



Electric-Heated Water-Jacketed Incubator

To meet the requirements for the safe application of artificial heat to premature and weak infants, three conditions must be observed:

1. The heat must be of a fairly constant temperature, with a safe maximum.
2. A constant supply of fresh air must be available.
3. A normal average of humidity must be maintained.

I have attempted to meet these requirements by the construction of an electric-heated water-jacketed bed. The bed shown in Fig. 1 is constructed of heavy sheet copper, with inside measurements as follows: length, 30 inches; width, 17 inches; and depth, 13 inches. The entire inner chamber is surrounded, except at the top, by a 1-inch water jacket. Covering the water is a layer of asbestos, and this, in turn, is covered by a copper jacket, making in all three walls of copper, with water between the first and second and asbestos between the second and third. The asbestos practically prevents heat radiation from the external surface, limiting heat radiation to the inner surface of the jacket—that is, to sides and floor. At one end a water gauge glass with faucet registers the height of the water, and is also used for emptying the jacket during transportation and in filling the jacket.

In the floor of the water jacket a $\frac{1}{4}$ -inch pipe is inserted to carry off any water which might flow into the bed in case of a leak, thus avoiding all danger of flooding the crib in event of an accident to the water jacket.

The bed proper rests on a standard (Fig. 1), which is supplied with ball-bearing casters, or with porcelain shoes if preferred, allowing of easy transportation from one ward to another if desirable.

The electric heating apparatus (Fig. 1) consists of:

1. A plate with a 6-inch surface in direct contact with the floor of the water jacket, and specially constructed to carry a maximum capacity of 300 watts, which makes it impossible to heat the water above 155° at a room temperature of 70° F.
2. A rheostat fastened to the standard (Fig. 1) with seven contacts; six of them graduated to take current varying from 25 watts on contact 1 to 300 watts on contact 6. The seventh contact shuts off the current.

For the protection of very frail infants, a partial cover (Figs. 1 and 2) for the tub, $21\frac{1}{2}$ inches in length, is provided to shield them more completely from outside air currents. It is provided with a thermometer, so that the temperature within the tub can be ascertained by the

nurse at all times. Further, a brass nickel-plated frame covered by a removable linen cover is provided in the form of a hood (Fig. 2). This can be set over the open space not covered by the metal lid in case of great air currents and extremely cold nights. The hood raises the temperature within the bed on an average of from 5 to 10° F., depending on the room temperature and current used, but does not interfere with perfect ventilation. The hood is made collapsible, and may be set at any angle desired as may be indicated.

The baby basket (Fig. 2), which is of the type used in many obstetric wards, is 28×14 inches and has a depth of $8\frac{1}{2}$ inches, thus allowing considerable air space on all sides, which prevents any danger of the infant's extremities coming in contact with the walls of the heated water jacket. The basket rests on a standard, raising it 2 inches above the floor of the bed, allowing a free circulation of air all around it. A simple removable net cover is provided, which encircles the basket, adding to its cleanliness and appearance. The basket supplied differs from



Fig. 1.

the illustration, being constructed of heavy brass wire mesh, nickel plated, in place of upright bars.

Excessive drying of the air is prevented by the constant circulation through the bed of the free air of the room and by evaporation from a flat basin, 9×11 inches, containing baked porous clay (as used in water filters), over which water is poured to allow of evaporation. This is placed on the floor of the bed immediately under the

baby basket. Varying with the degrees of temperature to be maintained within the bed, it is necessary once daily to supply from 8 to 16 ounces of water to replace that lost through evaporation.

The construction of the bed is such that it is intended for use in an ordinary ward or room, giving the infant the advantage of the most perfect room ventilation. The free currents of air within the bed can be demonstrated by allowing smoke to pass over the surface of the bed, which results in the smoke settling in the center, passing over the floor to the lateral walls and up the sides into the room.

We require inspection and charting of the temperature registered by the lid (if the latter is used), or by a register placed within the basket if the lid is not in use, at 6 a. m., 12 m., and 6 and 12 p. m. as most likely times for maximum changes in the ward temperature.

TEMPERATURE CHART FOR INCUBATOR BED

Day of Entrance..... Case No.
 Name..... Dr.

Date	6 a. m.	12 m.	6 p. m.	12 p. m.

Fig. 4. This chart has twelve lines, and is 5 inches wide and 8 inches long.

As the only variable factor in the maintenance of temperature within the bed is that of the changes in temperature in the surrounding room, I have made numerous calculations at different room temperatures and have tabulated them on a card at the head of the bed, so that the attendant need know only (1) the temperature desired on the inside of the bed and (2) the room temperature in order that by looking at her chart she may ascertain the number of the contact point at which to place the rheostat.

