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2,409,083

ENCLOSURE FOR BASSINETS

Filed Aug. 25, 1943

2 Sheets-Sheet 1

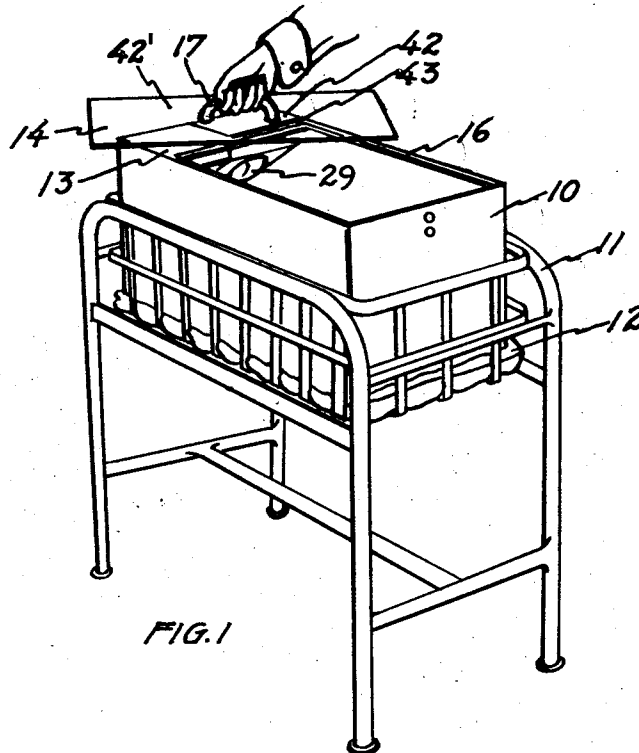
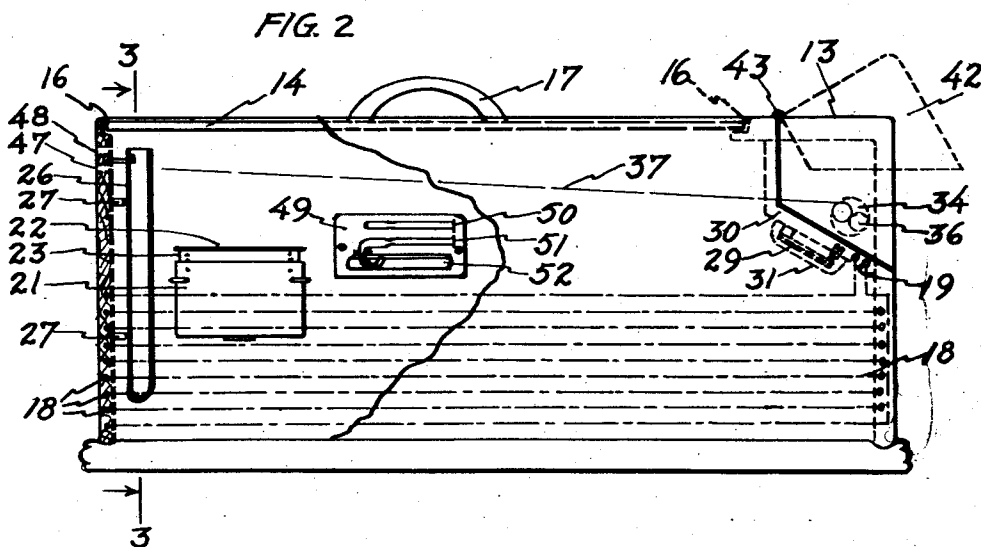


FIG. 1



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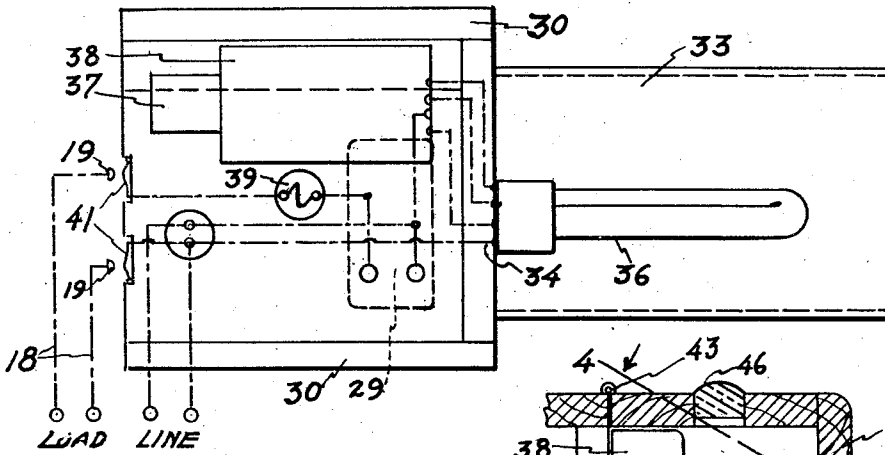


