H. B. TATHAM, Jr.

Incubator.

No. 220,191. Patented Sept. 30, 1879.

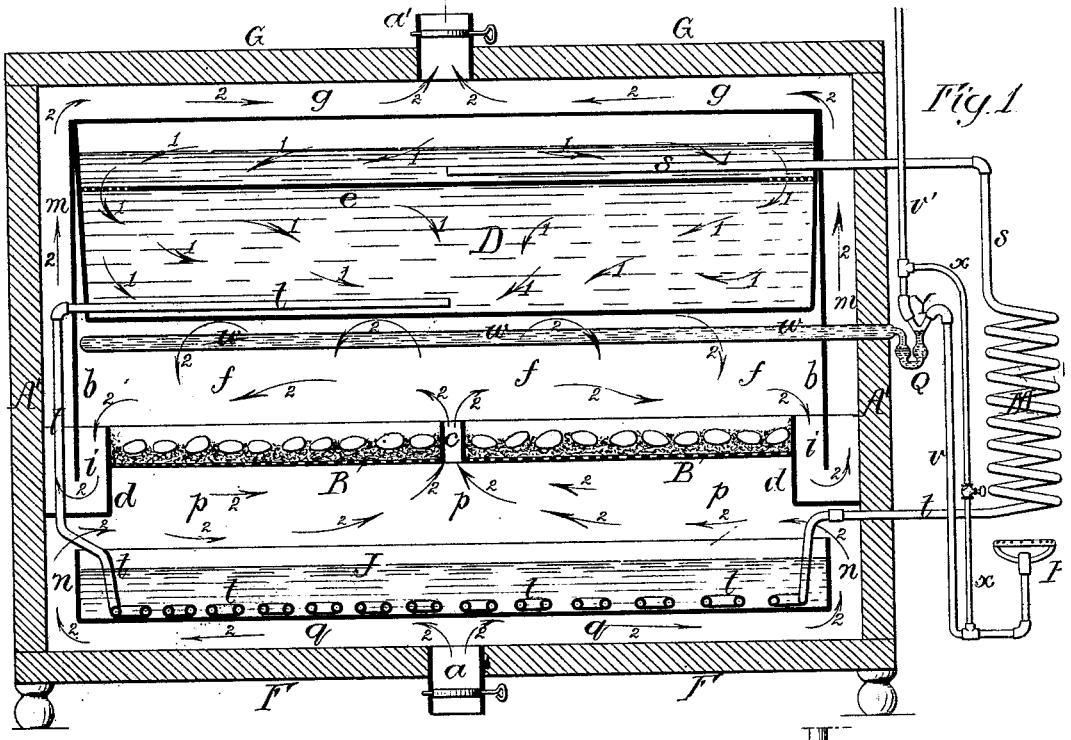
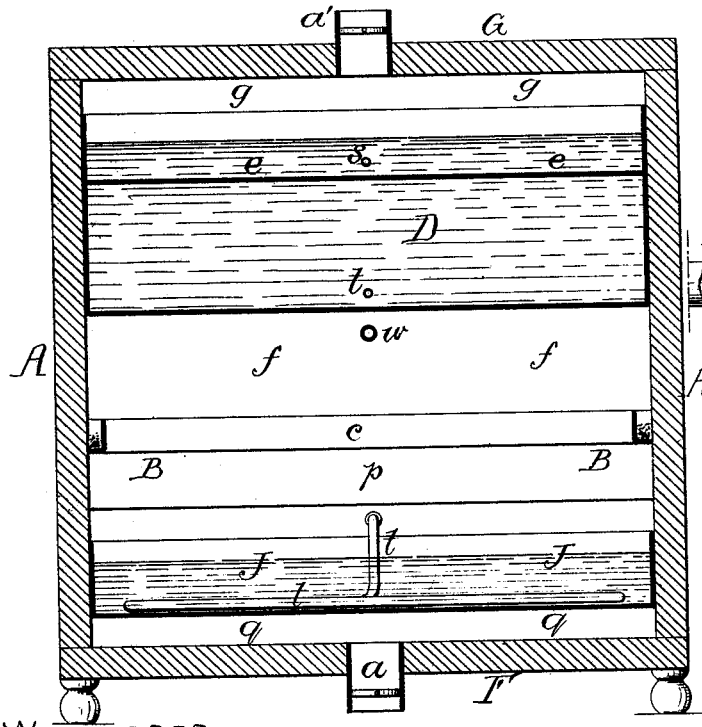


