OXYGEN TENT

Filed March 23, 1951 4 Sheets-Sheet 1

FIG. 1

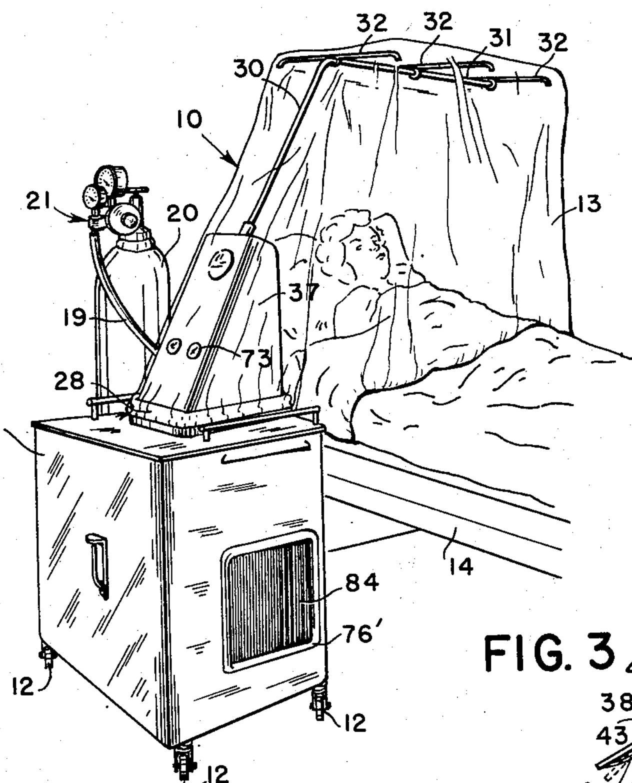

FIG. 3

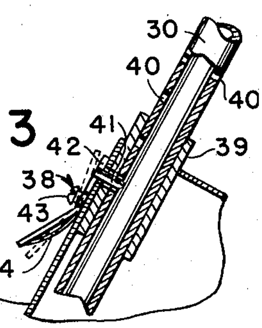

FIG. 2

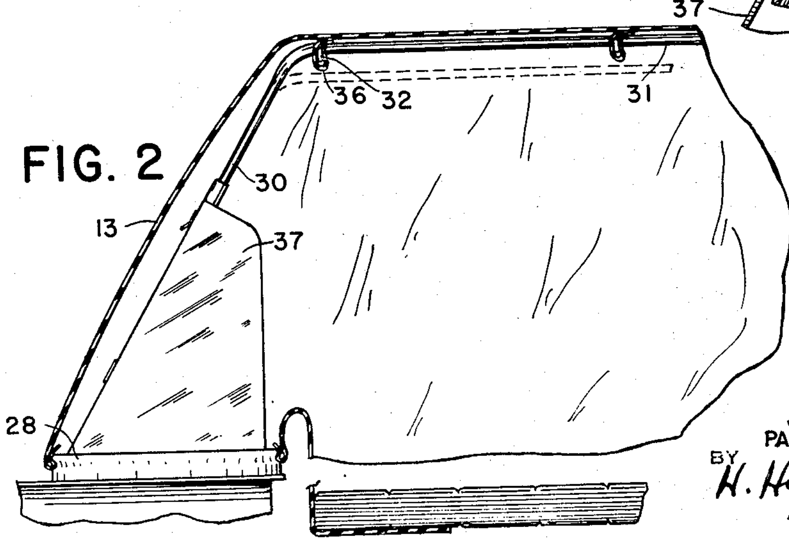

