

W. H. HOWARD.

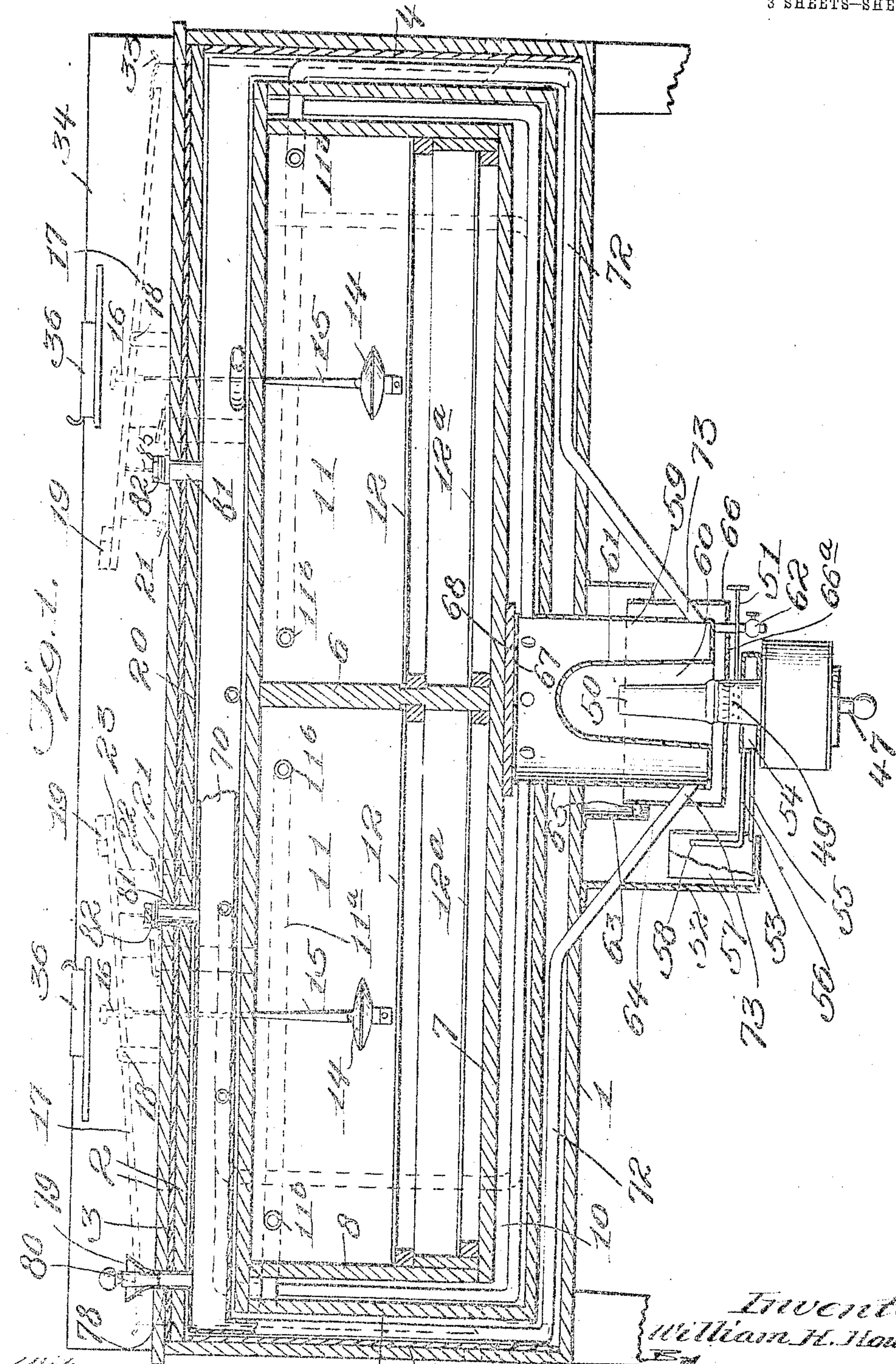
INCUBATOR.

APPLICATION FILED JULY 10, 1908.

983,823.

