

No. 826,149.

PATENTED JULY 17, 1906.

G. M. CURTIS.
INCUBATOR.

APPLICATION FILED MAY 25, 1905.

FIG. 1.

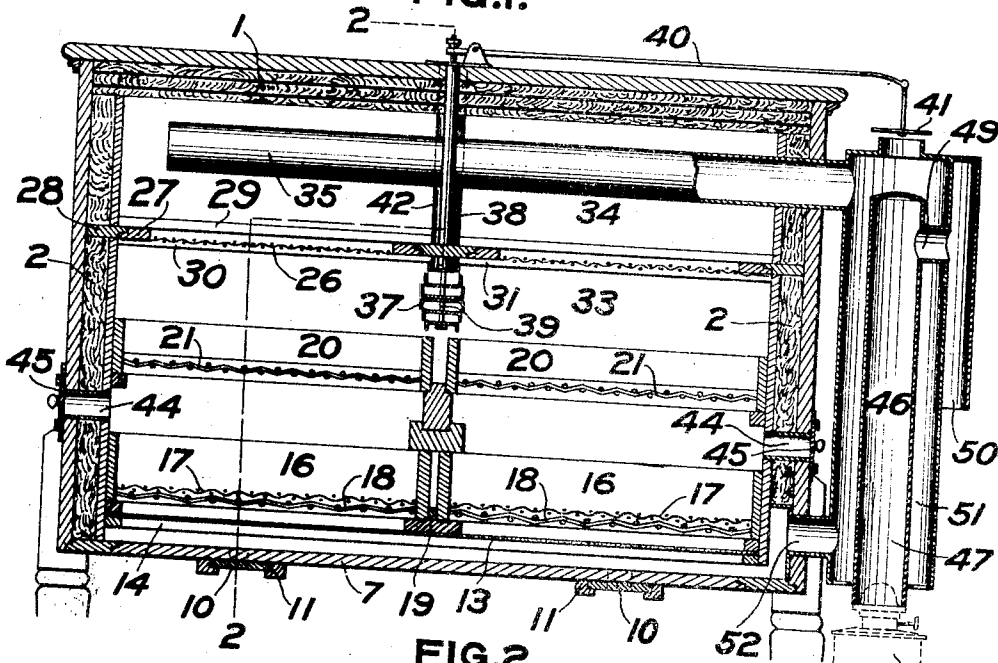
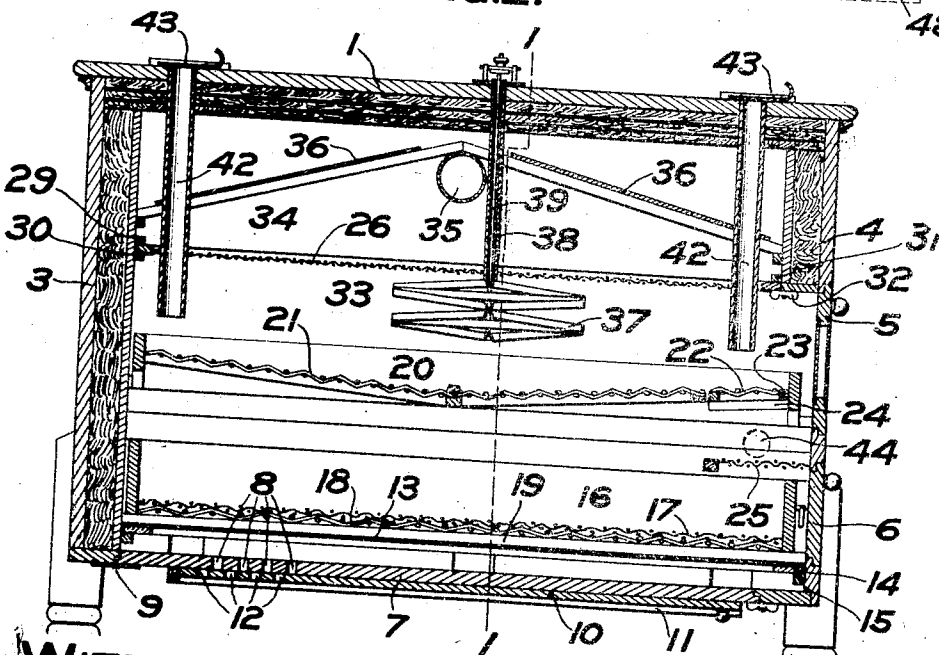


FIG. 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GRANT M. CURTIS, OF BUFFALO, NEW YORK, ASSIGNOR TO CYPHERS INCUBATOR COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

INCUBATOR.

