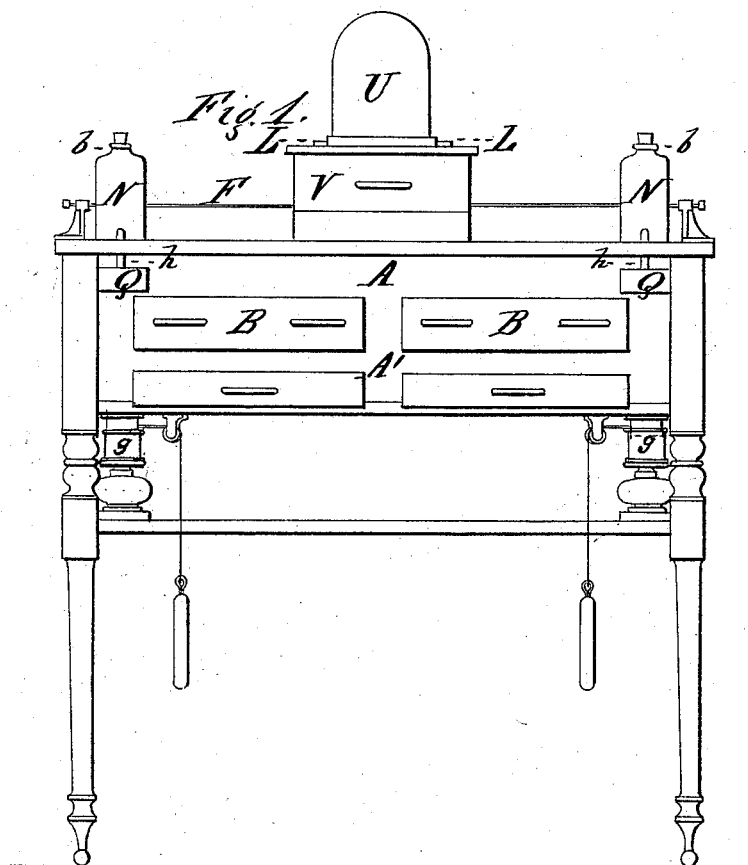


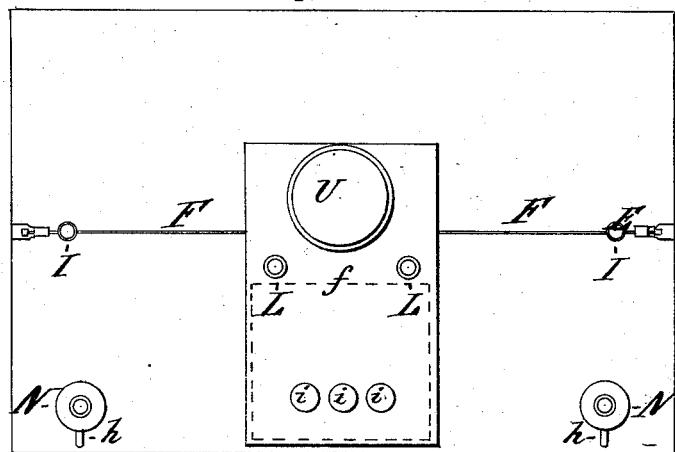
E. S. RENWICK.  
Incubator.

No. 217,148.

Patented July 1, 1879.



