No. 679,764. Patented Aug. 6, 1901.

J. L. MACY.

INCUBATOR.

(Application filed Oct. 16, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

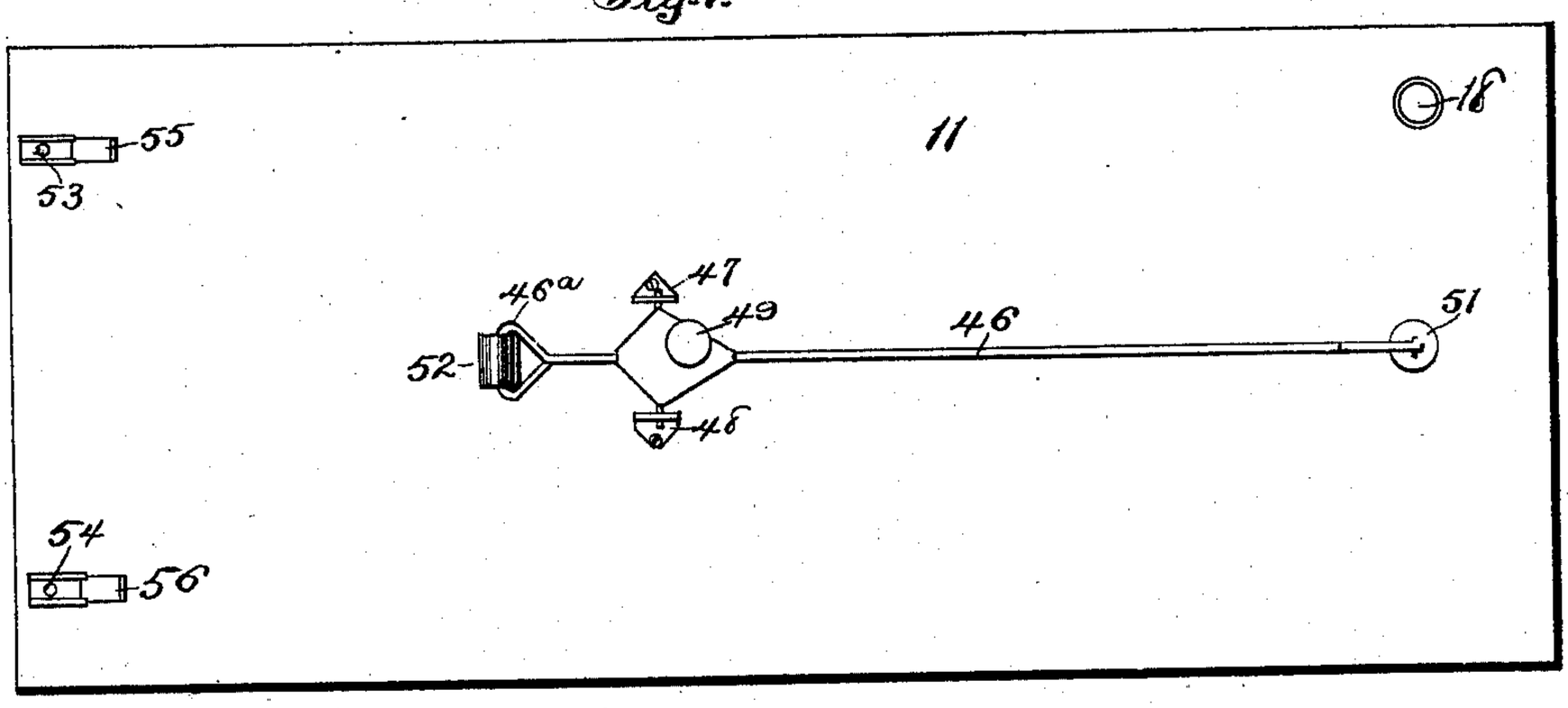


Fig. 2

