

May 30, 1933.

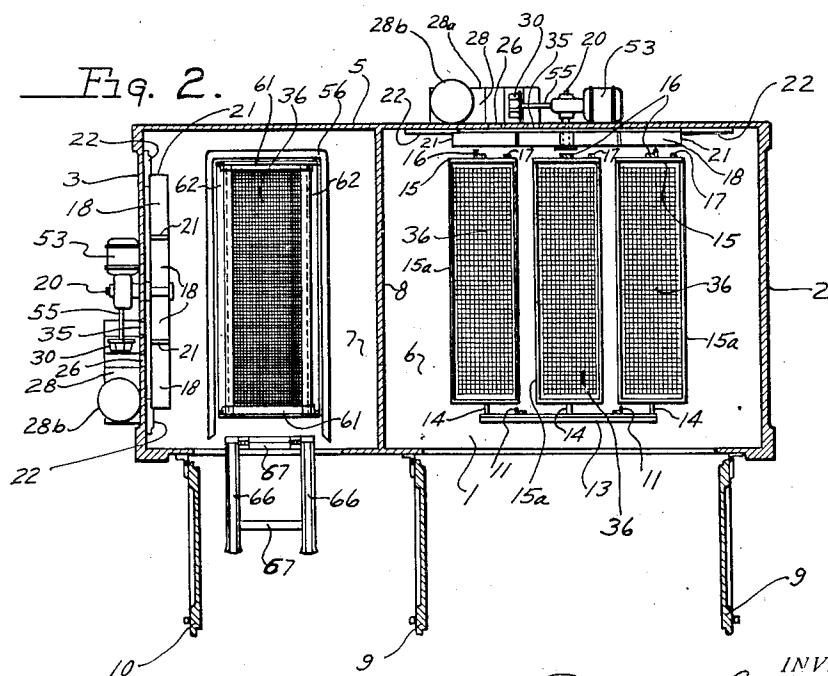
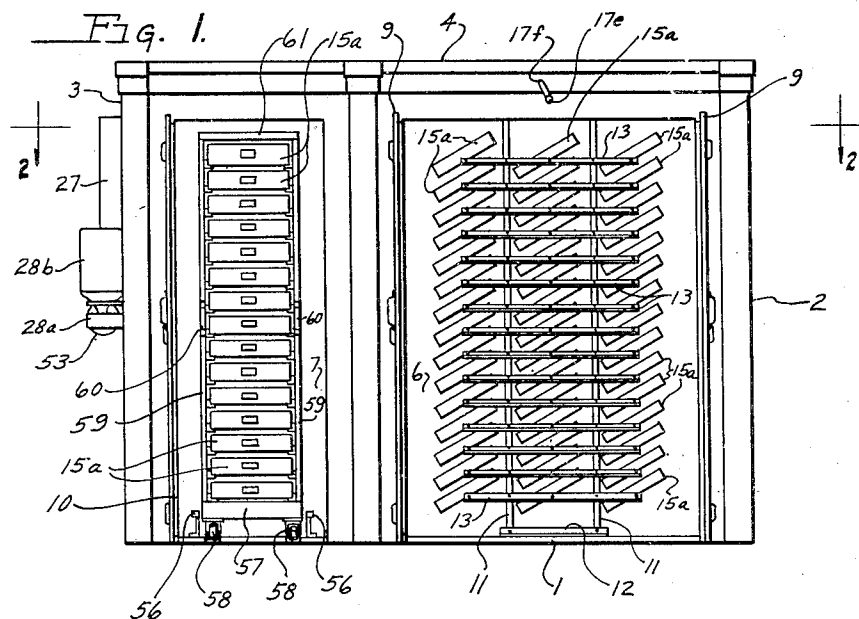
F. E. STOVER

1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 1



INVENTOR
Frank E. Stover.
 BY *Paulman & Paulman*
 ATTORNEYS

May 30, 1933.