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FIG. 4

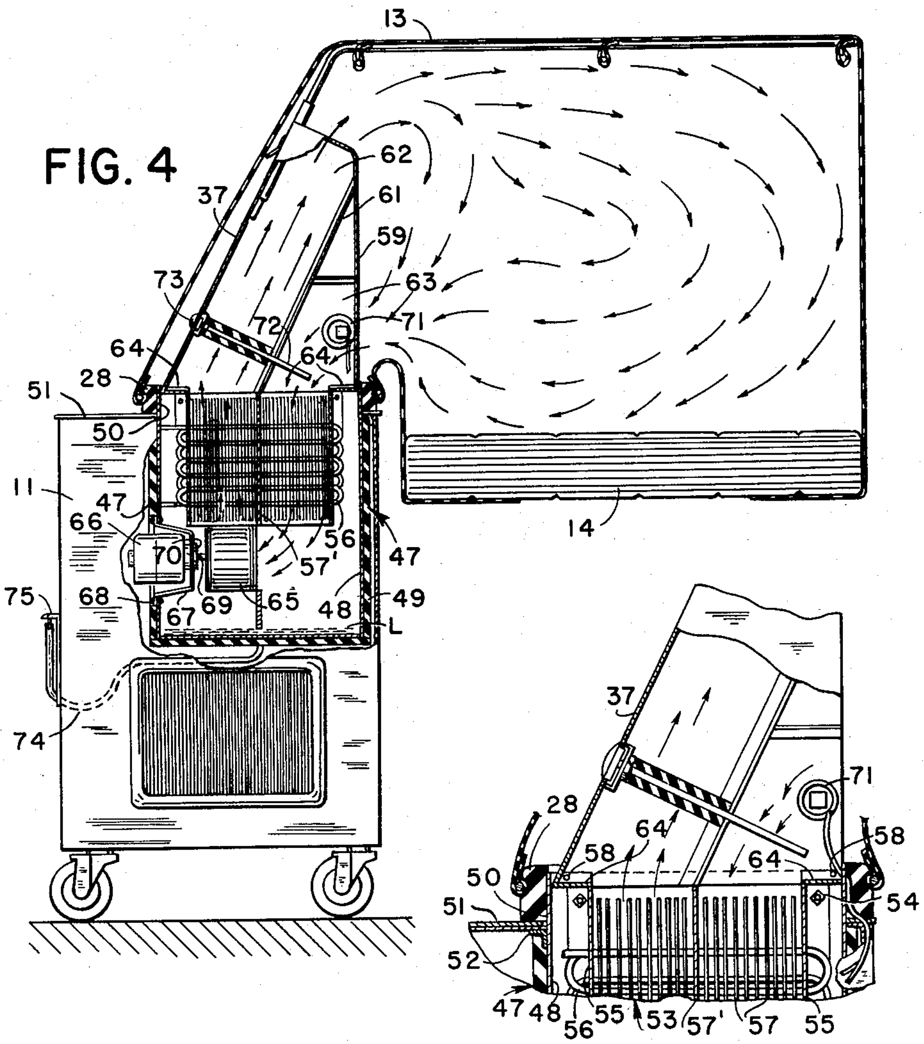

FIG. 5

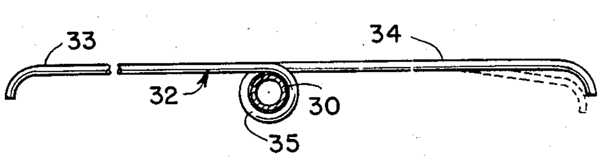

FIG. 6

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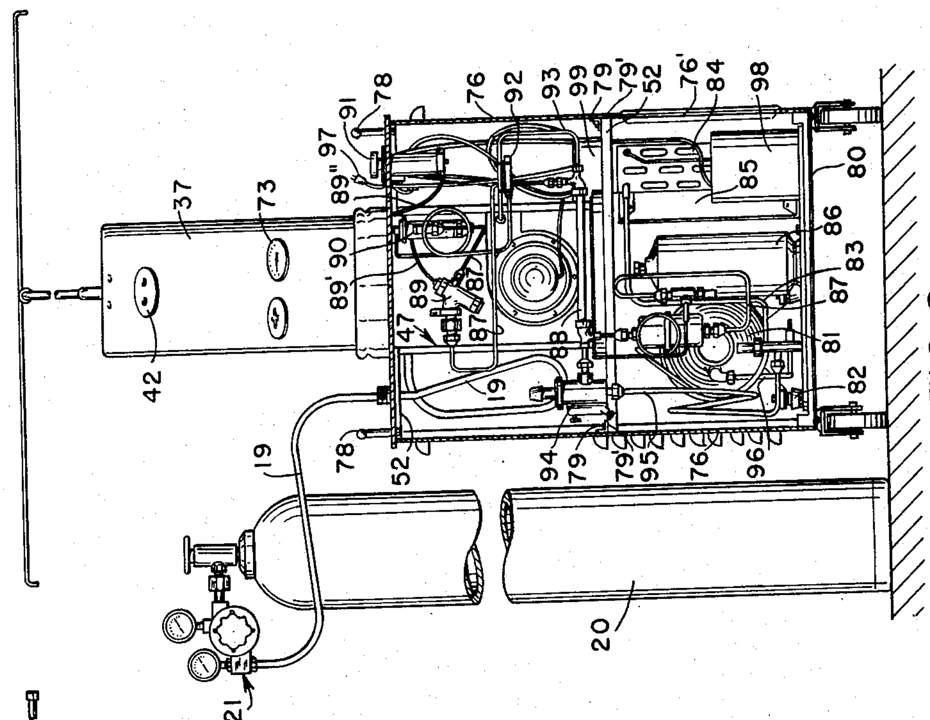

