

No. 736,015.

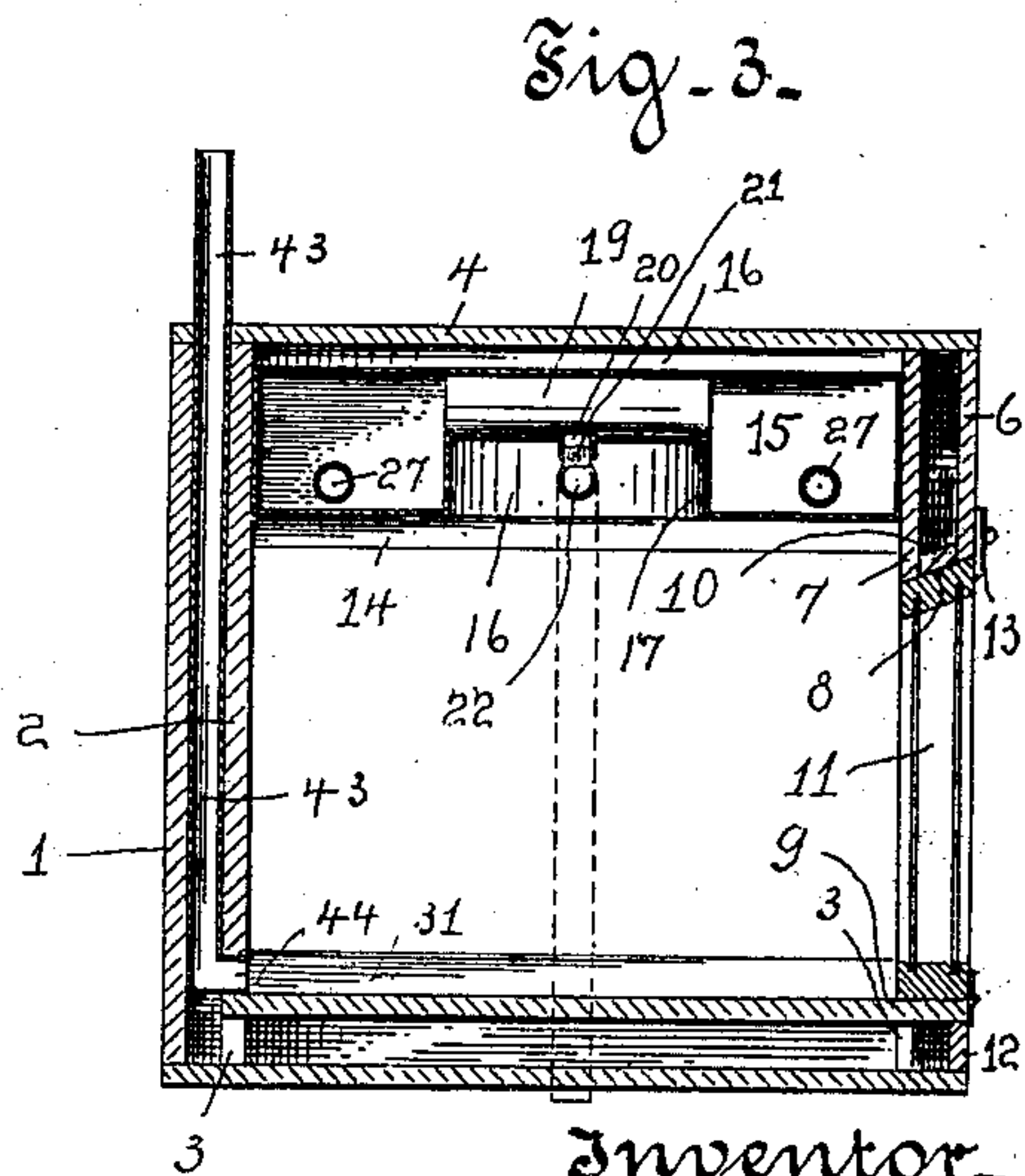