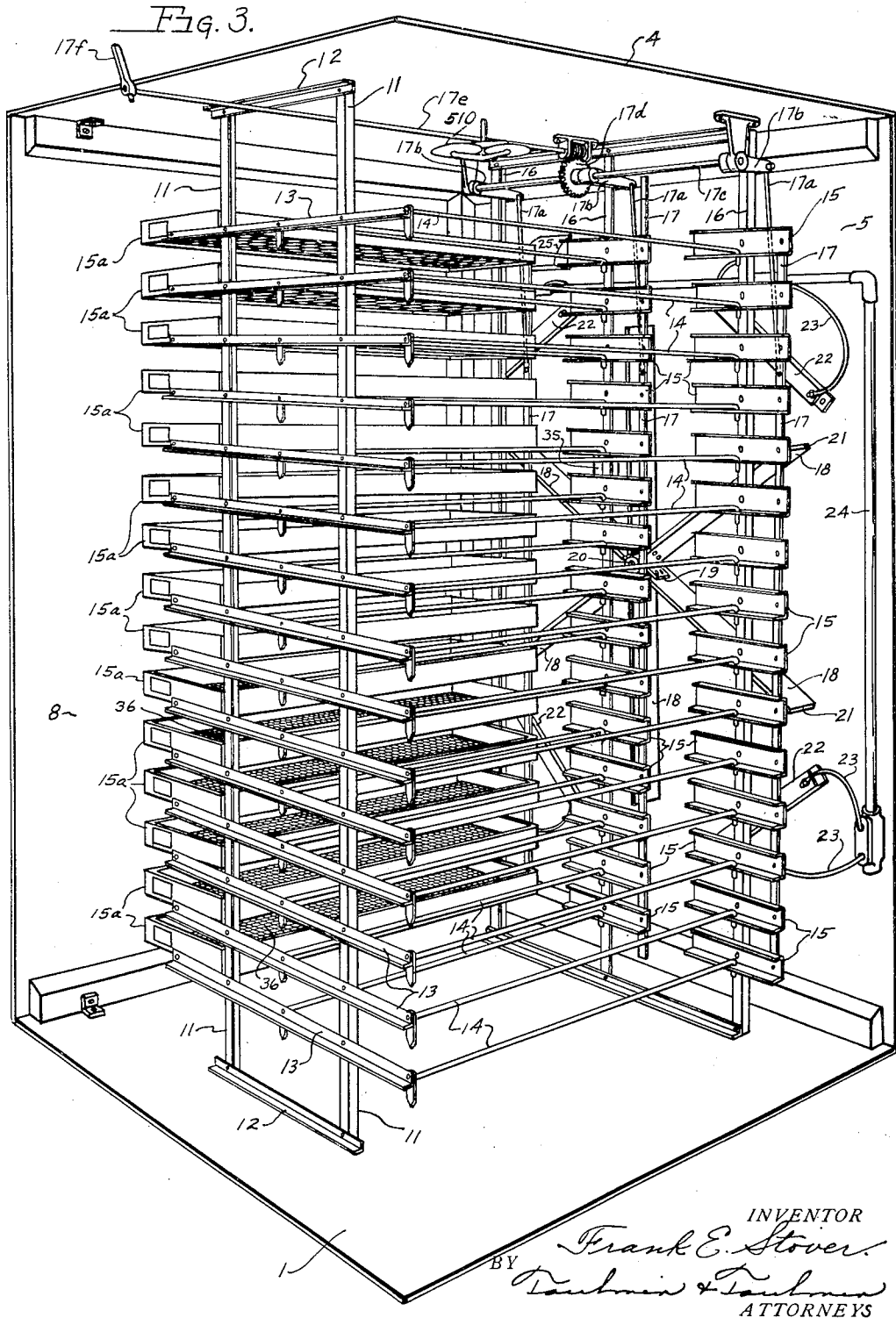
F. E. STOVER

1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 2



INVENTOR

Frank E. Stover

BY

Taubman & Taubman
ATTORNEYS

May 30, 1933.

F. E. STOVER

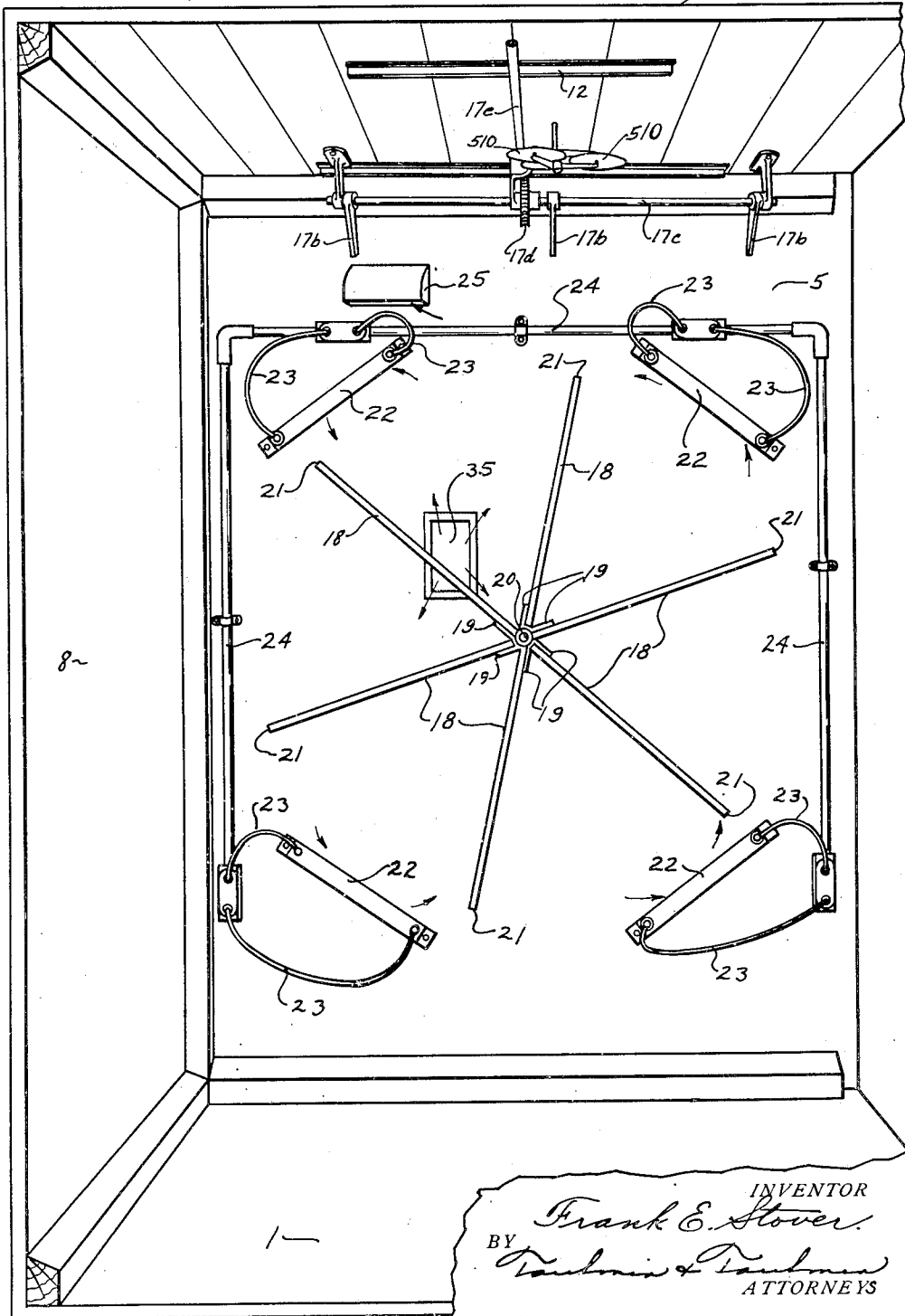
1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 3

Fig. 4.



May 30, 1933.

F. E. STOVER

1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 4

Fig. 5.