Patented Feb. 7, 1911

3 SHEETS—SHEET 1.



Witnesses  
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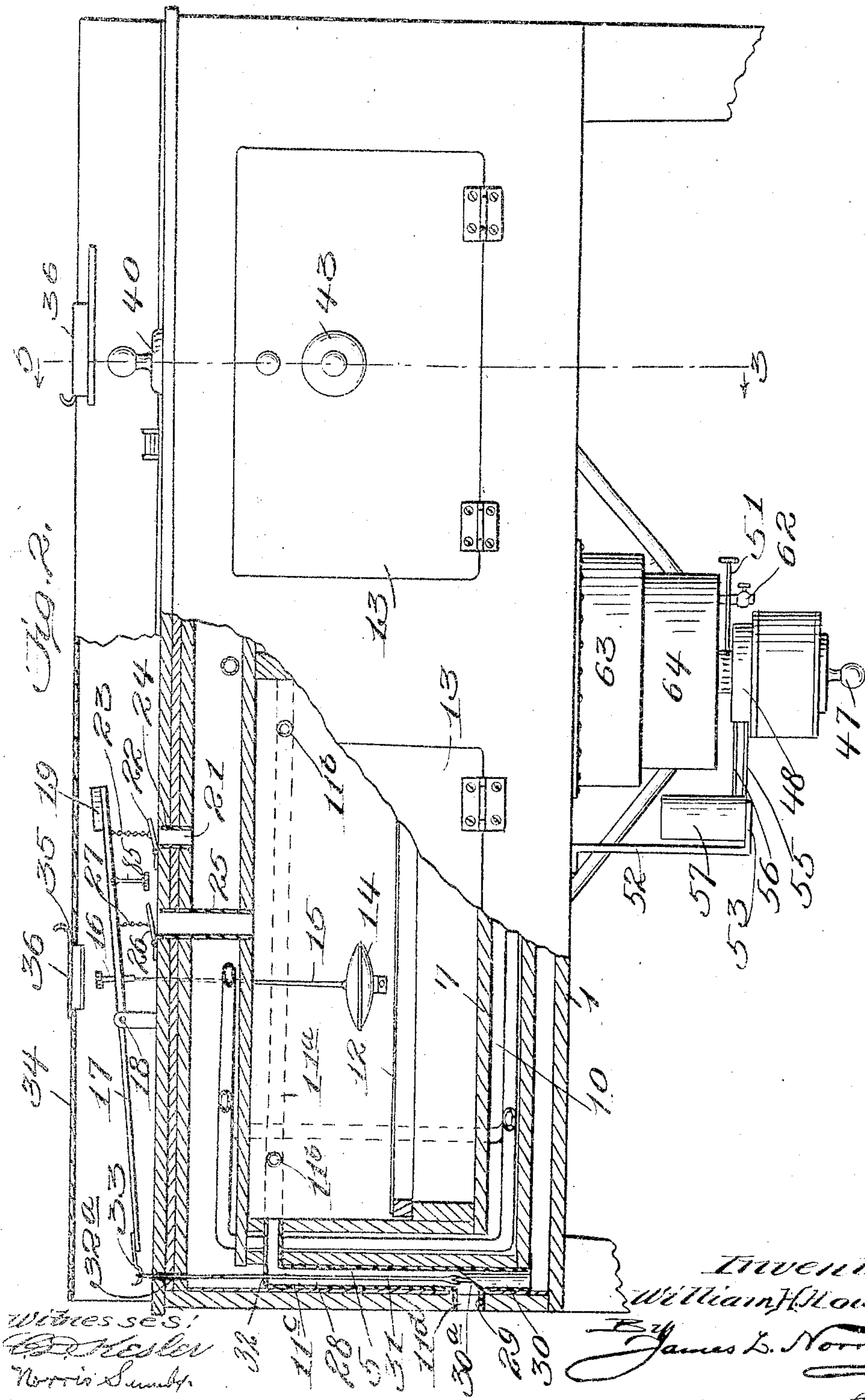
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3 SHEETS—SHEET 2.