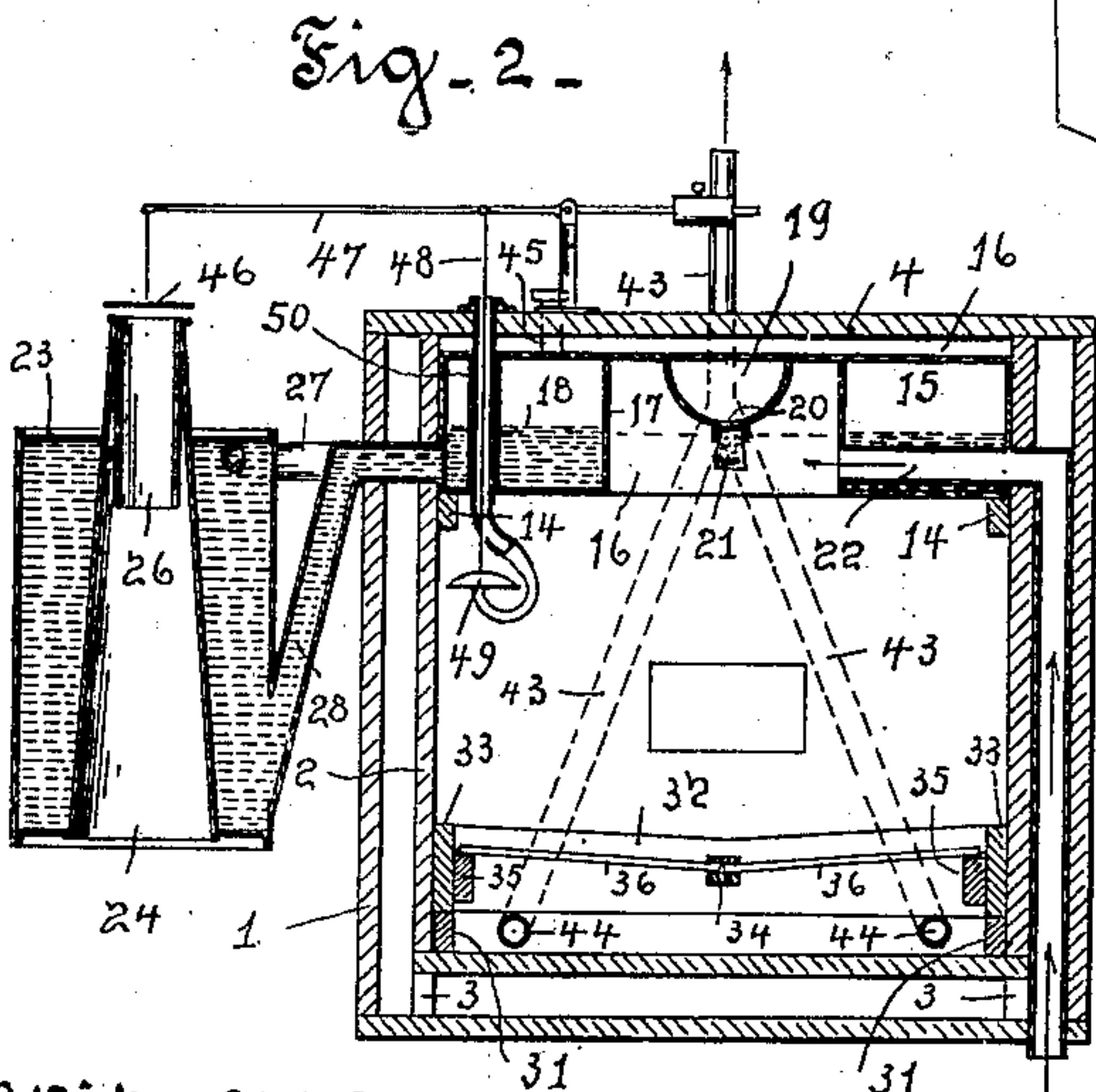
