(No Model.) 2 Sheets—Sheet 1.

J. W. HILE.

TEMPERATURE REGULATOR FOR INCUBATORS.

No. 383,732. Patented May 29, 1888.

Fig. 1.

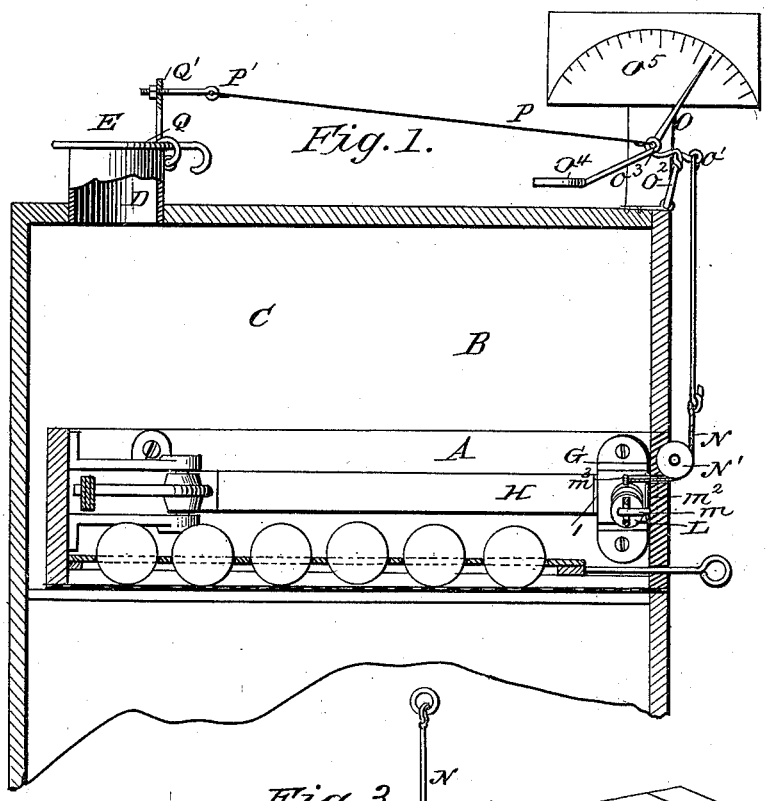
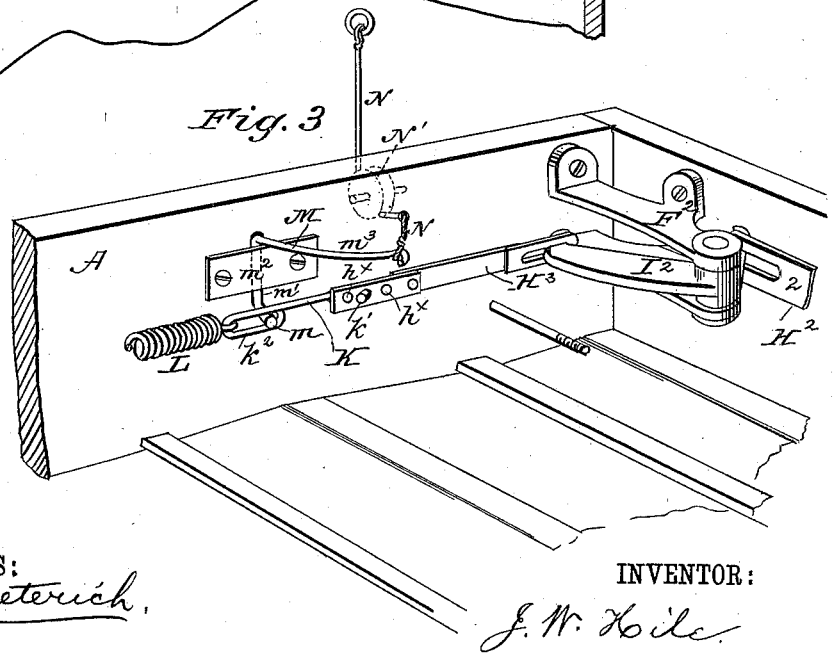


Fig. 3



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John C. Kenyon.

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ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

J. W. HILE.

TEMPERATURE REGULATOR FOR INCUBATORS.

No. 383,732. Patented May 29, 1888.

Fig. 2.

