Feb. 4, 1958 E. F. ST. JOHN LYBURN 2,821,982

CABINET FOR THERAPEUTIC TREATMENT

Filed Oct. 11, 1954 3 Sheets-Sheet 1

FIG. 1.

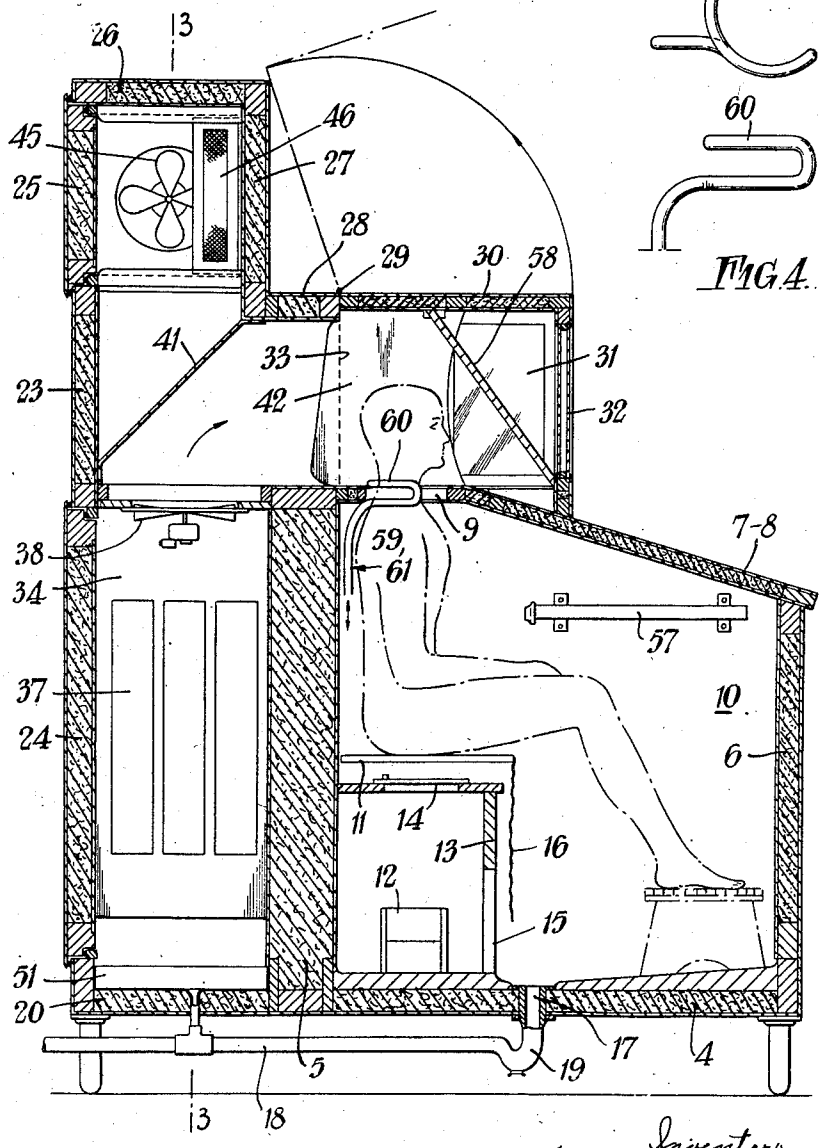

FIG. 5.

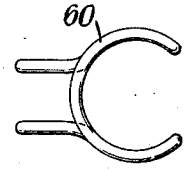

FIG. 4.

Inventor:
Eric Frederick St. John Lyburn,
by Singer, Stern & Carlberg,
Attorneys.

