July 10, 1951 L. G. NETTELAND 2,559,654

AIR-CONDITIONED BABY CRIB

Filed Nov. 24, 1947 2 Sheets-Sheet 1

FIG. 1

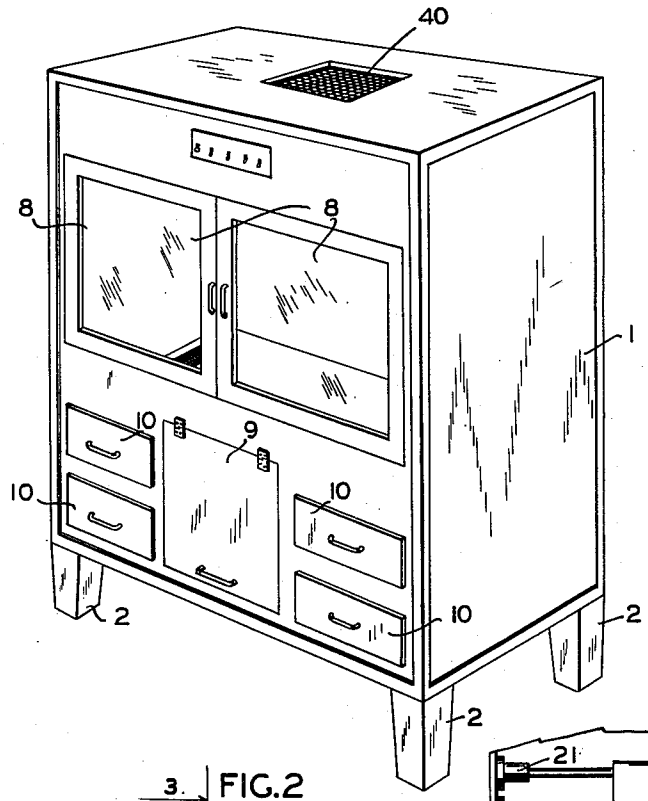


FIG. 4

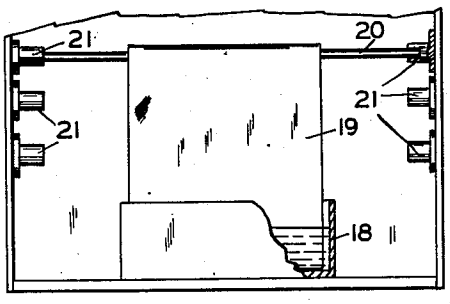
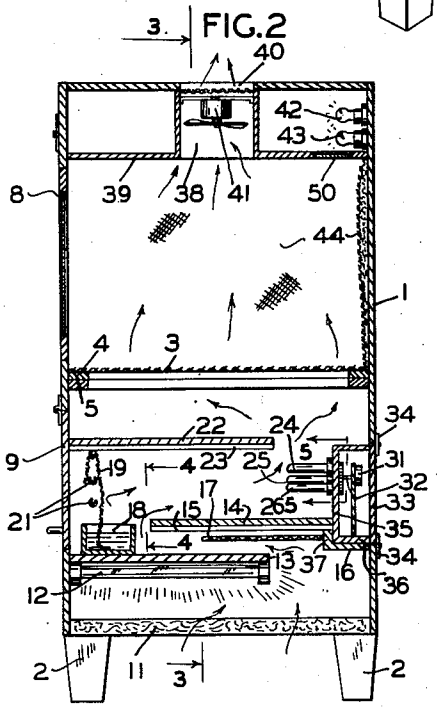


FIG. 2



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July 10, 1951 L. G. NETTELAND 2,559,654

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Filed Nov. 24, 1947 2 Sheets-Sheet 2