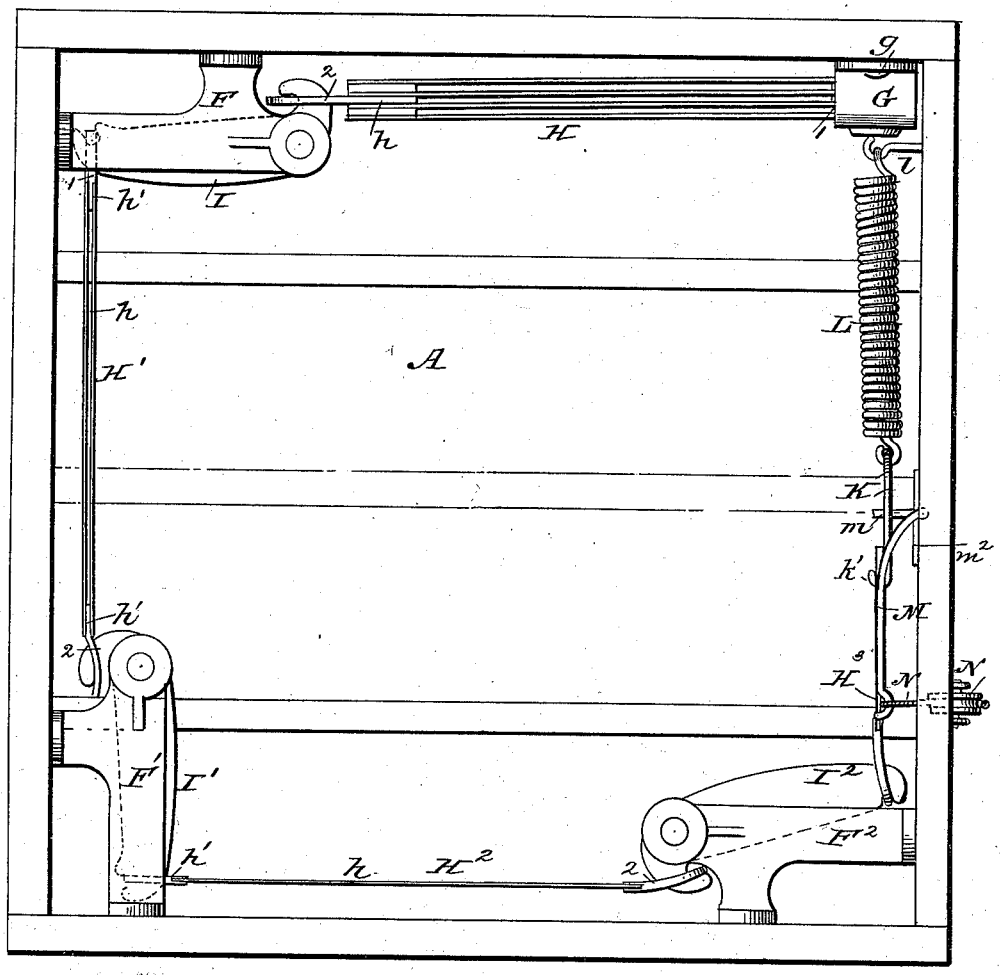
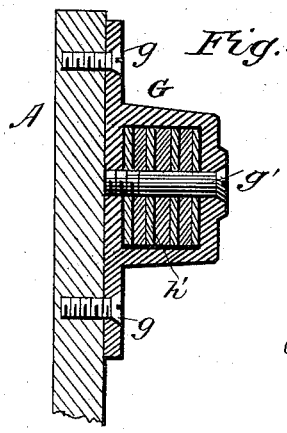


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN W. HILE, OF VALLEY FALLS, KANSAS.

TEMPERATURE-REGULATOR FOR INCUBATORS.

SPECIFICATION forming part of Letters Patent No. 383,732, dated May 29, 1888.

Application filed July 30, 1887. Serial No. 245,755. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. HILE, of Valley Falls, in the county of Jefferson and State of Kansas, have invented a new and useful Improvement in Heat-Regulators for Incubators, of which the following is a specification.

My invention relates to a thermostat or heat-regulator particularly adapted for incubators.

The object of my invention is to provide a simple mechanical device which may be applied to the inner walls of an incubator or an incubator-drawer, to economize space and secure the greatest extent of expanding surface within the limits allowed in this and similar devices for operating the damper or vent by the slightest variation of temperature within the chamber.

The improvement consists in arranging a series of metal plates coupled together in groups around the inner sides of the incubator walls or drawers by means of bell-crank levers pivoted at their corners to the corners of the walls of the compartment or chamber, and in certain other constructions and combinations of parts, hereinafter described, and particularly designated in the claims.

In the accompanying drawings, Figure 1 is a sectional elevation of a portion of an incubator having my improvement applied. Fig. 2 is a plan view of a drawer of an incubator, showing my thermostatic bars or links arranged therein. Fig. 3 is a detail perspective view of a portion of the drawer, and Fig. 4 is a detail sectional view.

My improved thermostat is applied to a drawer, A, supported in an incubator-box, B, having a heat-chamber, C, and ventilator-pipe D connected therewith to permit the overheated air to escape from the chamber C, and thus regulate the temperature therein. The ventilator-pipe D has a cap-valve, E, hinged thereto to fit over its upper end, and because of its weight close the said pipe D, so long as the temperature within the chamber C is not excessive. Said cap-valve is operated by means of a thermostat to open it when the air within the said chamber is heated to a temperature higher than that necessary for the incubation of eggs, and it is swung open and remains so until the warm air has escaped sufficiently to reduce the temperature within the chamber to the required degree.

The parts hereinbefore described may be of any well-known or preferred construction, and I will now endeavor to particularly describe my improvement as applied to such devices. To three of the interior corners of drawer A is securely screwed brackets F F′ F², and to the remaining corner a strap, G, is secured by wood-screws *g*.