FIG. 8

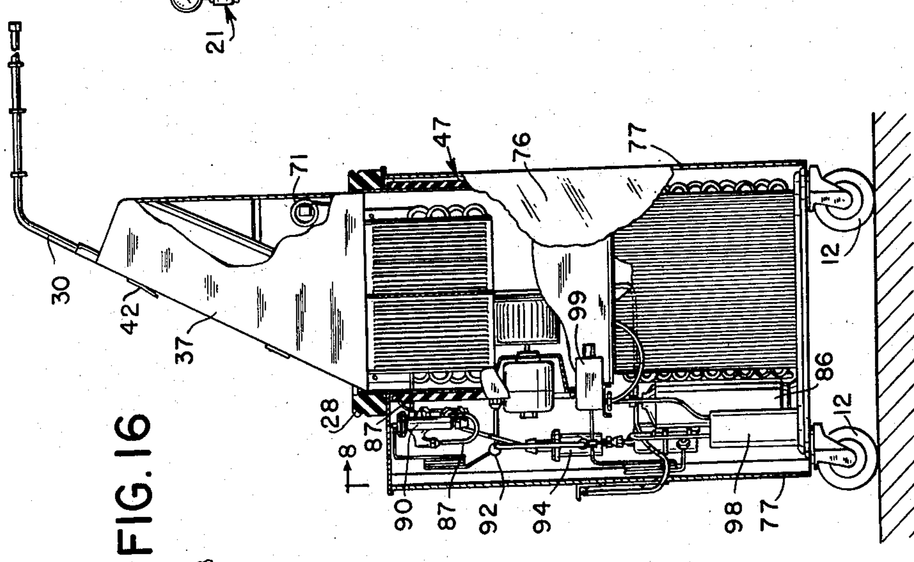

FIG. 7

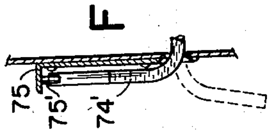

FIG. 16

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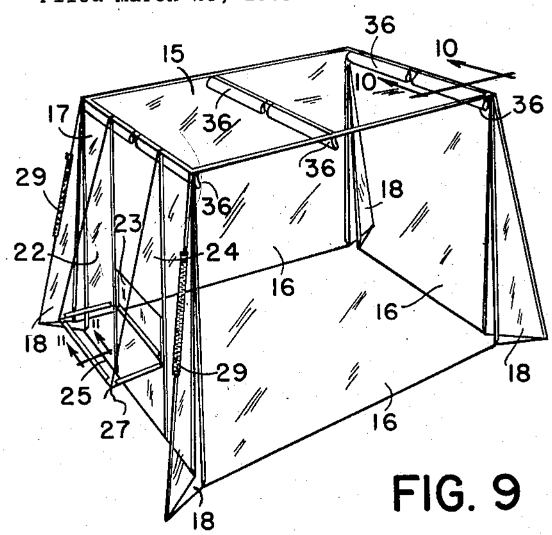

FIG. 9

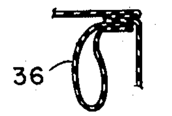

FIG. 10

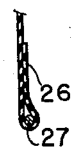

FIG. 11

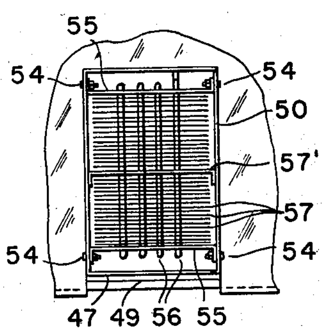

FIG. 13

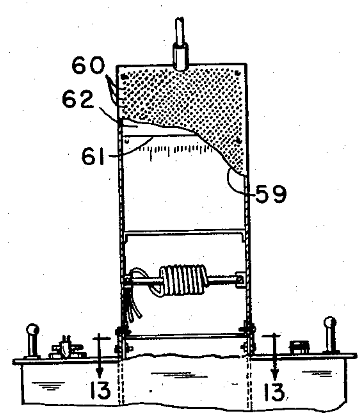

FIG. 12

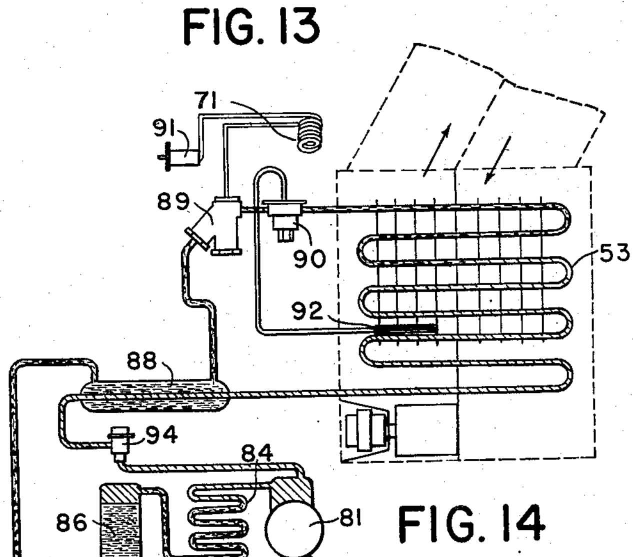

FIG. 14

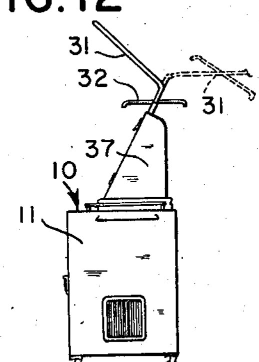

FIG. 15

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Patented Feb. 22, 1955

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OXYGEN TENT

John Gilroy, Sun Prairie, and Paul G. Eckman, Madison, Wis., assignors to Air Reduction Company, Incorporated, New York, N. Y., a corporation of New York

Application March 23, 1951, Serial No. 217,202

10 Claims. (Cl. 128—191)

This invention relates generally to oxygen tents and concerns particularly certain improvements in such apparatus.