FIG. 4

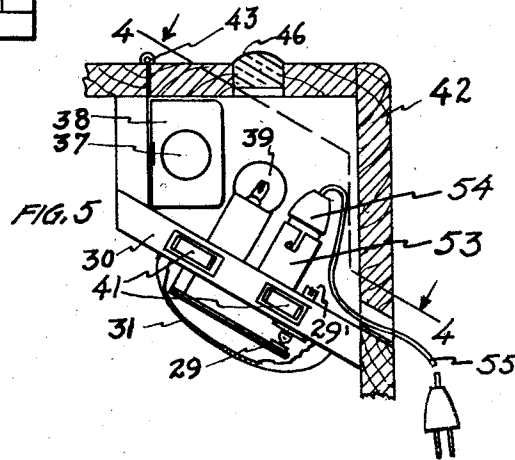


FIG. 5

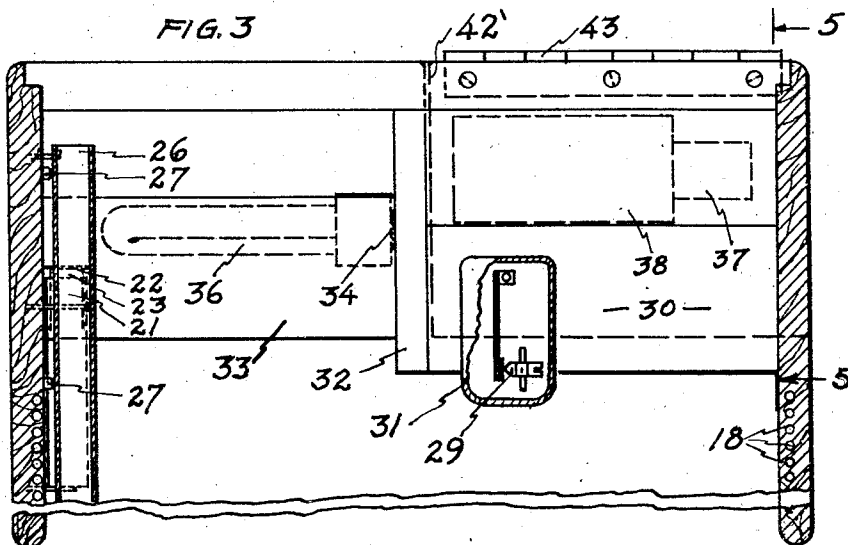


FIG. 3

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ENCLOSURE FOR BASSINETS

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3 Claims. (Cl. 128—1)

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This invention relates to enclosures or cabinets of a size to fit over most of the area of the mattress in a standard nursery bassinet. The cabinet is equipped with apparatus that makes it an incubator for premature infants, but some of the broadest aspects of the invention are not limited to incubators.

It is a feature of the invention that the cabinet is open at its lower end and rests on the mattress of the bassinet so that the mattress forms the bottom of the incubator. There is an opening of substantial size in the top of the cabinet for servicing the infant, and a removable cover for this top opening makes the incubator one of the "closed" type.

Medical development of the last several years has demonstrated that a person in a subnormal condition, and more particularly a premature infant, is better off in medically conditioned air. The expression "medically conditioned air" is used herein to designate air that is maintained at a given temperature and within definite limits of humidity, and oxygen and carbon dioxide concentration, and that has a very low bacterial count. Since the air best suited to a premature infant is quite different from the air in which a nurse can work best, the "closed" type of incubator for premature infants has been developed. Such incubators are effectively, though not completely, sealed from the outside air, and in the past they have been of large size and not suitable for movement from place to place in a hospital nursery.

This invention comprises a cabinet that is light and easily portable, and that can be placed within a nursery bassinet to form a closed incubator for providing an infant in the bassinet with medically conditioned air.

One object of the invention is to provide an incubator with improved means for heating the space enclosed by the incubator. Cabinets embodying this feature of the invention have resistance wires embedded in their walls for producing a moderate surface temperature that heats the interior of the incubator, partly by radiation and partly by convection currents of the air that contacts with the walls.

Another object of the invention is to provide means for sterilizing the air in the cabinet. The cabinet preferably includes a disinfecting lamp that is located in position to direct rays across a zone at the top of the space enclosed by the cabinet. There is a shield that protects the remainder of the space within the cabinet from the rays of the lamp.