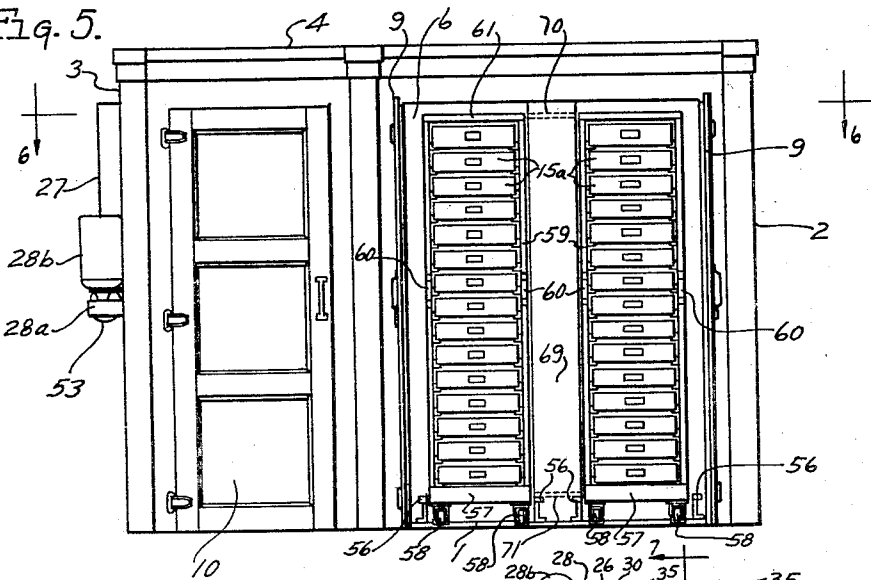


Fig. 6.

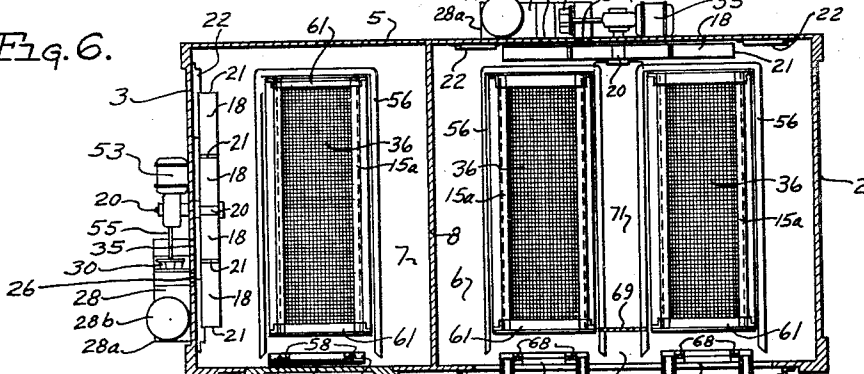
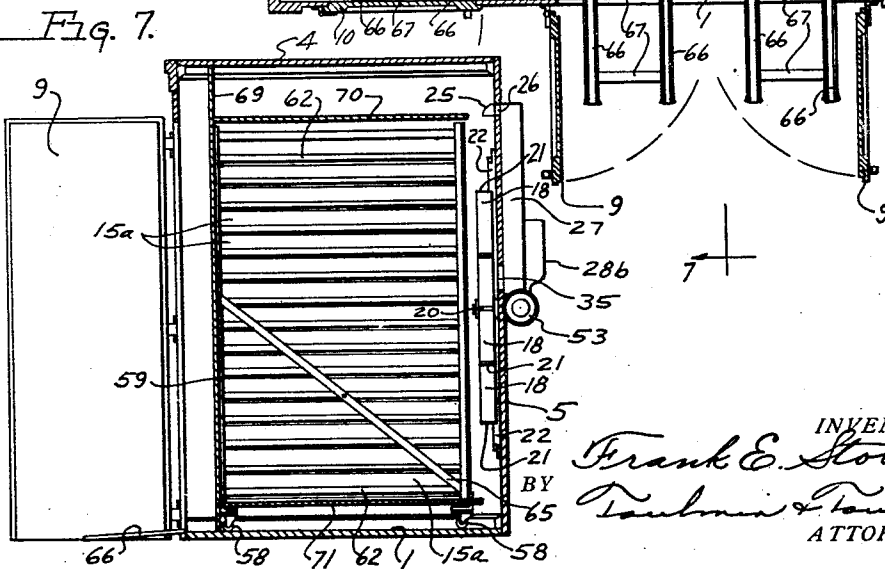


Fig. 7.



INVENTOR
Frank E. Stover.
BY *Taulman & Taulman*
ATTORNEYS

May 30, 1933.

