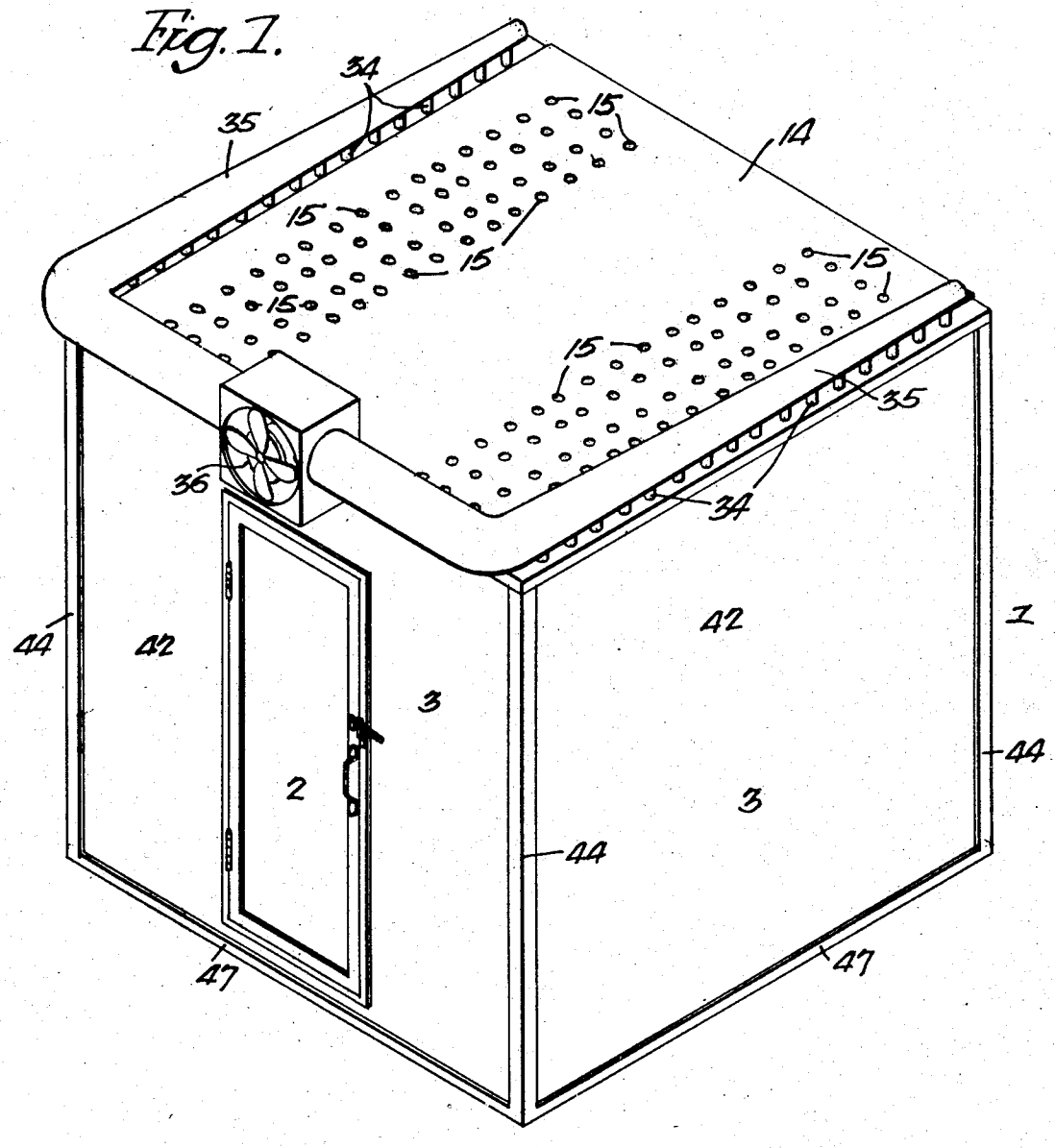
Nov. 25, 1930. W. R. GASKILL 1,782,309

INCUBATOR

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Fig. 1.



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Fig. 2.