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The heater for the cabinet or incubator circulates the atmosphere through this zone in which it is exposed to the rays of the lamp. In the preferred embodiment of the invention, the disinfecting lamp is arranged behind a shield that terminates short of the top and bottom of the space within the incubator so that when the heater is not in operation, the lamp itself, which operates continuously, causes a circulation of convection currents around the shield and past the lamp, thus increasing the effectiveness of the lamp during the periods when the heater is not in operation.

Another feature of the invention relates to the incubator cover and to a construction which makes opening of the incubator cabinet to service the infant convenient, with a minimum of disturbance of the medically conditioned atmosphere within the cabinet. Other features relate to control of the humidity within the cabinet, and to a construction by which an attendant can gain access to the incubator controls, such as the thermostat adjustment, without opening the part of the incubator in which the infant is enclosed.

Other objects, features and advantages of the invention will appear or be pointed out as the specification proceeds.

In the drawings, forming a part hereof, in which like reference characters designate corresponding parts in all the views,

Fig. 1 is a perspective view showing an incubator embodying this invention, with the incubator positioned within a nursery bassinet;

Fig. 2 is an enlarged side elevation, partly broken away, of the incubator shown in Fig. 1;

Fig. 3 is an enlarged sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a detail, diagrammatic sectional view taken on the line 4—4 of Fig. 5 but with the outside cover removed; and

Fig. 5 is a detail view, mostly in section, showing that portion of the incubator that opens to the room to expose the electric control apparatus, the section being taken on line 5—5 of Fig. 3.

Fig. 1 shows a rectangular cabinet 10 which is shaped to fit within a standard nursery crib or bassinet 11. The bottom of the cabinet 10 is open and the lower edges of the side walls rest on the mattress 12 of the bassinet.

Part of the top of the cabinet 10 is covered by a panel 13, but the panel 13 extends for only a small portion of the length of the cabinet 10, leaving an opening of substantial size that is covered, when the incubator is in use, by a re-

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movable top 14. The top 14 is preferably made of some transparent plastic so that a nurse can view an infant in the incubator without removing the top.

The upper edges of the side walls and the end of the panel 13 are formed with a recess 16, best shown in Fig. 2, that supports the cover and the side wall of which serves as a flange for holding the top 14 in place. The top 14 has a handle 17.

The electrical control parts shown in Figs. 4 and 5 are in a boxed in top corner and under a cover 42 with hinge 43, seen through the removable top 14 in Fig. 1.

The incubator is heated by resistance wire 18 embedded in the side walls of the cabinet (Fig. 2). The wire 18 is purposely located close to the inside surface of the cabinet walls so that most of the heat is radiated inwardly.

In the preferred construction, a single wire 18 passes continuously around the cabinet and forms in effect a rectangular spiral, and the opposite ends of the wire 18 are connected with terminals 19 at the end of the cabinet adjacent the electrical control panel terminals 41 (Fig. 4). If the incubator is to be used for lower voltages the heating elements formed by the convolutions of the wire 18 may be connected in parallel instead of in series, or some convolutions in series may be connected in parallel with others.

The wire 18 is located in the lower portions of the side walls of the cabinet. It is unnecessary to carry the heating elements more than about half way up the side walls since the air in the top portion of the incubator is effectively heated by convection currents that rise along the side walls of the cabinet.

For increasing the humidity within the cabinet 10, a vessel 21 (Fig. 2) is attached to one of the side walls, and provided with a cover 22 on spring slides 23 that thrust against the end walls of the vessel. The cover can be raised or lowered to increase or decrease the extent of the opening at the top of the vessel 21, and the friction of the slides 23 against the ends of the vessel 21 cause the cover to remain in any set position. Water is placed in the vessel 21, and the rate of evaporation of this water depends upon the extent of the opening of the cover 22. Since the vessel 21 is against a wall of the cabinet in a position over the heater wire 18, heat from the wall promotes evaporation of the water in the vessel 21.

In very humid summer weather it is sometimes necessary to remove moisture from the atmosphere within the incubator. This is done by means of a can 26 of triangular cross-section and connected in one corner of the cabinet. The can 26 is spaced from the walls by brackets 27. When the atmosphere in the incubator is too humid, this can is filled with ice, and the air which comes in contact with the walls of the can is chilled below its dew point. The surface of the can 21 is not sufficient to chill the entire atmosphere within the cabinet, but does effectively remove sufficient moisture, by condensation, to reduce the humidity within the incubator. Even though the wire 18 is supplied with current for heating the air within the incubator, at the same time that the can 26 is full of ice, the can will effectively condense moisture from the heated air which circulates past the surfaces of the can.

Mounted on a panel 49 on the wall of the cabinet 10 is a dry-bulb thermometer 50, a wet-bulb thermometer 51 calibrated to read directly in percent humidity, and a water reservoir 52 for the wet-bulb thermometer wick. These instru-

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ments give a visible check of temperature and humidity.

