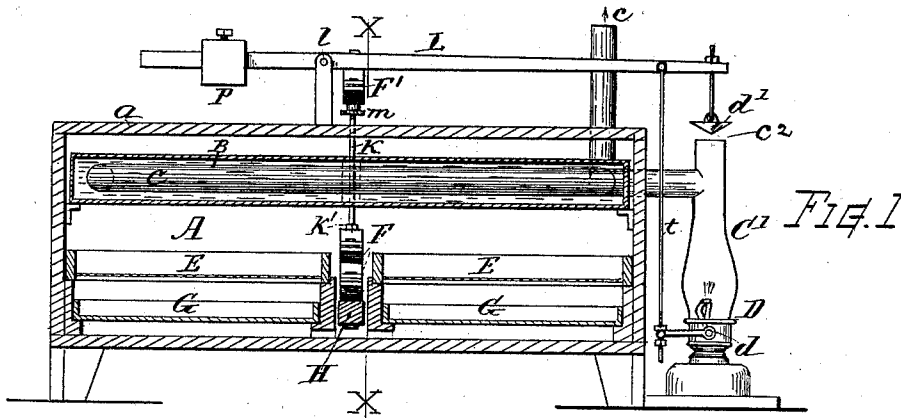


(No Model.)

C. A. CORMAN.
TEMPERATURE REGULATOR FOR INCUBATORS.

No. 464,957.

Patented Dec. 15, 1891.



Witnesses.

W. R. Barton
Simon C. King

Fig. 3

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UNITED STATES PATENT OFFICE.

CHARLES A. CORMAN, OF NATICK, MASSACHUSETTS.

TEMPERATURE-REGULATOR FOR INCUBATORS.

SPECIFICATION forming part of Letters Patent No. 464,957, dated December 15, 1891.

Application filed January 12, 1891. Serial No. 377,398. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. CORMAN, a citizen of the United States, residing at Natick, in the county of Middlesex and State of Massachusetts, have invented a new and useful Temperature-Regulator for Incubators, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The object of my present invention is to provide a simple and efficient means for regulating and controlling the temperature of incubator chambers or apartments and to afford automatic adjustment of the apparatus to meet the variations and differences of external atmospheric thermo changes without being injuriously affected by barometric changes of the external or surrounding atmosphere; also to afford a regulating apparatus controlled partly by the internal thermal conditions and partly by external thermal conditions and practically non-responsive to barometric conditions, said apparatus having means for varying the degree of its normal equilibrium for regulating to a higher or lower standard temperature, as desired. These objects I attain by mechanism, the nature of which is illustrated and explained in the following description, the subject-matter claimed being particularly defined in the summary.

In the drawings, Figure 1 is a vertical longitudinal section of an incubator having my improved temperature-regulating apparatus combined therewith taken at line *y y* of Fig. 2. Fig. 2 is a transverse section of the same at line *x x*, Fig. 1. Fig. 3 is a top view of the same with dotted lines, indicating the heating flue and tank; and Fig. 4 shows the detail of my improved compound thermostat or thermo-regulating device.

Referring to parts, A denotes the chamber of the incubator or apartment within which the temperature is to be regulated or maintained at any required normal standard. Said chamber may be formed with the wood case or box *a*, such as commonly employed for incubators, or can be any suitable apartment. B indicates a water-heating tank disposed in the upper part of the chamber.

C indicates a heating-flue disposed within

the water-tank in such length as desired, and having an exterior projection or terminal uptake with an exit-opening at *c*, and D indicates the burner or heat-producing device provided with a wick-elevator or shut-off means *d* for increasing or diminishing the size of the flame or controlling the quality of heat produced. The chimney *C'* from the burner communicates with the flue C, and also has an opening in its top at *c'*, over which is suspended a damper or stopper *d'*.

E denotes the drawers for containing the eggs in the process of incubation, the same being of well-known structure, and G indicates the evaporating-pans for supplying moisture within the chamber.

My improved regulating mechanism consists of a system of thermostats F, one or more of which is arranged within the chamber and one or more disposed outside the chamber, said thermostats being combined for conjoint action and connected with a lever or movable part by which the motion is transmitted from the thermostats to and for shifting the heater-controlling devices. The thermostats are each composed of an upper and a lower bow or oppositely-curved bars *f f'*, of hard rubber or similar substance having a high expansive capacity, which are connected from end to end by a straight strip of sheet-iron I or material having a comparatively low expansive capacity. The ends of the three bars or strips *f f'* and I are rigidly secured together by rivets *i* or in other equivalent manner, so that expansion will cause the bows to bulge or spring outward at their central portion, and contraction of the material will produce an opposite action. In the present instance I have shown two thermostats F within the chamber and one thermostat F' outside thereof; but I do not confine my invention to this particular number, as any convenient number may be employed, arranged to operate as described, as may be best adapted to different situations and conditions of service. The bottom bow of the lower thermostat is best supported on a suitable transom or bar H, fixed in the chamber A and connected thereto by a suitable fastener or bolt, as at *n*, and the second thermostat has its lower bow resting upon the top bow of the one below, and centrally fast-

ened thereto by the bolt *n*. From the top of this interior thermostat a rod *K* extends upward through the top of the case, suitable apertures being formed through the tank *B* and top board *a* to allow free movement of the rod. The lower end of the rod has a tip that enters a hole in the top of the bow of the thermostat *F*, and is provided with a shoulder or collar *K'* that rests thereon, so that the rod will rise and fall with said bow. The upper end of the rod *K* is threaded and an adjusting-nut *m* is fitted thereon, which can readily be turned up or down for giving greater or less working length or distance from the collar *K'* to the top surface of the nut *m*.

