

L. C. BYCE.
INCUBATOR.

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1,022,824.

Patented Apr. 9, 1912.

Fig. 1.

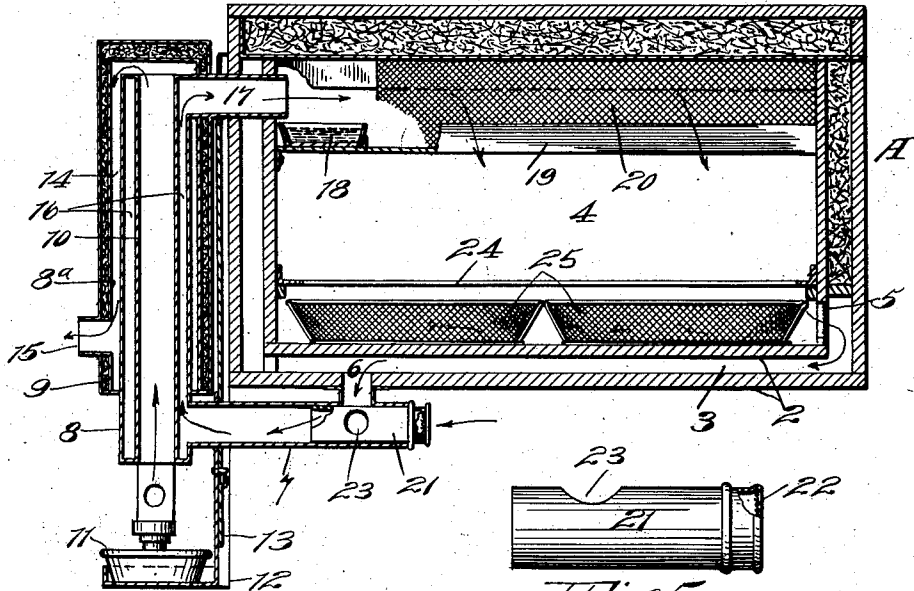


Fig. 5.

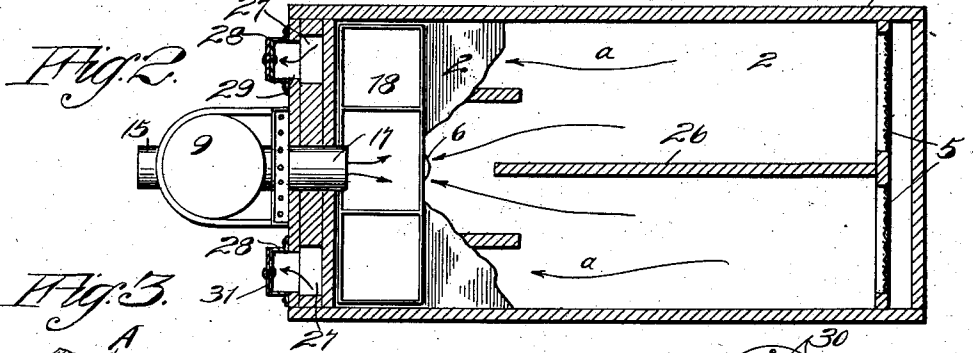
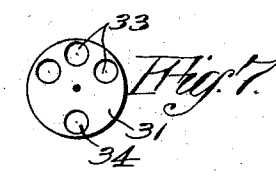
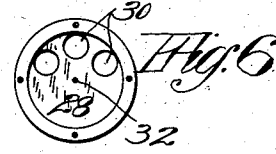
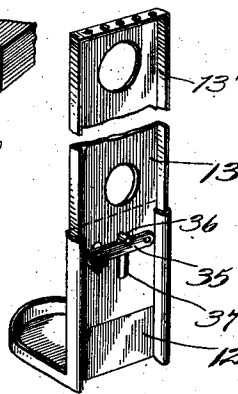
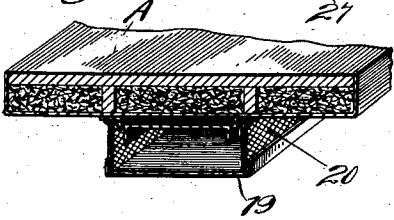


Fig. 3.



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Fig. 4.

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UNITED STATES PATENT OFFICE.

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INCUBATOR.

1,022,824.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, LYMAN C. BYCE, a citizen of the United States, residing at Petaluma, in the county of Sonoma and State of California, have invented new and useful Improvements in Incubators, of which the following is a specification.

This invention relates to incubators.

The object of this invention is to provide an incubator involving means for the economical, practical and reliable circulation and heating of air in the incubator; to provide means for controlling the inlet of air; means whereby a certain volume of air may be continuously circulated throughout the incubator; to provide means for the admission of heated fresh air to the incubator without including any of the gases of combustion; and to provide an incubator in which the humidity of the circulating air is under perfect control.

The invention consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a central vertical longitudinal section through the incubator. Fig. 2 is a sectional view on the irregular line 2—2, Fig. 1. Fig. 3 is a perspective view of a fragment of the heat distributor of the incubator. Fig. 4 is a perspective view of the lamp supporting bracket. Fig. 5 is a side elevation in partial section of the subway controller. Fig. 6 is a plan view of the perforated damper plate. Fig. 7 is a plan view of the damper.