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CABINET FOR THERAPEUTIC TREATMENT

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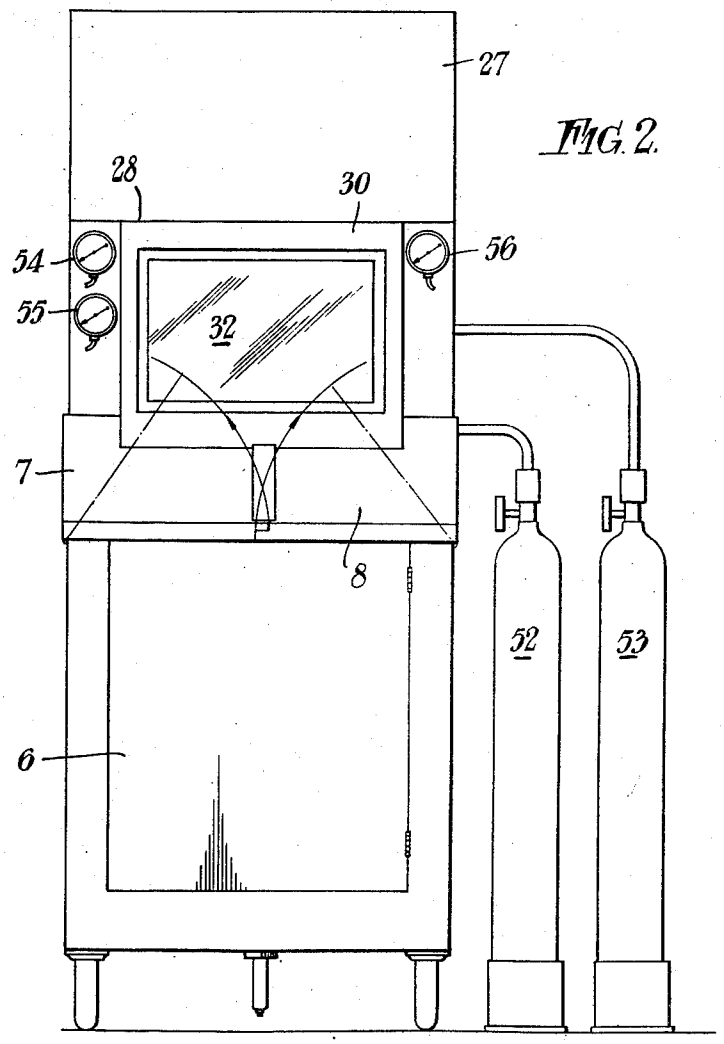

FIG. 2.

Inventor:
Eric Frederick St. John Lyburn,
by Singer, Stern & Carlberg,
Attorneys.

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CABINET FOR THERAPEUTIC TREATMENT

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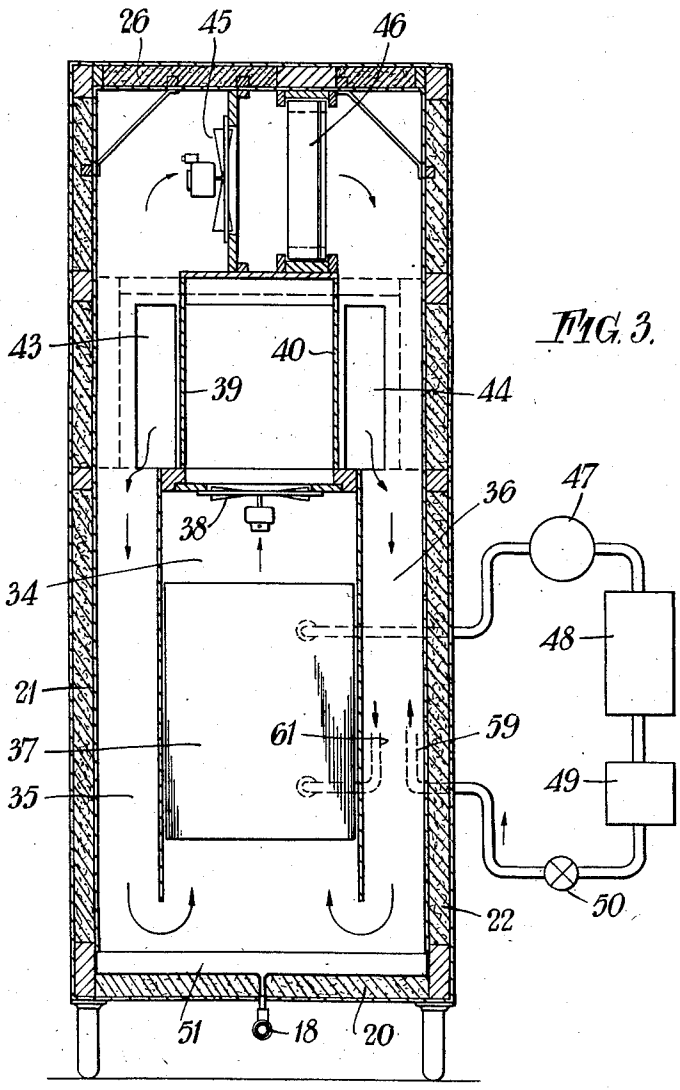