*Fig. 2.*



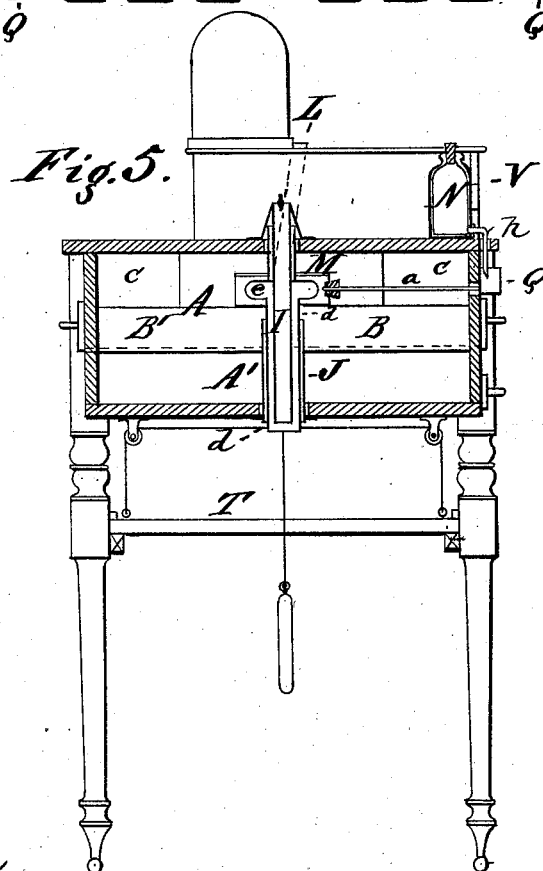
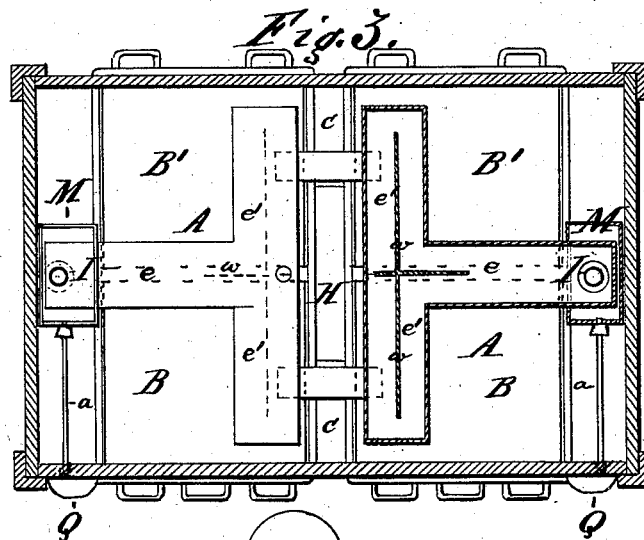
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Fig. 6.

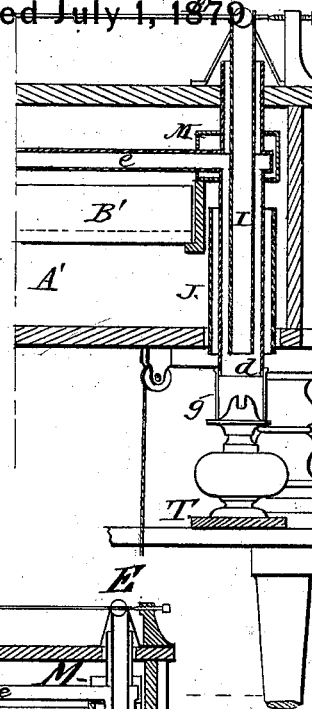
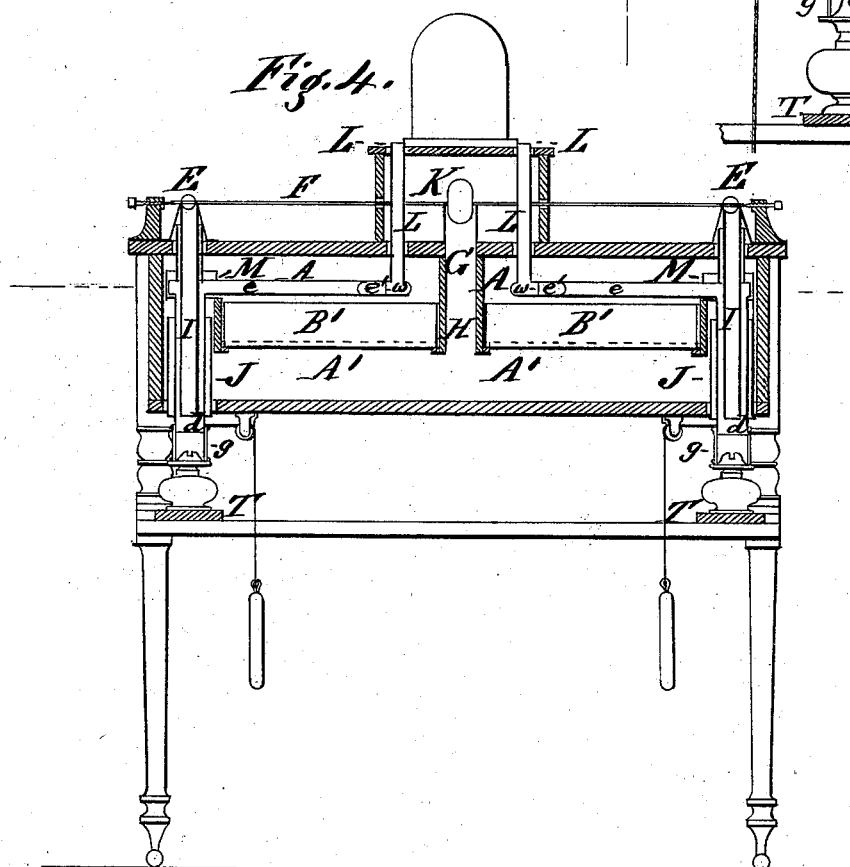


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN INCUBATORS.