F. E. STOVER

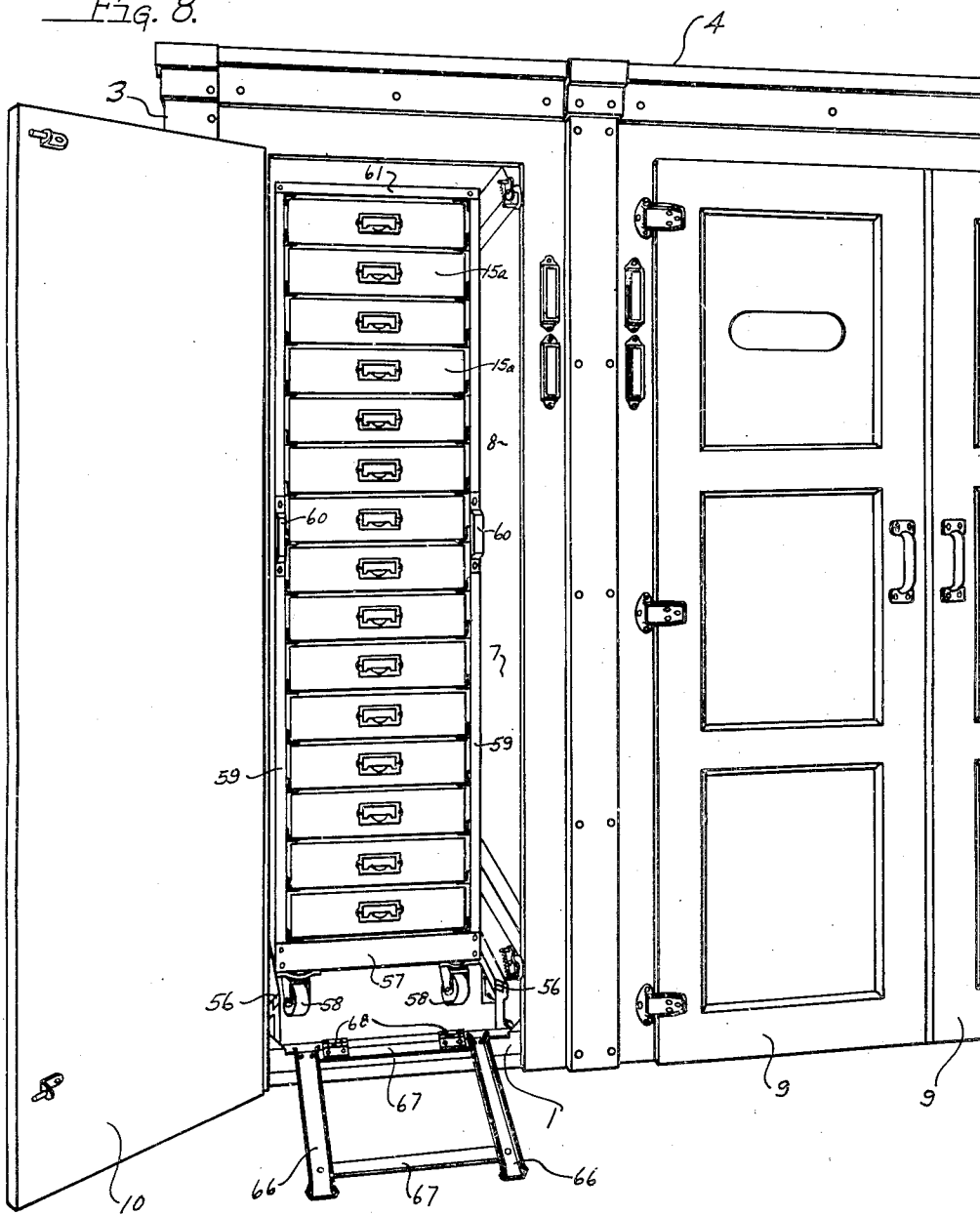
1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 5

Fig. 8.



INVENTOR
Frank E. Stover
BY *Taubman & Taubman*
ATTORNEYS

May 30, 1933.

F. E. STOVER

1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 6

Fig. 9.

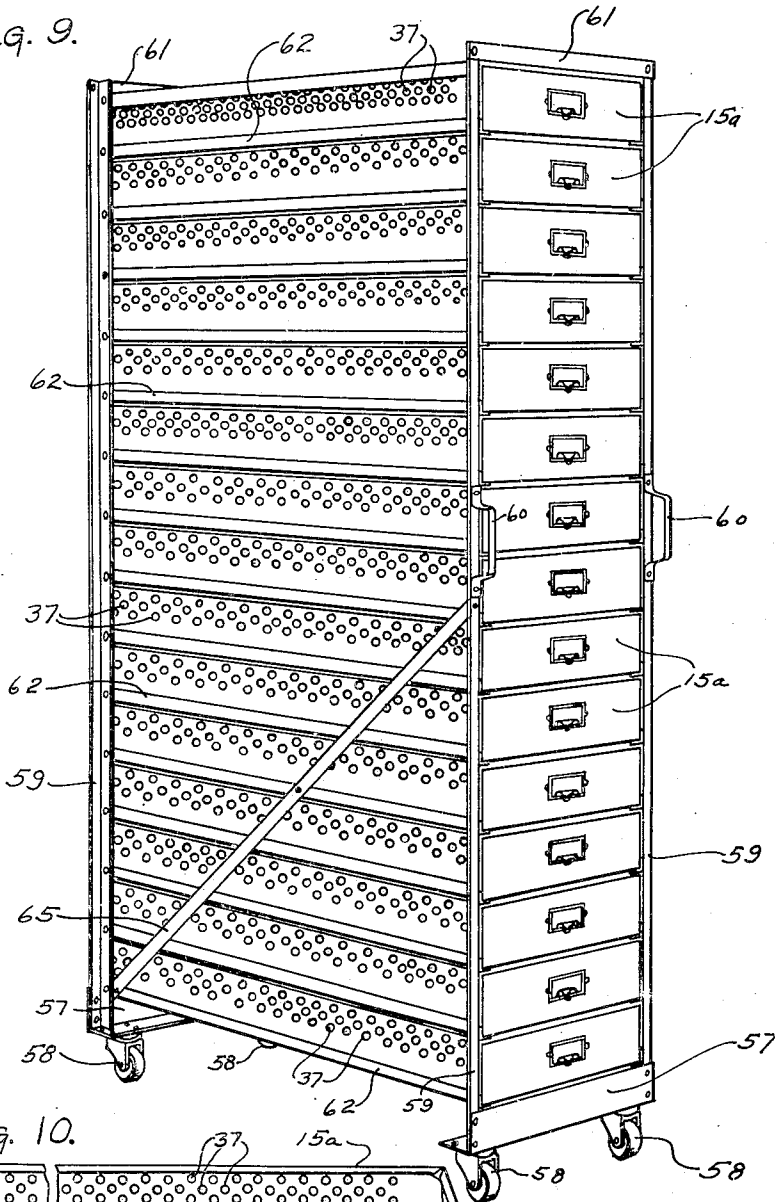
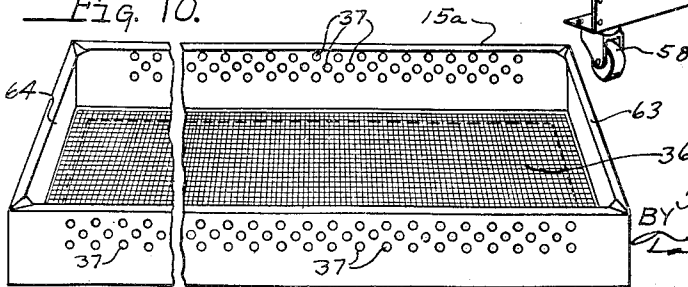


Fig. 10.