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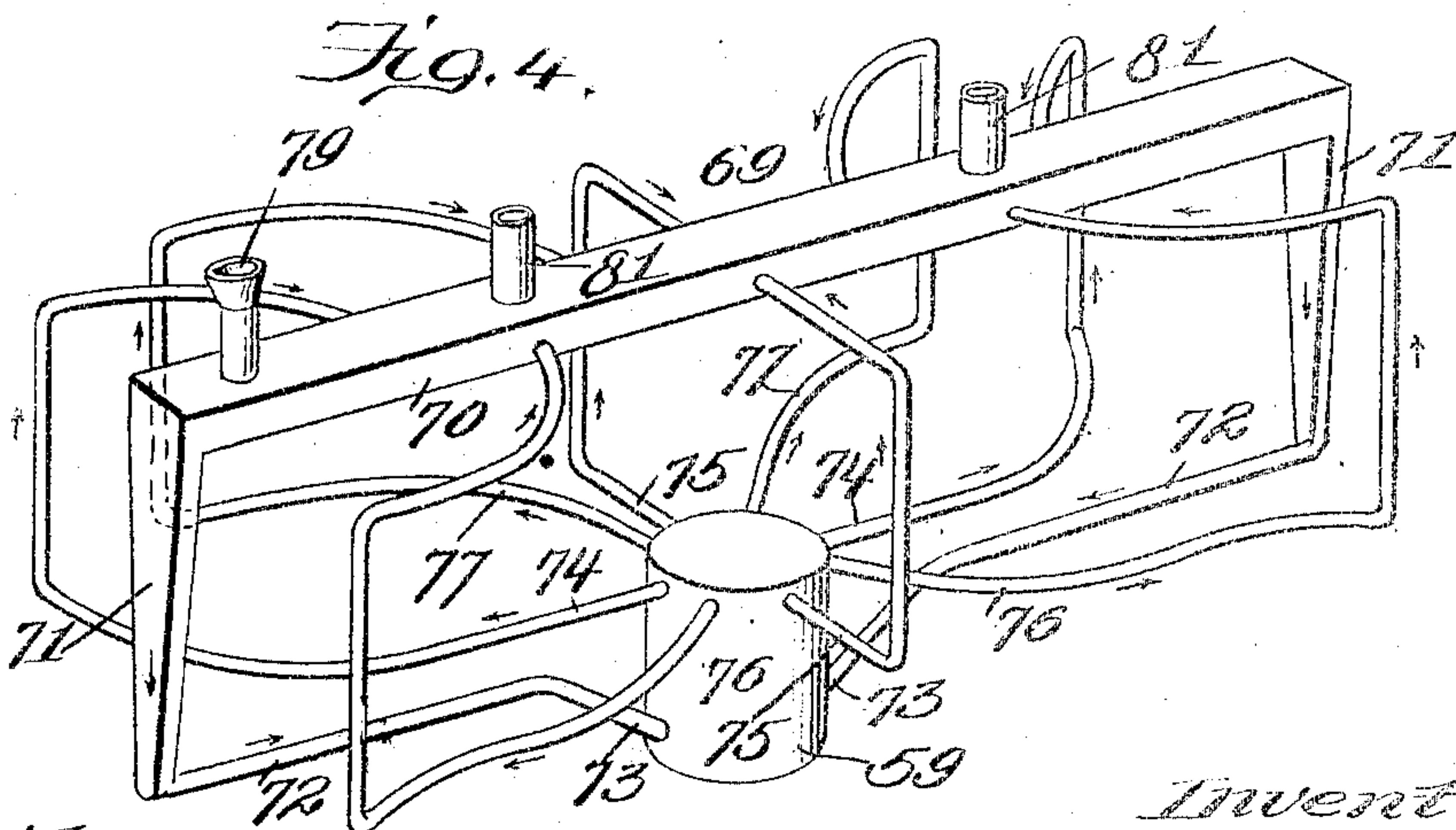
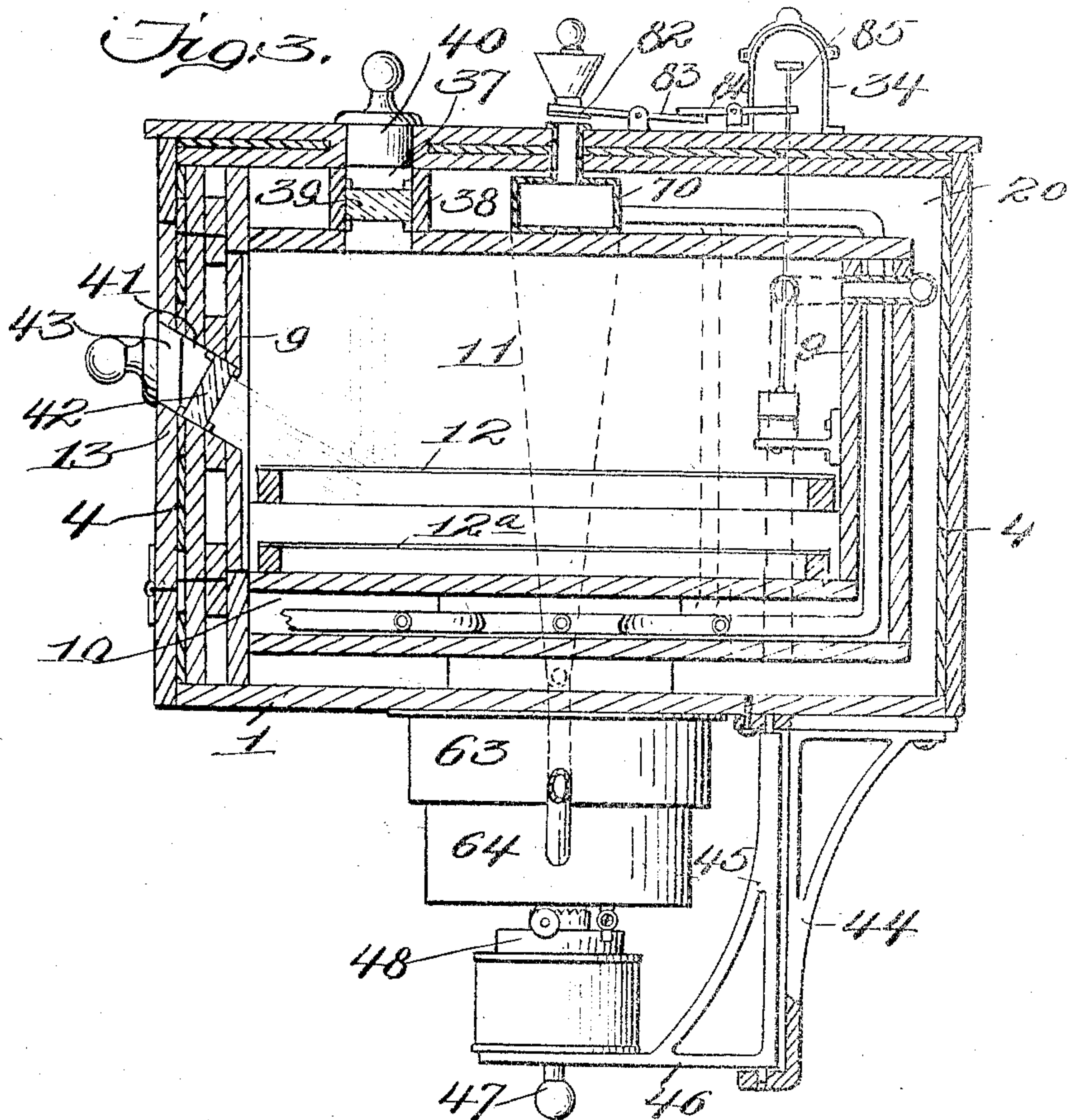
INCUBATOR.