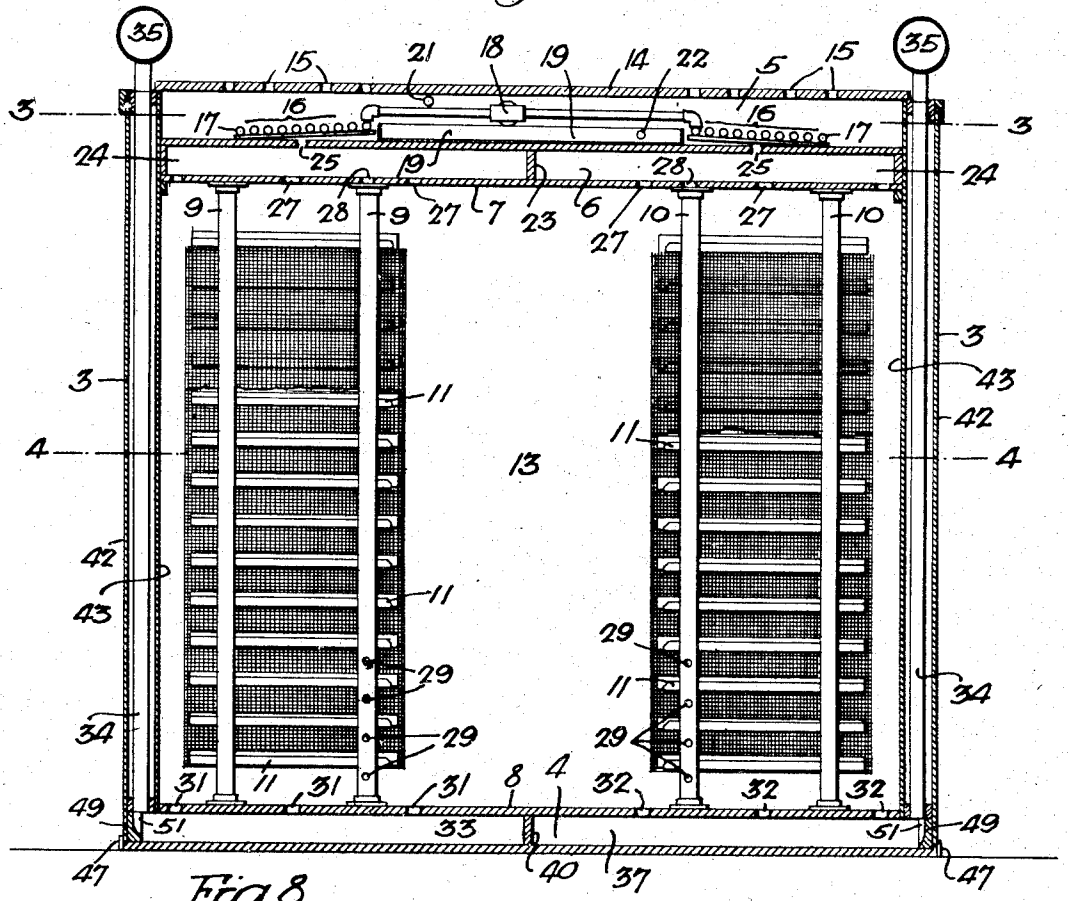


Fig. 8.

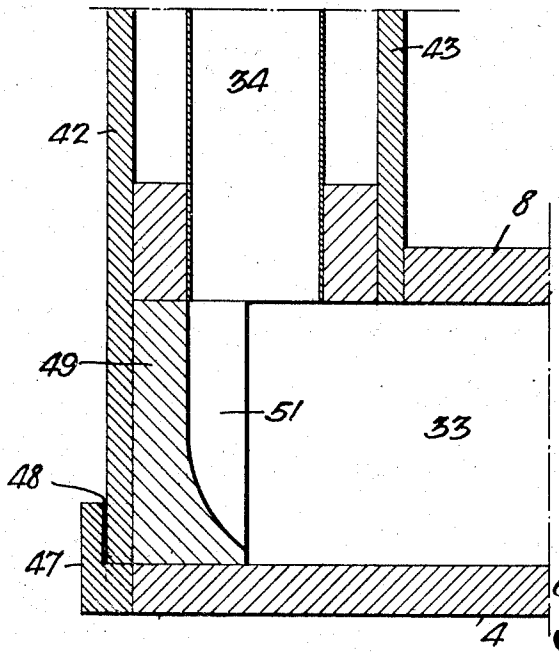
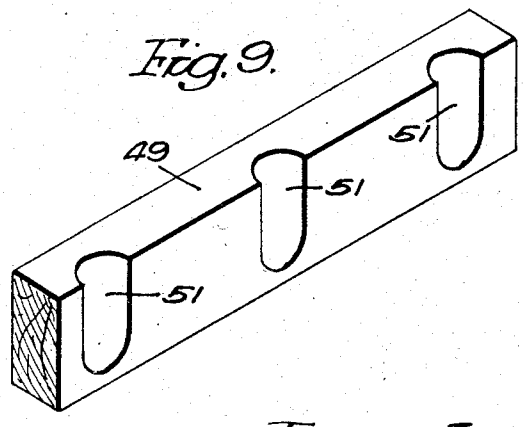


Fig. 9.