No. 826,149.

Specification of Letters Patent.

Patented July 17, 1906.

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To all whom it may concern:

Be it known that I, GRANT M. CURTIS, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

This invention relates to incubators; and it consists in the mechanism and improvements hereinafter described and claimed.

In the drawings, Figure 1 is a vertical section of an incubator embodying this invention, taken on the line 1 1 of Fig. 2; and Fig. 2 is a like vertical section on the line 2 2 of Fig. 1.

The incubator consists of a case having an insulated top 1 and insulated sides 2, back 3, and front 4. In the front of the incubator-case is a door 5, having double glass panels for insulation and which may be called the "egg-chamber" door. The casing has also a door in the lower part of the incubator-casing opening into the cavity beneath that portion into which the door 5 opens. The door 6 may be called the "chick-door." The bottom of the incubator consists of a door 7, having ventilation-openings 8 therein, hinged at 9 on one side and fastened by suitable means on the other side to close the aperture in which the door 7 fits. One or more slides 10, running in guides 11, are provided with openings 12, which can register with the openings 8. Setting the ventilating slide or slides 10, therefore, controls the communication between the interior of the incubator and the exterior air through the openings 8 and 12.

Above the bottom door 7 is a porous diaphragm 13, of suitable porous material, such as felt or burlap or any other material that will prevent drafts but permit slow movement of air through it. The diaphragm 13 is fastened on a frame 14, which rests upon cleats 15 in the interior of the incubator and is removable through the bottom or through the chick-door 6, as may be found convenient.

An outlet for air from the egg-chamber is provided beneath the egg-chamber in both the door 7 itself and in the openings 8.

Above the diaphragm 13 is a removable drawer 16, which may have a porous bottom. The preferred bottom for this drawer

is composed of a layer of coarse fabric 17, such as coarse burlap, and underneath is a bottom 18 of wire-netting. This drawer 16 rests on supports 19 within the incubator and is adapted to receive the chicks which may fall into it.

Above the drawer 16 is the egg drawer or tray 20, having a double inclined bottom 21, preferably made of wire-netting.

At the front of the egg-tray is a removable section 22, extending entirely across the front of the tray and formed of a piece of wire-netting fastened upon a frame 23, which rests upon supports 24 in the frame of the tray 20. When the tray 23 is removed, there is an opening across the front of the egg-tray for a purpose hereinafter described.

Immediately below the opening thus produced when the tray is in place in the incubator is a stationary shelf 25, extending across the incubator-space, so that any chick that falls through the opening caused by the removal of the frame 23 shall fall upon the shelf 25 and thence into the chick drawer or tray 16. Only one such shelf is shown; but more than one may of course be employed, the purpose of the shelf being that the chick may not fall a distance so great as to injure it.

Above the egg-tray 20 is a porous diaphragm 26, preferably made of a sheet of muslin. The sheet of muslin is fastened to the rabbeted frame 27, which fits under the rabbeted side pieces 28. The frame 27 at the back fits between two cleats 29 and 30 and up against a cleat 31 at the front, and it is held against the latter cleat by any suitable catch, such as a turn-button 32. The diaphragm may thus be easily removed from the incubator by unfastening the turn-button. Of course other material than muslin may be employed.

Felt or any other suitable porous material in one or more layers may take the place of any of the diaphragms in the present incubator provided there is not too great resistance to the passage of air.

Beneath the diaphragm 26 is the egg-chamber 33 and above said diaphragm is the heating or radiating chamber 34. Into this heating or radiating chamber extends the heat-delivery tube 35 of an air-heater, and in said chamber are also the baffle-plates 36, held suitably in place and at an angle with

each other similar to that of an ordinary ridge-roof, but leaving a space immediately over the heat-delivery tube 31 and a space between the lower edge of each baffle-plate and the said incubator, so that air may circulate through the space at the highest point of the baffle-plates and also through the spaces between the edges of the baffle-plates and the sides of the incubator.

- 10 Within the egg-chamber 33 is the thermostat or regulator 37, consisting of suitable expansion devices in the egg-chamber, a tube 38 extending up through the heating-chamber to form a communication with the outer
15 air, and a rod 39 within said tube, said rod connecting said expansion devices with a damper arm or lever 40, actuating a damper 41. Ventilation-tubes 42 of suitable number extend through the top of the incubator and
20 downward into the egg-chamber 33 through the heating-chamber. The ventilating-tubes 42 are closed or opened to such degree as may be desired by sliding plates or dampers 43 on the top of the incubator. Other ven-
25 tilation-tubes 44 extend through the side walls of the incubator, usually near the front thereof, and are also controlled by sliding dampers 45, whereby the said ventilation-tubes 44 may be opened or closed to such de-
30 gree as may be desired.