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3 SHEETS-SHEET 3.

983,823.



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# UNITED STATES PATENT OFFICE.

WILLIAM H. HOWARD, OF COTOPAXI, COLORADO, ASSIGNOR OF ONE-HALF TO  
J. RAYMOND HOWARD, OF COTOPAXI, COLORADO.

INCUBATOR.

983,823.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed July 10, 1908. Serial No. 442,955.

*To all whom it may concern:*

Be it known that I, WILLIAM H. HOWARD, a citizen of the United States, residing at Cotopaxi, in the county of Fremont and State of Colorado, have invented new and useful Improvements in Incubators, of which the following is a specification.

This invention relates to incubators, and the objects of the same are to provide means for regularly and uniformly heating the egg chamber and maintaining a degree of heat most beneficial during the entire period of incubation; to automatically ventilate the incubator by means under control of the heat regulating means or thermostat mechanism; and to produce a superior incubator structure having a generally efficient automatic operation and one not requiring special attention, so that whether an operator is skilled in the art of incubation or not, the machine will continue to practically operate without liability of injuring the eggs.

The improved machine embodies numerous convenient attachments for aiding the operator in ascertaining the condition of the egg chamber and eggs when desired; for replenishing and controlling the heating medium and heat generating means, and for insuring a maximum hatch from a given number of eggs and in accordance with the capacity of the machine.

The invention consists in the construction and arrangement of the several parts which will be more fully hereinafter specified.

In the drawings: Figure 1 is a longitudinal vertical section of an incubator embodying the features of the invention. Fig. 2 is a front elevation of the same, partially broken away and shown in section. Fig. 3 is a transverse vertical section on the line 3—3. Fig. 4 is a detail perspective view showing a hot water circulating system or heating means embodied in the incubator structure.

Similar characters of reference are employed to indicate corresponding parts in the several views.

The numeral 1 designates an inclosing casing having a double top 2 composed of spaced members with an interposed lining 3 of paper or analogous material. A paper lining 4 is also applied against the inner side of the casing 1 at the ends, front and back. The inclosing casing as well as the top, may be made as thick as desired and wood will

be preferably employed in constructing all parts of the incubator except the devices which will be hereinafter specified.

Disposed within the inclosing casing 1 is what may be termed an incubating inclosure 60 which comprises an outer wall or supplemental casing 5 having a bottom, ends, sides and top tightly joined, and within the outer wall or supplemental casing are the incubating chambers proper, there being two of the latter shown in the present instance formed by a central partition 6, but it will be understood that an incubator embodying the features of the invention may be equipped with only one of these chambers or more than two and which will be regulated in accordance with the capacity of the machine. The incubating chambers as shown have a closed bottom 7 and closed ends and sides 8 and 9. The sides, ends and bottom of the incubating chambers are spaced from the corresponding members of the inclosing wall or supplemental casing 5 to provide dead air space means 10 for a purpose which will be hereinafter specified. Similarly the top, sides, ends and bottom of the wall or supplemental casing 5 are spaced from the corresponding members of the inclosing casing 1, or, in other words, the supplemental casing 5 and incubating chambers therein are of such dimensions with respect to each other and to the inclosing casing 1 that passages will be provided between the walls thereof as explained, and by this means the incubating chambers will be fully shielded and protected from detrimental exterior atmospheric influences and also be more regularly heated without requiring as much fuel as consumed in the ordinary form of incubator.

Each incubator chamber 11 will be equipped with an egg tray 12 of any preferred form, these trays being removable through the medium of doors 13 in the front of the machine, as shown by Fig. 2, the doors being preferably of the downwardly opening type and having any suitable features of construction that will render the same tight-fitting in the openings with which they cooperate. The egg trays 12 are held at a suitable elevation above removable chick trays 12\*, the said trays 12\* serving as a rest or support for the hatched chicks.

Within the egg chambers 11 are thermostats 14, each having an expanding member or element 15 projecting upwardly through



the top of the machine. Each chamber is provided with a thermostat and the latter may be of any approved form of construction adapted for the purpose; and the expanding member 15 in each instance is connected at its upper extremity by an adjusting screw or analogous device 16 to a controlling lever 17 intermediately fulcrumed as at 18 and having its inner extremity provided with a weight or counter-poise 19 to insure a sensitive operation of the lever when released or free to move downward at its inner extremity and close certain devices which will be more fully hereinafter explained.

Between the top of the inner wall or supplemental casing 5 and the double top of the outer inclosing casing 1, a heating chamber 20 is formed and extends the full length of the incubator and also transversely of the latter, and also downwardly back of the said casing 5. Ventilating openings 21 extend vertically through the double top of the outer inclosing casing 1 and communicate with the heating chamber 20, the upper outlets of the said openings being normally closed by flap valves 22 hinged at one extremity and free to move at the opposite extremity and having a chain or analogous flexible device 23 connected to the intermediate portion of each and to the extremity of the lever 17 above. The openings 21 are provided with tubular linings 24, as clearly shown by Fig. 2, and the valves 22 cooperate directly with the upper ends of the said linings. Ventilating tubes 25 also extend through the top portion of the wall or supplemental casing 5 and communicate with incubating chambers 11, the said tubes 25 continuing upwardly through the heating chamber 20 and the double top of the outer inclosing casing 1. The tubes 25 are of greater diameter than the tubes 24 and have flap valves 26 cooperating with their upper outlet extremities and intermediately connected by flexible means 27 to the levers 17 above the same. The heating chamber 20 is continued downwardly at the opposite ends of the machine as at 28, and in the end walls of the outer inclosing casing 1 are ventilating openings 29 disposed near the bottom of said casing.