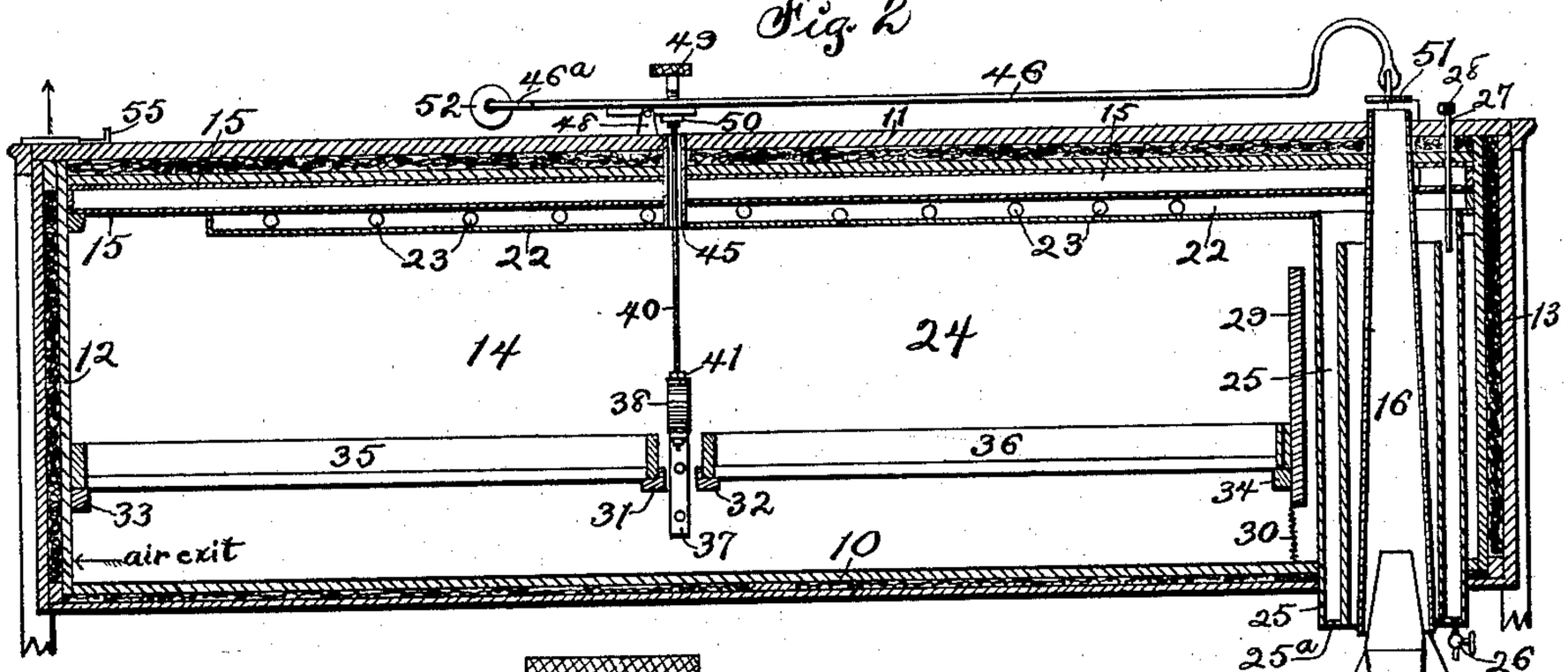


Fig. 4.

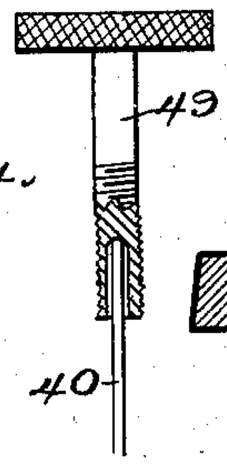
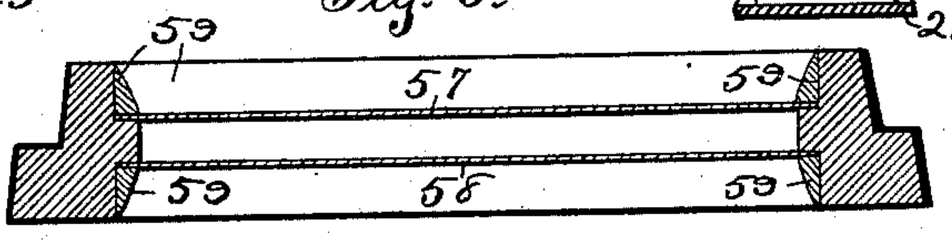


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 8.

