Sept. 21, 1937.

P. S. RICE

2,093,648

HUMAN INCUBATOR

Filed May 7, 1934

2 Sheets-Sheet 1

Fig. 1

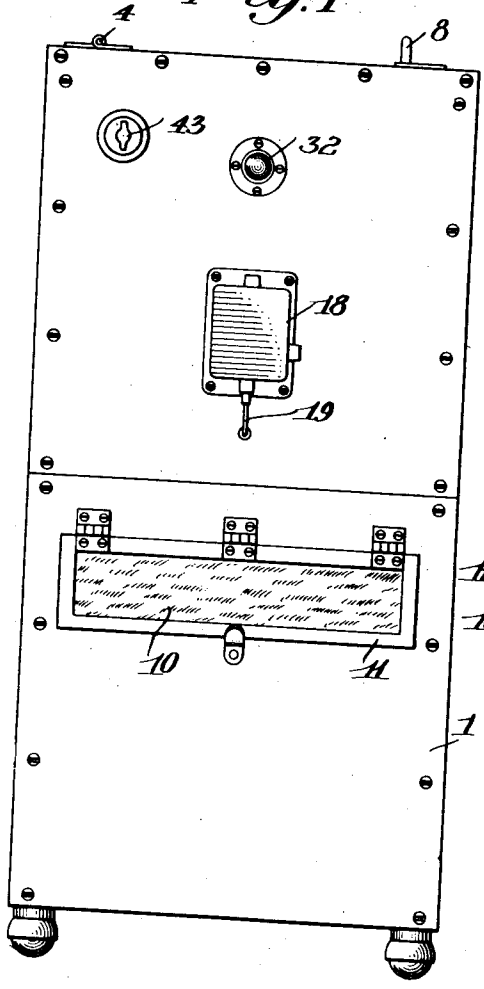


Fig. 2

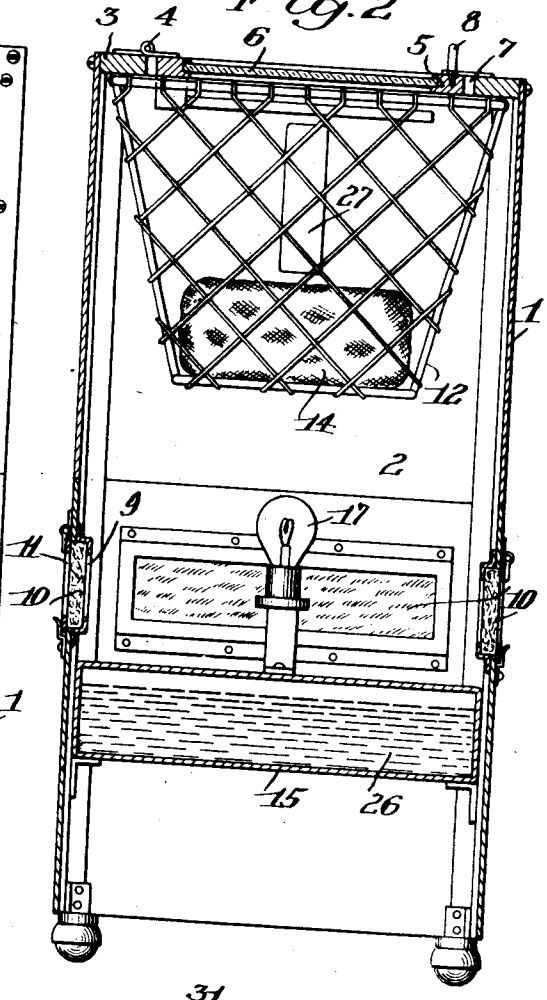


Fig. 5

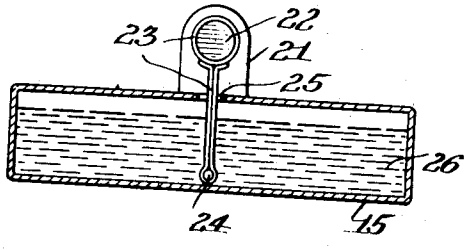
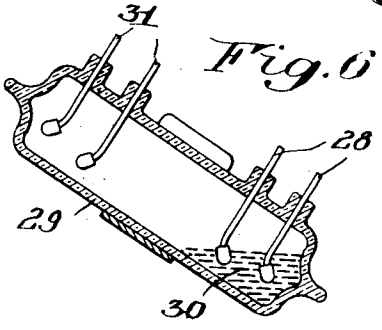