Specification forming part of Letters Patent No. 217,148, dated July 1, 1879; application filed October 28, 1878.

*To all whom it may concern:*

Be it known that I, EDWARD SABINE RENWICK, of Millburn, in the county of Essex and State of New Jersey, have made an invention of certain new and useful Improvements in Incubators; and that the following, taken in connection with the accompanying drawings, is a full, clear, and exact description and specification of the same.

The principal objects of the improvements which constitute the subject of this patent are to enable the water-heaters generally used for distributing the heat in incubators to be dispensed with, and to supply moisture to the atmosphere of the incubating-chamber.

To this end the invention consists of certain combinations of devices, which are recited in detail in the claims at the close of this specification.

In order that the invention may be fully understood, I have represented in the accompanying drawings, and will proceed to describe, an incubator embodying my invention in the best form thus far devised by me, it being understood that the form and construction of the parts of the incubator may be varied considerably without ceasing to embody the principal features of the invention.

Figure 1 of the accompanying drawings represents a front view of the incubator. Fig. 2 represents a top view of the same. Fig. 3 represents a view of the same with the top removed, and showing the horizontal flue and water-tray at the right-hand side in horizontal section. Fig. 4 represents a vertical longitudinal section of the same. Fig. 5 represents a vertical transverse section of the same. Fig. 6 represents a vertical longitudinal section, drawn on a scale somewhat larger than the scale on which the other figures are drawn, of the right-hand side of the incubator.

The incubator represented in the accompanying drawings is constructed, as respects its principal members, in accordance with my previous invention, as described in Letters Patent No. 193,616, A A' being the incubator-chamber; B B', the egg-holders, in the form of drawers with perforated bottoms; *d d*, the heat-flues; I, the waste-heat chimney; E E, the chimney-valves; G, the ventilating-chimney; K, the ventilating-valve; J J, the air-

supply pipes; and M M, the water-trays, arranged in the upper part of the incubating-chamber.

The egg holders or drawers are in this example four in number, two of them, B B, opening at the front of the incubator, and two of them, B' B', at its rear, so that their backs adjoin. These adjoining egg holders or drawers constitute two lateral pairs, B B' B B', between which the thermostatic chamber H is arranged, and it constitutes the base of the ventilating-chimney G.

The heat-flues, waste-heat chimneys, and air-supply pipes are, by preference, used in pairs, one of each pair being at one end of the incubator, and its mate at the opposite end thereof. The waste-heat chimney I is arranged within the heat-flue *d*, and the latter is arranged within the air-supply pipe J, so that these three devices are concentric, or thereabout, and the fresh air, entering at the bottom of the air-supply pipe J, is heated during its ascent by contact with or radiation from the heat-flue *d* within the air-supply pipe.

Each heat-flue *d* ascends to the upper part of the incubating-chamber, and is then conducted horizontally, or thereabout, toward the center thereof.

The horizontal portion *ee'* of the flue is made flat and broad, so as to present a large radiating-surface; and as the flue nears the center of the incubator it is extended laterally toward the front and rear thereof in the form of a T.

A partition, *w*, (represented in lines in Fig. 3) is inserted in the cross-head *e'* of the horizontal T-flue to divide the current of warm gases, and to conduct the two divisions of the current outwardly in opposite directions in the cross-head or cross-flue, and thence inwardly to a central aperture, to which a vent-tube, L, is fitted. This vent-tube is passed through the top of the incubating-chamber, so that the gases from the lamp do not enter the said chamber. As the heat in this incubator is distributed mainly by the air passing through it, and as a large quantity of air so passes, provision is made for a corresponding supply of moisture, so that the heated air may not rob the eggs of moisture materially. To this end each of the upper water-trays, M, is com-

bined with a lamp-flue, *d*, the water-tray being, by preference, traversed by the flue, as represented in the drawings, so that a portion of the heat of the lamp is utilized immediately to evaporate water. This portion of the heat, however, is subsequently imparted to the incubating-chamber and its contents by the warm vapor. The tops of the water-trays *M* are open to the incubating-chamber, so that the vapor from the water mingles with the air and descends with it through the egg-holders.

The arrangement of the water-trays at the elbow of the heat-flue is advantageous, because it prevents the undue heating of the flue where the hot gases strike it in their ascent, and because the vapor is then exhaled by the water into the current of warmed air disengaged from the upper end of the rising air-supply pipe *J*, and consequently the vapor and warm air mingle thoroughly.

In order that the water-tray may be constantly supplied with water, and that the level thereof may be constant, the water-tray is connected by a pipe, *a*, with a small basin or cup, *Q*, at the front of the incubator, and a fount, *N*, is employed to supply the basin with water. The fount *N* is placed, by preference, on the top of the incubator, and is connected with the basin *Q* by means of a supply-pipe, *h*, whose lower end dips into the basin, and is, by preference, beveled.