The temperature of the air within the incubator is controlled by a thermostat 29 located on a sloping partition wall 30. The thermostat 29 has a heat conducting metal cover 31 by which it is sealed from the atmosphere within the incubator.

The partition wall 30 is connected with a side wall of the cabinet at one end, and at its other end is connected with a dividing wall 32 (Fig. 3). This partition wall 30 and dividing wall 32 form a boxed-in chamber separate from the other space within the incubator. The walls 30 and 32 serve as the control panels of the incubator. A screw 29' for adjusting the thermostat extends through the control panel 30. On the other side of the dividing wall 32 there is a shield or screen 33 that extends to the opposite wall of the cabinet 10.

Mounted on the dividing wall 32 is a socket 34 into which fits a disinfecting lamp 36. The lamp can be reached across the top of the shield or screen 33. This disinfecting lamp 36 is in such relation to the shield that the rays of the lamp extend for the full width of the incubator in a zone that is confined to the upper portion of the incubator, above the dotted line 37 of Fig. 2. The shield 33 thus protects an infant in the incubator from the rays of the lamp 36.

The starter 37 and ballast 38 for the disinfecting lamp are located behind the partition wall 30. There is a signal lamp 39 (Figs. 4 and 5) held in a socket on the back of the partition wall 30, and this signal lamp is connected in series with the heater wire 18 so that the signal lamp 39 is lit whenever power is being supplied to the heater wires 18. The thermostat 29 controls the supply of power to the heater wires 18, but the disinfecting lamp 36 is directly in the circuit, as shown in Fig. 4, so that it operates continuously. There are spring contacts 41 connected with the partition wall 30 in position to touch the terminals 19 of the heater wires 18. The purpose of these contacts 41 is to simplify the assembly of the incubator when the partition wall 30 is initially positioned in the incubator.

The upper right hand corner 42 of the cabinet 10, as viewed in Fig. 2, is connected with the top panel 13 by a hinge 43, and can be opened to expose the electrical connections on the back of the partition wall 30. The corner 42 extends only part way across the incubator as indicated by the dotted line 42' of Fig. 3. This line 42' represents the left hand edge of the hinged corner 42.

A jewel window 46 (Fig. 5) is placed in an opening in the top of the hinged corner 42 for indicating when the signal lamp 39 is lighted. At the other end of the cabinet there is an opening 47 (Fig. 2) for the insertion of an oxygen supply tube and another opening 48 that can be used for the insertion of an oxygen analyzer catheter. A nurse can reach an infant in the incubator, with a minimum of disturbance of the incubator atmosphere, by raising one end of the top 14 and sliding the top as far as necessary to provide an opening between the end of the top 14 and the end of the frame in which the top 14 rests.

Power is supplied to the incubator through a socket 53 (Fig. 5) on the back of the control panel or wall 30. This socket is designed to receive a fitting 54 at the end of a drop cord 55

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that extends out through an opening in the cabinet and to a suitable source of electricity.

The preferred embodiment of the invention has been described but changes and modifications can be made and some features of the invention 5 can be used without others.

What is claimed is:

1. An incubator for premature infants, said incubator comprising a cabinet having an open bottom, the edges of which form a rectangle 10 slightly smaller than the top surface of a mattress of a hospital bassinet so as to enclose the infant completely, the cabinet also having a top opening of substantial size and through which a nurse can service an infant in the incubator, 15 a flange around the top opening, and a transparent cover that fits within the flange and closes said top opening of the incubator, said transparent cover being free along all four sides so that any edge of the cover can be tipped up above the 20 edge of the flange and the cover slid toward the tipped-up edge to provide an opening of any desired width along any side of the cabinet.

2. A premature infant incubator comprising a cabinet with an open bottom and side walls, the 25 edges of which rest upon the top of the mattress

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when the structure is inserted in a nursery bassinet, a removable cover that closes the top of the incubator, and means for maintaining the interior of the incubator at a uniform temperature, said means including heater wires embedded in the inside surface of the walls of the cabinet, said walls being of electrically nonconducting material and the wires in direct contact with said material of the wall so that said walls are heated by conduction from said wires and the inside surfaces of the conduction-heated walls radiate heat at low temperature to all of the space occupied by the infant, and a thermostat within the incubator for controlling the supply of electricity to said heater wires.

3. A premature infant incubator comprising a cabinet that fits within a nursery bassinet and that has walls with inside surfaces bounding the space in which the infant is to be contained, the material forming said inside surfaces being electrically nonconducting, and a resistance wire heater embedded directly into the electrically nonconducting material for heating the space within the cabinet.

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