Oxygen tents are used in various medical treatments which prescribe the administration of oxygen-enriched air or substantially pure oxygen to the patient. In most cases the patient is confined to a bed and the apparatus for administering the oxygen consists primarily of an oxygen canopy or hood which is disposed over the bed, forming an enclosure around the entire bed or at least around the region at the upper extremities of the patient, and a cabinet or housing in which the mechanism associated with the hood for conditioning and circulating the oxygen atmosphere is contained. Suitable apparatus is provided for delivering oxygen to the enclosure so that the atmosphere in the tent breathed by the patient is maintained at a desired oxygen concentration. It is also customary to provide a refrigerating system for the oxygen tent to maintain the tent atmosphere at a comfortable temperature.

In conventional oxygen tents, one of the important considerations has been the design of suitable oxygen canopies and of sturdy, yet easily adjustable, supporting means therefor. Because the patient is substantially secluded within the tent enclosure, it is desirable that the patient be easily visible and readily accessible to attendants and nurses at all times. Also, the attending of the patient at regular intervals, or in cases of emergency, makes it imperative that access to the enclosure be extermely simple. Most canopies are therefore constructed of some type of plastic or rubberized material either entirely transparent or having large panes to permit visibility. Various types of apertures, such as buttoned or zippered flaps, provided entrance to the enclosure. The canopies, however, being made of such relatively fragile material are frequently torn or damaged so that they must be replaced or repaired at frequent intervals. The difficulty arises largely as a result of the design of the canopies and supporting means in the prevailing apparatus, which, in the attempt to meet the requirements of oxygen tent apparatus do not enable sufficient distribution of the loads placed on the canopy such as are caused in the operation of tucking the depending sides of the canopy under the mattress or by inadvertent tugging of the side of the canopy. Such loads therefore produce undesirable localized stresses.

Another consideration in the design of oxygen tent apparatus has concerned the provision of refrigeration systems for the tent enclosure and the mode of association of such systems with the oxygen canopy or hood. A common expedient consists of a cabinet separate from the tent hood or canopy having mechanism for refrigerating and circulating the oxygen tent atmosphere which is provided with ducts for conducting gas to and from the tent enclosure. One of the disadvantages of this arrangement is the loss of refrigeration efficiency through the external ducts connecting the canopy. In addition, the necessity for making gas tight connections for such ducts increases the complexity of the tent hood construction and decreases the facility with which the tent may be manipulated and handled generally.

In view of the past shortcomings of oxygen tents, several of the principal objects of the present invention are as follows:

One object of the invention is to provide an improved oxygen tent for administering therapeutic oxygen to patients.

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Another object of the invention is to provide an improved type of canopy for oxygen tents and supporting means therefor.

Another object of the invention is to provide a supporting means for oxygen tent canopies or hoods lying wholly within the tent enclosure, having flexible spaced hanger or rib members adapted to carry the roof of the tent canopy thereon.

Another object of the invention is to provide supporting means extending from a bedside cabinet for normally suspending the oxygen tent canopy over the bed, which is retractable to within the lateral confines of the cabinet for minimizing occupied space during storage.

Another object of the invention is to provide oxygen tent apparatus having an improved ventilating and air conditioning system for circulating and controlling the temperature of the atmosphere in the tent canopy.

Another object is to provide such a ventilating and air conditioning system having a high heat exchange efficiency incurring a minimum heat gain from the surrounding atmosphere.

A further object of the invention is to provide an improved oxygen tent having a movable bedside cabinet, housing substantially all of the mechanism of the apparatus, which is mostly below the level of the bed to afford a maximum degree of observation of and accessibility to the patient.

A further object of the invention is to eliminate external ducts connecting the bedside cabinet and the oxygen canopy.

A further object of the invention is to provide an insulated cooling box mounted in the cabinet having an open side around which a portion of the canopy receives said opening directly into the tent enclosure.

A still further object of the invention is to provide unique means in such an apparatus for receiving the oxygen canopy on the cooling box to afford a gas tight connection therewith.

A still further object of the invention is to provide in an oxygen tent apparatus of the type herein concerned, means for inducing forced circulation of the atmosphere within the oxygen canopy in which the colder air enters in substantially draft-free flow at the upper region of the canopy and warmer air is drawn off at the lower region.

A still further object of the invention is to provide improved means for collecting and draining the condensate formed in the cooling box which affords visual indication of the accumulated moisture supply and enables the discharge of such moisture without removal of any part of the apparatus.

Other objects and advantages will be apparent from the specification and claims, and from the accompanying drawings which illustrate what is now considered to be a preferred embodiment of the invention.

In the drawing,

Fig. 1 is a perspective view of an oxygen tent constructed and arranged according to the teaching of this invention.

Fig. 2 is a partial side view of the oxygen tent, sectioned through the canopy to show the interior construction of the canopy and the adjustable supporting rod means therefor.

Fig. 3 is a sectional view showing the adjusting and locking means for the canopy supporting rod.