Extending along the rear upper portions of the incubating chambers 11 within the back portion of the heating chamber 20 is a ventilating pipe 11<sup>a</sup> having branches 11<sup>b</sup> communicating at intervals with the chambers 11, the said pipe 11<sup>a</sup> also having end legs 11<sup>c</sup> depending to near the bottom of the outer casing at the end portions of the latter, as shown by Fig. 2. The legs 11<sup>c</sup> are provided with outwardly extending branches 11<sup>d</sup> projecting through the openings 29, and by this means the chambers 11 may be ventilated. Each ventilating leg 11<sup>c</sup> has a ver-

tically movable slide valve 30 cooperating therewith and operatively confined therein, a flexible connecting device or wire 31 being attached to the upper end of each valve and movably extending through openings 32 and 32<sup>a</sup> respectively in the upper terminal of the leg 11<sup>c</sup> and the double top of the outer inclosing casing 1 and attached to an outer hooked member 33 forming part of the outer extremity of the lever 17, the ventilating pipes 11<sup>a</sup> having the branches 11<sup>b</sup> communicating with the chambers 11 and the legs 11<sup>c</sup> provided with means for controlling communication thereof with the atmospheric exterior of the incubator will operate not only to relieve the chambers 11 of gases and foul air, but also serve as a means for admitting the necessary amount of fresh air to the said chambers without subjecting the eggs to chilling currents of air.

When either egg chamber becomes heated beyond the necessary degree for effectively carrying on incubation, and in excess of the degree for which the thermostat may be set, the thermostat member 15 elongates, as will be understood, and raises the inner extremity of the lever 17 and consequently lowers the outer extremity of said lever, thereby opening the valves 22 and 26 by raising said valves and lowering the valve 30 to clear the ventilating branches 11<sup>d</sup>. When either of the thermostat members 15 elongates through excessive heat in the corresponding chamber 11, the inner extremity of the lever 17 to which said member is attached will be elevated and the outer extremity of the said lever will be lowered as particularly shown by Fig. 2 and the valve 30 attached to the lever 17 so operated and mounted in the one leg 11<sup>c</sup> will be lowered and the air from the exterior of the incubator admitted to the interior of the egg chamber 11, the upper beveled or inclined end of the valve 30 permitting a gradual ingress or escape of the air through the leg 11<sup>d</sup> or branch of the leg 11<sup>c</sup>. When the chamber 11 is working under normal conditions and the thermostat member 15 contracted, the valve 30 will be elevated by reason of the fact that the inner extremity of the lever 17 will be lowered through the weight 19 and the outer extremity of said lever elevated and pull the valve 30 upwardly to gradually close the branch 11<sup>d</sup> by reason of the upper inclined extremity 30<sup>a</sup> of the said valve. The upper inclined extremity of the valve also prevents a too rapid influx of the air into the chamber 11 and efflux of the gases or foul air from the said chamber. The tubes 24 and 25 being thus opened will permit the heat currents to pass out from the heating chamber 20 and each incubating chamber 11 respectively, and the infusing of cold air from the exterior through branches 11<sup>d</sup> legs 11<sup>c</sup>, pipe 11<sup>a</sup> and branches 11<sup>b</sup> will properly temper



or lower the degree of heat of the incubating chambers. The same operation will take place in both incubating chambers, but it will be understood that the chambers have an independent operation as to their combined heat controlling and ventilating mechanism, and by this means if one incubating chamber becomes more rapidly heated than the other and reaches an excessive degree of heat, its heat controlling and ventilating mechanism is free to operate without affecting the similar mechanism of the other incubating chamber and which may be at the time in normal condition. The valves 30 are beveled at their upper extremities as at 30<sup>a</sup> so as to partially or wholly open and close the inlets or branches 11<sup>a</sup>.

Extending longitudinally over the top of the machine and inclosing the levers 17 and the parts with which said levers cooperate, is a suitable sheet metal hood 34 fully open at its opposite extremities and also provided with top openings 35 covered by slides 36 for gaining access to the adjusting screws or analogous devices 16 of the thermostats. The advantage of this hood is that the thermostats as well as the levers and the flap valves are shielded and thus less liable to become broken, and, further, the hot air passing out through the tubes 24 and the heated air and foul gases escaping through the tubes 25 will be more readily conducted toward opposite extremities or ends of the machine and liberated in the surrounding atmosphere with less obstruction than would ensue if the ends of the tubes 24 and 25 were fully exposed to the atmosphere in view of the fact that there is always more or less draft through the hood which will affect valves open to such draft.