The fount is, by preference, constructed with a mouth, *b*, to which a good cork is fitted. When the fount is to be filled the point of one finger of the left hand of the operator is employed to close the delivery end of the supply-pipe in the basin. The cork is then removed from the mouth of the fount, and water is poured therein with the right hand. The cork must be replaced before the finger is withdrawn from the mouth of the delivery-pipe.

It is expedient to use a separate basin, *Q*, and fount *N* for each water-tray; but, if deemed best, both water-trays may be connected with one basin and fount by separate pipes; or the two trays may be connected by a pipe, so that one tray derives its supply from the basin directly, and the other derives its supply indirectly through the first tray. If a single basin and fount are employed to supply two water-trays, it is expedient to place the first two in some central position relatively to the trays; and, if deemed expedient, one or more water-trays may be used in the incubating-chamber separate from the heat flue or flues, and such tray or trays may be connected with an external basin or basins and a fount or founts.

In order that the temperature may equalize more thoroughly, it is expedient to connect the two portions of the upper part of the incubating-chamber at opposite sides of the thermostatic chamber by openings *c*, so that the warm atmosphere may circulate from one portion to the other.

The invention is not restricted to duplicate heat-flues, air-pipes, and water-trays, as an in-

cubator may be constructed with one of each of these and yet embody substantial parts of my invention. If the arrangement of the air-supply pipes around the heat-flue is not deemed expedient, one or more of such pipes may be arranged laterally of the heat-flue; or the fresh air for ventilation may be admitted into the upper part of the incubator by openings in its walls, provided the draft of the ventilating-chimney be sufficient to draw the air into such opening.

In an apparatus of this description it is convenient to have upon the top of the incubating-chamber a chicken-drawer, *V*, (represented in dotted lines in Fig. 2,) in which chickens taken from the egg-drawer may be placed until it is expedient to remove them to a brooder. The ventilating-pipe *G* discharges into the casing of this drawer, and the warm air passes into the drawer through its back at *f*, which is perforated, and thence out through holes *i* in the top of the drawer-casing, so that the chicken-drawer is heated by the waste heat of the escaping air.

Although the invention renders unnecessary the employment of the ordinary closed water-vessels commonly used in incubators to distribute the heat, yet it may, if deemed expedient, be used in connection with them. Thus, for example, the horizontal portion *e* of the heat-flue may be surrounded in whole or in part by a close water-vessel, and the heat then imparted to the water in the vessel will be radiated by its walls into the incubating-chamber.

The regulation of the heat in the incubator represented in the accompanying drawings may be effected, as in the incubator described in my Patent No. 193,616, by opening and closing the valves *E* of the heat-flues; or it may be regulated by regulating the flames of the lamps by means of sliding wick-tubes or other devices. In either case it is convenient to place the valve-engine in a case upon the top of the apparatus in the position indicated by the lines *U*, and to connect the engine with the valve-shaft *F* by means of an endless chain and chain-wheels, or by other connecting mechanism.

The heat for the incubator is furnished by two lamps, which are supported upon a movable platform, *T*, and are connected with the heat-flues *d* by means of short chimneys *g*. The platform or support of the lamps is, by preference, suspended beneath the incubating-chamber by cords and weights, so that either end of the platform may be readily depressed to permit the lamp to be applied or removed. The legs of the incubator may be used to guide the lamp-platform in its movement, and stops may be applied to the legs above the platform to limit the extent of its rise by the action of the weights.

I claim as my invention—

1. The combination, substantially as before set forth, of the incubating-chamber, the egg-holder, the air-supply pipe, and the heat-flue arranged within the air-supply pipe.

2. The combination, substantially as before set forth, of the incubating-chamber, the egg-holder, and the heat-flue constructed to ascend to the upper part of the incubating-chamber and to spread therein laterally in the vicinity of the exit-tube, whereby the heat is more thoroughly distributed.

3. The combination, substantially as before set forth, of the incubating-chamber, the egg-holder, the heat-flue ascending in the incubating-chamber, and the water-tray applied to said heat-flue.

4. The combination, substantially as before set forth, of the incubating-chamber, the egg-

holder, the heat-flue, the water-tray applied to said heat-flue, and the waste-heat chimney passed through said water-tray.

5. The combination, substantially as before set forth, of the incubating-chamber, the egg-holder, the water-tray within the incubating-chamber, the basin at the exterior of the chamber, and the water-fount.

Witness my hand this 27th day of September, A. D. 1878.

E. S. RENWICK.

Witnesses:

W. L. BENNEM,

H. H. ISAACS.