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Fig. 3.

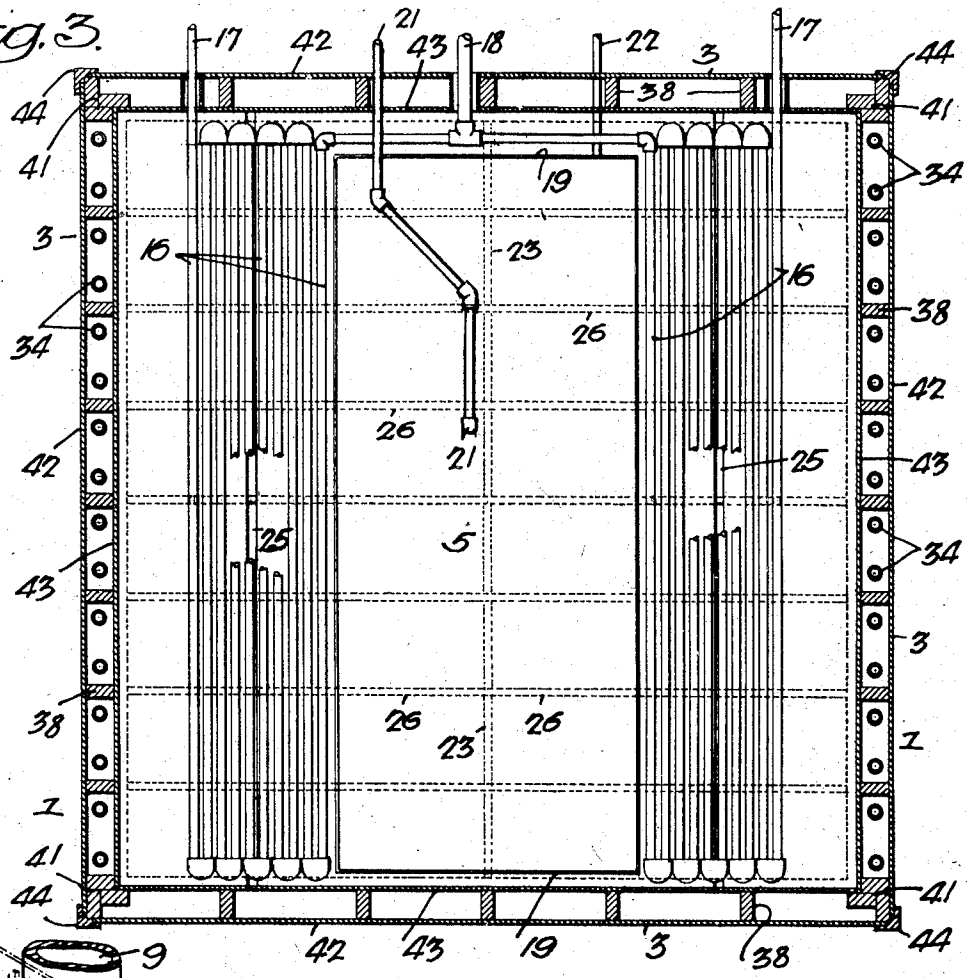


Fig. 7

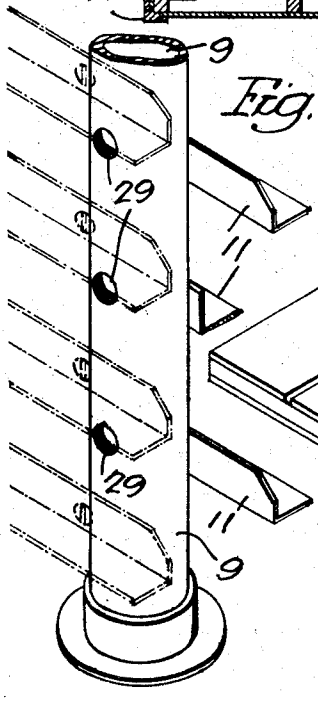
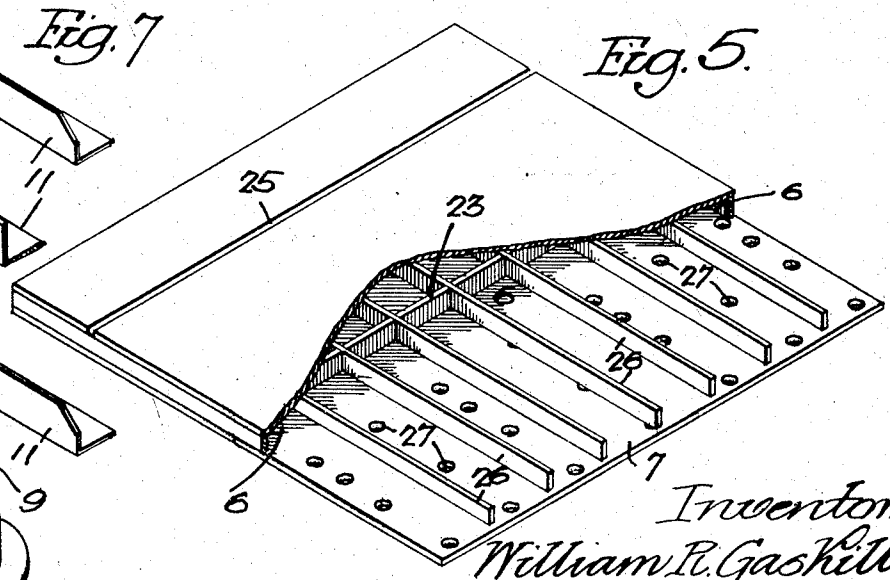