Fig. 6



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Fig. 3

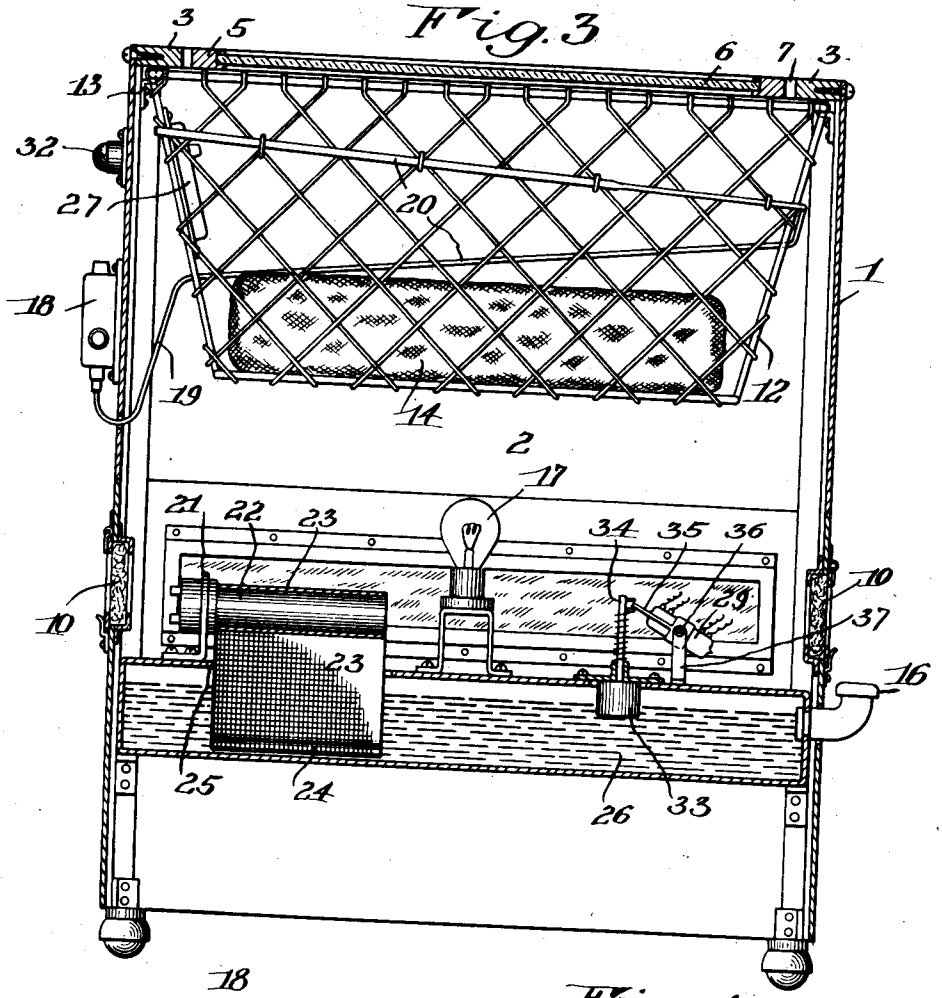
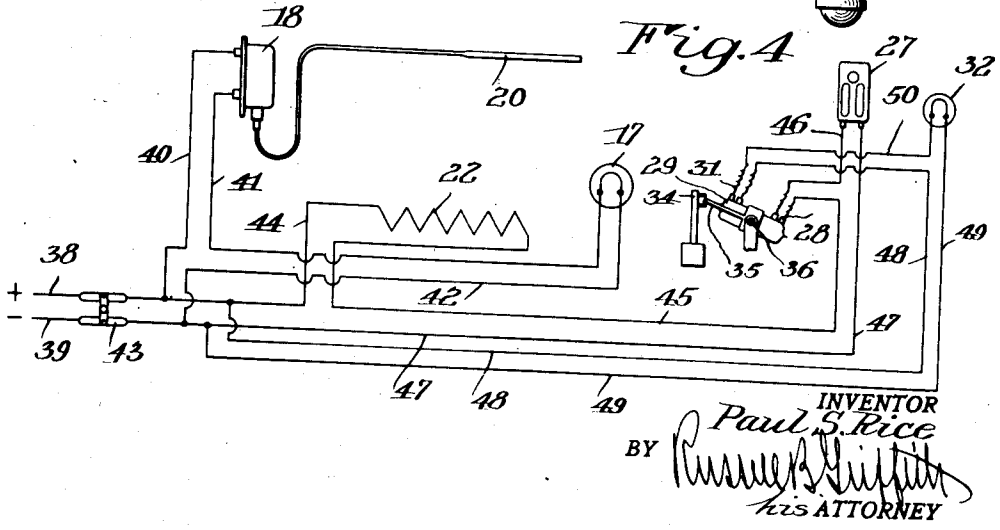