Fig. 1



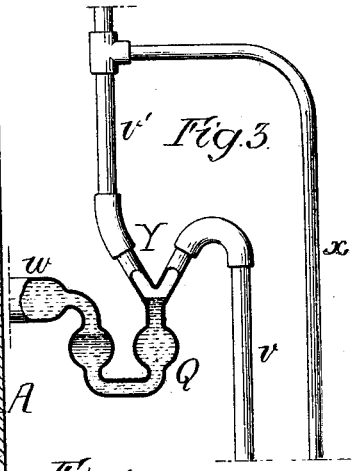


Fig. 3

Fig. 2

WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY B. TATHAM, JR., OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN INCUBATORS.

Specification forming part of Letters Patent No. **220,191**, dated September 30, 1879; application filed April 8, 1879.

To all whom it may concern:

Be it known that I, HENRY B. TATHAM, Jr., of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Incubators, of which the following is a specification.

The object of my invention is to construct an incubator in which the eggs will always be subjected to the action of volumes of moist air of uniform or comparatively uniform temperature; and this object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of my improved incubator; Fig. 2, a transverse vertical section of the same; and Fig. 3 a detached view, drawn to a larger scale, of part of the apparatus.

A A are the opposite sides, and A′ A′ the opposite ends, of the casing or box of the incubator, this casing being preferably made of wood, and being provided at the bottom, F, with a valved air-inlet pipe, *a*, and at the top, G, with a valved outlet-pipe, *a′*.

At each end of the box are two transverse partitions, *b* and *d*, which extend completely across the box from one side, A, to the other, the partitions *b* being vertical, and the partitions *d* L-shaped, as shown in Fig. 1.

Extending longitudinally from one partition *d* to the other, at a point somewhat below the tops of the same, is a tray, B, on which are deposited the eggs, the latter being placed on a layer of cotton or other cushioning material. The tray B is, in the present instance, perforated, and is provided with a central flue, *c*, for a purpose described hereinafter.

Extending longitudinally across the box from one partition *b* to the other is a pan, D, which is provided, at some distance below the top, with a partition, *e*, perforated at each end.

The lower ends of the partitions *b* extend to within a short distance of the horizontal portions of the partitions *d*, and the upper ends of said partitions *b* extend to within a short distance of the top, G, of the box, so that the partitions *b* and *d* form at each end of the box diving flues, *i*, and ascending flues, *m*, the flues *i* communicating with the chamber *f* between the bottom of the pan D and the egg-tray, and the flues *m* communicating with the chamber *g* above the pan D, while each flue *i* communicates with the adjacent flue *m* at the lower end of the partition *b*.

At a short distance above the bottom, F, of the box is a pan, J, which is somewhat shorter than the interior of the box, so that a flue, *n*, is formed at each end of the same, these flues communicating above with the chamber *p*, beneath the egg-tray, and below with the space *q* between the bottom of the pan J and the bottom, F, of the box.

The pans D and J and egg-tray B extend from one side to the other of the box transversely, as shown in Fig. 2.

Outside of the box or casing is a coil, M, of tubing, the upper end of which communicates through a pipe, *s*, with the interior of the pan D above the partition *e*, the lower end of the coil communicating with the lower portion of said pan through a pipe, *t*, which is carried through the pan J in a zigzag or circuitous course.