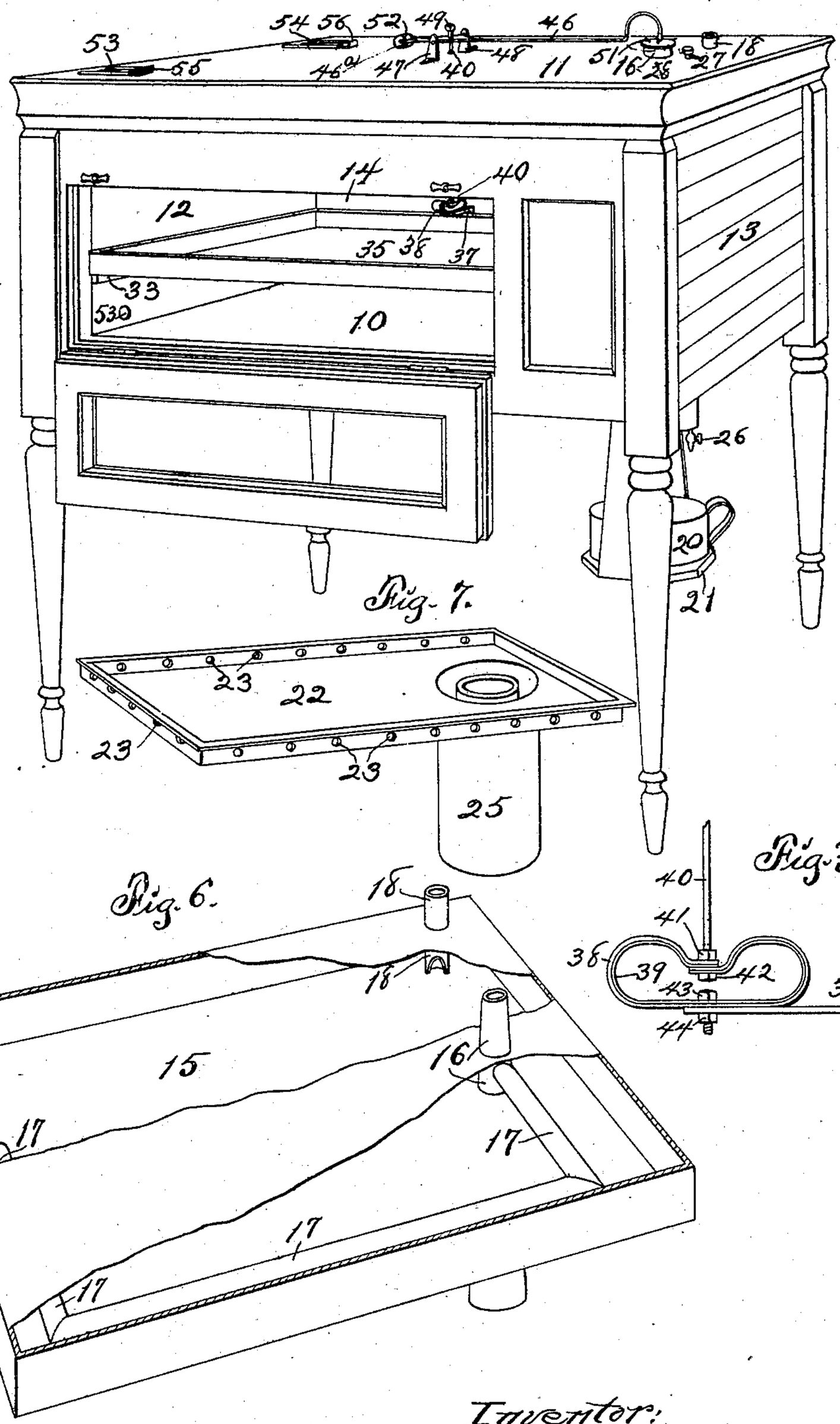

Fig. 7.

Fig. 6.

Fig. 3.

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UNITED STATES PATENT OFFICE.

JETHRO L. MACY, OF DES MOINES, IOWA.

INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 679,764, dated August 6, 1901.

Application filed October 16, 1899. Serial No. 733,843. (No model.)

To all whom it may concern:

Be it known that I, JETHRO L. MACY, a citizen of the United States of America, and a resident of Des Moines, Polk county, Iowa, have invented certain new and useful Improvements in Incubators, of which the following is a specification.

The object of this invention is to provide improved means for incubating or hatching eggs and in which the heat and moisture supply and ventilation will be under control and economically and properly applied in the incubator-chamber.