FIG. 3.

Inventor:
Eric Frederick St. John Lyburn,
by Singer, Stern & Carlberg,
Attorneys.

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CABINET FOR THERAPEUTIC TREATMENT

Eric Frederick St. John Lyburn, Tunbridge Wells, England, assignor to Marguerite St. John Lyburn, Tunbridge Wells, England

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Claims priority, application Great Britain October 13, 1953

7 Claims. (Cl. 128—371)

This invention relates to therapeutic apparatus for the treatment of systemic diseases or body conditions needing removal of the by-products of metabolism from tissues and higher oxygen tension in tissues, and more particularly apparatus in which the heat of wet vapour is applied to the surface of the body below the neck, whilst cooling is applied above this position and to the breathing system, and has for its object to provide such apparatus of highly advantageous character.

In general, in accordance with the present invention a therapeutic apparatus comprises as a principal feature a closed capacity (cabinet, room, loose-fitting waterproof overall, or otherwise) to enclose the patient from the neck downwards, with adequate space between its inner surface and the surface of the body of the patient (hereafter where necessary assumed to be masculine) having at least an opening for the neck with more or less loosely fitting wet packing to come around the neck, together with freezing tubes (as hereafter described) to cool the carotid sinuses and arteries, and means on the interior or exterior of the capacity for supplying heated water vapour, (which may be medicated) to the interior to apply the wet heat to and actually to raise the temperature of the skin surface or skin of the body, and with means if desired for recording and regulating such skin temperature and/or supplying oxygen for other gases thereto.

The invention comprises as a further feature another closed capacity into which the head of the patient projects together with means on the interior and/or exterior of this capacity for supplying cold or cooled air, which if breathed may have its CO_2 removed, to the interior thereof for the patient to breathe and cool the blood in the lung vascular bed and also to cool his exposed head, neck and carotid arteries by conduction, evaporation and convection. The carotid arteries and sinuses are also cooled, for example by an extension of the evaporator (as hereafter described) by two tubes that pass round the back and sides of the neck and by freezing cool the carotid vessels.

Additionally, means may be provided for supplying oxygen to this second closed capacity as such or even by a nasal carrier, to the nostrils of the patient so that in addition to the normal breathing of the cooled or cold air he also can have an increased supply of oxygen via the lungs to increase the alveolar oxygen, for example from 14% to 65% oxygen.

The means for supplying the air for the cooling of the neck and head of the patient and for his normal respiration preferably includes a refrigerating apparatus having an evaporator which is part of or integral with the capacity into which the head of the patient projects, and a condenser and other necessary components, which may be on the exterior, of such a refrigerating system which, for example, operates on the compression cycle.

As a subordinate feature there may be associated in the same capacity as and with the evaporator, filtering and absorption means whereby CO_2 can be extracted from the air that has been expired and has come from the

evaporator, before being returned to the circuit with or without an additional air inlet or an additional inlet of oxygen.

According to a still further feature of the invention means are provided for supplying oxygen or any other suitable gas to the interior of the capacity enclosing the body of the patient so that oxygen under regulation of quantity and pressure varying from 21% to 100% can be applied to come into contact with the heated moist skin or epidermis of his body to his benefit by effecting what is probably cutaneous respiration, which is increased markedly when the oxygen content of the interior capacity is brought up from the normal 21% to 50%.