FIG. 3

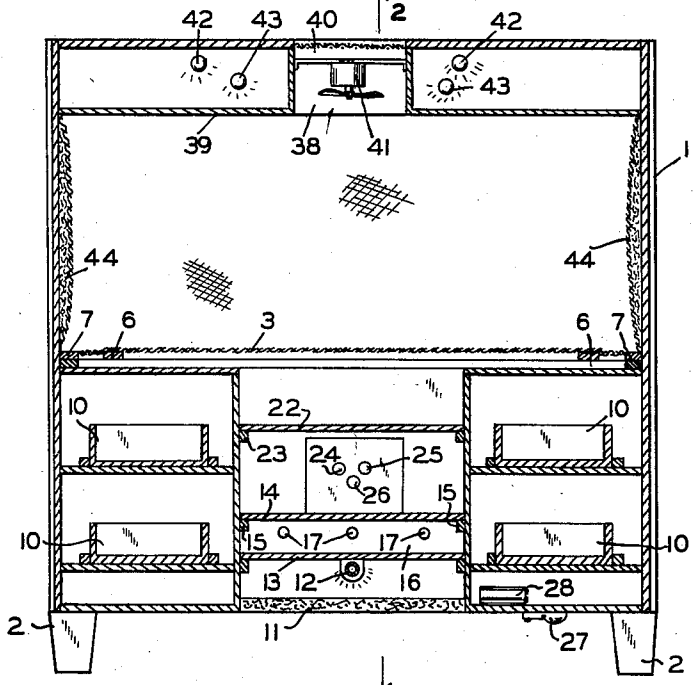


FIG. 5

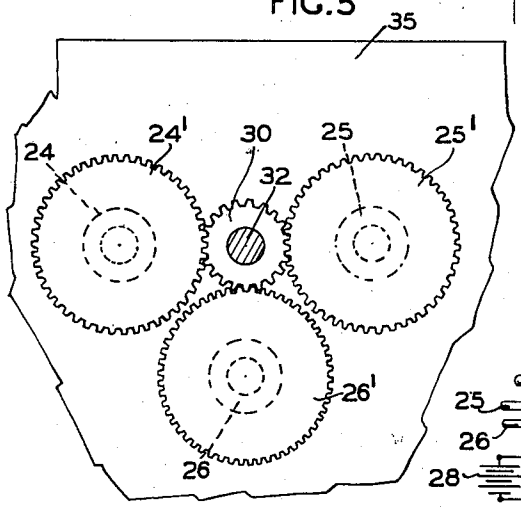
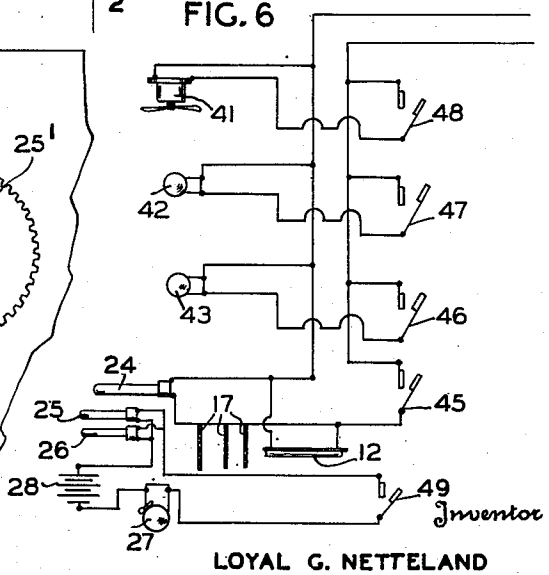


FIG. 6



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AIR-CONDITIONED BABY CRIB

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1 Claim. (Cl. 128—1)

1

This invention relates to an air-conditioned baby crib especially useful in the care of very young infants.

The principal object of the invention is to provide an enclosed crib designed to give a child constant, comfortable temperature, a controlled humidity and clean pure air where he may sleep, stretch and move in freedom and safety.

Further and more specific objects of the invention will be apparent from the following description made in connection with the accompanying drawings.

In the drawings:

Figure 1 is a perspective view showing the exterior of the air-conditioned crib;

Figure 2 is a vertical section taken on the line 2—2 of Figure 3;

Figure 3 is a longitudinal vertical section taken on the line 3—3 of Figure 2;

Figure 4 is a fragmentary view taken on the line 4—4 of Figure 2, illustrating the humidifying device with a portion thereof cut away;

Figure 5 is a fragmentary enlarged view taken on the line 5—5 of Figure 2 showing the gear mechanism for interlocking the thermostatic elements; and,

Figure 6 is a wiring diagram to be described hereinafter.

Referring more particularly to Figures 1, 2 and 3, it will be apparent that the apparatus as a whole is contained in a cabinet 1 supported a substantial distance above the floor by legs 2, 2. The cabinet is divided into an upper compartment and a lower compartment by a horizontal reticulated partition 3 which serves to support the infant. The partition 3 is preferably made of a flexible and somewhat elastic material which is woven and which is permeable to air and comfortable for the child to lie on. Although fabric formed of other plastics can be used, the fabric preferably used in making the partition 3 is one woven from strands of synthetic filaments made from polyvinylidene chloride.

The fabric is resilient, durable, non-absorbent and acid and alkali resistant. The many small openings between the woven strands permit air to circulate up and around the child's body and it is possible to place a baby a few hours old on his stomach, resting on this material without danger of suffocation. This screen-like woven fabric is suspended horizontally on a frame 4 resting on abutments 5 disposed within the cabinet 1. The frame 4 is rectangular and may include two crossbars 6 parallel to and spaced a few inches from the end pieces 7. A wire mesh

2

screen is provided at each end extending from the crossbar 6 to the end piece 7. The wire screen furnishes auxiliary passageways for air between the upper and lower compartments, the primary passageway being through the interstices of the fabric 3.

