F. MEYER.

Heat-Regulator for Incubators.

No. 214,941. Patented April 29, 1879.

Fig. 1.

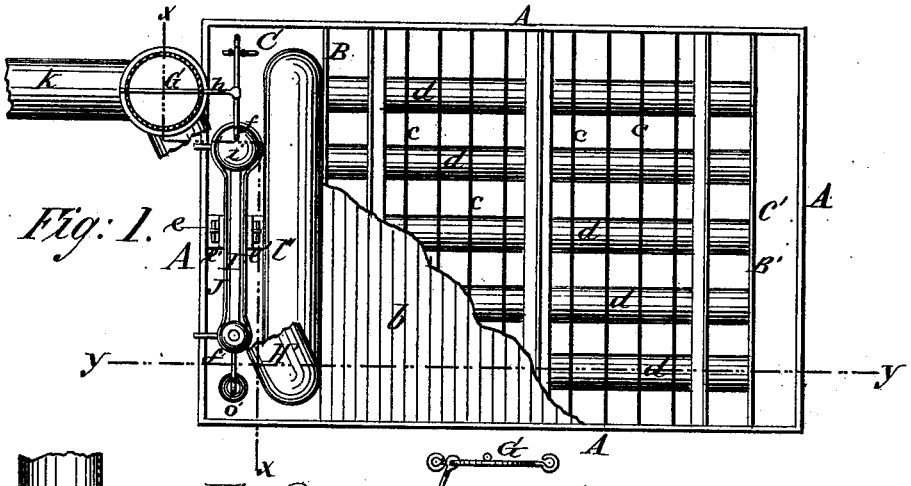

Fig. 2.

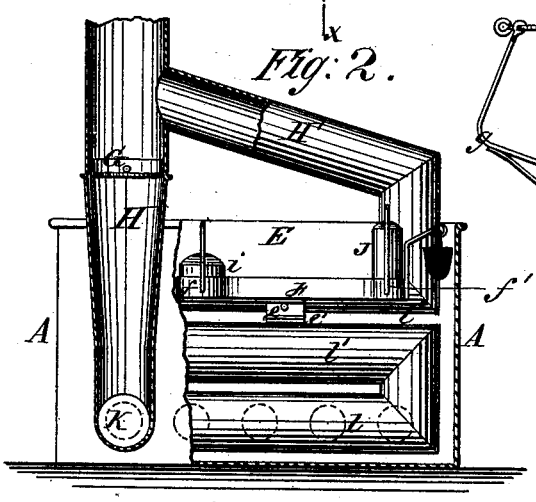

Fig. 4.

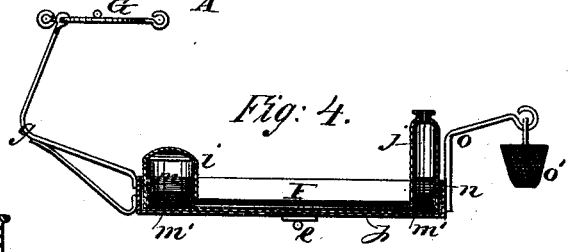

Fig. 5.

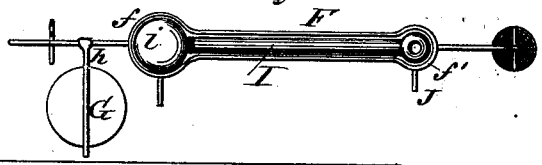

Fig. 3.

WITNESSES:

Achilles Schehl.

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UNITED STATES PATENT OFFICE.

FREDERICK MEYER, OF DOYLESTOWN, PENNSYLVANIA.

IMPROVEMENT IN HEAT-REGULATORS FOR INCUBATORS.

Specification forming part of Letters Patent No. **214,941**, dated April 29, 1879; application filed October 12, 1878.

To all whom it may concern:

Be it known that I, FREDERICK MEYER, of Doylestown, in the county of Bucks and State of Pennsylvania, have invented new and useful Improvements in Heat-Regulators for Incubators, of which the following is a specification.

The object of this invention is to regulate the temperature of the heat medium in the incubator; and it consists of a lever carrying a tube with reservoirs at each end containing ether and mercury, whereby when the heat expands the ether the mercury is forced to one end of the lever, causing it to tilt and operate a damper, so that the heat will be excluded wholly or partially from the radiating tubes in the incubator, and when the temperature falls the ether contracting allows the mercury to flow back, re-establishing the equilibrium of the lever, and thus close the damper, so that the heat will again flow into the radiating tubes.

In the accompanying drawings, Figure 1 is a plan of an incubator with my improved heat-regulator. Fig. 2 is a section on line *x x*, Fig. 1. Fig. 3 is a section on line *y y*, Fig. 1. Fig. 4 is a longitudinal section of the device for operating the damper, and Fig. 5 is a top view of the same.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the outside casing of the incubator, provided at each end with bulk-heads B B′, forming chambers C C′.