In the present embodiment of my invention, A represents the walls or casing of an incubator which is here shown as provided with a double bottom 2, forming a channel or subway 3, into which air may be admitted from the interior 4 of the incubator through a transverse screened opening 5 formed in one end of the incubator. The subway 3 communicates through a port or passageway 6 with a suitably disposed tubular connection 7 which is here shown as being secured to the cylindrical heater casing 8, forming a portion of a suitable heater, as indicated at 9, and which has an interior flue 10 open at its bottom to receive heated gases generated by any desired form of lamp or other heating device 11 supported adjacent the bottom of the heater 9, on an appropriate bracket

12. The bracket 12 is slidably adjustable along a back plate or hanger 13 suitably secured to the end of the incubator.

The warmed gas from the heating device 11 ascends through central flue 10 and escapes into an annular chamber 14, which is closed at its upper end and located exterior to the heater casing 8, and the gas passes out through an outlet 15 formed on one side of the jacket 8^a. Between the interior of the heater wall 8 and the exterior of the flue 10, there is formed an annular chamber 16, which communicates at its lower end with the branch 7, and which is provided at its upper end with another branch 17 projecting through the back plate 13, to which it may be secured in through the end wall of the incubator and opening to the interior thereof.

Preferably the open end of the flue or branch 17 of the heater terminates above a water tray 18, which is shown in Fig. 2 as being divided into three compartments, and as heated air flows from the branch 17 and over the water pans 18 a suitable percentage of moisture is absorbed by the air. To prevent the air which arises from the heating chamber 16 which surrounds the flue 10 and passes into the incubator through the branch 4, from radiating or diffusing too rapidly, and thus abnormally heating the adjacent end of the incubator, I have provided a flue or distributor formed of a trough 19 having perforated or foraminous walls 20 which extend lengthwise of the incubator and between which the flue 17 discharges the heated air. By this means the air is prevented from immediately disseminating and is conveyed entirely across the incubator in the trough 19, escaping through the vertical side walls 20, which, if desired, may be made of netting of suitable mesh. When the heated air accumulates in the chamber 4, of the incubator a circulation is caused by the heating of the air in the chamber 16, and which is then discharged through the flue 17 into the incubator, and there is a tendency of the air in the branch 7 to float into the lower portion of the chamber 16.

For the purpose of controlling a flow or circulation of air through the incubator, I have mounted in the outer end of the branch 7, and just below the port 6, which communicates with the subway 3, a controller

which has a snug working fit in the branch 7 and is provided at its outer end with a screen 22 through which may be drawn fresh, pure air from the atmosphere to fill the inner chamber 16.

The controller 21 is perforated at 23, forming a port or opening which may be turned into registration with the port 6 in the bottom of the incubator so that a portion of the heated air within the subway 3 may flow downwardly through the ports 6 and 23 into the branch 7 when the controller 21 has been so revolved in the branch as to bring its port into registration with the complementary port 6.

If desired to admit fresh, pure air to the heater and incubator, the controller 21 is turned to the position shown in Fig. 1, thereby preventing the circulation of air through the port 6 and causing all of the air to be drawn in through the screen 22 to pass thence through the branch 7 into the annular air-containing chamber 16, from which it passes in a heated condition, due to contact with the heat flue 10, escaping finally through the branch 17 into the distributor-trough 19.

The adjustment of the controller 21 will be varied according to the location or region in which the incubator is being operated, and also varies in the same locality, according to the percentage of moisture in the atmosphere, and it may be sometimes desirable to so turn the controller 21 that its port 23 will fully open with the port 6, and when the controller 21 is in this position there will be a constant circulation of heated air from the discharge branch 17 into the incubator, from which it will pass downwardly from the screened opening 5 into the subway 3, thence down through port 6, through branch 7, and arises to be again heated in the chamber 16. When one body of air is so continuously circulated through the incubator, it will derive its moisture, in appropriate degree, from the water pans 18, which are provided for this purpose. Located at a suitable distance above the bottom 2 of the incubator, is an egg tray 24, below which are disposed a suitable number of nursery baskets 25 into which the chicks hatched in the incubator may repose.

As shown in Fig. 2, the subway 3 is divided into two compartments by a central wall 26 tending to guide the circulation of air and lead it forwardly toward the port 6 in the bottom wall 2, and when the controller 21 has been nearly or entirely closed, the air travels forwardly, as indicated by the arrows *a*, through the subway 3, and rises through vertical passageways 27 formed in the end of the incubator adjacent the heater, the discharge of air from the passageways 27 being controlled by damper

plates or ventilators 28, which are secured over openings 29 in the end of the incubator which communicate with the passageways 27. Each of the ventilators 28 is provided with a plurality of perforations 30, over which may be moved a damper cover 31, pivoted at 32 upon the damper box 28, and provided with a series of openings 33 which may be moved into registration with the openings 30 of the damper box, thus allowing a free escape of the air from the subway 3 and flues 27. By turning the damper 31 a suitable number of the openings 30 in the damper box 28 may be covered, and if desired to allow only a small percentage of air to flow out of the incubator the dampers may be so turned upon the damper boxes 28 as to allow a single perforation 34 to register with one of the perforations 30.