- A heater 46 is provided and may be of the following construction: An inner combustion-tube 47 forms the chimney for a lamp 48. The said inner tube 47 is closed at the top
35 and has a lateral tubular connection 49 with an outer tube 50, which opens downward and is closed at the top. Around the tube 47 and between it and the outer tube 50 is the hot-air tube 51, that is open at the top
40 and at the bottom and is connected near the top with the heat-delivery tube 35 and is connected near the bottom with a tube 52, leading to the space underneath the lower diaphragm 13. The damper 41 controls and
45 may close the top of the tube 51. When said damper is raised, the air in the tube 51, heated by contact with the tube 47, rises out through the orifice controlled by the damper. When the damper is down or is raised only
50 slightly, hot air will pour into the heating-chamber 34 through the heat-delivery pipe 35, down through the diaphragm 26, the egg-chamber 33, the diaphragm 13, and thence out through the tube 52. The tube 52 con-
55 stitutes an outlet for air beneath the egg-chamber. A circulation is thus created, whereby the freshly-heated air is constantly passed through the egg-chamber. In the normal running of the incubator the damper
60 41 is slightly raised, so that some of the hot air constantly passes out through the damper-orifice and the remainder passes into the heat-delivery tube 35, while fresh air is constantly passing into the bottom of the tube

51, thus renewing the air that is fed into the 65 egg-chamber.

It is probably never found that all the eggs originally placed in the egg-tray for a hatch are fertile, and consequently a certain pro- 70 portion of the eggs so placed in the egg-tray for a particular hatch have to be discarded when sufficient time has passed to determine whether the eggs were fertile. The unfertile eggs are rejected, thus making an empty space in the egg-tray. It is desirable that 75 the egg-trays should be filled to their maximum capacity when the hatch is first started, and it is also desirable when the hatch is ending and the chicks are leaving the shells that there should be space at the front of the egg- 80 tray nearest the light, toward which the chicks naturally move, through which they may pass into a chick-drawer. In the present device the removal of the frame 23 provides this capability in the machine. 85

In the normal running of the machine the air-tubes 42 are closed; but when the chicks are hatching these tubes are opened, and, if need be, the bottom ventilation-holes 8 are opened to the air, or, if need be, the bottom 90 itself may be unfastened and dropped, so that air may pass up into the chick-compartment and through the egg-tray when the chicks are coming out. So, too, where the maximum of ventilation is required the 95 slides 45 may be opened to the proper degree in order to promote the passage of air above the chick-drawer and without direct draft through its bottom.

This incubator provides for not only the 100 minimum ventilation required for the ordinary hatching of eggs under conditions of average external moisture and external temperature, but also provides for means of reg- 105 ulating the incubator so that it is capable of use in damp hot climates, in dry cold climates, in dry hot climates, or cold damp climates. This capacity is provided by what may be called the "normal and slow trans- 110 fusion of air" through it when the ventilation-tubes 42 and 44 are closed and the bottom, with its ventilation-holes 8, is closed and the ability to regulate the incubator in accordance with the climate where it may be operated by opening or closing the various 115 ventilation-ducts, as the conditions may require.

The chick tray or drawer as above described has a double bottom composed of an upper layer of a porous fabric, such as bur- 120 lap, and a lower layer of an open-work support for the fabric, consisting in the present case of wire-netting.

What I claim is—

1. In an incubator, a heating-chamber, an 125 egg-chamber beneath the heating-chamber having its top and bottom walls of porous material, a heater for discharging heated air

into said heating-chamber whereby the heated air passes downward through the egg-chamber, an outlet for air beneath the egg-chamber, a ventilating-tube passing upward
5 from said egg-chamber through the heating-chamber to the outer air, and a damper for said tube.

2. In an incubator, a heating-chamber, an egg-chamber beneath the heating-chamber
10 having its top and bottom walls of porous material, a heater for discharging heated air into said heating-chamber whereby the heated air passes downward through the egg-chamber, an outlet for air beneath the egg-chamber, an egg-tray in said egg-chamber, a
15 ventilating-tube such as 44, 45, connecting said egg-chamber above said bottom porous wall with the outer air for delivering unheated air into said incubator, and a damper for
20 said tube.