Between the bulk-heads are the chambers D D, the walls of which are furnished with strips *a a*, &c., for receiving the trays holding the eggs. Chambers D D are provided with rubber-cloth cover *b*, fastened at the edges, and supported by transverse rods *c c*, &c., and underneath are circulating-pipes *d d*, &c., supplying communication between the chambers C C′ for the passage of the air or water from the former to the latter.

Above the hatching-chambers D D is a space, E, communicating with the chambers C C′. This space is inclosed by the casing and a crown placed or fixed thereon. These parts of the incubator form no part of my invention, and are referred to merely to enable me to more fully and clearly describe the mode of regulating the temperature.

The apparatus designed to carry out this mode is placed in the chamber C. It consists of a lever, F, supported in its longitudinal axis on the pivot *e*, supported in bearings *e′*—one attached to the bulk-head and the other to the opposite side of the casing A. This lever consists of a gutter having enlarged ends *f f′*.

The end with part *f* is fixed to one end of an elbow, *g*, the opposite end of said elbow being joined to one arm of the T on the shaft *h*, fixed to the damper G in the stack or flue H.

I represents a metal tube, to one end of which is fitted a close reservoir, *i*, and to the opposite end is fitted (at right angles) a tube, *j*, open at the top. The tube I is placed in the guttered lever with the reservoir *i* in the enlarged end *f*, while the right-angular tube *j* is in the end *f′*, so that the reservoir and the tube remain upright and at right angles to the lever's length. The tube I opens at the ends into the reservoirs, so that communication from one to the other is obtained.

The stack H is connected with the heat-supply pipe K, and at its lower end joins with the lower one of the radiating pipes *l l′ l″*. It is provided with the damper G, before mentioned, pivoted therein in the usual manner at a point above the heat-supply K, and above the damper is joined a pipe, H′, connected with the opened end of the radiating pipe *l″*, so that heat entering the stack can pass into and through pipes *l l′ l″*, and thence into pipe H′ uninterruptedly, there being free communication from the stack at the lowest part to the upper part when the damper is closed through the radiating pipe, for a purpose presently to be described.

In the reservoir *i* is placed a quantity of ether, (represented by the fine lines *m*,) and then mercury is poured in until it fills the tube I and rises in the reservoir *i* and tube *j*, as indicated by the thick lines *m′*. There must be sufficient mercury in the reservoir to confine the ether and prevent its evaporation. On top of the mercury in the tube *j* is placed a little glycerine, represented by the fine lines *n*.

To the end *f′* of the lever F is fixed an arm, *o*, carrying a basket, *o′*, for receiving shot or other suitable material for the purpose of bal-

ancing the lever. A similar arrangement may be placed at the opposite end.

The operation of my invention is as follows: When the lever F, with its tube and reservoirs containing the ether, mercury, and glycerine, is placed on its bearings, it will remain in equilibrium, if properly balanced, as shown in Fig. 4, and when in that condition the damper is closed down, as in Fig. 2, thus shutting the exit through the stack directly.

The heat from the furnace entering pipe K is delivered into the stack, and, there being no other exit, it is compelled to circulate through pipes *l l' l''*, which radiate it to the water in chamber C, (or air, if that be the heat-conveying medium,) and thence it passes up into pipe H', which delivers it to the stack H above the damper.

When the temperature of the air surrounding the lever F rises above the proper degree, (which must be adjusted,) the ether in the reservoir *i* expands, and, acting on the mercury underneath, drives it to the opposite end of the tube in reservoir *j*, in which it rises, and this throwing the preponderance of weight to that end of the lever destroys the equilibrium, and the lever is tilted in that direction, throwing the elbow *g* up, and this operates the damper, so that it is lifted from the seat and opens the stack partially or completely, according to the distance traversed by the lever. This gives a passage for the heat directly up the stack from the pipe K.

A lower temperature results from this in the incubator, and when it falls below the desired point the ether contracts, and the mercury, flowing back, restores the equilibrium, and thus closes the damper.

It will be readily understood from this that the alternate expansion and contraction of the ether and the resulting action of the mercury and the movement of the damper consequent thereon establish a mean temperature that will vary but slightly either one way or the other.

The use of the glycerine is an important element in my invention. It coats the surface of the mercury, and thus prevents its oxidation, and also the escape of poisonous vapors, and possesses the valuable properties of neither drying nor evaporating.

The use of this device and method for equalizing the temperature will be found far superior to any device (thermometers, for instance) now in use. The slightest variation in temperature will cause this device to act instantly and automatically, while the thermometer will not indicate the slighter changes.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

As an improvement in heat-regulators for incubators, the lever F, pivoted in the chamber C and carrying the tube J, with reservoir *i* and tube *j*, supplied with ether, mercury, and glycerine in the manner specified, and connected with damper G by elbow *g*, in combination with chamber C, radiating pipes *l l' l''*, pipe H', stack H, and supply-pipe K, whereby the expansion and contraction of the ether cause the mercury to operate the lever, and thus control the damper, so that the heat is caused to circulate through the pipes *l l' l''* or pass directly out of the stack, and thus equalize the temperature of the heat medium in the incubator, substantially as described.

FREDERICK MEYER.

Witnesses:
STANISLAUS REMAK,
TENNY SALINGER.