Thermometers or other temperature-responsive means are situated in desired positions within the capacities so that the temperature in the positions concerned is shown on exterior indicators. This permits the temperature, in the various positions, of the steam, air or otherwise to be regulated in accordance with any particular treatment being given. In addition, stethoscopic means preferably are provided internal to the main capacity but extending to the exterior and held applied to the heart of the patient so that the doctor or other attendant supervising the treatment can listen thereto from the exterior and control the treatment and heart rate accordingly.

Further, if desired, means may be included in the structure whereby it is possible to extract samples of the "atmosphere" in either of the capacities for testing purposes when required.

In order that the invention may be better understood it will now be described with reference to the accompanying drawings which are given by way of example only and in which:

Fig. 1 is a cross sectional elevation of one form of apparatus in accordance with the invention, with all the parts in the closed position,

Fig. 2 is a front elevation of Fig. 1,

Fig. 3 is a cross section on the line 3—3, Fig. 1,

Fig. 4 shows in elevation and Fig. 5 in plan, a detail hereafter referred to, drawn to a larger scale.

In the method of carrying the invention into effect shown in the drawings, what may be termed the main cabinet shown to the lower and front part of Fig. 1 is of a generally known type for applying heated water-vapour to the skin. It comprises a base 4, a rear wall 5, a front 6 actually formed by a door on vertical hinges, and a sloping top formed by two flaps 7 and 8 hinged at their outer lateral edges. These latter, when turned down, form a completely enclosing top as will be seen from Fig. 2. At and towards their upper edge they are shaped to form part of an opening 9 through which the neck of the patient emerges, the remaining part of the opening coming in the side-to-side joining member at the top of the rear wall 5. In addition, the main cabinet comprises side walls, one only (10) of which is shown in Fig. 1.

All of the members forming boundaries to the main cabinet preferably are formed in a heat-insulating manner, for example and as shown, by surface ply members having packed between them granulated cork or other similar heat-insulating material. This is especially the case for the rear wall 5 for the purpose hereafter explained.

In the interior of the main cabinet there is a seat 11 extending from side to side which comes over a steam generator 12 comprised by a small open-topped tank having an electric immersion heater therein in connection with a suitable exterior circuit. Further, pipe means (not shown) are provided passing from the exterior for keeping the steam generator replenished with water. The steam generator comes in a housing 13 the upper part of which has one or more openings guarded by sliding valves 14 for the controlled escape of the steam upwardly. At the

front it has an opening 15 for the outward passage of the steam and the seat has a hanging curtain or baffle 16 of soft rubber or other suitable material to guard the legs of the patient.

17 is a draining aperture for condensed moisture, perspiration and the like which passes to a drain pipe 18 guarded by a gas trap 19.

It will readily be understood that it is a matter of ease for a patient to enter the main cabinet as it is simply necessary to raise the top members 7 and 8 to their upper position and open the front formed by the door 6. The patient then can enter and sit upon the seat and with his neck in the correct position. The front door is shut and then the two portions 7 and 8 of the top turned down so that the head of the patient projects as illustrated in Fig. 1. The neck aperture 9 is packed with wet towels or the like to give the maximum comfort to the patient but to prevent the egress of the heated vapour from the interior. In addition, the neck aperture accommodates, possibly enwrapped by the towel, freezing tubular members as hereafter set forth.

The structure thus far described is extended rearwardly and upwardly to constitute another closed capacity which will be termed the auxiliary capacity. That is to say, there is a further base portion 20 with sides 21 and 22, and a rear wall 23 having lower and upper doors 24 and 25 turning on vertical hinges. This auxiliary capacity has a top 26 as well as an upper front portion 27 which extends only part of the way down and terminates in a lower top portion 28 to the front of which is hinged by a horizontal hinge 29 a cowl member which comprises a top 30, glazed sides (only one, 31, of which is shown in Fig. 1), and a glazed front 32.

Behind the glazed front 32 preferably there is disposed a transparent deflecting member 58 of perspex or other suitable material. This serves to deflect the cold gases and air coming from the fan 38 immediately to the face, ears and neck of the patient.