Fig. 4



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UNITED STATES PATENT OFFICE

2,093,648

HUMAN INCUBATOR

Paul S. Rice, Rochester, N. Y.

Application May 7, 1934, Serial No. 724,332

4 Claims. (Cl. 128—1)

My present invention relates to incubators and more particularly to those of a type designed for the nurturing and care of infants which, because of premature birth or other reasons, are too delicate for usual treatment, and it has for its object to provide a device of this character which will be simple in construction, effective in operation to maintain the infant under favorable conditions for its development and will be convenient for attendants in use. The improvements are directed in part toward the mounting of the bassinet or holder and toward the provision of automatically-acting instrumentalities whereby both the temperature and the humidity of the air within the incubator are held at scientifically correct points for the best results.

To these and other ends, the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of this specification.

In the drawings:

Fig. 1 is an end elevation of an incubator constructed in accordance with and illustrating one embodiment of my invention;

Fig. 2 is a transverse vertical sectional view therethrough;

Fig. 3 is a longitudinal central vertical section;

Fig. 4 is a diagrammatic plan of the electrical circuit arrangements;

Fig. 5 is a detail transverse section through the water reservoir, showing an end view of the humidifier; and

Fig. 6 is an enlarged longitudinal central section through a mercurial switch that is used.

Similar reference numerals throughout the several views indicate the same parts.

Referring more particularly to the drawings, 1 indicates a sheet metal or similar casing having an incubating chamber 2 therein and embodying a top frame 3 to which is hinged at 4 a door 5 having a glass panel 6 through which the interior may be observed, said door being fitted with a suitable handle and stop 8. The door is smaller than the opening in the frame on one dimension at least to provide vents 7 for the circulation of air. The air enters near the bottom through openings 9 and is preferably filtered through suitable pads 10, such as flocculent cotton, held in pockets by hinged door frames 11. It should be noted that the area of the inlet openings 9 is very much greater than the area of the discharge opening or vent 7, in order to obviate the possibility of a reversal of air flow through the incubator whereby cold or unconditioned air might enter the incubator through the discharge opening and subject the infant to chilling. (See Figs. 2 and 3).

An open wire mesh bassinet 12 is suspended from the under side of the top frame 3 on brackets 13 and contains the mattress 14 and such other fittings as the infant requires.

A raised bottom for the incubating chamber 2 is furnished by a flat water tank or reservoir 15 to be filled at 16 and on the upper deck of which is an electric lamp 17 of sufficient power to accumulate a desired amount of heat within the chamber 2. This lamp which may be a 260 watt lamp, is under the control of a thermostat 18 mounted, in the present instance, on the exterior of an end wall of the casing with its heat induction element 19 passing through the wall and embracing the bassinet at 20. The circuit arrangements thereof, as well as those of other elements about to be referred to, will be later described.

Another heating element for evaporating moisture, embodying a hot point or resistance coil of the usual type is also mounted on the upper deck of the bottom tank by means of a bracket 21 and embodies a horizontal cylinder 22, with the surface of which contacts a wick 23 weighted at 24 to depend through a slot 25 in the top of the tank and be immersed in the body of liquid, indicated at 26. This heating element 22 which may be a 300 watt unit or may have a range from 200 to 600 watts, is controlled by a humidostat 27 arranged on the head or end wall of bassinet 12 in the region of the infant's breathing. The humidostat is of the electric contact type in which the contacts thereof are normally closed while the relative humidity within the chamber is below a predetermined value but when the predetermined value of relative humidity is reached in the chamber, these contacts are opened. The circuit of the heater 22 includes contacts 28 at one end of a double pole, double throw mercurial tube switch 29 containing a body of mercury 30 and shown in detail in Fig. 6. A similar pair of normally open terminals 31 at the other end of the tube are in circuit with a danger or signal light 32 on the wall of the casing 1. A float 33 in tank 15 has a stem 34 extending therethrough and provided with a bifurcated end engaging a projection 35 on the end of tube 29 which is centrally pivoted at 36 on a bracket 37. When the level of the water 26 drops below the lower end of wick 23 the float 33 drops reversing the angle of tube 29 so that the circuit is broken at 28 through element 22 and a circuit is made at

31 through danger light 32 informing the attendant that more water must be supplied.