My invention consists in the construction, arrangement, and combination of elements hereinafter set forth, pointed out in my claims, and illustrated by the accompanying drawings, in which—

Figure 1 is a plan of a complete machine. Fig. 2 is a vertical and longitudinal section centrally of the machine. Fig. 3 is an elevation of the thermostat detached from the machine. Fig. 4 is a detail view of an adjusting-screw and portion of a thermostat-rod detached from the machine. Fig. 5 is a cross-section of a door employed in the machine. Fig. 6 is a perspective of the hot-air chamber or tank detached from the machine, a portion of the top plate thereof being broken away to expose the heat-conducting pipe therein. Fig. 7 is a perspective of the moisture-tank detached from the machine. The design of the moisture-tank shown in Fig. 7 is described and shown in Letters Patent of the United States of America granted to me on the 30th day of May, 1899, and numbered 30,900. Fig. 8 is a perspective of the incubator employing one egg-tray and one door only.

In the construction of the incubator, as shown, the numeral 10 designates the bottom, 11 the top, 12 13 the ends, and 14 the rear wall of the casing, and said several parts are made double, if desired, and packed with mineral wool or other non-conductor of heat. A hot-air tank 15, of rectangular form and relatively shallow, is mounted in the upper portion of the casing immediately beneath the top 11 and fills the length and width thereof. An opening is formed in the tank 15 near one end thereof, and a flue 16 is vertically positioned and extends through said opening, the upper end of the flue extending through the top of the casing and the body and lower portion thereof extending through the casing and below the bottom thereof. The flue is rigidly mounted by soldering or otherwise in the hot-air tank, and a pipe 17 is located in the tank and communicates at its initial end with the flue. The pipe 17 leads forwardly from the flue 16, is bent at right angles, extends lengthwise of the front portion of the tank nearly to the left end thereof, and is again bent at right angles and extends rearwardly beyond the longitudinal center of the tank, at which point it terminates with an open end. The pipe 17 is wholly within the hot-air tank 15. A vent-pipe 18 is mounted vertically in an opening in the rear right corner of the hot-air tank 15 and rises therefrom through the top 11 of the casing.

A heating-lamp 20 is mounted on a bracket 21, depending from the bottom 10 of the casing, and the chimney of said lamp enters and is spaced apart from the lower end of the flue 16, the spacing apart being provided to supply atmospheric air to the flue.

A moisture-pan 22 is formed of sheet metal and fixed by its side flanges to the bottom plate of the hot-air tank 15. The moisture-pan extends from the right end of the hot-air tank nearly to the left end thereof and is of less width than said tank. The sides and left end of the moisture-pan 22 are provided with a plurality of perforations 23, through which moisture and vapor-laden air may escape from the pan to the egg-chamber 24 or interior of the casing. The right end of the moisture-pan is imperforate and abuts the right end of the casing, and the said pan is covered by and hermetically sealed to the bottom plate of the hot-air tank. An opening is formed in the moisture-pan 22 beneath and of larger diameter than the flue-opening of the hot-air tank, and a water-tank 25 is mounted in and depends from said opening through the casing. The water-tank 25 is of annular form, and the outer shell thereof is attached to the moisture-pan and sealed thereto. The inner shell of the annular water-tank 25 is of less height than the outer shell and is connected thereto by a bottom

ring 25ª, in which bottom ring is mounted a drainage-faucet 26. A supply-pipe 27 is mounted in the top of the casing and depends within and between the shells of the annular water-tank 25, and a removable and replaceable cap 28 is mounted on the upper end of said supply-pipe. The water-tank is supplied through the pipe 27 and drained through the faucet 26, and the inner shell of the water-tank is made of less height than the outer shell in order that any surplus of water in the tank may flow therefrom through the central opening and be prevented from flooding the egg-chamber or interior of the casing. The outer shell of the water-tank 25 is fitted snugly to the bottom of the casing to avoid leakage of air into or from the egg-chamber. The water-tank 25 is mounted outside and concentric of the flue 16, and the water therein is heated and caused to throw off vapor by the radiation from the flue. The inner shell of the water-tank 25 is spaced apart from the flue 16 to provide an entrance for air to the moisture-pan. The moisture-pan and water-tank conjunctively form a moisture-tank.

A partition 29 is mounted in and transversely of the casing adjacent the water-tank 25 and is spaced apart from both the top and bottom of the casing. The space or opening between the lower edge of the partition 29 and the upper surface of the bottom of the casing is protected by a sheet 30 of wire-cloth mounted thereon and extending transversely of the casing.