Fig. 5.



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Fig. 4.

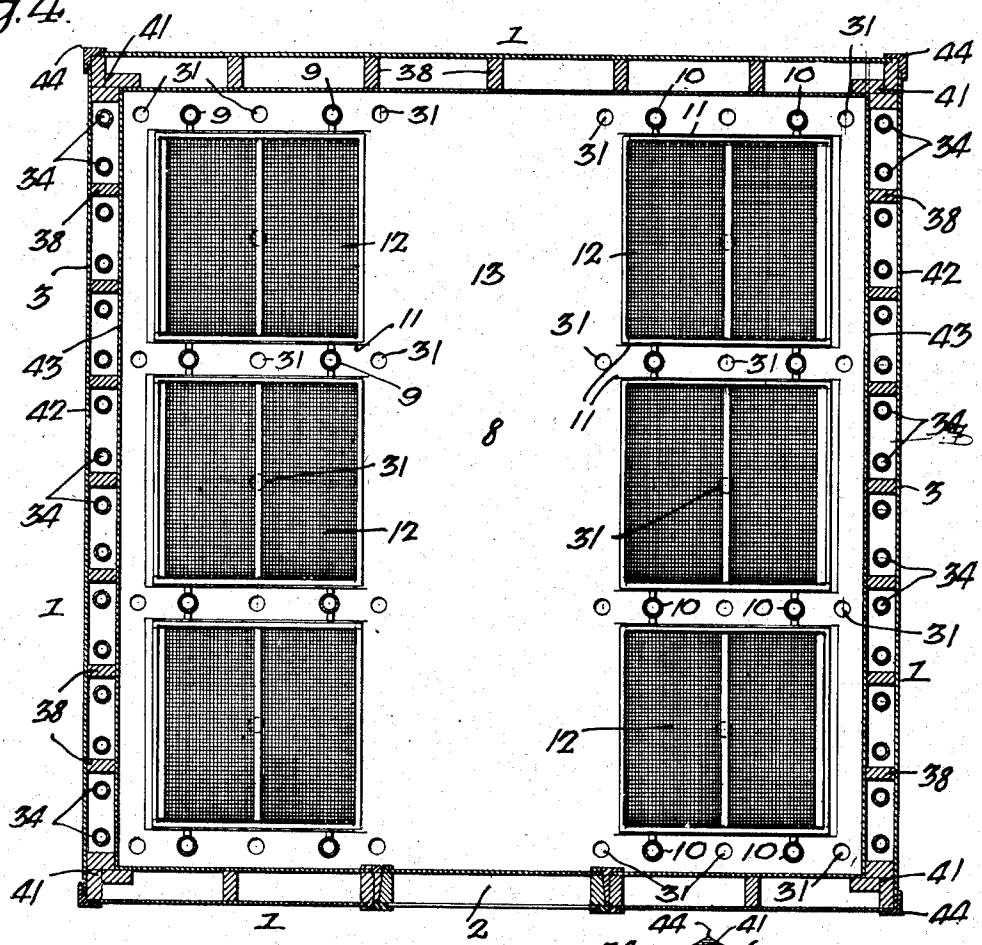
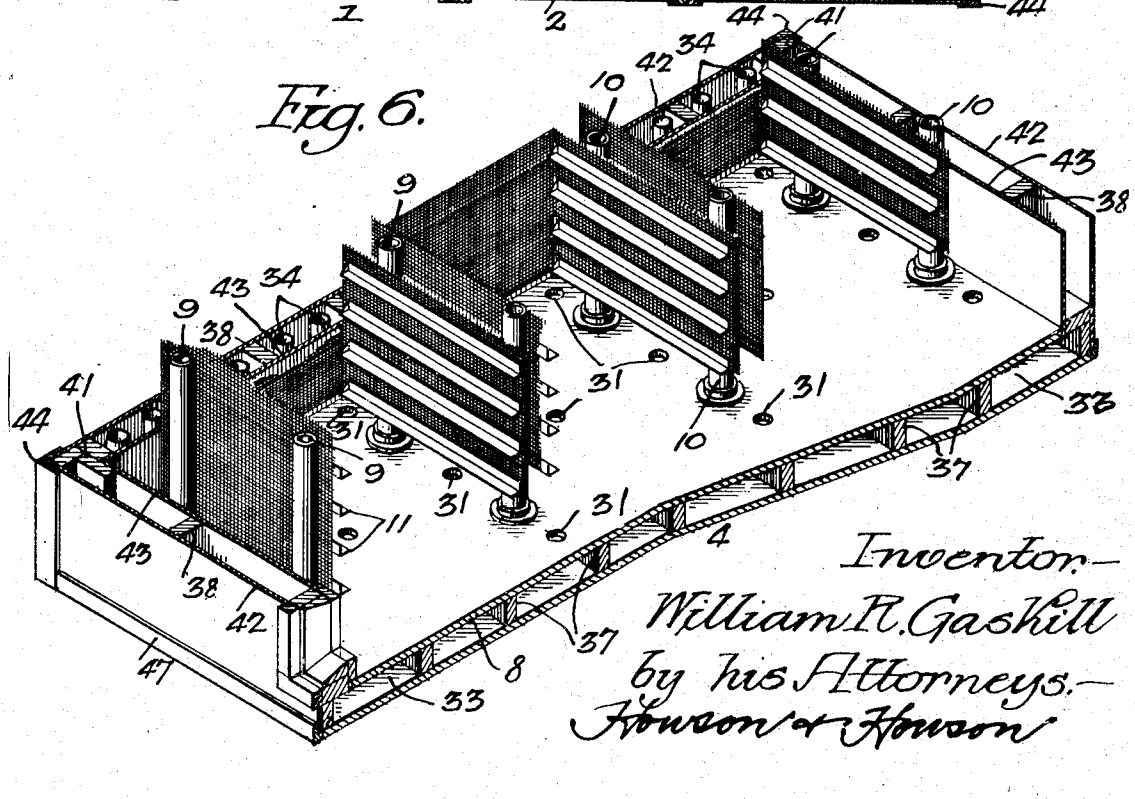