Sight openings 37 are formed in the top of the outer inclosure and continue through the heating chamber 20 and the top portions of the incubating chambers 11, said openings 37 being provided with lining tubes 38 having glass or other transparent members 39 therein and closed at their outer extremities by removable plugs 40. The doors 13 also have similar sight openings 41 extending therethrough and through the adjacent side into the incubating chamber at a downward angle of inclination and also provided with glass or other transparent members 42 and outer closing plugs 43. The openings 37 and 41 provide means for inspecting the interior of the incubating chambers and viewing the eggs on the trays 12, one opening assisting the other when the plugs 40 and 43 are removed in illuminating the incubating chambers, and either opening may be used as a sight opening to permit an operator to look inwardly into the incubating chambers from the front of the machine, or to look downwardly into said chambers from the top of the incubator, and also permit in-

spection of the thermometers that may be placed on the egg trays. These sight openings further permit inspection of the interior of the incubating chambers without opening the doors 13, and as said openings have transparent members disposed therein and closely fitting the same, the atmosphere surrounding the incubator will be prevented from rushing into the incubating chambers when the plugs 40 and 43 are removed.

The heat generating means and heating medium, together with the cooperating accessories, will now be described. To the bottom of the incubator and depending below the latter is a bracket 44 having a swinging arm 45 embodying a lower horizontal member 46 with a depending knob or grasping device 47 near its free extremity. On this arm 46 is disposed a heating lamp 48 of usual construction and provided with a burner 49 and a chimney 50, together with a wick regulating means 51. A second bracket 52 is also secured to and depends below the bottom of the incubator and is provided with a lower horizontal member 53. Surrounding the burner 49 of the lamp is an annular water chamber 54 having upper and lower pipes 55 and 56 communicating therewith and extending off in horizontal planes and communicating with the lower extremity of a water tank 57 removably arranged on the member 53 of the bracket 52. The lower pipe 55 terminates in line with the bottom of the water tank 57, but the pipe 56 continues into an angularly disposed or vertical outlet extremity 58 which is of greater diameter than the diameter of the said pipe 56 and has its outlet extremity located adjacent to the top of the water tank. The object of the water chamber 54 is to cool the lamp adjacent to the point of greatest heat to avoid explosions, and the two pipes 55 and 56 set up a thorough circulation of water in the said chamber. From time to time the water tank 57 may be replenished or resupplied with a quantity of cold water to maintain the water circulating through the pipes 55 and 56 at a proper temperature for effectively cooling the lamp adjacent to the burner.

To remove the lamp, the operator must hold the same with one hand, swing the bracket 46 by the knob or projection 47 out of position, turn the lamp sufficiently to remove the reservoir 57 from the rest 53, and then lower the lamp. A reverse operation is pursued in applying the lamp.

Centrally disposed in the lower portion of the incubator below the incubating chambers 11 and extending downwardly below the bottom of the incubator is a water heater 59 which is partially annular and has a heating chamber 60 extending upwardly thereinto and fully open at the bottom to receive the lamp chimney 50 and permit



heated currents to circulate therein. The heating chamber 60 is formed by an elongated thimble 61 centrally secured in and forming part of the inclosing wall of the water heater 59, the wall of the water heater being fully closed at all other points except at the bottom where a valved drain pipe 62 is secured.

Depending from the bottom of the incubator and concentrically arranged with relation to the water heater 59 is a thin sheet metal collar or cylinder 63 which overlaps or projects below the upper extremity of a second or inclosing cylinder 64 for the lower extremity of the heater 59, the lower extremity of the cylinder 64 and upper extremity of the cylinder 64 being connected at intervals by wooden or other analogous blocks 65 interposed therebetween and spaced a sufficient distance to permit heat currents to pass down around the lower end of the heater 59 and upwardly and out through the cylinders 63 and 64 to facilitate combustion. The upper end of the cylinder 64 is fully open, but the lower end 66 is inwardly bent or flanged to meet a plate 66<sup>a</sup> held by the lamp, said plate being apertured at intervals and especially to permit the drain pipe 62 to pass therethrough and to take over the burner 49 of the lamp. The plate 66<sup>a</sup> has a greater diametrical extent than the bottom of the chamber 60, so that when the lamp is removed the bottom of the said chamber 60 will be clear to permit the operator to clean out the chamber 60 and relieve the latter of accumulations of products of combustion that may have settled therein. On the upper closed end 67 of the water heater 59 a heat non-conducting disk 68, of suitable material, preferably wood, is placed and has its upper side in close relation to the common bottom 7 of the incubating chambers 11, the object of this heat non-conducting disk or element being to prevent a concentration of too great heat at the portions of the incubating chambers immediately above the said disk.

The circulatory system of the incubator including the water heater 59 also comprises a radiator 69 having an upper elongated rectangular or similarly shaped top member 70 which is horizontally disposed and depending end legs 71 continuous with or secured to return pipes 72 having downwardly and inwardly inclined extremities 73 communicating with the lower portion of the water heater 59 at diametrically opposite points. To the top portion of the water heater 59 a plurality of feed-pipes 74, 75, 76 and 77 connects and extends outwardly in various directions through different portions of the incubator around the incubating chambers and through the space 10 and connects with the upper horizontal member 70 of the radiator 69. The several pipes 74,

75, 76 and 77 are so shaped as to fully embrace the incubating chambers and each pipe of this series includes upper and lower horizontal members connected by a vertical member, as clearly illustrated by Fig. 4. The upper and lower members of these feed-pipes are so curved as to bring their vertical connecting members in different positions relatively to the longitudinal extent of the combined incubating chambers so as to uniformly distribute the heat between the walls of the chambers and the supplemental casing 5. The radiator member 70 is disposed in the heating chamber 20 at the center of the latter, as clearly shown by Fig. 3, and the legs 71 depend through the center of the spaces between the end walls of the supplemental casing 5 and the end walls of the outer inclosing casing 1, and by this means the return pipes 72 conveying water at a lower temperature back to the water heater 59 than the water passing out through the feed-pipes connected to the upper extremity of said water heater are separated from the said feed-pipes by the end and bottom walls of the supplemental casing 5 and thereby counteracting cooling influence of the water returning through the pipes is prevented from affecting the heated water passing out and upwardly through the feed-pipes.