The cowl is positioned and shaped so that it can be turned and held in an upper position as indicated in dot and dash lines in Fig. 1 or can be turned down to enclose the head of the patient in an airtight manner to the exterior atmosphere. It will be appreciated that the glazed sides 31 of the cowl when turned down contact with the fixed rear parts of the structure, that is, with the sides 21 and 22, on surfaces represented by the line 33 (Fig. 1).

The portion of the auxiliary capacity adjacent the door 24 is divided vertically into three passageways 34, 35 and 36 from front to back but open at the top and bottom. In the central passageway 34 there is located the "evaporator" 37 of a refrigerating system, which evaporator is preferably of the fin type. Above the evaporator there is located an electric-motor-driven fan 38 which can be driven at variable speeds and which draws air down the passageways 35 and 36 and up the passageway 34 past the evaporator 37.

Beyond the fan 38 there are vertical partitions 39 and 40 with a closed and sloping top 41 so that the current of air is directed forwardly into the open rear of the cowl member. It is directed by side baffles 42 to the rear of the neck and head of the patient and to the front of the cowl for the patient to breathe and in this position it is deflected, as previously explained, by the transparent member 58. The patient's breath passes forwardly and laterally on each side of the cowl through openings 43, 44 and comes under the action of a fan 45 driven by an electric motor at constant speed, which co-operates with filters 46 for CO_2. After passing through said filters the air with the CO_2 removed again passes downwardly through the passageways 35 and 36 past the evaporator 37 to complete the cycle.

Fig. 3 shows to the right-hand side thereof a diagrammatic representation of the remainder of the refrigerating system which works upon a compression cycle and apart from the conduits includes a pump 47 driven by an electric motor, a condenser 48, a receiver 49 and an expansion valve 50, the conduits being in connection in the usual manner with the evaporator 37.

However, in place of the conduit to the evaporator proceeding directly thereto from the valve 50, preferably it is branched at 59 to continue to a double coil 60 (Figs. 1, 4 and 5) which is of flexible or semi-flexible material and designed to be located around the neck of the patient. It can be suitably enwrapped or enclosed in the wet packing towel located in the aperture 9. The cold medium of the refrigerator passes from this double coil 60 to the evaporator 37 by the return pipe 61.

In this manner and by the double coil 60, the carotid arteries and sinuses are cooled to a maximum degree.

To catch any exterior condensate there may be, the auxiliary capacity at the base includes a tray 51 which by a drain aperture opens into the drain pipe 18. Towards the right of Fig. 2 there have been shown gas bottles 52 and 53 for oxygen or other suitable gas which communicate by ducts with the interior of the apparatus, for example into the main cabinet or into the auxiliary capacity, or both. In addition, of course, there may be other conduits for the oxygen.

In utilising apparatus as particularly described, it will be understood that heated water-vapour, which is wet, is applied, under control, to the surface of the body of the patient coming within the main cabinet. This raises the skin temperature as high as possible or desirable. Again, oxygen or other suitable gas can be supplied to the main cabinet.

Additionally, whilst the skin is undergoing the heat treatment the patient's head, neck and carotid vessels are subjected to a controlled supply of cold or cooled air and this cold or cooled air is also breathed by the patient and passes to his lung vascular bed.

Additional oxygen can also be supplied to the auxiliary capacity either directly or by means of a nasal carrier to the nostrils of the patient so that in addition to the normal breathing of the cold or cooled air he can have an increased oxygen supply to his lungs.

It will thus be understood that the wet heating of the skin proceeds under control simultaneously with the cooling of the body by the cold or cooled air breathed by the patient and applied to his head and neck, wholly maintaining the heat balance. As a general result, after a few minutes' total treatment during which the skin temperature is raised for example to 115° F. and higher and when the heat is slowly reduced, there ensues a flood of sweat which continues more or less until the end of the treatment. The applied temperatures throughout the treatment are higher than the internal body temperature and blood.

Where oxygen treatment for cutaneous respiration is also to be given to the body, then with the surface of the body or skin at the required temperature the oxygen is admitted to the main cabinet to the required amount and possibly at a slightly elevated pressure.