Fig. 6.



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Fig. 11.

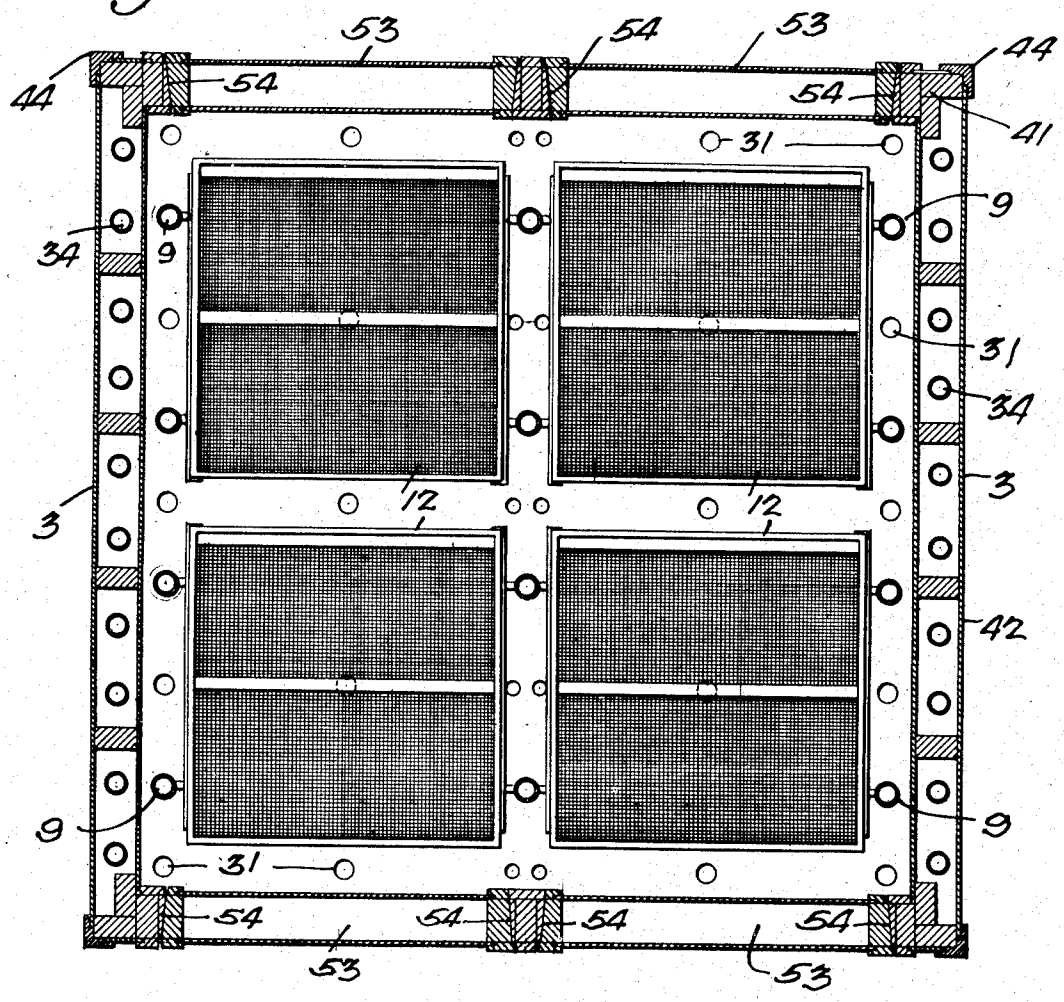
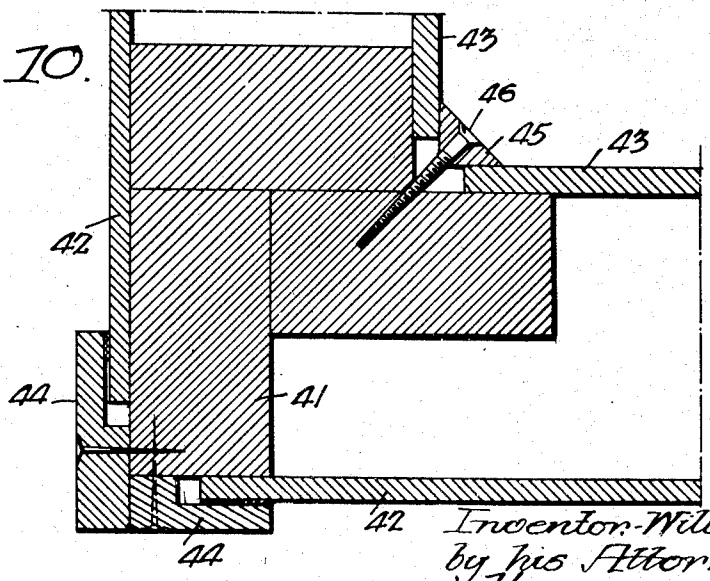


Fig. 10.



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UNITED STATES PATENT OFFICE

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INCUBATOR

Application filed November 3, 1924. Serial No. 747,661.

This invention relates to incubators for hatching eggs, and the principal object of the invention is to provide a compact incubator of relatively large capacity and exceptionally high efficiency in operation.

Another object of the invention is to provide an incubator provided with novel means for obtaining and controlling a forced circulation of air therethrough.

A further object of the invention is to provide an incubator having forced circulation, said circulation being obtained by means of suitable apparatus creating a suction in one part of the incubator tending to draw heated and humidified air into the incubator at another point, said points of exit and entry being so located with respect to each other and the various parts of the incubator as to effect a desirable circulation throughout the interior.

The invention further contemplates the provision of an incubator so constructed that it may be built in either single or multiple units of any desired capacity, the invention in its essential features being adapted to the construction of incubators either operated from the outside or having a central aisle or corridor in the interior from which an operator may have access to the stacks of egg-containing trays.

Incubators of two different types embodying my invention I have illustrated in the attached drawings, in which:

Figure 1 is a view in perspective of one form of incubator;

Fig. 2 is a transverse section of the incubator;

Fig. 3 is a horizontal section on the line 3—3, Fig. 2;

Fig. 4 is a section on the line 4—4, Fig. 2;

Fig. 5 is a fragmentary detached perspective partly in section of the inner distributing chamber;

Fig. 6 is a fragmentary sectional perspective illustrating the details of construction;

Fig. 7 is a fragmentary perspective showing a part of one of the rack-supporting standards having air ports for distribution of the circulated air;

Fig. 8 is an enlargement of one of the lower corners of the incubator as illustrated in Fig. 2;

Fig. 9 is a fragmentary perspective of one of the elements shown in Fig. 8;

Fig. 10 is a fragmentary horizontal section of one of the vertical corners of the incubator enlarged to illustrate details of the construction, and

Fig. 11 is a horizontal section of a modified form of incubator.