As shown in Fig. 4, the back plate 13 is provided with longitudinal flanges 13' along its edges, which cause the body of the back plate 13 to stand at a suitable distance from the end of the incubator and provide an air space between them so that the end of the incubator cannot become heated by radiated heat from the heater 9, and in order to adjust the elevation of the heating device or lamp 10 with relation to the heater, the bracket 12 may be moved into position upon its supporting back plate 13, and latched thereon by means of an appropriate locking device, as a latch 35, pivoted upon the back plate 13 and adapted to encounter a rivet or pin head 36 secured upon the lamp bracket 12 and projecting through a slot 37 formed in the back plate 13. Fresh air is admitted to the heater through the fresh air controller 21 which, it will be noticed, is located at the bottom end of the heater projecting through the back plate and underneath the incubator chamber. The opening to the fresh air controller is covered with fine wire, gauze, or other suitable material, serving as a filter of all the air that passes through the heater and to the egg chamber 4. The point of entrance of the fresh air is, therefore, some distance from the lamp, and it is impossible for any odor of the lamp to enter the fresh air passage in this apparatus. As the air passes up through the heater it is properly warmed and then discharged into the egg chamber, over and around the eggs, thence through the screened passageway 5, and into the subway or space between the double floors, thence upward through the channels in the end of the incubator and out through the ventilation dampers or caps 28.

The circulation of air through the incubator, and its humidity, are under perfect control of the operator, and may be varied to suit conditions. For example, there are localities where the humidity of the atmosphere is so great that the full flow of air

through the fresh air controller may be admitted to the egg chamber and all of the openings in the ventilators 28 left open; in other places the percentage of humidity is less, hence the subway controller is opened and a portion of the already warmed air of the egg chamber is carried through the subway or air space between the floors into the subway controller, where it commingles with a new supply of air entering the fresh air conductor, thence passing up through the heater is again discharged into the incubator, by which process a large proportion of the humidity is retained in the circulating air. In other localities of high altitudes and in the excessively heated valleys of tropical and semi-tropical countries where the air is greatly rarefied with low humidity, it may be necessary to not only have the subway open, but, as an additional means of retaining humidity in the air chamber, to close all but one of the openings in each of the ventilators 28, and provide means for additional humidity, as by the water pans 18.

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

1. An incubator having a suitable casing, an incubating chamber, a heating device, a subway formed in the bottom wall of the casing, an exterior connection between the subway and said heating device, and a unitary controller of heated and fresh air adjustably mounted in the inlet end of said exterior connection.

2. An incubator having a suitable casing and a subway formed in its bottom wall, a jacketed air heating device having its jacket connected to the incubator to discharge heated air into its interior, connections between said subway and the jacket of the heater, and controlling devices mounted in the inlet end of said connection, said controlling devices comprising a movable tube having a port adapted to open communication between the inlet end of said connections and the outlet from the subway.

3. An incubator comprising a suitable casing provided with a subway in its bottom wall, a jacketed air heating device, a hot-air flue connected to the upper end of the heating device to discharge air into the incubator, connections between the bottom of the incubator and the heater to allow air to flow from the subway to the jacket of the heater, and means controlling the movement of air from the subway to the heating device.

4. An incubator comprising a suitable casing provided with a subway in its bottom wall, a jacketed air heating device, a hot-air flue connected to the upper end of the heating device to discharge air into the incubator, connections between the bottom of the incubator and the heater to allow air to flow from the subway to the jacket of the heater, and a controller through which fresh air may be admitted to the connections with the lower end of the subway, said controller being movably mounted in said connections and having a port adapted to be brought into and out of register with the subway, to admit heated air from the latter to said connections.

5. An incubator having a double bottom forming a subway or chamber, screened openings in one end of the incubator allowing the passage of air from the interior of the incubator to the subway, and unitary means controlling the circulation of both heated and fresh air through the subway.

6. An incubator comprising a suitable casing having a subway formed in its bottom wall, flues communicating with said subway, screened ports allowing the circulation of air from the interior of the incubator to said subway, dampers or ventilators controlling the movement of air from said flues, a jacketed air heater, and connections between jacket space of said air heater and the incubator, one of said connections being adapted to communicate with said subway and being valve-controlled.

7. An incubator comprising a suitable casing having a subway formed in its bottom wall, flues communicating with said subway, screened ports allowing the circulation of air from the interior of the incubator to said subway, dampers or ventilators controlling the movement of air from said flues, an air heater, connections between said air heater and the incubator, one of said connections being adapted to communicate with said subway, and means for controlling the communication of the subway and the said connection, said means including an adjustable controller through which both heated and fresh air may be drawn into the heater.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LYMAN C. BYCE.

Witnesses:

H. R. CAMPBELL,
C. KECK.