A series of links, H H′ H², each formed of one or more zinc strips, *h*, having loop-blocks *h′* secured to their ends, are coupled to bell-crank levers I I′ I², pivoted, respectively, in the brackets F F′ F² at the corners of the drawer or compartment, and so arranged or located that the crank-levers will be between and even with the links or zinc straps to fit closely against the sides of the drawer or compartment and occupy the least possible amount of space therein.

The end 1 of the link H is secured by a screw, *g′*, to the strap G, and the end 2 of said link is coupled to the short arm of the lever I by link-blocks *h*, the long arm of said lever being coupled to the end 1 of the second link, H′. The end 2 of the second link is coupled to the short arm of lever I′, and the long arm of said lever is coupled to end 1 of the third link, H². The end 2 of link H² is coupled to the short arm of lever I², and the long arm of said lever I² is coupled to one end of a short zinc strip or link, H³, the other end of which is connected by a link, K, with the expanding end of a spiral spring, L, secured at its opposite or fixed end to a pin, *l*, at the corner of the box occupied by the strap G, to which end 1 of the first link, H, of the series is connected, thus providing a continuous chain of thermostatic bars. Each preceding link of the series has a greater movement than the succeeding one—that is to say, each preceding link will moved a distance equal to that moved by the succeeding link multiplied by the difference of leverage plus the movement due to its own expansion, whereby the distance moved by the first link will be greatly multiplied.

The distance moved by the link K at the end of the series is equal to the sum of the distances moved by the thermostatic links and their connections. The spring L will take up the distance moved or paid out by the expansion of the links, and will yield it up again when the links contract. The tension of the

spring L is kept up to the required degree by adjusting the hooked end k' of the link K to engage with any one of a series of holes, $h^{\times}$, in the end of the link H^3.

The link K has a loop, k^2, secured to the expanding end of the spring L and the short arm m of a bell-crank lever, M, having a journal portion, m', held by a strap, m^2, upon the inner side of the front end of the egg-drawer. The longer arm, m^3, of lever M is connected to a cord, N, passing through a hole in the drawer and around a cord-pulley, N', journaled thereon, and said cord is attached to the arm o' of an index-lever, O, pivoted to a strap, o^2, secured to the top of the incubator. The arm o^3 of the incubator-lever is coupled by a rod, P, to an adjusting-screw, P', with an arm, Q', projecting upwardly from the cap Q of the ventilator-pipe. A counterbalance-weight, o^4, upon the index-lever O relieves said lever of the weight of the arm O', secured thereto, and a dial, O^5, secured to the top of the box opposite the index-lever, shows the variation of temperature within the incubator to degrees and fractions of a degree. The screw P' is adjusted to permit the valve-cap Q to be opened at the degree of temperature desired.

In operation, when the heat rises above the degree or a fraction of a degree on which it may be set, the valve will open in proportion to the intensity of the heat. When the temperature falls to the degree to which it may be set, the valve will close. This will ventilate the eggs and keep the air in good healthy condition and the temperature equal. The degree of heat on the top of the egg drawer is indicated on the outside of the incubator. No battery or rubber is used. It can be easily attached and is not liable to get out of order.

The regulator may be attached and adjusted by any one having ordinary mechanical judgment, and may be employed effectively for any purpose where the variation of temperature is to be indicated or applied for mechanical purposes.

Various changes may be made in my invention without departing therefrom. When the thermostatic chain is used in a continuous direction, the levers connecting the links may be straight and not bell cranked, as those employed in turning the corners of a compartment.

It is obvious that my invention may be connected with the heat registers or valves of a room or furnace for regulating the temperature in houses or other buildings.

I claim as my invention and desire to secure by Letters Patent—

1. A thermostat for incubators, consisting of a series of pivoted levers, and a series of thermostatic links connected directly to the long and short arms of the said levers, substantially as described, whereby provision is made for permitting the links to exert a pull when contracting, as set forth.

2. In a thermostat for incubators, the combination of a series of pivoted levers, a series of thermostatic links connected directly to the long and short arms of the said levers, and a spring connected to the last link of the series and serving to actuate the links and levers when permitted by the expansion of the links, substantially as herein shown and described.

3. The combination, with the incubating-chamber provided with a valve, of a series of pivoted bell-crank levers, a series of thermostatic links connected to the long and short arms of the said levers, and intermediate mechanism between the said last link and the valve for operating the said valve, substantially as herein shown and described.

4. The combination, with the incubating-chamber provided with a hinged valve and egg-drawer in said chamber, of a series of bell-crank levers pivoted in the drawer, a series of thermostatic links connected to the long and short arms of the said levers, a spring, a link connecting the spring to the last link of the series, and intermediate mechanism for operating the valve by the expansion and contraction of the said links, substantially as herein shown and described.

5. The combination, with the incubator-drawer A, of the links H H' H^2 H^3, the bell-crank levers I I' I^2, the spring L, the bell-crank lever M, the cord N, and a rod for operating the ventilator-valve or the index of a register supported upon the outside of the incubator, substantially as described.

JOHN W. HILE.

Witnesses:
W. F. HICKS,
J. C. COEN.