Access to the upper compartment, above the fabric partition 3, is made possible and convenient by the provision of hinged doors 8, 8, which are preferably glazed for observation of the infant.

The lower compartment contains air filtering, sterilizing, heating, and humidifying devices, and access may be had to the lower compartment through a front hinged door 9. Conventional drawers 10, 10 are provided on either side of the lower compartment, but these drawers form no part of the present invention.

All air entering the lower compartment of the crib must pass through a filter 11 located at the bottom of the lower compartment. Filter 11 may be a conventional flat square pad containing fibrous material which will remove particles of lint and dirt from the air.

The air admitted to the lower compartment, after passing through filter 11, is next subjected to the sterilizing action of ultraviolet rays from a germicidal lamp 12. The lamp 12 is supported on a horizontal shelf 13, which extends more than half way across the lower compartment and serves to baffle the flow of air, directing it toward the rear of the lower compartment or to the right as viewed in Figure 2. The air rises upwardly and is then directed forwardly by a horizontal shelf 14, which is carried by horizontal abutments 15 and which, together with support 16, forms a baffle extending to the left as viewed in Figure 2.

Heating elements 17, preferably of the elongated electrical resistance type, are situated between the baffle 13 and the baffle 14 and furnish heat to the incoming air as governed by a thermostatic control to be described later in this specification.

After the air has been warmed, it picks up moisture from a humidifying device which includes a vessel 18, containing water, and a wick 19 consisting of a piece of absorbent cloth having its lower end immersed in the water. The cloth wick 19 is supported by a rod 20 which is held at each end by sockets 21. The sockets have threaded sleeves which may be unscrewed to release the rod 20. Oppositely disposed pairs of sockets 21 are disposed at different heights relative to the water vessel 18 so that varying amounts of wet cloth 19 are exposed to the air depending

on which sockets are used to hold the rod 20. By raising or lowering the rod 20, the humidity of the air entering the upper compartment can be regulated.

After being humidified, the air is directed rearwardly, or to the right as viewed in Fig. 2, by a horizontal shelf or baffle 22 supported on abutments 23 fastened to the sides of the lower compartment.

As the heated and humidified air is directed rearwardly, it is forced to contact thermostatic switches 24, 25, and 26 which are arranged in the path of the air as it moves around the baffle 22 and upwardly into the upper compartment of the crib.

It will now be seen that the provision of baffles as above described compels the air to move in a tortuous pathway thus insuring thorough mixing of the air and the avoidance of stratification. All of the air will be subjected to the action of the several air conditioning devices and the air contacting the thermostats will be uniform in temperature.

The thermostatic switches 24, 25 and 26 are of a conventional type and include an electric switch and means responsive to changes in temperature for making and breaking the circuit. Each thermostatic switch is adjustable by a rotatable element to maintain a selected temperature and the switches 24 and 26 will open when the temperature called for is reached and close when the temperature of the air falls below the temperature selected. Thermostatic switch 25 will close when the temperature called for is reached and open when the temperature of the air falls below the temperature selected. The thermostatic switch 24 is connected in series with the heating elements 17, and thus controls the temperature of the air entering the crib at approximately the temperature prescribed by the physician. This temperature may be different for each individual infant depending on age, weight and many other factors.

The thermostatic switches 25 and 26 act as sentinels to set off an alarm if the temperature should slightly exceed or fall below the temperature called for by the primary thermostatic switch 24 as the result of failure of the latter, failure of the source of power to the heating elements 17 or for any other reason.

The thermostatic switch 25 is adjusted to close at a temperature approximately two degrees above the temperature setting of the primary thermostatic switch 24 and the thermostatic switch 26 is adjusted to close at a temperature approximately two degrees below the temperature setting of the primary thermostatic switch. An electric alarm bell 27 located under the cabinet as shown in Fig. 3, or in any convenient place, is powered by dry cells 28 and the circuit through the alarm and dry cells will be completed whenever one of the sentinel thermostats is closed as shown in the wiring diagram (Figure 6).

The three thermostatic switches 24, 25 and 26 are all simultaneously adjustable by rotatable means which raise the temperature setting when rotated in one direction and lower it when rotated in the other direction. As illustrated especially in Fig. 5, I have attached gear wheels 24^1, 25^1, and 26^1, to the rotatable elements on the respective thermostatic switches and have provided a pinion 30 which meshes with each of the gear wheels so as to maintain constant the desired relationship. The pinion 30 is turned manually by means of a knob 31 mounted on a standard 32 and, as this knob is turned, all of the thermostatic switches are adjusted simultaneously. Access to the knob 31 is obtained by removing the door 33 which is normally held in place by conventional fasteners 34.