INVENTOR
BY *Frank E. Stover*
Taulman & Taulman
ATTORNEYS

May 30, 1933.

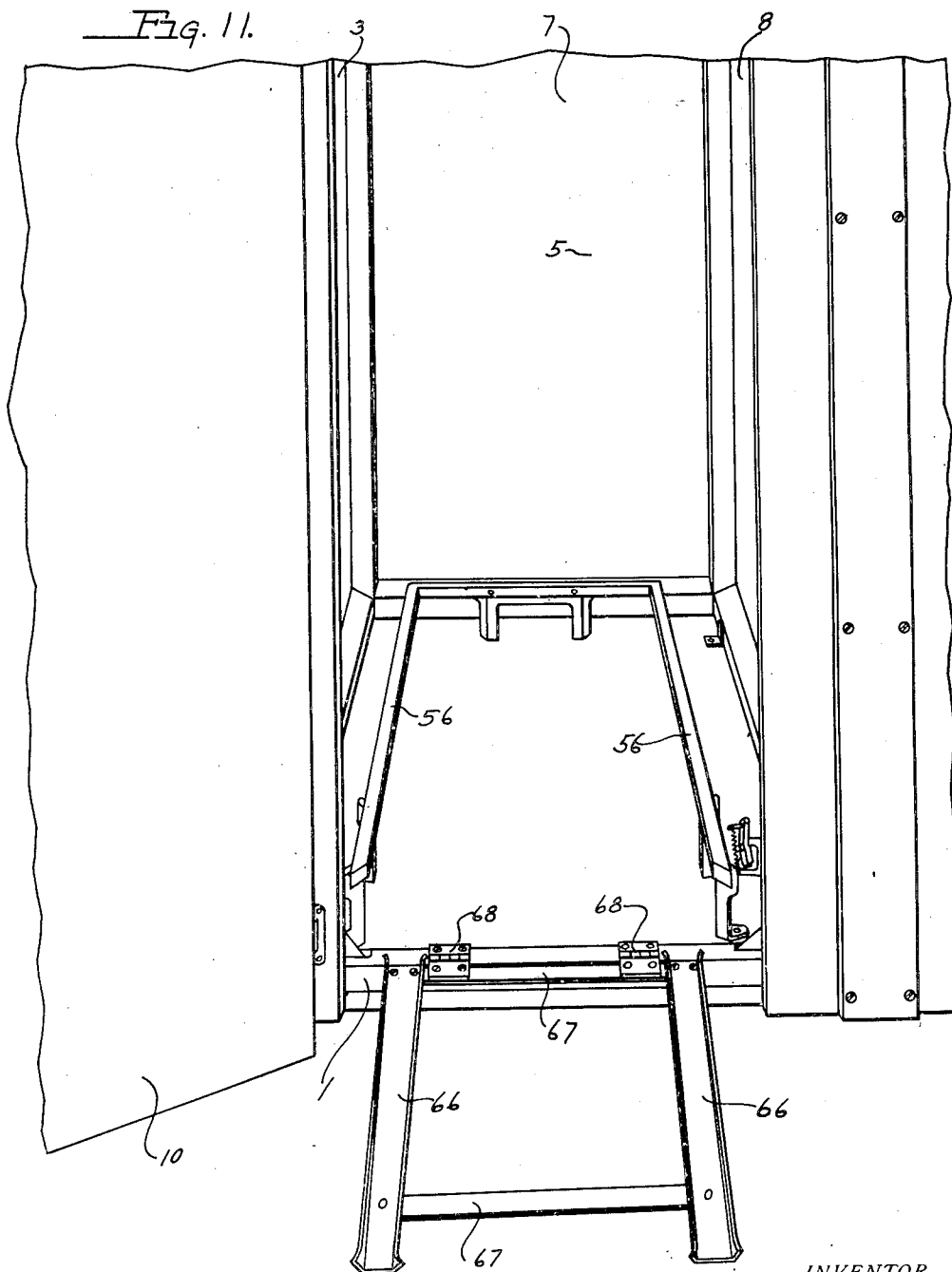
F. E. STOVER

1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 7



INVENTOR
Frank E. Stover.
BY *Taulmin & Taulmin*
ATTORNEYS

May 30, 1933.