With reference to the drawings, and particularly to Figs. 1 to 10, inclusive, my incubator may comprise a chamber 1 of any size depending upon the capacity required. This chamber 1 is preferably rectangular in shape and is provided at one or both sides with a door 2 giving access to the interior.

As shown in Figs. 2 and 4, the walls 3 and floor 4 are of double thickness providing an air space, while the top of the chamber is so formed as to form two horizontal main chambers 5 and 6.

Between the ceiling 7 and the floor 8 of the chamber extend, longitudinally of the chamber, two series of uprights 9, 9, and 10, 10, to which, as shown in Fig. 6, are secured the slides or tray supports 11, 11, these supports in the present instance consisting of angle bars. The standards 9 and 10 with their respective slides or supports 11 constitute the racks which support the egg trays in stacks, there being in the incubator illustrated provision for six stacks of trays, three on each side, as best shown in Fig. 4, with an intermediate corridor 13, at one end of which is the door 2.

As illustrated in Fig. 6, the sides and back of each rack may be lined with netting or similar material to prevent the hatched chicks from falling from the trays. The latter, as will be apparent, are inserted in the racks from the corridor side, and provision is also made, as for example by detachable sections of netting not shown, for closing the front ends of the tray to prevent escape of the chicks from that side.

As shown in Figs. 1 and 2, the top wall 14 of the chamber is provided with two quadruple rows of apertures 15, 15, which extend respectively over the two sets of racks, these

apertures 15 being preferably so arranged that they uniformly cover the areas under which the said trays are located. Within the outer chamber 5 of the top of the chamber is located two sets of pipe coils 16, 16, the coils extending the full length of the chamber directly under the sets of apertures 15, 15. These coils constitute artificial means for maintaining the incubator at the desired temperatures, and may be connected to a boiler, not shown, by pipes 17 and 18 entering the chamber 5 through an end wall.

Also within the chamber 5 and between the coils 16, 16, space is provided overlying the corridor 13 for a moisture pan 19 by means of which a proper amount of moisture may be introduced into the air entering the incubating chamber. The pan 19 may be supplied from a pipe 21 entering the chamber through an end wall and being connected to the boiler, the open end of this pipe being located above the pan so that the latter may receive the condensed portion of the vapor introduced through the pipe 21. An overflow pipe 22 is provided in the pan to prevent flooding.

As previously stated, a second chamber 6 is provided at the top of the chamber 1, this chamber 6 being divided longitudinally of the chamber by a central partition 23 extending the full length of the incubator and forming two sub-chambers 24. The chamber 5 communicates with each of these sub-chambers 24, 24, through a slot 25 underlying each of the coils 16, 16, and each of the sub-chambers 24 is preferably sub-divided by a series of transverse partitions 26 into a number of independent compartments each having access to the incubating chamber through a series of ports 27. In this manner, it will be noted that the chamber 6 is subdivided into a comparatively large number of independent compartments uniformly connected with the chamber 5 through the slots 25; and the ports 27 may be so arranged as to number and size as to distribute the air entering the incubating chamber in a manner most favorable for incubation purposes.

To further assist in giving a proper circulation, I may make the standards 9 and 10 hollow, and may provide ports 28 in the ceiling of the main chamber 13 which communicate with the upper ends of these hollow standards. The standards may then be provided with ports 29 at points intermediate the top and bottom. In the present instance, I have shown only the inner rows of the standards 9 and 10, or those adjacent the corridor 13, so perforated and connected with the chamber 6, and in the present instance I have shown the ports 29 located near the bottom of the standards for reasons hereinafter set forth.

The floor 8 of the incubator I provide with series of perforations 31 and 32 underlying the racks on either side of the chamber. It will be understood, however, that as to the arrangement of the various intake and outlet ports, I am not restricted to my present showing, as their position may be largely modified without departing from the essential features of the invention.

The ports 31 and 32 open into the space between the floor 8 and the bottom of the incubator, and at the sides this space or chamber 33 communicates with a series of pipes or ducts 34 which extend upwardly through the hollow side walls of the incubator, and, projecting above the top thereof, connect with manifolds 35, 35, which latter as shown in Fig. 1, connect at the front of the incubator, in the present instance, with a suitable fan or blower 36. The pipes 34 at each side of the incubator are uniformly distributed in rows extending the complete length of the incubator, and the space 33 as well as the space between the side walls is preferably divided by the floor beams 37 and uprights 38 into a series of independent chambers, each one of which communicates with a predetermined number of the pipes 34, the space 33 also being sub-divided by a central transverse beam 40 in a manner similar to the sub-chamber 6.