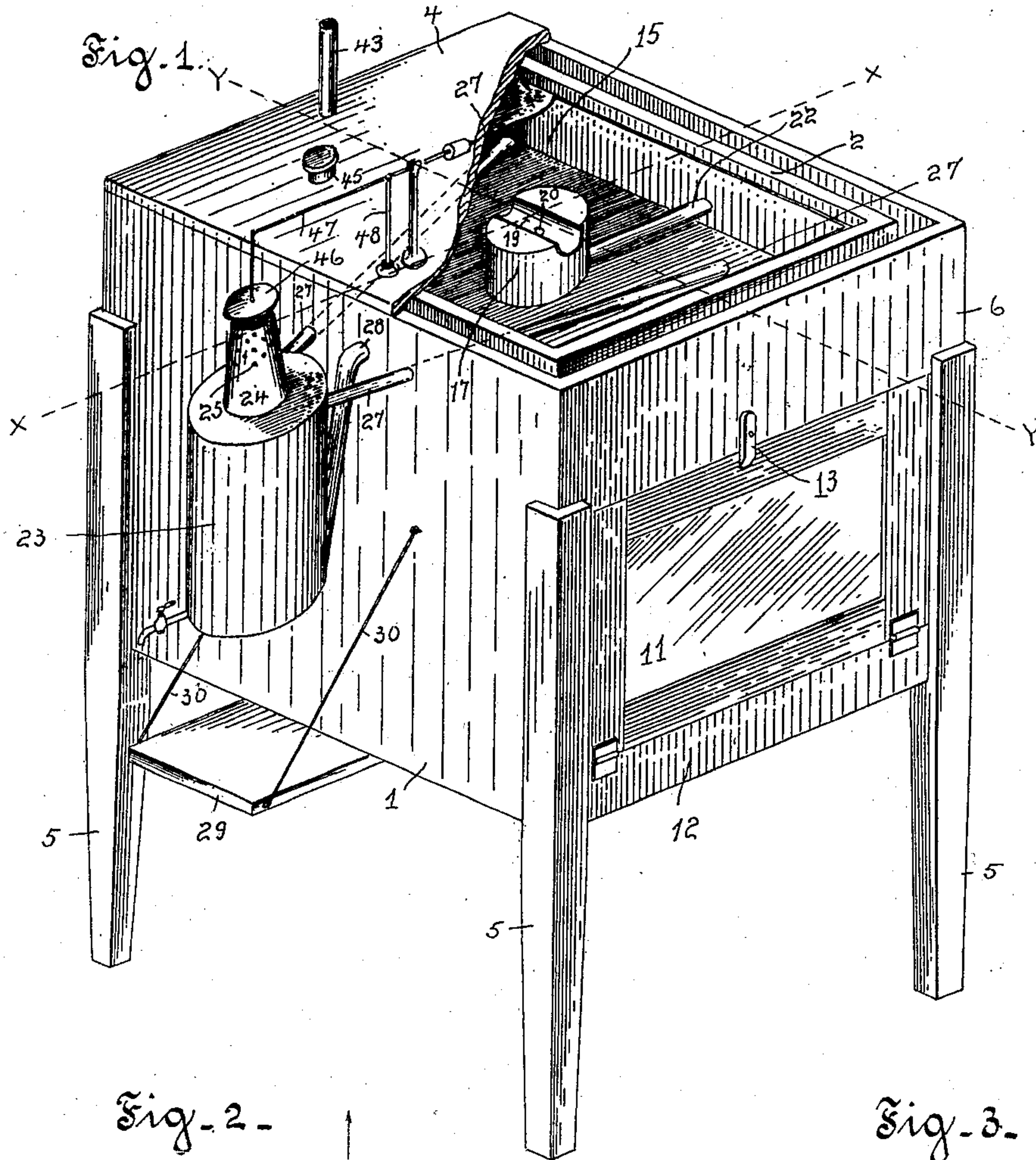
PATENTED AUG. 11, 1903.