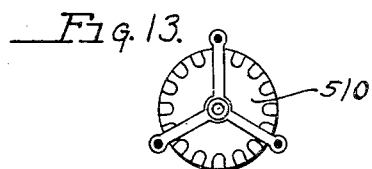
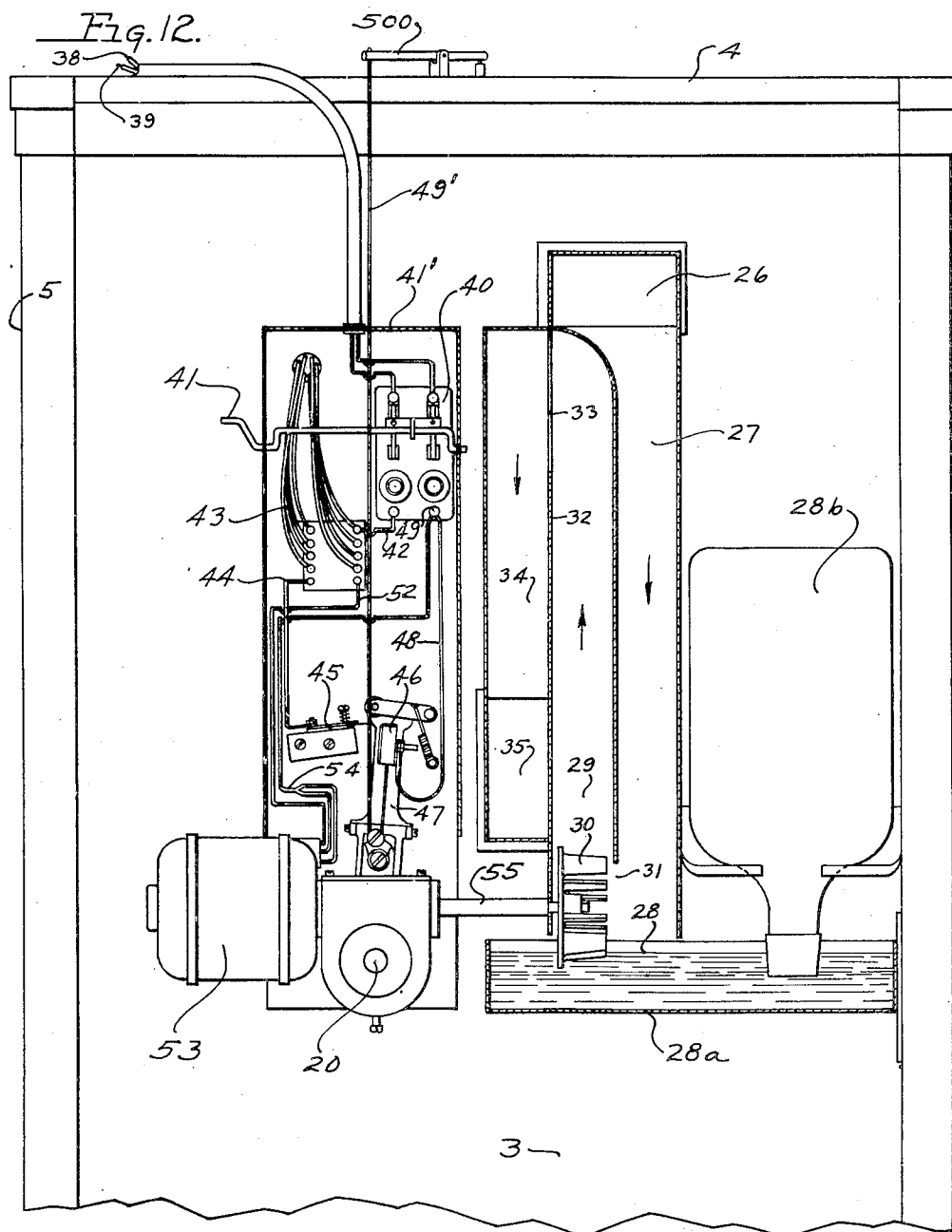
F. E. STOVER

1,911,249

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Filed Oct. 31, 1930

8 Sheets-Sheet 8



INVENTOR
Frank E. Stover.
 BY *Taubman & Taubman*
 ATTORNEYS

UNITED STATES PATENT OFFICE

FRANK E. STOVER, OF SPRINGFIELD, OHIO, ASSIGNOR TO THE BUNDY INCUBATOR COMPANY, OF SPRINGFIELD, OHIO, A CORPORATION OF OHIO

METHOD AND APPARATUS FOR INCUBATION OF EGGS

Application filed October 31, 1930. Serial No. 492,516.

My invention relates to incubators.

It is the object of my invention to provide a method of incubating and hatching which will provide adequate distribution of heat and moisture for incubation and appropriate heat and moisture for hatching whereby there will be relatively low moisture during the incubation period to avoid sticky chicks and relatively high moisture during the hatching period in order to provide a soft shell for easy hatching of the chicks from the shell; and to further insure that transmission of disease is prevented by having the hatching separate from the incubation, but joined in a unitary structure in order that the apparatus may be operated as a unit.

It is a further object to provide an arrangement whereby excess heat produced during the hatching period may be removed from the eggs in the hatching period.

It is a further object of my invention to provide separate inclosed spaces and a common cabinet, an independent means for stirring the air and regulating the moisture in the respective inclosed spaces, as well as controlling the temperature therein in order to provide independent control in the single cabinet of a hatching inclosed space and incubation inclosed space.

It is a further object to provide an arrangement by which the air from the stirrers will be delivered radially from the tips of the stirrers over the heating elements in the path of the stirrers peripherally arranged around the stirrer blades.

It is my object to provide means for scooping a portion of such heated air from the cabinet and delivering it through a scoop into and through a humidifier and thence back into the cabinet in the path of the stirrer blades for stirring the humidified air in heated condition within the cabinet.

It is a further object to provide a common source of power, a master switch therefor which is adapted to control the delivery of current to the heating elements, the delivery of current to the motor which operates the stirrer and humidifier, and the delivery of current through the heating element switch that is thermostatically controlled.

The method disclosed herein is claimed in my divisional application, Serial No. 648,367, filed Dec. 22, 1932.

Referring to the drawings:—

Figure 1 is a front elevation of the unitary cabinet with the doors of the inclosed incubation space and inclosed hatching space open.

Figure 2 is a section on the line 2—2 of Figure 1 looking in the direction of the arrows.

Figure 3 is a perspective of the incubating space with a portion of the trays removed showing the arrangement of the stirrer, heating elements, and means for tilting the egg trays, two of the walls being removed for the purpose of illustration.

Figure 4 is a similar view with the trays and tray carriers removed showing in detail the arrangement of the stirrer, the heating elements, the outlet scoop for heated air and inlet port for heated, humidified air.

Figure 5 is a front elevation of the dual arrangement of hatching spaces, one of which has two stacks of trays with the doors open and one of which has a single stack of trays with the door closed.

Figure 6 is a section on the line 6—6 of Figure 5 looking in the direction of the arrows.

Figure 7 is a section on the line 7—7 of Figure 6.

Figure 8 is a view similar to that in Figure 5 showing the door open on the single cabinet and illustrating the movable track in position for guiding the single stack of trays out of the cabinet.

Figure 9 is a perspective of the tray rack with the trays in position.

Figure 10 is a perspective of the tray.

Figure 11 is a perspective of the floor of the hatching cabinet with the positioning rails and discharge track in position.

Figure 12 is a side elevation of the cover in section of the humidifier and of the electric connections together with the switch.

Figure 13 is a top plan view of the thermostat that operates the heating switch.

Referring to the drawings in detail, 1 is the bottom of a cabinet, 2 and 3 the side walls

thereof, 4 the top, and 5 the back. The cabinet is divided into an inclosed incubation space 6 and an inclosed hatching space 7 by the partition 8.