The water heating and circulating system is supplied with water at intervals as may be found necessary through the medium of an inlet tube 78 extending through the top of the inclosing casing 1 and communicating with one extremity of the member 70 adjacent to one end of the incubator, the upper end of the inlet tube being provided with a funnel 79 in which is fitted a removable stopper or plug 80. The water in the circulatory system is also tempered or reduced to a certain degree or extent by the thermostat mechanism hereinbefore described and controlling the ventilation of the incubating chambers 11, the heating chamber 20 and the spaces around the supplemental inclosing casing 5.

Between the tubes 74 and 75 is a tube 81 extending through the double top of the outer inclosing casing 1 and communicating with the top portion of the radiator 69. This tube 81 has a valve 82 cooperating therewith to open and close the upper end of the same, the said valve being operated by counter-levers 83, see Fig. 3, engaged by actuating levers 84 having their outer extremities extending into the hood 34 in planes at right angles to one of the levers 17, vertically disposed operating projections 85 being interposed between the outer ends of the lever 84 and the cooperating lever 17, so that as the latter moves the counter-lever mechanism embodying the levers 83 and 84 will correspondingly actuate the valve 82 and open and close the tube 81. By opening the tube



81 the temperature of the water in the radiator 69 will be lowered by allowing the escape of steam as well as heat units, and such opening operation will take place approximately simultaneously with the liberation of the hot air and obnoxious gases from the radiating chamber 20 and the incubating chambers 11 and the ventilation of the interior of the incubator through the medium of the openings, pipes and branches heretofore explained and valves 30, and thus it will be seen that the thermostats and co-operating levers 17 control not only the degree of heat of the incubator or maintain the temperature of the latter at a proper degree, but that simultaneously the incubator is ventilated and the heating medium is correspondingly tempered or reduced.

This unification as to control of the temperature and ventilation of the incubator proportionate to the degree of heat which the thermostats have been set to maintain is advantageous not only in dispensing with mechanism requiring an independent operation and adjustment, but in preserving uniformity of temperature throughout the entire incubator in an automatic manner and mistakes incident to ignorance on the part of an operator as to the necessary adjustment of separate parts or in view of lack of attention, will be avoided, and it is possible to place the incubator either indoors or fully expose the same outdoors without serious consequences or interference with the proper operation of the several incubator mechanisms. The flame of the lamp may also be regulated at will and it is fully shielded from the surrounding atmosphere and is therefore not subject to drafts and will remain continually ignited as long as required and when the oil is sufficient to maintain combustion. The valves co-operating with the several outlets or vents, as explained, will be set to obtain the best results and will open and close in accordance with their position or attachment with respect to the several levers or lever mechanism. It is intended that the valves 30 shall open to ventilate the egg chambers through the ventilating pipes hereinbefore explained when the temperature in said chambers has reached 100°; vent 25 will open when chambers reach 104°; vent 21 will open when egg chamber reaches 105°, and 81 will open when temperature in egg chamber reaches 106°, all the foregoing vents closing reversely as the temperature lowers. The positions of the valves, however, may be modified in various incubators and in proportion to the lengths of the levers.

It will be understood that the eggs will be properly disposed upon the trays 12 and remain in the incubator during the period of incubation, or until they are hatched,

the lamp being supplied with fuel at intervals and the circulatory system likewise replenished with water.

Before the eggs are placed in the egg chambers, the doors 13 are closed and remain in this condition for twenty-four to thirty-six hours, and during this latter time the incubator is heated and regulated as to heat required, 102° F., by turning the lamp wick up or down as may be necessary and determined by inspecting the thermometers placed in the egg chambers. After the incubator is properly heated, the doors are opened and the eggs are then placed on the trays 12 and the said doors again closed until the third day. At this time and continuously and regularly until the eighteenth day of incubation the eggs are turned twice or more every twenty-four hours by opening the doors and gently rubbing the hand over them. At the end of the eighteenth day the doors are closed and remain in this condition until the chicks are hatched. The hatching of the chicks may be observed through the transparently sealed openings 37 and 41. The eggs are protected from chilling drafts by having the ventilating means communicating with the upper portions of the egg chambers.

It will be understood that the ventilation of the egg chambers is regulated in accordance with the temperature of the said egg chambers and not by the temperature or degree of heat of the water reservoir and circulatory system. The provision of the water circulating system and the particular means for ventilating are conducive to and insure a minimized consumption of fuel or heating medium for the lamp, and also a uniformity and regularity of temperature throughout all parts of the incubator. While two egg chambers are shown, it will be understood that the invention is not limited to this number.

The legs 71 of the radiator 69 provide return means for the water fed to the said radiator and converge toward their lower extremities where they communicate with the return pipes 72, all of the remaining pipes serving as feed pipes for the radiator and communicating with opposite sides of the latter at points inwardly from the opposite extremities of said radiator, thereby insuring a thorough circulation of the water.