O. W. RANDOLPH.  
INCUBATOR.

APPLICATION FILED SEPT. 6, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.  
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By Wilson & Martin  
His Attorneys

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2 SHEETS—SHEET 2.

Fig. 4-

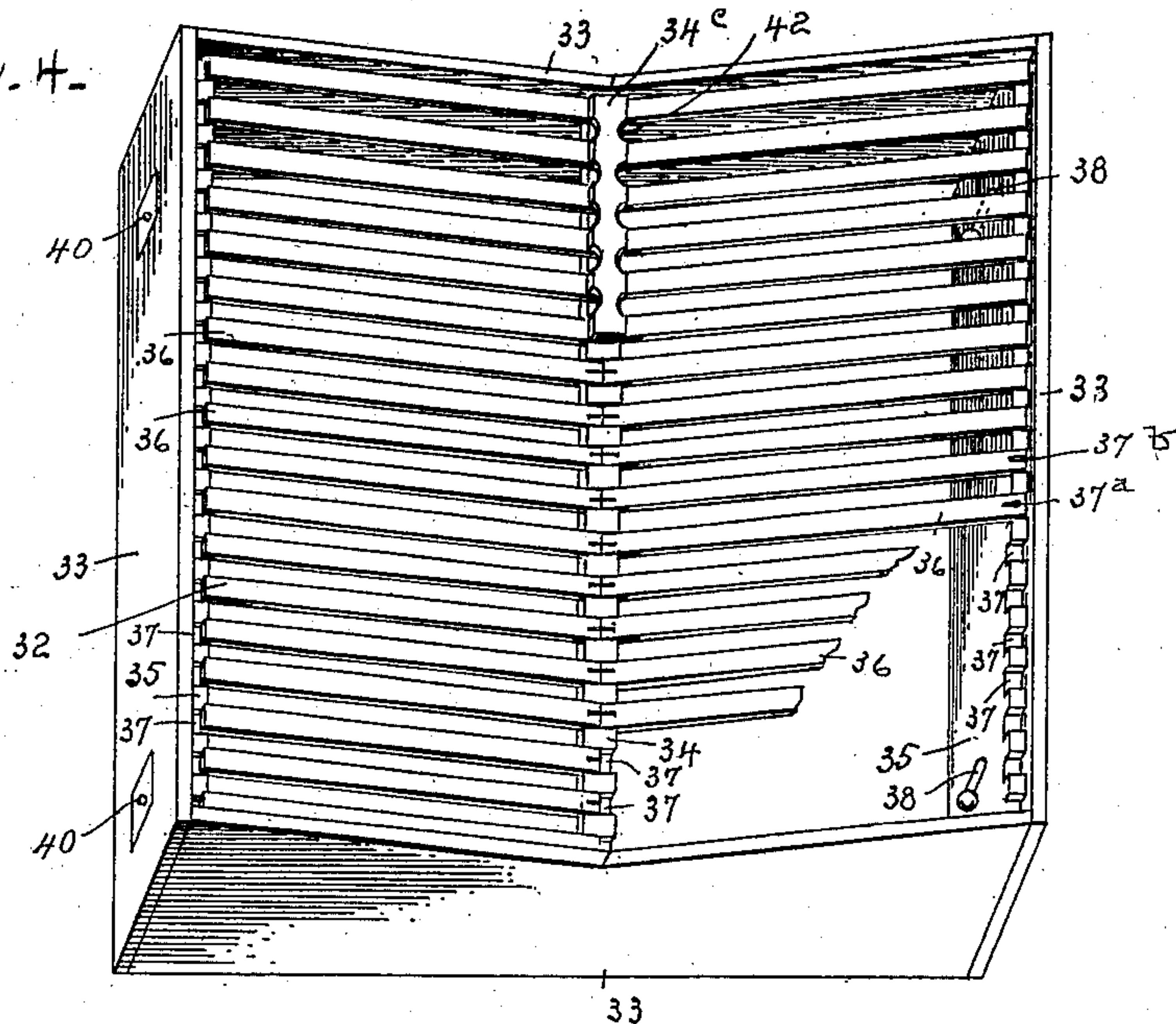


Fig. 5-

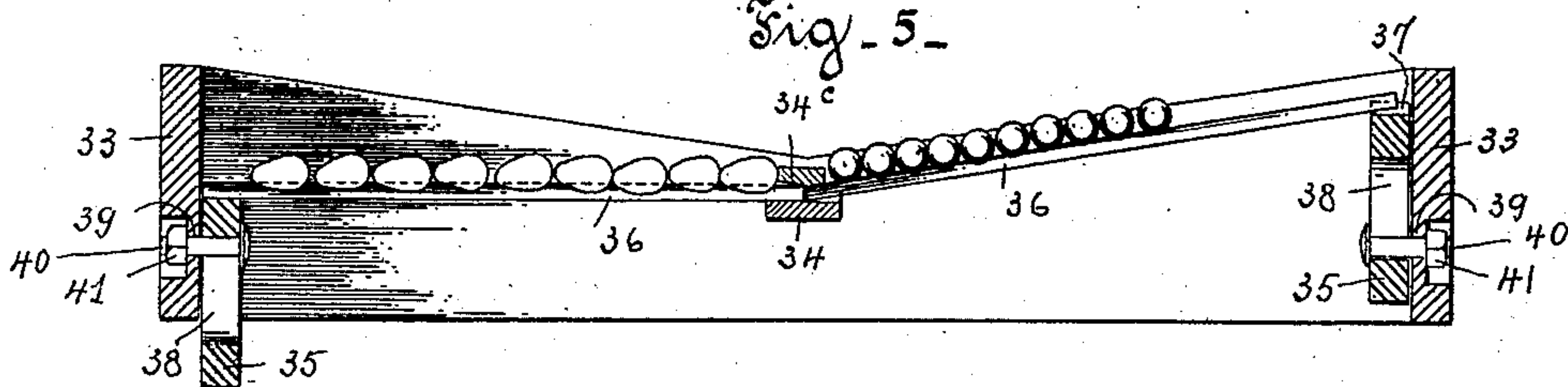
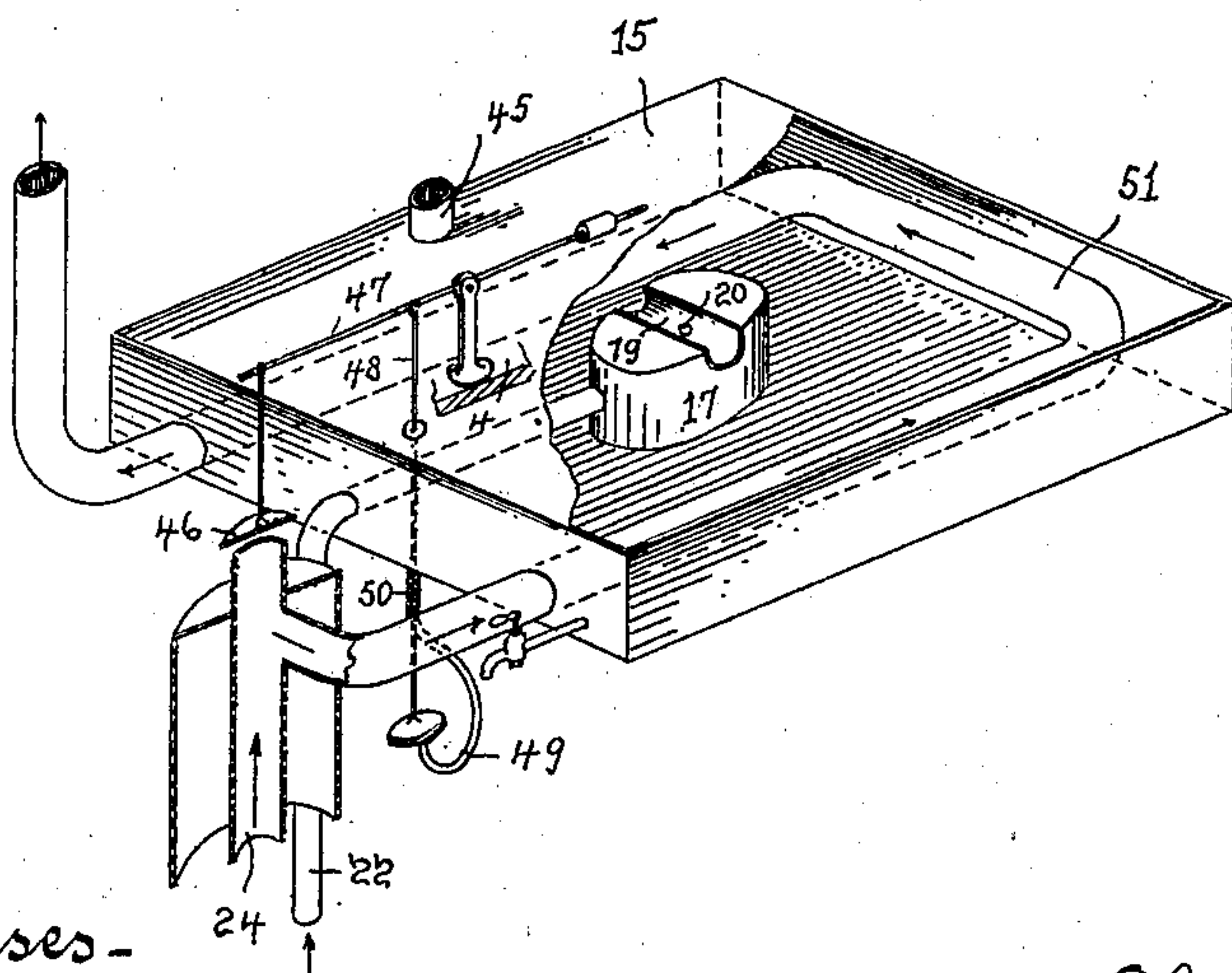


Fig. 6-



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# UNITED STATES PATENT OFFICE.

OLIVER W. RANDOLPH, OF McCLURE, OHIO.

## INCUBATOR.

SPECIFICATION forming part of Letters Patent No. 736,015, dated August 11, 1903.

Application filed September 6, 1902. Serial No. 122,307. (No model.)

*To all whom it may concern:*

Be it known that I, OLIVER W. RANDOLPH, a citizen of the United States, residing at McClure, in the county of Henry and State of Ohio, have invented a new and useful Improvement in Incubators, of which the following is a specification.

My invention relates to an improvement in incubators, and has for its object to provide a simple and efficient device of the kind of economical construction and operation, in which uniform and evenly-distributed heat and moisture are maintained, together with thorough ventilation, and in which the eggs may be readily and uniformly turned and changed in position at intervals of time as required. I accomplish these objects by constructing an incubator as hereinafter described, claimed, and illustrated in the drawings, in which—

Figure 1 is an isometric front view of an incubator constructed in accordance with my invention, partially broken away at the top to show the interior of the water-tank and showing the heater attached. Fig. 2 is a cross-section of the same on the line X X of Fig. 1. Fig. 3 is a longitudinal section of the same on the line Y Y of Fig. 1. Fig. 4 is an isometric view of the egg-tray. Fig. 5 is a cross-section of Fig. 4, showing one series of slats lowered; and Fig. 6 is an isometric view of a modified construction of my invention, in which the hot air and gases of the lamp are used for heating the water in the tank.