5 Suitable doors 9 control the incubation space and a similar door or doors 10 the hatching space.

The incubating space is provided with a frame-work consisting of the uprights 11
10 arranged in a pair at the front of the machine and attached to the top and bottom thereof by the cross plate 12 which is attached to the inside of the top and inside of the bottom of the hatching space 7. Mounted
15 upon these vertical bars is a series of cross bars or cross angle pieces 13, which support pivotally the actuation rods 14, the other ends of which are inserted in the tray holders 15 so that they will serve to rotate the
20 tray holders which are pivotally mounted upon the uprights 16 at the back of the cabinet. These tray holders are interconnected so that they will be moved about their pivots as a unit by the rods 17. To the rods
25 17 are connected a pitman 17a, cranks 17b on the rod 17c which are actuated by the gears 17d, shaft 17e and handle 17f on the exterior of the cabinet. Thus the trays can be tilted as a unit as shown in Figure 1. The
30 turning means here described is similar to that claimed in copending application Ser. No. 418,823.

Behind the trays 15a at the back of the machine is a flat bladed stirrer having the
35 blades 18 attached by the blades 19 to the axle 20. The tips of these blades are designated 21. The blades are located between the trays and the rear wall 5 of the incubator. Mounted on this rear wall 5 around the periphery of the blades 18 and adjacent the tips
40 21 thereof are the diagonally disposed heating elements 22. The cables 23 for these heating elements 22 are carried in the conduit 24. The air leaving the tips 21 of the blades 18
45 peripherally flows over the heating elements 22.

In the path of this air which flows off of the tips 21 of the blades 18 over the heating elements 22 is a scoop 25 projecting into the
50 cabinet through the rear wall 5.

Turning to Figure 12, it is noticed that this scoop delivers the heated air through the opening 26, thence downwardly through the passageway 27 and over the pool of water 28
55 from which a supply is picked up and delivered into the passageway 29 by the humidifier wheel 30 that is located adjacent the opening 31. The air thence passes upwardly over the partition 32 so as to insure deposition of
60 any excess moisture and thence through the opening 33 downwardly through the passageway 34, having been freed of the excess moisture and then discharges into the passageway 35, which is shown in Figure 4. This discharge is at right angles to the flow of the

air along the surface of the blades 18, and thence over the heating elements 22. This causes a churning of the air within the inclosed space 6 and thorough movement of the air between the eggs in the tilted trays. The
70 trays are provided with the usual wire mesh bottoms such as are shown in Figure 10 at 36. The side walls of the trays may be perforated with perforations 37. Ordinarily, however, the eggs in the incubating space are placed
75 in trays with solid side walls, while trays with perforated side walls are used in the hatching space for reasons hereinafter described.

Electric current is supplied by the cables 38 and 39 to the two pole switch 40 controlled by the switch handle 41 within the switch box 41'. One pole of this switch is connected to the line 42 which leads to the heating elements. The return line from the heating elements 43 is connected through the cable 44
80 to one side of the thermostatically controlled switch 45. The other side of this switch designated 46 carried on the rocking arm 47 is connected to the cable 48 that is in turn connected to the other pole 49 of the two pole
85 switch. The two sides of this thermostatically controlled switch 45 and 46 are controlled by the rod 49' actuated by the lever 500 and the thermostat 510. The details of the actuation of this switch form no part of
90 the present invention.

The side of the two pole switch represented by the cable 42 is also connected by the cable 52 to one side of the motor 53, the other side of the motor being connected by
100 the cable 54 to the terminal 49. This motor drives the humidifier shaft 55 and the humidifier 30. The shaft 55 drives the shaft 20 of the stirrer through suitable gearing.

The water 28 in the pan 28a is supplied
105 from the water bottle 28b.

Each hatching space and each incubating space is provided with its own stirrer motor and humidifier with the necessary complement of switches to control the cutting in
110 and cutting out of the heating elements. In Figures 5, 6 and 7 are shown these several arrangements.

In each of the types of hatching spaces are found the aligning guide rails 56 supported
115 on the floor in spaced relationship to the floors, side walls and back of the hatching space. These rails are arranged on three sides of the floor in spaced relationship to the wall of the cabinet. They serve to guide the wheel
120 tray racks which are thus positioned in spaced relationship with respect to the walls of the hatching space. This tray rack consists of front bottom plate 57 mounted on casters 58 and having up-right corner pieces
125 59. These corner pieces carry the handles 60 and are joined together at the top with a cross member 61.

The rear of the frame is similarly arranged, having parts with the same numbers. These
130

two frames, the front section and rear section, are joined together by tray supports consisting of angle members 62, which support the trays shown in Figure 10. These trays have solid front and rear walls 63 and 64, side walls with perforations 37, and a screen bottom 36. Diagonal braces 65 are provided to insure sufficient rigidity of structure. The casters 58 are adapted to be guided into and out of the cabinet on the tracks 66 which are held together by cross pieces 67, one of which is hinged by the hinges 68 to the outer edge of the bottom of the inclosed space. By thus positioning this portable rack of trays by the guard rail 56, the rack of trays can be brought closely adjacent to the stirrer and the heating element without danger of contact therewith, either because of the construction of the parts or because of the danger of transmission of electric current through the metallic trays and framework. As will be seen in Figure 6, in the case of the hatching space with the single portable rack of trays, the stirrer is mounted to one side of the rack opposite the circulation openings 37 and the stirring of air causes the air to percolate vertically through the eggs and wire bottom 36 and transversely through the eggs and openings 37. Where there are two or more racks used, the air is caused to move off of the ends of the blades, to churn the air, and to enter laterally as described through the sides of the trays although the stirrer is located at the back of the trays. The trays themselves are separated by a vertical partition 69 and horizontal top and bottom partitions 70 and 71 that extend horizontally below the top and above the bottom to a point within about 8 inches of the plane of movement of the stirrer.

These partitions are located between the racks of trays and insure the movement of the churned air in all directions to the passage of air through the openings 37 in the sides of the trays.