The difference of oxygen tension in the main cabinet and in the venous blood causes oxygen to diffuse through the hot wet epidermis into the veins and it has been found that patients have obtained great benefit therefrom. This benefit is attributed to the observed fact that the venous blood at the venous end of the capillaries has been oxygenated or distinctly reddened, from which it has been deduced that a certain proportion of oxygen has been absorbed through the skin. Prothrombin times are increased up to five seconds and blood sugars fall 10%. The alkali reserve or CO_2 capacity of the blood falls 10% to 12% and the sweat glands act as secondary kidneys and excrete a fluid similar in constitution to urine. If desired, special trays can be placed under the feet of the patient in the cabinet to obtain samples of the sweat for biochemical determination in routine clinical analysis of the sweat.

The particular apparatus described will carry and can

also include accessory devices such as indicators 54, 55 and 56 for variously positioned thermometers, exterior stethoscopic earpieces in connection with an integral part of the same instrument applied to the patient's heart, as well as electrical fuses and tell-tales applied to the different electrical circuits involved.

To supplement the heat within the main cabinet, a suitable number of electrical heating devices may be utilised, for example there may be three black heat units which are suitably disposed and one of which is shown at 57, Fig. 1.

Structurally, on the exterior in suitable positions and suitably supported, there can be provided what may be termed drip trays so that when the parts of the cabinet are opened and held in the open position, any condensate running therefrom passes to the said trays.

These, if desired, may be in connection with the main draining system of the apparatus which, as before mentioned, drains away condensate from the main cabinet and can also be connected to one or more drain holes in the base of the evaporator and, if desired, the filter.

The invention is not limited to the precise forms or details of construction herein described, as these may be varied to suit particular requirements.

What I claim is:

1. A therapeutic cabinet including a main housing forming a chamber in which a patient can be enclosed from the neck downward with a space between the patient's surface and the interior of the main housing, a packable opening in said main housing for receiving the neck of the patient so that the patient's head can project from the main housing, means located in said main housing for supplying heated water vapor to said chamber, a housing in the rear of said main housing, an auxiliary housing hingedly connected to the upper portion of the rear housing and arranged to swing downwardly over the upper portion of the main housing to enclose the patient's head projecting therefrom with a space between the patient's head and the interior of said auxiliary housing, air cooling and circulating means mounted in said rear housing for supplying cool air to the space within the auxiliary housing for cooling the projecting head portion of the patient and access closures for the main housing to permit the patient to enter and leave said housing.

2. A therapeutic apparatus as set forth in claim 1 in which filter means is provided in the upper portion of the rear housing for removing foreign gases from the air circulated by said air circulating means and passing from said auxiliary housing to said main housing.

3. A therapeutic apparatus as set forth in claim 1 in which the auxiliary housing has in communication therewith pressurized gas tanks for the admission of oxygen and the like to the interior of said auxiliary housing.

4. A therapeutic apparatus as set forth in claim 1 in which the neck opening for the patient in the main housing is provided with tubular coil means on the sides and rear of the patient's neck with refrigerant means connected to the rear housing for causing a coolant fluid to circulate through such coils.

5. A therapeutic apparatus as set forth in claim 1 in which the auxiliary housing and rear housing provide a chamber in which the evaporator of a refrigerating circuit is located to lower the temperature of the air passing to the auxiliary chamber and around the patient's head.

6. A therapeutic apparatus as set forth in claim 1 in which the refrigerating means includes an evaporator of a refrigerating circuit mounted in the rear chamber and in which partition walls are arranged on opposite sides of said evaporator to permit air to be circulated from the auxiliary chamber to the lowermost portion of the rear chamber and thence upwardly between the partition walls and around the evaporator to the auxiliary chamber and around the patient's head.

7. A therapeutic apparatus as set forth in claim 1 in which the refrigerating means includes an evaporator of a refrigerating circuit to which is attached conduits connected to a coil for location around the neck of the patient.

References Cited in the file of this patent

UNITED STATES PATENTS

64,677	Landis	May 14, 1867
191,432	Huffman et al.	May 29, 1877
819,704	Bamberger et al.	May 1, 1906
2,539,710	Sziklay	Jan. 30, 1951