Referring to the drawings, the incubator-housing comprises an outer-casing 1 of suitable dimensions to receive therein an inner casing 2, which is of reduced dimensions and adapted to be freely inserted within the outer casing and provide therewith when supported and secured together by spacing-blocks 3 a continuous space around the sides and bottom of the inner casing. When the casing 2 is thus inserted and secured within the outer casing 1, the top edges of the walls of the outer casing 1 and top edges of the inner casing 2 are in the same plane, whereby a common plate 4 will form the top closure for both. The housing thus formed is supported above ground by means of standards or legs 5, secured to each corner of the outer casing, and in the front wall 6 of the outer casing and in

the front wall 7 of the inner casing there is formed a common door-opening 8, extending from the bottom 9 of the inner casing a suitable distance toward the top and having the air-space between the outer and inner walls around the opening closed by a frame 10. The door-opening 8 is provided with a double glazed door 11, hinged to the bottom portion 12 of the outer front wall, and is secured in a closed position by means of a suitable latch 13. Near the top of the inner casing above the door-opening there is secured to the inner side of opposite walls cleats 14, adapted to support a closed water-tank 15, which is of a size to fit within the inner casing and a depth to provide for an air-space 16 between the tank and the top closure 4 when the tank is inserted within the top portion of the casing and supported on the cleats. The tank 15 thus supported forms a top closure and heater for the incubating-chamber below. Central in the bottom of the tank is provided a circular opening 16, preferably circular, and around the opening within the tank is secured to the bottom of the tank a wall 17, the top of the wall being also secured to the top of the tank, which forms a top closure for the recessed chamber thus formed above the incubating-chamber. Through diametric portions of the wall 17 and above the water-line 18 is extended a semicylindrical open-ended trough 19, forming with the top of the tank to which it is secured an inclosed air-passage between opposite portions of the tank, and central of its length the bottom of the trough 19 is provided with an orifice 20, which is provided with a suitable stopper 21 for the purpose hereinafter stated. The recessed chamber formed by the wall 17 is provided with the air-inlet pipe 22, which, entering the cylinder below the water-line of the tank, extends horizontally through the adjacent end wall of the tank and the inner-casing wall, and thence vertically downward between the outer and inner walls of the housing and through the bottom of the outer casing. By thus providing the tank with a central recessed chamber the heating-surface of the tank is arranged mainly around the exposed walls of the incubating-chamber, whereby any loss of heat through the exposed walls is compensated by radiation from the tank, and by admitting fresh heated air into



the recessed chamber central to the tank and diffusing it from the center to the sides of the incubating-chamber the temperature throughout the incubating-chamber is maintained at an even degree by the convection of heat caused by the diffusion of fresh warm air.

23 is a cylindrical water-heater having a central flue 24 vertical therethrough, which is made tapering from the bottom toward the top end and has its top portion projecting above the top of the heater and provided with vents 25. In the top end of flue 24 is inserted the cylindrical flue 26, having its upper end flanged outward and resting on the upper end of flue 24, with the lower end extending downward therein. The heater 23 is supported, with the top of the heater below the water-line of the tank, by water-pipes 27 and 28, respectively connected to the top and bottom portions of the heater, the pipes 27 extending through the walls of the outer and inner casings and into the tank different distances toward the opposite end of the tank and on opposite sides of the recessed chamber formed by the wall 17 below the water-line of the tank and pipe 28 through the bottom of the tank, as shown in Fig. 1. Below the heater is provided a lamp-bracket 29, hinged as a table-leaf to the bottom of the casing 1 and supported in a horizontal position beneath the heater by the wire stays 30, stapled at one end to the end of the casing and provided with hooks at their free ends for engaging suitable eye-staples in the leaf 29.