The above mentioned thermostatic switches, gear wheels and pinion are preferably mounted on the vertical wall 35 of a thermostat support which has a lower horizontal portion 36 resting on a shelf 16 secured to the inside of the cabinet 1. The shelf 16 has an upturned edge 37 which serves as a stop for holding the lower portion 36 of the thermostat support against inward movement. The thermostat support is thus clamped between the door 33 and the stop 37 when the door is closed, and it may be readily removed upon opening the door 33.

A recess 38 in a false ceiling 39 communicates with an opening 40 in the top of the cabinet 1. The opening 40 is preferably covered with a wire mesh screen and serves as the air outlet. A fan 41 is positioned just below the outlet opening and may be used to assist in the exhaust of air from the crib when convection is not adequate for this purpose.

The space between the top of the cabinet 1 and the ceiling 39 serves as a compartment for housing lights, preferably a rather large "day" light 42, and a relatively small "night" light 43. One or more frosted windows 50 are provided which permit the light to enter the crib and which at the same time diffuse the light so as to reduce the glare.

Preferably the walls of the upper compartment of cabinet 1 are covered on their inner surfaces by upholstery indicated at 44 which is padded to absorb the child's kicking and bumps.

The fan, lights and heating elements are all operated from any convenient source of electric power, usually the house current. The operation of the apparatus will be apparent from the foregoing description taken in conjunction with the wiring diagram shown in Fig. 6. Switches, preferably located on the front of the cabinet, near the top, provide the necessary manual controls.

Ordinarily the switch 45 is closed and under these circumstances the sterilizing lamp 12 will be turned on and the heating elements 17 will go on and off under the control of the primary thermostat 24. The "night" light switch 46 and the "day" light switch 47 will usually be closed only during examination of the infant in the crib. The fan switch 48 will be closed whenever circulation of air, greater than that resulting from convection currents, is desired. It is important that the switch 49 be closed when the crib is in use because the opening of this switch would render the alarm inoperative.

With the arrangement provided, the baby may be placed upon the fabric partition 3 and this partition may be employed as a bed for the child as well as a safe play floor on which the child may crawl and clamber. The temperature and moisture of the air within the cabinet may be maintained at the proper temperature to best promote the health of the child irrespective of the temperature and moisture condition of the room or space wherein the cabinet is located. The air penetrates to the child through the fabric partition 3 from below the child thus tending to keep the fabric dry and warm irrespective of wetting by the child. Due to the evenness of the temperature maintained in the cabinet it becomes unnecessary to employ blankets or other bedding for the child and if the child

becomes wet he will quickly dry out. By opening the doors 8, access to the child may be had and the child can be readily recovered from the cabinet. The fabric partition can be easily washed and kept in a clean and sanitary condition.

It will be understood that minor changes may be made in the apparatus without departing from the invention as defined in the appended claim.

I claim:

An air-conditioned baby cabinet type crib consisting of spaced side, end, and top walls connected together, sleeping mat supporting means secured interiorly to the opposite walls of the cabinet, a flexible pervious non-absorbent closely woven plastic sheet of substantially the same dimensions as the interior dimensions of the cabinet secured to a substantially rigid frame, and constituting a totally unobstructed sleeping mat which frame carrying the sleeping mat is supported directly on the supporting means and thus serves as a partition to divide the cabinet into an unobstructed upper compartment and a lower compartment, means for conditioning air positioned in the lower compartment and for allowing circulation of air upwardly through the interstices of the sleeping mat, the sleeping mat being adapted to receive and support the baby directly thereon and in contact with a portion thereof, the dimensions of the sleeping mat being such that a substantial portion thereof is not in contact with the baby and thus the air from the lower compartment is allowed to permeate through the interstices of the mat and directly engage all portions of the baby contacting and

supported on the mat and also to permeate through the interstices of the mat between the legs of the baby if separated as well as to pass through all other portions of the mat not contacted by the baby which results in a complete release of the air from the lower compartment into the upper compartment and in contact with the baby on the contacted portion of the mat and a circulation of air about the baby through the uncontacted portions of the mat, and the characteristics of the sleeping mat which is closely woven are such that any fast updraft or movement of the air is prevented and the air that passes from the lower compartment to the upper compartment permeates gently through the mat without creating any drafts or direct streams of air that would merely flow upwardly and not surround and contact all portions of the baby supported on the mat.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
934,754	Porter	Sept. 21, 1909
1,947,007	Hoffman	Feb. 13, 1934
2,243,999	Chapple	June 3, 1941
2,292,120	Hanby	Aug. 4, 1942
2,409,083	Valverde	Oct. 8, 1946
2,409,420	Clark	Oct. 15, 1946
2,433,124	Johnson	Dec. 23, 1947