P is a burner, supplied with gas through a pipe, *v*, the upper end of which is connected to one branch of an elbow-pipe, Y, the other branch being attached to or forming a continuation of the gas-pipe *v′*. A reservoir, Q, communicates with the elbow at the junction of its two branches, the mercury in the reservoir Q being acted upon by alcohol or other volatile liquid contained in a long tube, *w*, which projects into the incubator and is arranged in the chamber *f* between the pan D and the egg-tray B.

When the incubator is in use the burner P heats the water in the coil M and causes the same to rise therein and flow through the pipe *s* into the upper portion of the pan D, which is filled with water to about the height shown, water passing into the lower end of the coil through the pipe *t*, which derives its supply from the pan D at a point at or near the center and close to the bottom of the same. By this means not only is a constant circulation of water maintained in the pipes *s* and *t* and coil M, but there is also a constant circulation of the water in the pan D in the directions pointed out by the arrows 1.

The pan J contains a supply of water, which

is heated to a moderate degree by the hot water circulating through the zigzag portions of the pipe *t*.

Air enters the interior of the casing through the valved pipe *a*, impinges at once against the heated bottom of the pan J, and passes to the flues *n n* at the ends of the pan, and thence to the chamber *p* beneath the egg-tray. The air thus receives its primary heating and is moistened by being brought into contact with the surface of the warm water in the pan J, so that there is no risk of chilling the eggs by bringing volumes of cold air into contact with the same, or of drying the eggs by subjecting them to the action of volumes of dry heated air.

From the chamber *p* the air passes up through the central flue, *c*, of the egg-tray to the chamber *f* above the same, where it is further heated by contact with the bottom of the pan D, the upper portions of the eggs being exposed to this superheated air, which finally passes in the direction of the arrows through the flues *i* and *m* to the chamber *g* above the pan, and thence through the outlet *a'*.

It will thus be seen that there is a constant circulation of warm air through the incubator in the direction of the arrows 2, so that the thorough ventilation of the interior of the apparatus is insured.

As long as the proper degree of heat is maintained within the chamber *f* above the egg-tray the mercury in the reservoir Q will be in about the condition shown in Fig. 3, and the flow of gas to the burner P through the pipes *v v'* and elbow-pipe Y will be unobstructed. As soon as the degree of heat in the chamber *f* is unduly increased, however, the volatile liquid in the tube *w* will be expanded to such an extent as to cause the mercury in the reservoir Q to rise and obstruct the throat of the elbow Y, the flow of gas to the burner through the same being thereby restricted or cut off. Sufficient gas passes to the burner, however, through a branch pipe, *x*, to prevent the said burner from being extinguished, and as soon as the temperature within the chamber *f* falls to the proper degree the mercury in the reservoir Q will fall, and the flow of gas will be re-established. This regulating device forms no part of the present invention.

I claim as my invention—

1. The combination, in an incubator, of the outer casing or box A A', the air inlet *a* and outlet *a'*, the egg-tray B, and the hot-water pan D, arranged as described, so as to form an air-chamber, *f*, between the egg-tray and the bottom of the pan, and flues at the sides or ends of the box, for causing a circulation of air through the chamber *f* and over the top of the eggs, as set forth.

2. The combination of the hot-water pan D, the egg-tray B, the descending flues *i*, and ascending flues *m*, as set forth.

3. The combination of the water-pan D, the descending and ascending flues *i* and *m*, and the egg-tray B, having a central flue, *c*, as specified.

4. The combination of the egg-tray B, the air-inlet *a*, and the warm-water pan J, arranged between the inlet and the tray, so as to cause the air to circulate around the same before reaching the eggs, as set forth.

5. The combination of the pan D, having a partition, *e*, perforated at the ends, with the hot-water-supply pipe *s*, as specified.

6. The combination of the hot-water pan D, the water-pan J, the heating-coil M, and the pipes *s* and *t*, all constructed and arranged substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

H. B. TATHAM, JR.

Witnesses:

WILLIAM J. COOPER,

HARRY SMITH.