Method of operation

According to the method of incubation that I practice in my incubator, I place the eggs in the incubating space, tilt them from time to time, stir the air and churn it, cause it to percolate through the eggs and impart to it uniform heat by allowing the air to slip off of the flat blades of the stirrer over the heating elements. Thus all of the heated air is delivered radially from the stirrer, but being without any means to guide it, thereafter moves in irregular paths, is churned, mixed and diffused throughout the cabinet. A certain portion passes out through the scoop as heretofore described, takes up moisture, is freed of surplus moisture and is returned near the center of the stirrer, whence it passes out again radially of the blades.

The humidity control and the amount of

humidity in the incubating space are the essentials of my invention. I arrange the humidity from 78 to 80 degrees while maintaining the temperature at 99½ degrees. When the eggs are at the end of the 18th day of incubation, I move them over into the hatching space where I increase the humidity from 84 to 86 degrees while maintaining the temperature at 99½ degrees. Thus by keeping the humidity down during incubation, I prevent the chicks from becoming sticky and adhering to the shell, but upon being put into the hatching space, I can safely increase the moisture which softens the shell and enables an easy hatch. The chick is then so far advanced at the 18th day that the increase in moisture does not have a disadvantageous result heretofore indicated of excess moisture during the incubation period. This cannot be avoided where the eggs being incubated and eggs being hatched are in the same space. By using the combined spaces of incubation with uniform heat and relatively low humidity and hatching with uniform heat and relatively high humidity, I secure the new result of a very soft shell easily broken by the chick while at the same time the chick has adequate moisture during its incubation period, but not enough moisture to cause adherence to the shell. Of course, I get the further result of prevention of the transmission of disease and of greatly increased cleanliness, as the refuse from hatching is kept out of the incubation chamber. By combining the two inclosed spaces in a single insulated cabinet of usual construction, I am enabled to get the benefit of the heat in one space with respect to the other as the conduction from one to the other through the adjacent partition wall results in economy of the total heat. The hatching space can be disinfected without disturbing the progress of incubation.

It will be understood that I desire to comprehend within my invention such modifications as may be clearly embraced within the scope of my claims and invention.

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

1. In combination, an inclosed space having therein, a flat-bladed stirrer and a plurality of heating elements arranged around the periphery of the stirrer and in the path of the air moving radially from the tips of the stirrer, means for operating the stirrer and means for withdrawing a portion of the air from the inclosed space adjacent the tips of the stirrer and returning it to the center of the stirrer, and means of humidifying said air after it is withdrawn and before it is returned to the inclosed space.

2. In combination, an inclosed space having therein, a flat-bladed stirrer and a plurality of heating elements arranged around

- the periphery of the stirrer and in the path of the air moving radially from the tips of the stirrer, means for operating the stirrer, and means of withdrawing a portion of the air from the tips of the stirrer and returning it to the center of the stirrer, and means of humidifying said air after it is withdrawn and before it is returned to the inclosed space, and a common means of actuating the stirrer and the humidification means.
3. In an incubator, an inclosed space having therein, a plurality of spaced stacks of egg trays having side apertures and foraminous bottoms with closed ends, a vertical partition between the fronts of said stacks of trays, horizontal partitions at the top and bottom of said stacks of trays extending backwardly to the ends of said trays, a stirrer behind said trays, and means for operating the stirrer.
4. In an incubator, an inclosed space having therein, a plurality of spaced stacks of egg trays having side apertures and foraminous bottoms with closed ends, a vertical partition between the fronts of said stacks of trays, horizontal partitions at the top and bottom of said stacks of trays extending backwardly to the ends of said trays, a stirrer behind said trays, means for operating the stirrers, and means for heating the air arranged peripherally of said stirrer.
5. In an incubator, an inclosed space having therein, a plurality of spaced stacks of egg trays having side apertures and foraminous bottoms with closed ends, a vertical partition between the fronts of said stacks of trays, horizontal partitions at the top and bottom of said stacks of trays extending backwardly to the ends of said trays, a stirrer behind said trays, means for operating the stirrer, means for heating the air arranged peripherally of said stirrer, means for extracting a portion of the air so heated, means for humidifying the extracted portion, and means for returning said extracted portion centrally of the stirrer.
6. In an incubator, an inclosed space having therein a plurality of spaced stacks of egg trays having side apertures and foraminous bottoms with closed ends, a vertical partition between the fronts of said stacks of trays, horizontal partitions at the top and bottom of said stacks of trays extending backwardly to the ends of said trays, a stirrer behind said trays, means for operating the stirrer, means for heating the air arranged peripherally of said stirrer, means for extracting a portion of the air so heated, means for humidifying the extracted portion, means for returning said extracted portion centrally of the stirrer, and means for positioning said stacks of egg trays in predetermined relationship to said partition, the side walls of the cabinet, and the stirrer.
7. In an incubator, the combination of a cabinet, means to support eggs in the cabinet, means to agitate the air in the cabinet, means for holding a pool of humidifying liquid, and mechanical means adapted to agitate this liquid and air adjacent the liquid for incorporating the liquid in the air which is being agitated by the first mentioned air agitating means.
- In testimony whereof, I affix my signature.
- FRANK E. STOVER.

70

75

80

85

90

95

100

105

110

115

120

125

130

DISCLAIMER

1,911,249.—*Frank E. Stover*, Springfield, Ohio. METHOD AND APPARATUS FOR INCUBATION OF EGGS. Patent dated May 30, 1933. Disclaimer filed July 15, 1935, by the patentee, the assignee, *The Bundy Incubator Company*, consenting.

Hereby enters this disclaimer of claim 7, of the said patent, which is in the following words, to wit:

"7. In an incubator, the combination of a cabinet, means to support eggs in the cabinet, means to agitate the air in the cabinet, means for holding a pool of humidifying liquid, and mechanical means adapted to agitate this liquid and air adjacent the liquid for incorporating the liquid in the air which is being agitated by the first mentioned air agitating means."

[*Official Gazette August 6, 1935.*]