The double walls of the incubator I may form of any material, and I have found for this purpose the well known composition or wall board extremely satisfactory. In using this material, it is desirable to provide ample room for expansion of the board under relatively great changes of temperature. I have accordingly so constructed the incubator that the walls are not positively secured by nails or the like, but are free to expand and contract.

With reference to Figs. 3, 4 and 10, it will be noted that at each corner of the incubator I provide an upright 41, and the outer facings or panels 42 are held in place against these uprights by angular corner pieces 44 which are secured to the inner uprights 41 in such manner that the securing elements do not pass through the panels 42. This may be done for example, as shown in Fig. 10, by passing screws or other securing elements through the angle 44 into the upright 41 at points near the corner. A similar device may be employed on the inside by using a corner piece 45 which may be secured to the uprights 41 by screws or other elements 46 passed through the center in such manner as to avoid the ends of the inner panels 43.

The outer walls 42 at the bottom may be confined by a molding strip 47, as shown in Fig. 8, the joint being made tight by means of a gasket or strip of felt or like material 48. In this manner, the panel is permitted to expand in a vertical direction. All the joints of the incubator may be provided

with a gasket similar to that described, if desired.

The side pieces 49 of the floor frame, as shown in Figs. 2, 8 and 9, are recessed or channeled beneath each of the ducts 34, as indicated at 51, so that the air will have an unrestricted entry into said ducts. These recesses permit the use of a full width beam at the sides for strength.

The operation of the incubator is as follows:

The fan 36, which may be driven by an electric motor, or by any other suitable power means (not shown) draws air from the manifolds 35, and thereby tends to evacuate the interior of the incubator. As a result, air is drawn through the apertures 15 at the top into the chamber 5, and through the coils 16 to the slits 25, the air in its passage through the chamber 5 being properly humidified from the moisture in the pan 19 and from the vapor introduced through the pipe 21. From the chamber 5, the air passes through the slits 25 into the compartments of the chamber 6, and thence through the apertures 27 and through the hollow inner standards 9 and 10 into the incubating chamber. The apertures 27 and the outlet apertures 31 in the floor are so located that the air is drawn down over and around the stacks of eggs. From the chamber 33 below the floor, the air passes through the pipes 34 to the manifolds 35 at the top and is ejected by the fan.

The air drawn through the standards 9 and 10 and from the standards through the apertures 29 has a tendency to create a circulation of air in the corridor 13 and to prevent stagnation in that part. This air has a tendency to circulate upwardly through the corridor and back into the normal air current between and around the stacks, thereby preventing the formation of dead areas or pockets in the corridor with resultant lack of uniformity in the temperature of the incubating chamber.

Under some circumstances, I have found it desirable to make the exhaust ports of the incubator generally of greater capacity than the intake ports whereby there is a tendency to maintain the interior of the incubator at a pressure slightly below atmospheric.

Exceedingly good results have been obtained by the use of the down draft and by obtaining circulation through suction rather than by forcing the air into the incubator. The suction while affording as great an air volume as obtainable by driving the air into the incubator, gives a materially greater evenness and uniformity of circulation, and the circulation is by this means more easily controlled. Furthermore, passing the air up through the side walls of the incubator after it leaves the incubating chamber utilizes to a maximum extent the heat of the air and makes it possible to maintain a practically constant temperature in the incubating chamber.

It will further be apparent that the construction as described may be easily modified to meet any conditions under which the incubator may be used and to regulate the circulation as desired.

In Fig. 11, I have illustrated a modification in which access to the egg trays may be had from outside the incubating chamber. In this instance, the central corridor is eliminated, and instead a door is provided for each stack of eggs. The general construction and operation is identical with that previously described. The incubator structure in this instance comprises four doors 53 which may have the double construction of the walls and floor of the incubator and may be provided with any suitable means such as the tapered joint 54 for making the incubator entirely air-tight. The trays are introduced and removed and access may be had to the trays during the period of incubation by opening these doors 53.

It is obvious that there may be further modifications without departure from the essential features of the invention.

I claim:

In an incubator, the combination of an incubating chamber, of a plurality of tray-supporting standards within said chamber, at least one of said standards being hollow, a port communicating with the top of said hollow standard, ports in said standard at a point below the top, and means for creating a circulation of air through the standard and out of said ports into the said chamber.

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