Cleats 31 32 are mounted in and transversely of the casing approximately midway between the partition 29 and end 12, and cleats 33 34 are mounted on said end 12 and partition, respectively, and extend parallel with the cleats 31 32. Egg-trays 35 36 are mounted on the cleats below and parallel with the moisture-pan 22 and are spaced apart. The egg-trays may be slid from or into the casing on the cleats and may be of any desired construction. A bracket 37 is fixed to the inner surface of the rear wall 14 of the casing and extends between the egg-trays.

A thermostat is formed of an outer plate or bar of steel 38 and an inner bar of brass or aluminium 39, rigidly connected and bent in oval form, the ends of the thermostat overlapping and provided with slots to receive a thermostat-rod 40, connected therewith by nuts 41 42. The thermostat is mounted on the bracket approximately in the plane of the eggs in the egg-trays and is secured to said bracket by a bolt 43 and nut 44. The rod 40 extends vertically through a pipe 45, traversing the moisture-pan and hot-air tank, and projects slightly from the top of the casing.

A damper-lever 46 is fulcrumed on angle-irons 47 48, mounted on the top of the casing, and an adjusting-screw 49 is screwed in a nut 50 on said lever and depends therethrough. The adjusting-screw 49 is tubular at its lower end and receives and rests on the upper end of the thermostat-rod 40. The forward end portion of the lever 46 is goose-necked, and a damper 51 is mounted thereon immediately over the top of the flue 16. The adjusting-screw 49 is located between the pivots of the lever and the damper. Hence the lifting force of the thermostat is exerted to lift the damper. The rear end of the lever 46 is formed into a loop or eye 46ª, and a poise or counterbalancing weight 52 is mounted thereon and confined thereby at a predetermined distance from the pivots of said lever.

Air-vents 53 54 are formed in the end wall 12 of the casing and lead vertically from the left end of the bottom of the egg-chamber through the top 11 of the casing. Slide-dampers 55 56 are mounted on the top 11 of the casing and may be adjusted manually over the air-vents 53 54 to control the flow of air therefrom.

Doors are hinged in and form the front of the casing, and the edges of the doors are rabbeted, as shown in Fig. 5, and packed or faced with felt to form air-tight joints with the jambs. The doors also are formed with double glass panes spaced apart to provide an air-space to minimize radiation of heat or cold, the panes 57 58 being parallel with each other and retained by beads or strips 59, attached to the inner edges of the rails and stiles thereof.

In practical operation the eggs are supplied to the trays and the doors closed. The water is supplied to the tank 25 and the cap 28 placed to close the pipe 27. The lamp 20 is lighted and the damper held down until the temperature in the egg-chamber reaches the desired degree through radiation of heat therein from the hot-air tank heated by the flow of air through the flue 16, pipe 17, air-tank, and air-vent pipe 18. Then the thermostat is adjusted to do the desired work by raising or lowering the adjusting-screw 49 in its seat to the degree necessary to balance the lever 46 in such a manner that any further increase of heat in the egg-chamber will expand the thermostat, and such expansion acting through the rod 40 will raise the adjusting-screw and lever and lift the damper from the top of the flue. When the damper is lifted from the top of the flue 16, the air heated by the lamp and rising therethrough will escape from the top of the flue instead of passing laterally through the pipe 17, tank 15, and vent 18. Any variation of temperature in the egg-chamber will expand or contract the thermostat and open or close the flue-damper. Thus is the temperature maintained approximately at the desired degree, since the operations of the thermostat are very sensitive. Heat radiated from the flue 16 to the inner shell of the water-tank increases the temperature of the air in the space between said shell and flue and since the dampers 55 56 are open causes a draft of

air through the interior of the shell, through the moisture-pan and perforations 23, and through the egg-chamber. The heat radiated from the flue to the water-tank heats the water therein and causes it to throw off a vapor at its open upper end, which vapor is carried by the draft of air through the moisture-pan and into the egg-chamber, to the end that the eggs are provided with a constant, uniform, and proper quantity or degree of moisture. The heating of the egg-chamber by the hot-air tank also facilitates the flow or draft of air through said chamber; but all of said air must be surcharged with moisture before it enters the chamber, the degree of moisture being determined by the size of the water-tank, quantity of water therein, or degree of heat radiated from the flue to the water-tank, and is controlled by manual adjustment of the dampers 55 56 over the vents 53 54 or the determination of the water and heat supply. Sufficient atmospheric air for the proper operation of the lamp and vehicle for conveying the heat to the interior of the hot-air tank is supplied by draft through the space between the lower end of the flue 16 and the outer surface of the chimney of the lamp.