The lower part of the outside thermostat *F'* rests upon the adjusting-nut *m*, while its upper part is attached to a lever *L*, extending along the top of the case, fulcrumed at *l* on a suitable standard and having connected with its arm the damper *d'*, and the shut-off or flame-controlling device *d* by a suitable link *t*. The flame-controlling device can be either a tubular slide for raising and lowering on the wick-tube, similar to that illustrated in Patent No. 373,435, or a shutter for cutting off a portion of the flame from the wick, or any other suitable means for effecting increase or diminution of the flame by movement of the lever can be employed. A counterpoise-weight *P* is best provided on the lever *L* to balance the cut-off and damper connections.

In the operation the expansion and contraction of the thermostat-bows *f f'* causes them to spring outward and inward accordingly as the temperature surrounding them increases or diminishes, thereby imparting to the lever *L* an extent of movement such as may be required for working the shut-off *d* and stopper *d'* to control and regulate the production of heat to a degree sufficient and only sufficient to maintain the temperature in the chamber substantially uniform and constant at any standard normal degree to which the apparatus has been adjusted. The thermostats being formed of material that is practically unaffected by barometric changes, and the outside thermostat *F'* being supported in connection with the inside thermostat *F*, gives by their conjoint action a very accurate regulation under extremes of climatic variation. The action of the thermostat within the chamber is transmitted to the outside thermostat *F'* and thence to the lever *L*. Consequently the regulating action is modified by the action of said outside thermostat, which is effected by the outside temperature, irrespective of barometric changes. Hence there results an automatic variation in the adjustment of the heat-controlling devices due to the thermal changes in the exterior atmosphere in connection with and in modification of the automatic adjustment or regulative action due to thermal changes or variations of temperature within the chamber. Consequently the temperature

within the apartment or incubating-chamber will be maintained with the slightest variations from the standard normal degree under all conditions of climatic changes. Thus by my invention a very efficient and reliable regulating apparatus is produced.

In the Letters Patent No. 378,435, heretofore granted me, there is described and claimed a temperature-regulating apparatus embracing the feature of an inside and an outside pneumatic thermo-regulator. It will therefore be understood that my present claims refer to an apparatus of special character, wherein such feature is embodied in a structure that is practically unaffected by barometric influences, and to constructive features or combinations of the improved nature herein defined.

I claim as my invention herein to be secured by Letters Patent—

1. The combination, with the chamber, of a thermostat composed of oppositely-bowed expanding bars supported within the chamber, a thermostat composed of oppositely-bowed expanding bars disposed outside of said chamber and having one of its bars centrally connected with one of the bars of said inside thermostat and its other bar connected with the lever that operates the heater shut-off, the action of said interior thermostat being transmitted through said outer thermostat to said actuating-lever, substantially as set forth.

2. The combination, with the chamber and heat-producer-regulating devices, of a plurality of elliptical thermostats disposed within the chamber superimposed one upon another and joined together at the center of their outwardly-curved bows, a stationary support for the lower thermostat-bow, a connection-rod having its lower end sustained by the upper thermostat-bow extending upward to the exterior of said chamber and provided with an adjustable collar or nut at its upper end, the externally-disposed thermostat, its lower bow resting on said collar and its upper bow attached to the actuating-lever for transmitting motion from said thermostats to the regulating devices, all substantially as set forth.

3. The combination, with the chamber, heating-tank, and heat-producing burner with its shut-off mechanism, of the transom-bar disposed across said chamber, the internally-disposed elliptical thermostat arranged upon said bar, the upright rod supported upon the top bow of said thermostat and extending to the exterior of the case, provided with an adjusting seat or collar at its top end, a thermostat supported on said collar at the top of said rod outside the case, and connections from said outside thermostat for moving the shut-off, all substantially as and for the purpose set forth.

4. The combination of the burner *D*, its chimney having the opening *c*², the heating-

flue C, extending within the case and having
the uptake-opening *c*, the shut-off *d* at the
burner, and drop-damper *d'* at said chimney-
opening, the actuating-lever L, having both
5 said shut-off and damper connected there-
with, the fulcrum 1, and the combined ex-
terior and interior thermostatic operator con-
nected with said lever between the fulcrum

and the damper connections, all substantially
as and for the purpose set forth. 10

Witness my hand this 8th day of January,
A. D. 1891.

CHARLES A. CORMAN.

Witnesses:

HARRY W. BUTLER,
T. J. MAUDE.