Fig. 4 is a side view of the oxygen tent, partially sectioned, illustrating the ventilating system for the oxygen tent enclosure which includes the oxygen canopy, the cooling box chamber in the bedside cabinet, and a diffuser duct housing received directly in the oxygen tent canopy.

Fig. 5 is an enlarged sectional view illustrating the details of construction of the means for receiving the canopy on the bedside cabinet and the junction of the diffuser spout with the cooling box shown in Fig. 4.

Fig. 6 is a transverse sectional view through the canopy support rod showing one of the spaced flexible hangers that support the roof of the canopy.

Fig. 7 is a side view of the bedside cabinet having a side panel partially broken away to show the internal arrangement of the mechanism housed in the cabinet.

Fig. 8 is a sectional view taken along the line 8—8 in Fig. 7

Fig. 9 is a perspective view of the oxygen canopy, the vertical dimension of which is shortened with respect to the other dimensions thereof.

Fig. 10 is a sectional view taken along the line 10—10 of Fig. 9.

Fig. 11 is a sectional view taken along the line 11—11 of Fig. 9.

Fig. 12 is a view of the bedside cabinet looking toward the cabinet from within the tent canopy, partially sectioned to illustrate portions of the diffuser duct housing.

Fig. 13 is a sectional view taken along the line 13—13 in Fig. 12.

Fig. 14 is a diagram of the refrigerating system for the oxygen tent shown in the drawings.

Fig. 15 is a reduced scale schematic illustration of the oxygen tent showing the canopy supporting rod in retracted and reversed position suitable for storage.

Fig. 16 is an enlarged view of the condensate draining tube and holding fixture.

In accordance with the invention an improved oxygen tent apparatus includes an oxygen canopy providing an enclosure and having an opened ended sleeve in one side thereof, a heat insulated cooling box open on one side having a rubber collar therearound, said sleeve being received thereon to form a gas-tight connection, cooling coils within the cooling box and means within said cooling box adapted to produce forced circulation of the atmosphere within the enclosure. A diffuser duct housing is secured over the open side of said cooling box extending into said canopy in which ducts are provided to carry gas to and from the cooling box and which is provided with a diffuser plate over the ends of the ducts opening into the canopy enclosure causing uniform and substantially draft-free circulation in the canopy. In the preferred form, canopy-supporting means are provided wholly within the oxygen tent enclosure comprising an extensible rod having an upwardly extending length adjustably mounted in said diffuser duct housing, a horizontal length at the outer end of said supporing rod, and hangers spaced on the horizontal length providing cantilever arms projecting laterally on opposite sides of the horizontal length which are adapted to receive the roof of the canopy thereon. Further, a condensate collection basin is provided in the bottom of the cooling chamber having a flexible drainage hose, the outer end of which is transparent and extends exteriorly of the cabinet to provide means for indicating the accumulated condensate supply and for facilitating the draining of the liquid.

Referring now to the drawings, an oxygen tent apparatus is shown at **10** in Fig. 1, comprising a movable cabinet **11** having caster wheels **12** and an oxygen canopy or hood **13** which is supported over a bed **14**. The canopy is preferably made of a clear vinylite plastic material. Its construction is best shown in Fig. 9 wherein it will be seen that the canopy is made up of a top, substantially rectangular, panel **15**, three depending side panels **16**, and a fourth side panel **17**. The lower ends of the panels, or the skirts as they might be called, are adapted to be tucked under and around the bed mattress on three sides and under the bedclothes across the bed to form an enclosure around the patient in the manner illustrated in Fig. 1. Pleats or extra folds **18** of the canopy material are provided along each corner of the hood by which a fullness is created in the box-like construction to facilitate tucking of the edges under the mattress. The seams of the panels are heat sealed in accordance with conventional methods of fabricating articles from such material. Again in Fig. 1, oxygen is administered to the tent enclosure through a hose **19** from a source of oxygen such as the oxygen cylinder **20**. This cylinder is provided with an oxygen metering apparatus **21** identical to the apparatus shown and described in a co-pending application of J. Gilroy and A. R. Wiese, Jr., Serial No. 217,201, assigned to the assignee of the present application, filed March 23, 1951, now Patent No. 2,646,041.

Referring again to Fig. 9, the side panel **17** has a pocket comprising four panels **22**, **23**, **24**, and **25** which form a pocket or sleeve extending outwardly from the canopy. The sleeve or pocket surrounds an aperture in the side panel **17** of the oxygen canopy which is of sufficient vertical dimension to extend substantially from the bottom to the top of the patient receiving enclosure formed by the canopy over the hospital bed, as seen in Figs. 1 and 4 of the drawings illustrating the canopy in position for use. The ends of the panels making the pocket the hemmed in the manner shown in Fig. 11, forming loops **26** through which a cord **27** is threaded to provide a drawstring opening at the mouth of the sleeve. This opening is received on a soft rubber collar **28**, Fig. 1, on the cabinet around which the drawstring opening is tightened to effect a gas-tight seal. In place of a drawstring it is possible to use an elastic loop which may be stretched around the rubber collar **28** to hold the edges of the canopy thereon in gas-tight engagement. The canopy is provided with openings for access to the interior thereof which are not indicated in Fig. 1 for the sake of clarity. These openings are indicated in Fig. 9 wherein zipper fasteners **29** in two of the corner folds **18** enable lengths of the seams in the side panels to be drawn apart to form the openings.