I claim as my invention—

1. An incubator comprising a casing, the hot-air tank in the top of the casing, a flue vertically traversing the hot-air tank, a lamp in the lower end of the flue, a lever-damper located above the top of the flue and arranged to close said flue, a thermostat controlling said lever-damper, a pipe leading from the flue and discharging within the hot-air tank, a vent-pipe leading from the hot-air tank and discharging outside the casing, an annular water-tank having an inner shell of less height than the outer shell and the broad and relatively shallow moisture-pan fixed to the upper edge of the outer shell of the water-tank and open to the space between the shells of said water-tank and provided with moisture-vents in its edges, which moisture-pan is sealed to the bottom of the hot-air tank, the inner shell of the water-tank being spaced apart from the flue, whereby air may enter the flue and traverse the hot-air tank and be discharged through the top of the casing and air may enter the space between the flue and the inner shell of the water-tank and escape over the upper edge of said inner shell into the moisture-pan and thence through the egg-chamber of the casing to the atmosphere at the top of the casing and in so doing be heated by radiation from the flue and surcharged with moisture from the water-tank.

2. In an incubator, a hot-air tank, a flue traversing one end of the hot-air tank and fixed thereto, a pipe in the hot-air tank communicating at its initial end with the flue, extending forwardly from the flue, bent at right angles and extended lengthwise of the hot-air tank and then bent at right angles and extended rearwardly and terminating with an open end in the central portion of one end of the hot-air tank, and a vent-pipe leading from the hot-air tank adjacent the flue, in combination with a lamp in the flue, egg-trays in the chamber, and means for ventilating the egg-chamber.

3. In an incubator, a casing, a hot-air tank in the top of said casing, a flue vertically traversing one end of the hot-air tank and extending outside the casing, a damper arranged to close the upper end of said flue at times, a pipe located in the hot-air tank and communicating at its initial end with the flue, which pipe extends forwardly from the flue nearly to the front edge of the hot-air tank and is bent at right angles and extends along the front portion of said hot-air tank adjacent a doorway of said casing, and is again bent at right angles and extends rearwardly in the end portion of the hot-air tank opposite the flue and terminates with an open end in said tank, the vent-pipe leading from the hot-air tank at the rear of and adjacent the flue, a lamp in the lower end of the flue, egg-trays in the casing below the hot-air tank and means for ventilating the casing.

4. In an incubator, the hot-air tank, the broad and relatively shallow moisture-pan sealed to the bottom of the hot-air tank and provided with moisture-vents, the water-tank of annular form having its outer shell fixed to and depending from the moisture-pan and its inner shell of less height than its outer shell and open at both ends, the flue traversing the central opening of the water-tank and communicating with the hot-air tank, which flue is spaced apart from the inner shell of the water-tank, air-vents in the end of the incubator opposite to the water-tank and a lamp in the lower end of the flue, whereby air may enter between the flue and the inner shell of the water-tank and escape over the upper edge of said inner shell into the moisture-pan and thence through the egg-chamber of the incubator and in so doing be heated by radiation from the flue and surcharged with moisture from the water-tank.

5. In an incubator, the annular water-tank having an inner shell of less height than the outer shell, the broad and relatively shallow moisture-pan fixed to the upper edge of the outer shell of the water-tank and open to the space between the shells of said tanks, and provided with moisture-vents in its edges, the hot-air tank to the bottom of which the moisture-pan is sealed, which air-tank is formed with an aperture in vertical alinement with the center of the annular water-tank, a flue mounted within the central portion of the annular water-tank and extended through said aperture in the air-tank, which flue is spaced apart from the inner shell of the water-tank and extended wholly therethrough, the casing and the vent-pipes for the casing, whereby air may enter between

the inner shell of the water-tank and the flue, escape over the upper edge of said inner shell into the moisture-pan and thence through the egg-chamber of the casing to the atmosphere at the top of the casing and in so doing be heated by radiation from the flue and surcharged with moisture from the water-tank.

Signed by me at Des Moines, Iowa, this 23d day of September, 1899.

JETHRO L. MACY.

Witnesses:
JAS. MCKINNEY,
S. C. SWEET.