Within the inner casing, resting edgewise on the bottom and secured to the end walls of the inner casing, are provided the cleats 31, upon which is movably mounted the egg-tray 32, comprising the frame 33, having the central transverse bar 34, the vertically-movable end bars 35, and the egg-slats 36, of a length adapting them to be supported at one end by an end bar 35 and at the opposite end by the central cross-bar 34. The top edge of the center bar and preferably also the top edges of the end bars are provided with incuts 37 to receive the slats at regular intervals of a depth equal to the thickness of the slats, and the intervals between the slat-notches 37 are slightly less than the transverse diameter of an egg, so that when the slats 36 are mounted in the incuts an egg resting lengthwise between two slats will not fall through. The incuts 37 for the slats may be omitted from the end bars 35 and retaining-pins 37<sup>a</sup> substituted therefor, the ends of the slats being provided with saw-cuts 37<sup>b</sup> to receive the pins. The end bars 35 are provided with vertical slots 38, in alinement with bolt-holes 39 in the ends of the frame 33, the holes being countersunk in the outer faces of the ends of the tray-frame to receive the head of the threaded bolts 40, which are provided with the nuts 41, by which the bars may be locked in a raised position with their upper edges above the level of the central cross-bar 34, where-

by the outer ends of the slats 36, resting thereon, may be elevated and the slats inclined downward from their outer ends to the central bar, as shown in Fig. 4. By loosening the nuts of the bolts 40 the end bars 35 may be lowered, as shown at one end of Fig. 5, to level the slats 36. Above the cross-bar 34 and resting thereon and across the inner ends of the slats 36 is provided the cross-bar 34<sup>c</sup>, having opposite incuts 42 in the edges of the bar coinciding with the slat intervals and curved to coincide with the longitudinal curve of an egg, whereby eggs placed lengthwise across the intervals between the slats on opposite sides of the central bar will closely approach.

To provide means of ventilating the egg-chamber, there is provided the bifurcated pipe 43, located in the air-space between the rear walls of the inner and outer casings and having the ends 44 of the bifurcations opening from the space below the egg-tray and the top end extended as a flue through the top of the casing.

The heater 23 is so located as to be filled with water when the water-tank has been filled to the water-line 18 through the filling-pipe 45, and the water is heated by a suitable lamp (not shown) having a chimney adapted to be inserted in the lower end of flue 24 of the heater.

To regulate the heat of the incubator, the top of the flue 26 is provided with a damper 46, attached to the lever 47, which is suitably fulcrumed and weighted at the opposite end to counterbalance the damper in a position closing the flue 26. Between the fulcrum of the lever and the damper is also attached the rod 48 of a thermostat 49, located in the egg-chamber, the rod 48 passing through a pipe 50, extending vertically through the tops of the casing and tank. When the flue 26 is closed by the damper 46, the vents 25 in the top of flue 24 provide an exit for the gases and a normal draft for the lamp without permitting too-rapid escape of the heat, thereby utilizing the heat generated by the lamp to heat the water in the heater.

Thus constructed, when the water-tank is filled to the water-line and the egg-tray is filled with eggs placed side by side transverse the intervals between the slats, an equal number in each interval, with the outer ends of the slats elevated, as shown in Fig. 4, the lamp being lighted, the operation will be as follows: As the water in the heater becomes heated a circulation of water will be established through pipes 27 from the heater to the tank and from the tank back to the heater by pipe 28, whereby the temperature of the water is raised until the temperature of the egg-chamber is raised to the degree at which the thermostat operates to open the flue-damper, thereby allowing the escape of the heat of the lamp and preventing a further increase of the degree of heat of the water and in the egg-chamber. If the temperature



of the egg-chamber falls, the thermostat will close the damper, and thereby cause the degree of heat of the water to be increased. The circulation of the water from the heater to the tank and back to the heater maintains the water in the tank at a uniform temperature in all parts of the tank, whereby all parts of the egg-chamber are maintained at a uniform temperature, and by means of the thermostat the temperature in the chamber is maintained at or about a predetermined degree. The daily turning of all the eggs is readily accomplished by drawing out the egg-tray and lifting out the eggs in each slat interval that lies next the central bar and placing it at the outer end of the line of eggs in that interval. In making this change each of the other eggs in that interval will roll one-half a turn down the incline of the slats, whereby all of the eggs in the tray will be daily changed in location as well as turned over, and thereby providing that each egg in each interval shall during the period of incubation have occupied for an equal length of time the same position that each of the other eggs in the interval originally occupied. After the air in the incubator has become heated to the bottom a thorough ventilation of the incubator is also secured by the pipes 43 and 22, as when the air has become heated in the bottom of the chamber it will flow out through the openings of the bifurcations of pipe 43 at the bottom of the incubator and establish a flow of air therefrom, which will carry with it the effluvia of the warmed eggs, the outward flow from the bottom of the chamber, together with the heating of the air in the portion of the pipe 22 submerged in the heated water of the tank, establishing a flow of warm air into the chamber through the pipe 22 to replace the air which escapes by pipe 43. For the first eighteen days of the incubating period the moisture of the air admitted to the egg-chamber will ordinarily be sufficient to prevent evaporation of the water from the eggs in the progress of incubation, at the end of which period or at any time prior thereto when the air lacks moisture by removing the stopper 21 from the bottom of the trough 19 heated vapor from the tank will be admitted to the cylinder 17 and thence be diffused throughout the egg-chamber and supply the additional moisture required. At the end of the eighteen-day period the end bars 35 of the tray are lowered to level the slats and the eggs are turned lengthwise of the slat intervals, so that when on or about the twenty-first day the chicks are hatched they drop through between the slats to the floor of the egg-chamber below, while for the most part the egg-shells are retained by the slats, thus allowing freedom of movement of the newly-hatched chicks, unimpeded by the shells or slats. Preferably the top portion of the front side of the egg-tray frame is cut away from the ends toward the center on lines parallel