3. In an incubator, a case, a heating-chamber therein, an egg-chamber therein beneath the heating-chamber having its top and bottom walls of porous material, a heater for discharging heated air
25 into said heating-chamber whereby the heated air passes downward through the egg-chamber, an outlet for the heated air beneath the egg-chamber, a removable bottom for said case having a perforation therethrough, and a damper for the
30 perforation.

4. In an incubator, a heating-chamber, an egg-chamber beneath the heating-chamber having its top and bottom walls of porous
35 material, a heater for discharging heated air into said heating-chamber whereby the heated air passes downward through the egg-chamber, an outlet for air beneath the egg-chamber, a ventilating-tube passing upward
40 from said egg-chamber through the heating-chamber to the outer air, a damper for said tube, an egg-tray in said egg-chamber, a ventilating-tube connecting said chamber beneath the egg-trays with the outer air, and a
45 damper for said tube.

5. In an incubator, a heating-chamber, an egg-chamber beneath the heating-chamber having its top and bottom walls of porous
50 material, a heater for discharging heated air into said heating-chamber whereby the heated air passes downward through the egg-chamber, an outlet for air beneath the egg-chamber, a ventilating-tube passing upward
55 from said egg-chamber through the heating-chamber to the outer air, a damper for said tube, an egg-tray in said egg-chamber, a ventilating-tube connecting said chamber beneath the egg-trays with the outer air, a damper for said tube, a perforated opening bottom
60 for said incubator, and a damper for the perforation.

6. In an incubator, a heating-chamber, an egg-chamber beneath the heating-chamber having its top and bottom walls of porous
65 material, a heater for discharging heated air

into said heating-chamber whereby the heated air passes downward through the egg-chamber, an outlet for air beneath the egg-chamber, an egg-tray in said egg-chamber, a
70 ventilating-tube connecting said chamber beneath the egg-tray with the outer air, a damper for said tube, a perforated opening bottom for said incubator, and a damper for the perforation.

7. In an incubator, a heating-chamber, an
75 egg-chamber beneath the heating-chamber having its top and bottom walls of porous material, a heater for discharging heated air into said heating-chamber whereby the heated air passes downward through the egg-chamber, an outlet for air beneath the egg-chamber, a ventilating-tube passing upward
80 from said egg-chamber through the heating-chamber to the outer air, a damper for said tube, an egg-tray in said egg-chamber, a ventilating-tube connecting said chamber beneath the egg-tray with the outer air, a damper for said tube, a perforated bottom for
85 said incubator and a damper for the perforation.

8. In an incubator having an egg-chamber, an egg-tray therein, a chick-space below said
90 egg-tray, and a substantially horizontal stationary support on which chicks may rest situate between the egg-tray and the bottom of the chick-space, said support being smaller in
95 area than the bottom of the chick-space.

9. In an incubator having an egg-chamber, an egg-tray therein, a chick-space below said
100 egg-tray, and a stationary shelf upon which chicks may rest situate between the egg-tray and the bottom of the chick-space, said shelf being smaller in area than the bottom of the chick-space.

10. In an incubator, an egg-tray having a
105 bottom formed of netting a portion of which bottom is detached and is removable, supports for said egg-tray in the incubator, and a chick-space beneath said egg-tray.

11. In an incubator, an egg-tray having a
110 portion of its bottom removable, supports for said egg-tray in the incubator, a chick-space beneath said egg-tray, and a shelf beneath the space left by the removable portion of the egg-tray whereon chicks may fall from
115 the egg-tray and thence to the bottom of the chick-space.

12. In an incubator, an egg-chamber having a top of porous material, an egg-tray in
120 said egg-chamber, a sliding chick-drawer beneath the egg-tray having its bottom of porous material, means for discharging heated air into said egg-chamber through its porous top, and an outlet for the heated air beneath the chick-drawer.

13. In an incubator, an egg-chamber having a top of porous material, an egg-tray in
125 said egg-chamber, and a chick-tray beneath the egg-tray having a double bottom formed of an upper layer of porous fabric and a lower
130

layer consisting of an open-work support for said fabric.

14. In an incubator having an egg-chamber, means for heating said egg-chamber, a ventilating-tube for unheated air, such as 44, 45, connecting said egg-chamber directly with the outer air and unconnected with the heating means, and a damper for said tube.

15. In an incubator, a case, an egg-cham-

ber therein having a bottom of porous material, means for heating said egg-chamber, a removable bottom for said case having a perforation therethrough, and a damper for said perforation.

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Witnesses:

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