The canopy **13** is supported by means of an extensible rod **30**, Fig. 1, which has a horizontal end portion **31** carrying three spaced hangers **32**, that span the tent canopy and support the roof thereon. These hangers are made as shown in Fig. 6. In addition to being free to rotate about rod **31**, each hanger **32** has laterally extending arms **33** and **34** which are flexible so as to be relatively easily deflected by any strain exerted on the sides of the canopy. Thus the hangers may rotate or bend, in the manner shown by the dotted lines, to cushion resiliently and distribute any forces exerted on the hood across the entire top surface of the canopy instead of allowing high localized stress at some small area. The hangers are formed out of a single metal rod twisted in a coil at the center to form a ring **35** which is slidably received on the supporting rod **30**. The outer ends of the hangers are bent downwardly at their outer ends to prevent the ends from being poked through the sides of the canopy and to assist in lateral positioning of the canopy on its supporting hangers. The roof of the canopy is provided with sleeves **36**, in which the laterally extending arms of each of the hangers is adapted to be received as shown in Fig. 2. The sleeves **36** are made in the form of loops as illustrated in Fig. 9 and by the sectional view in Fig. 10. The sleeves are arranged in sets of two, each set having an intervening space along the centerline of the tent roof to accommodate the portion **31** of the supporting rod. It will be seen that the construction, which has been described, affords an oxygen canopy support wholly within the canopy, which does not interfere with the vision through the canopy and which distributes the weight of the canopy or any load exerted thereon uniformly across the top of the hood.

The supporting rod **30** is adjustably mounted in a housing **37** enclosed by the canopy **13** and extending upwardly from the top of the cabinet **11**. Vertical adjustment of the rod **30** and of the canopy is thereby afforded as indicated by the displaced position of the rod **30** in Fig. 2. Locking means **38** for securing the supporting rod are shown in greater detail in Fig. 3. Such means include a sleeve **39** fixed rigidly in the housing **37** which slidably receives the rod **30**. A series of openings **40** along the hollow rod **30** correspond to different height adjustments of the rod and are adapted to receive a locking pin **41** which locks the rod in place. The pin **41** is carried on a plate **42** mounted at the outside of the housing **37** by means of shouldered screws **43** loosely engaging the plate. The plate has an upwardly bent portion that is adapted to be pressed toward the cabinet housing causing the plate to be pivoted and the locking pin to be retracted from locked position. A spring **44** held between the housing **37** and the locking plate **42** urges the plate toward the position shown in full lines in which the pin **41** is inserted through an opening **45** to engage the rod **30**. An opening **40′** similar to the locking holes **40** is placed diametrically opposite the side of the openings **40** to enable the rod **30** to be locked in a rotated and retracted position. Thus, it is evident that in order to adjust the rod **30**, it is only necessary to unlock the rod **30** by depressing the bent portion of the locking plate and move the rod lengthwise to the desired height. This may be accomplished without entering the tent enclosure, since the plate **42** may be pressed directly through the portion of the canopy enclosing the housing **37**, and the rod **30** may be held for adjustment by grasping it through the canopy.

An additional feature of the canopy-supporting construction is illustrated in Fig. 15. This feature results from the provision for enabling rotation of the vertically extending portion of the supporting rod **30** in its mounting and locking means **38**. Thus the horizontal length **31** may be rotated 180° from its normal direction, shown in dotted lines, so that it assumes the position shown in full lines. The hangers **32** are slid to the bottom of the supporting rod. In this position, the canopy-supporting rod does not project beyond the sides of the cabinet and thus reduces the storage space of the cabinet when it is not in use.