with the slats when inclined as shown in Fig. 5, in order that the eggs may all be visible through the glass of the door.

In Fig. 6 is shown an incubator having a modified form of heater, in which the water in the tank is heated by the gases of the lamp conducted through a flue-pipe 51, submerged in the water of the tank and extending around the margin of the bottom of the tank, said pipe being connected to the flue of the heater at one end and having the exit end upturned to increase the draft. In this form of heater the pipes 27 and 28 and the vents 25 and the flues 26 are omitted and the water-space around the flue 24 is used as an air-space to diminish the heat radiation from the flue. In this form of heater the damper 46 normally closes the top of flue 24 instead of flue 26, as in the water-heater, the construction and operation of the heat-regulator being the same as for the water-heater.

What I claim to be new is—

1. In an incubator, the combination with a housing provided with means of heating the housing, of an egg-tray movably supported as a drawer within the housing and comprising an open frame provided with transverse slat-supporting bars at the ends and center of the frame; and slats supported thereon at uniform intervals throughout the area of the frame and upwardly inclined from the central bar to the end bars.

2. In an incubator, the combination with a housing provided with means of heating the housing, of an egg-tray movably supported as a drawer within the housing and comprising an open frame provided with slats arranged at uniform intervals in opposite series, the slats of each series having a common fixed support at one end and a vertically-movable support at the opposite end, adapted to simultaneously raise or lower the ends of the slats resting on the movable support, and support the slats in an inclined or level position.

3. In an incubator, the combination with a housing provided with means of heating the housing, of an egg-tray movably supported as a drawer within the housing and comprising an open frame having a fixed central transverse bar and vertically-movable end bars parallel with a central bar; slats spaced at uniform intervals throughout the area of the frame having their outer ends supported on a movable end bar of the frame and the opposite end by the central bar; means to support the end bars in raised position inclining the slats downward toward the central bar from each end of the frame or in a lowered position adapted to level the slats; and means of retaining the slats at such intervals in either position and during the movement of the end bars.

4. In an incubator, the combination with an egg-tray, of a central transverse slat-supporting bar having top incuts to receive the



slats at uniform intervals and curved incuts in opposite sides of the interval portions substantially as and for purposes set forth.

5 In an incubator, the combination with a  
double-walled housing having its lower interior  
space adapted for an incubating-chamber, of a water-heating tank supported in the  
top of the housing and having an upwardly-  
recessed chamber to form a dome-space cen-  
10 trally above the incubating-chamber and ar-  
range the heating-surface of the tank around  
the exposed walls thereof, a vapor-inlet from  
the tank into the dome-space provided with  
a detachable closure, an air-inlet extending  
15 from below the housing through the water in  
the tank into the dome-space, a ventilator-  
flue between the walls of the housing extend-  
ing from outlets from the lower part of the  
incubating-chamber through the top of the  
20 housing, and means for heating the water in  
the tank.

6. In an incubator, the combination with a  
double-walled housing having its lower interior  
space adapted for an incubating-cham-

ber, of a water-heating tank supported in the 25  
top of the housing and having an upwardly-  
recessed chamber to form a dome-space above  
the incubating-chamber and arrange the heat-  
ing-surface of the tank around the exposed  
walls thereof, a vapor-inlet from the tank 30  
into the dome-space provided with a detach-  
able closure, an air-inlet extending from be-  
low the housing through the water in the tank  
into the dome-space, a ventilator-flue between  
the walls of the housing extending from out- 35  
lets from the lower part of the incubating-  
chamber through the top of the housing,  
means for heating the water in the tank, and  
means for automatically maintaining a uni-  
form degree of heat in the incubating-cham- 40  
ber.

In witness whereof I have hereunto set my  
hand this 26th day of August, A. D. 1902.

OLIVER W. RANDOLPH.

Witnesses:

WM. NELSON,

W. T. HITCHCOCK.