The advantages offered by this apparatus are:

1. Safety. The maximum temperature to which the water can be heated with this special stove is about 155° F., with a room temperature of 70° F. and rheostat on contact 6, this giving a maximum temperature within the bed of about 110° F., with the lid and canopy on.
2. Economy of construction, operation, and, most important, the elimination of the trained attendant.

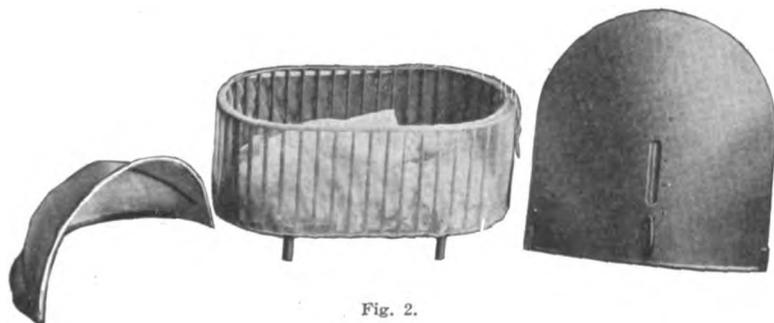


Fig. 2.

3. Simplicity of operation. It needs practically no attention unless there are extreme ranges of temperature in the ward, since the asbestos insulation prevents radiation from the outer surface of the bed, and the heater holds the water at a constant temperature. We rarely find it necessary to change the rheostat more than twice daily.
4. Perfect control of ventilation of air within the bed in the general wards of the hospital.

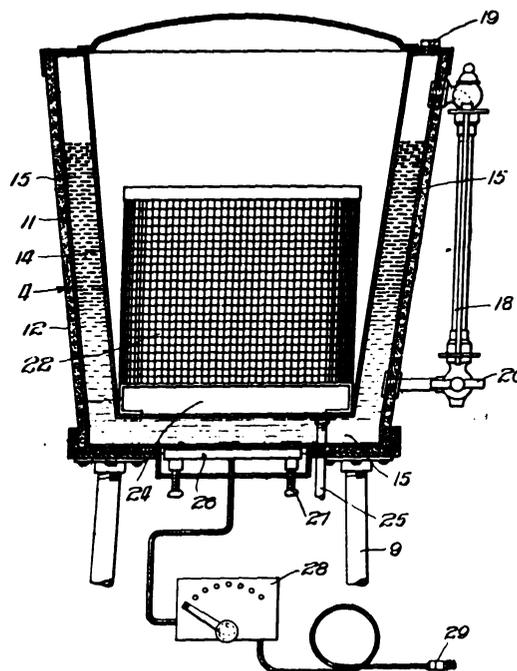


Fig. 3.

Fig. 3. 4, copper wall covering asbestos layer; 9, stand supporting bed; 11, 14, inner and outer walls of copper water jacket; 12, asbestos layer insulating water jacket; 16, water within jacket surrounding sides and floor of bed; 18, water gauge; 19, plug in opening used for filling jacket; 20, cock for emptying jacket; 22, removable crib; 24, air space underneath crib; 26, heating plate; 28, rheostat; 29, electric plug.

5. Humidity, which is little lower than that of the surrounding air (hygrometer, Taylor Instrument Company). I have had four in the infant incubator beds in use in the wards of Michael Reese Hospital for periods varying from four to fourteen months.

JULIUS H. HESS, M. D.,

Associate Professor and Head of the Department of Pediatrics, University of Illinois, College of Medicine.

Use of Hospital Garbage—How One Institution Sterilizes Waste Food for Feeding to the Swine Herd

Hospital or sanatorium garbage furnishes a fairly well-balanced food for pigs, and can be used to advantage if care is taken to prevent broken glass or china, soap, etc., being thrown in the cans, and the garbage is sterilized. Garbage is commonly sterilized by boiling in a cauldron kettle, and this method, while effective, is objectionable in that it necessitates emptying from the cans into the kettle and scooping out after cooking. The labor is thereby increased and disagreeable odors permeate the vicinity. The method here described obviates to a large extent both of these objections, as the garbage is sterilized in the same can in which it is collected.

Description of Can.—The cans are made of No. 10 B. W. G. sheet steel, closely riveted and fitted with 1½ x ½-inch reinforcing bands at bottom and top and six vertical reinforcing irons; the bottom of the can is ½ inch above bottom of reinforcing band. Each can is fitted with a reinforced gasketed top, with permanent gasket and three cast-iron screw pattern wood clamps arranged to secure it in place. The dimensions of the can are 18 inches in diameter by 24 inches high.