Having now described the oxygen canopy and the supporting means therefor, the means for ventilating the tent enclosure and refrigerating the atmosphere in the tent will be described. Referring to Fig. 4, a cooling box **47** is housed in the cabinet **11** which is in the form of a well having an opening through the top of the cabinet and depending downwardly into the cabinet. The cooling box comprises a metal container **48** which is mounted in the cabinet by suitable supporting brackets, not shown in this figure, and is covered on all sides and on the bottom by a layer of heat insulation **49**. The top of the box-like container **48** extends beyond the insulating covering forming a neck portion **50** which protrudes through an opening in the cover **51** of the cabinet. In Fig. 5 this part of the structure is shown in greater detail. The rubber collar **28** is carried on the protruding neck portion **50** on which the tent canopy is received, as before described, thus completely enclosing the open end of the cooling box. Also shown in Fig. 5 is one of the supporting brackets **52** for mounting the cooling box in the cabinet. A cooling coil assembly **53** is fastened within the cooling chamber by means of bolt fastenings **54**, seen also in Fig. 13, that secure end plates **55** on which the entire coil assembly is supported. The cooling coils **56** carry a series of fins **57** which assist the heat transfer from the gas flowing over the cooling coils and also direct the flow of the gas through the cooling chamber. A plate **57'** is carried on the cooling coils forming a partition across the cooling box which separates one side of the cooling chamber, through which the gas is drawn inwardly, from the other side of the chamber, through which gas is returned to the canopy. The housing **37** is received inside of the neck portion **50** of the cooling box and rests on the top of the cooling coil assembly **53**. Bolt fastenings **58** anchor the housing in the top of the cooling box. Referring again to Fig. 4, the housing **37** comprises a diffuser duct in which the oxygen atmosphere is circulated to and from the canopy or hood **13**. A perforated diffuser plate **59**, Fig. 12, is placed over the mouth of the diffuser duct which has perforated openings **60** causing the circulated gas to be distributed over the entire opening of the ducts provided in the housing, thereby producing a substantially draft-free circulation. A baffle **61** within the diffuser duct housing **37** provides a duct **62** at one side thereof and a duct **63**, Fig. 4, at the other side thereof. The baffle **61** registers with the plate **57'** providing a continuous path of flow for the gas inwardly through the duct **63** and one side of the cooling chamber and outwardly through the other side of the chamber and duct **62**. Baffle elements **64** are mounted on the bottom of the diffuser housing **37** which cover the space outside of the side plates **55** of the cooling coil assembly so that the circulated gas may pass only through the cooling coils between the end plates **55**. A fan blower **65** is provided within the cooling box **47** which produces a forced circulation of the oxygen atmosphere. The fan draws in the gas at the lower end of the cooling coil assembly at one side of the plate **57'** and discharges it at the other side of the dividing plate. The fan is driven by an electric motor **66** supported externally of the cooling box in a motor well **67** having a flange secured to the cooling box by means of bolts **68**. The motor is operatively connected to the fan through a drive shaft **69** which passes through a gas-tight bearing **70**. The insulation around the cooling box **47** also assists in reducing the vibrations produced by the fan motor so that its operation is relatively noiseless. A temperature sensing coil **71** is disposed in the duct **63** of the diffuser duct housing **37**. This coil contains a fluid, responsive to the temperature of the gas in the tent hood, which operates a refrigerating valve to control the circulation of the refrigerant through the cooling coils, thereby regulating the oxygen hood temperature as will be more fully explained. The hood temperature is indicated by means of a thermometer **72** inserted through the duct housing having a dial and temperature scale **73** seen in Fig. 1.

It will be seen that the insulated cooling box, together with the oxygen canopy which is received directly thereon

around the rubber seat **38** constitute a closed chamber in which there are no external ducts or uninsulated conduits extending between the canopy and the cooling chamber. The air is continuously circulated therein by the fan blower **65** that is in constant operation while the tent is in use. The diffuser housing lying wholly within the canopy produces a substantially laminar flow circulation admitting colder gas at the upper section of the hood and drawing off the warmer gas in the lower region.

Oxygen is administered to the oxygen tent from the cylinder **20** at the desired rate through gas metering apparatus **21** and hose **19** as stated in the preceding description of the apparatus in Fig. 1. Referring now to Fig. 8, it will be seen that the hose **19** is inserted through the top of the cabinet **11** and is received through the side of the cooling box **47** wherein the oxygen supply is admitted. The oxygen is then circulated through the tent canopy and cooling chamber as described above. The rate at which the oxygen is supplied is sufficient to maintain a desired oxygen concentration within the hood in which the oxygen supply is continuously being depleted by consumption by the patient during breathing and by the diffusion and leakage of gas from the tent. The latter is reduced substantially in the present construction, but some small leakages invariably occur and cannot be completely eliminated under practical operating conditions.

The cooling box **47**, Fig. 4, is provided with a space at the bottom of the enclosure, forming a basin for collecting condensate. The condensate is obtained from the water vapor in the atmosphere circulated through the tent hood which condenses on the cooling coils and drips to the bottom of the box as indicated by the accumulated liquid supply L. A drain tube **74** is provided at the bottom of the cooling box which extends through an opening in the side of the cabinet and is secured in its outer end in a fixture **75**. The drain tube is transparent, either over its entire length or at least at its outer end as at **74'**, in which the visible level of the liquid corresponds to and indicates the level of the supply accumulated in the collecting basin. The holding fixture **75** and end **74'** of the tube **74** are enlarged in Fig. 16. The fixture **75** is mounted on the front panel of the cabinet and has a stud **75'** on which the open end of the tube **74'** is received. When the liquid in the tube **74'** reaches a certain level, the tube may be pulled away from the stud **75'** and lowered to the position shown in dotted lines. The collecting basin, which is at a higher level than the tube when it is lowered in this manner discharges the condensate which may be collected in a pail placed under the tube **74'**. Thus the condensate may be disposed of without dismantling any part of the oxygen tent and even without interruption of its operation.