Having thus fully described the invention, what is claimed as new, is:

1. An incubator having an outer inclosing casing, an incubating chamber, a heating source located under the bottom of the incubator, a heating chamber over the incubating chamber, and a water heating and circulatory system consisting of a plurality of pipes extending over opposite side portions of the incubating chamber and including an



upper radiator centrally disposed longitudinally in and of less dimensions than the said heating chamber and having downwardly projecting legs at the ends thereof located  
 5 between the end walls of the incubator and having their lower terminals connected to the heating source, the radiator having greater dimensions than the said pipes and legs, the pipes being connected to opposite  
 10 side portions of the radiator between the ends of the latter.

2. An incubator comprising an outer inclosing casing having ventilating means at opposite ends thereof provided with automatically operating controlling devices, an  
 15 incubating chamber within the casing provided with thermostat means, means for causing the thermostat to control the temperature of the incubating chamber, a heating chamber over the incubating chamber,  
 20 a water circulatory system in the outer casing and consisting of a plurality of pipes surrounding different portions of the incubating chamber and an upper radiator  
 25 centrally disposed in the heating chamber and from which the pipes extend, the radiator having depending legs between the end walls of the incubator, an upper heat reducing means communicating with the interior  
 30 of the incubating chamber, and a source of heat to which portions of the said pipes and legs are connected, the thermostat means in the incubating chamber controlling both the ventilation and temperature  
 35 of the interior of said chamber and the heat reducing means.

3. An incubator having ventilating and heat reducing means, an incubating chamber with which a portion of the heat reducing means directly coöperates, and a water  
 40 circulatory system surrounding the incubating chamber and provided with a radiator also having heat reducing means communicating with the interior thereof, the heat reducing means of the chamber and radiator  
 45 being simultaneously operable to arrange the same in open or closed condition.

4. An incubator having an outer inclosing casing, an inner supplemental casing, an incubating chamber means within the supplemental casing, the supplemental casing  
 50 being of materially less dimensions than the interior of the outer inclosing casing and spaced from the latter and the incubating chamber means likewise spaced from the bottom, ends and sides of the supplemental casing, a radiating chamber being formed over the top portion of the incubating chamber means, a hot water circulatory system consisting of a water heater  
 60 located in the lower central portion of the incubator, an upper radiator within the radiating chamber having depending terminal legs in the space between the end walls of the outer inclosing casing and the end walls

of the supplemental inclosing casing, return pipes connected to the lower ends of the legs and to the lower extremity of the water heater and passing through the space between the bottoms of the outer inclosing  
 70 casing and the supplemental inclosing casing, feed-pipes connected to the upper extremity of the water heater and passing through the space between the bottoms of the incubating means and the supplemental  
 75 casing and around the sides and ends of the incubating chamber means and attached to different portions of the radiator, and means for regulating the temperature of the incubator.

5. In an incubator, the combination of an outer inclosing casing, an incubating chamber inclosed within the said casing, a water heating means located at the central lower  
 80 portion of the incubator and depending below the bottom of the outer inclosing casing and provided with a central hot air chamber opening through the bottom thereof, cylinders surrounding the water heating means, the said cylinders having their adjacent  
 85 ends overlapped and spaced to permit ingress of air to the said hot air chamber, and a lamp removably coöperating with the said hot air chamber, the water heating means being provided with devices for distributing  
 90 the heated water around different portions of the incubating chamber.

6. In an incubator, the combination of an inclosing casing having ventilating openings at the ends, vertically movable slide valves  
 100 coöperating with said openings, an incubating chamber means within the casing and spaced from the latter, a hot water circulatory system coöperating with and embracing the incubating chamber means and having  
 105 an upper radiator provided with a valved heat escape and heat reducing openings having communication with the incubating chamber means and the space over the latter, a thermostat in the incubating  
 110 chamber means having a member projecting upwardly through the incubator, a lever to which the thermostat member is adjustably connected, the movable slide valves being also attached to said lever, valves coöperating with the outlet extremities of the heat reducing openings communicating with the incubating chamber means and the space above the latter, and counter-lever mechanism actuated by the thermostat levers and  
 120 coöperating with the valved heat escape of the radiator.

7. In an incubator, the combination of an inclosing casing having an incubating chamber therein and provided with valved openings to control the ventilation and temperature of the interior of the casing, the incubating chamber being also provided with a valved outlet, heating means, a thermostat within the incubating chamber, a lever con-  
 125  
 130



5. nected to a portion of the thermostat and the valves of the openings and outlet, and a hood covering the said openings and valve and lever, the hood being open at opposite extremities.

8. In an incubator, the combination of an inclosing casing having an incubating chamber therein and doors at the front to render said chamber accessible, the top and front  
10. of the casing and incubating chamber being provided with openings extending there-through, the openings in the front of the casing being in downwardly and inwardly inclined planes, transparent members in-  
15. troduced at intermediate points in the open-

ings at a distance inwardly from the outer portions of the inclosing casing, the transparent members in the inclined openings being disposed at corresponding inclinations in planes at right angles to said openings, 20 and closing devices removably mounted in the outer extremities of the said openings.

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

WILLIAM H. HOWARD.

Witnesses:

JAMES R. HOWARD,  
JOHN R. WORTH.