The foregoing is an exposition of the mechanical elements and functions of the apparatus. The electric circuit connections are shown in Fig. 4 and as soon as the mechanical parts are in the positions of Fig. 3, as indicated, the circuits are as follows. The circuit for the heating lamp 17 is traceable from the lead-in conductor 38, upper blade of the master switch 43, conductor 40, contacts of thermostat 18, conductor 41, lamp 17, conductor 42, lower blade of the master switch 43 to the other lead-in conductor 39. The circuit for the heating unit 22 of the humidifier, which circuit is in multiple with that last described is traceable from the lead-in conductor 38, upper blade of the master switch 43, conductor 44, heating unit 22, conductor 45, contacts 28 of the mercurial switch, conductor 46, contacts of the humidostat 27, conductor 47, lower blade of the master switch to the other lead-in conductor 39. The alarm circuit for the lamp 32 which indicates failure of the water supply in the reservoir, is likewise completed in multiple with the circuits just described. This circuit extends from the lead-in conductor 38, upper blade of the master switch 43, conductor 48, contacts 31, conductor 50, lamp 32, conductor 49, lower blade 43 of the master switch to the other lead-in conductor 39.

By the use of my apparatus, not only the proper degree of heat is maintained but a proper humidity is contributed to the air entering at 9 and escaping at 7 after passing the infant, because if it rises too high the humidostat in the bassinet will open the circuit through humidifying heater 22 and restore it only when the humidostat calls for more moisture and this is always available as long as the danger light 32 is deenergized, while the thermostat 18 takes care of the heat factor through the lamp 17, the heater 22 not being sufficient to overheat the chamber by itself.

I claim as my invention:

1. An incubator for persons comprising a cabinet, a bed supported within said cabinet adjacent the top thereof, said cabinet having an inlet opening therein below said bed and having an outlet opening therein above said bed, said outlet opening being materially smaller than said inlet opening, an air filter associated with said inlet opening, means for introducing heat and moisture into said cabinet below said bed whereby air enters the cabinet through said inlet opening and after being filtered, heated and moistened, rises by convection to flow past said bed and thence through said outlet opening, and thermostatic and humidostatic means responsive to the temperature and relative humidity of the air in the cabinet for controlling said heat and moisture introducing means.

2. An incubator for persons comprising a cabinet, a bed supported within said cabinet adjacent the top thereof, said bed having at least one side and one end thereof spaced from the adjacent side and end of the cabinet to provide a passage, said cabinet having an inlet opening therein below said bed and having an outlet opening therein above said bed, said outlet opening being materially smaller than said inlet opening, means for filtering air introduced through said inlet opening, means for introducing heat into said cabinet below said bed whereby air entering the cabinet through said inlet opening after being heated rises by convection to flow through said passage and thence through said discharge opening, and thermostatic means responsive to the temperature of the air in the cabinet for controlling said heat introducing means.

3. An incubator for persons comprising a cabinet, a bed supported in substantially horizontal position within the cabinet adjacent the top thereof, said bed having its sides and ends spaced from the adjacent inner side and end walls of the cabinet whereby an air passage encompasses said bed, said cabinet having an inlet opening therein below said bed and having an outlet opening therein above said bed, said outlet opening being materially smaller than said inlet opening, an air filter covering said inlet opening, means for introducing heat into said cabinet below said bed whereby air entering the cabinet through said inlet opening after being heated, rises by convection to flow through said passage and thence through said outlet opening, and thermostatic means responsive to the temperature of air in the cabinet for controlling said heat means.

4. An incubator for persons comprising a cabinet, a bed supported within said cabinet adjacent the top thereof, said cabinet having an inlet opening therein below said bed and having an outlet opening therein above said bed, said outlet opening being materially smaller than said inlet opening, an air filter associated with said inlet opening, means for introducing heat into said cabinet below said bed whereby air enters the cabinet through said inlet opening and after being filtered and heated, rises by convection to flow past said bed and thence through said outlet opening, and thermostatic means responsive to the temperature of the air in the cabinet for controlling said heat introducing means.

PAUL S. RICE.