The construction of the cabinet **11** and the arrangement of the refrigerating apparatus therein is illustrated in Figs. 7 and 8 of the drawings. The cabinet consists of a framework structure, preferably welded, and made up of a series of frame members including side panels **76** to which front and back panels **77** are removably fastened. The top covering **51** is also secured thereto and carries a pair of handle bars **78** on opposite sides of the duct housing **37** by which the cabinet may be grasped for moving it on its rollers **12**. The bracket members **52** for mounting the cooling box **47** in the cabinet are seen in the rear view of Fig. 8, the lower bracket being secured by bolts **79** to anchoring members **79'** fastened to the side panels **76**. A floor plate **80** is fixed to the cabinet frame on which a compressor **81** is supported by conventional motor mountings **82**. A discharge line **83** connects the compressor outlet with a condenser coil assembly **84** with which there is associated a blower fan within an enclosing shield **85**. Side panel **76** is provided with an opening **76'** opposite the condenser coil assembly **84**, seen also in Fig. 1, through which air is drawn through the condenser coils by the condenser blower fan. The opening **76'** also facilitates the cleaning of the condenser coils and cooling fins by obviating the necessity for removing the side panel to gain access thereto. The refrigerant used in the refrigerating apparatus is preferably Freon which is now in common use. After condensing in the condenser coils the liquid refrigerant is fed from the condenser to a receiving tank **86**. A series of pipes **87** carry the liquid refrigerant from the receiver to the coils within cooling box **47**, through a heat exchanger **88**, in which vaporized refrigerant from the cooling box further cools the liquid refrigerant, and thence through a pair of valves in series, one valve **89** being a modulating pilot valve and the other valve **90** comprising a thermostatic expansion valve. The modulating valve **89** has a thin tube **89'** connecting with expansion coil **71** located in the diffuser duct housing which contains expansion fluid, the expansion of which controls the modulating valve so that the volume of refrigerant circulated is varied to maintain the desired hood temperature. The temperature setting of the expansion coil **71** may be changed by a temperature control adjusting device **91** connected thereto through a thin tube **89''** which changes the volume of the expansion fluid control circuit in the expansion coil and modulating valve. The valve **90** has a temperature bulb **92** which controls this valve to produce proper flooding of the cooling coils in cooling box **47** with liquid refrigerant and cause the refrigerant to be completely vaporized upon leaving the cooling coils. The bulb **92** is wrapped on a pipe **93** to respond to the temperature of the vaporized refrigerant therein carried from the cooling coils to heat exchanger **88**. From thence the vaporized refrigerant is returned through a suction pressure regulator **94** and pipes **95** and **96** to the compressor.

The operation of the refrigerating cycle is best explained in connection with the diagram in Fig. 14. Refrigerant vapor returning from cooling coils **53** enters compressor **81** where its pressure is raised to a value permitting condensation of the vapor at room temperature. The condensation of the vapor at such raised pressure occurs in the coils of the condenser **84** and liquid flows from thence into receiver tank **86**. The flow of liquid from the receiver tank is controlled by the demand of the system; that is, the amount of refrigeration necessary to maintain the hood temperature according to the adjustment of the expansion control coil **71**. The liquid delivered from the tank flows through the outer jacket of heat exchanger **88** which is so constructed that the cold vaporized refrigerant returning from the evaporator cooling coils **53** is used to cool the liquid refrigerant en route to the cooling box, thus increasing the efficiency of the system and preventing the frosting of the pipes delivering the cold refrigerant vapor back to the compressor. From the exchanger **88** liquid flows through modulating pilot valve **89** and thermal expansion valve **90** which operate as a team to control the flow of the refrigerant in response to load demands of the cooling coils. The modulating pilot valve has its temperature control coil **71** located in the return air stream in the diffuser housing, and a temperature control adjusting device **91**. As the hood temperature rises above the temperature setting of the pilot valve, the valve opens allowing more refrigerant to flow through the cooling coil. As the temperature drops, the temperature control closes the valve completely, stopping the flow of refrigerant and allowing the tent temperature to rise. The thermostatic expansion valve **90** controls the flow of refrigerant to the cooling coils so that no liquid refrigerant passes into the coil discharge outlet tubing. This valve is controlled by an expansion bulb **92** which is responsive to the temperature of the refrigerant at the outlet end of the coil whereby proper flooding of the coils is assured without allowing liquid refrigerant to pass into the coil outlet tubing. Within the cooling coils **53** the refrigerant is expanded to a gas thereby absorbing heat picked up from the air passing across the cooling coils and the fins in the cooling box **47**. From the cooling coils, refrigerant vapor passes centrally through heat exchanger **88** and into suction pressure regulator **94**. This regulating valve is responsive to the pressure on its upstream side to retard the flow of refrigerant when this pressure drops below a predetermined value corresponding to a temperature of the refrigerant which produces undesirable frosting on the coils and fins in the cooling box. Upon so doing, the compressor, which continues to operate, reduces the pressure downstream of the valve to a vacuum. Flow is resumed when the upstream pressure is raised above the predetermined minimum allowable pressure. Leaving the regulator **94**, refrigerant vapor enters the compressor **81** and the refrigeration cycle is repeated.

The electrical circuit for the refrigerating apparatus is connected to a source of electricity by a power cord **97** having a plug which is adapted to be inserted in a conventional electrical outlet. The electric circuit includes a master switch, not shown in the drawings, by which the tent apparatus may be turned on or off. The

motors for the compressor **81** and for the condenser fan in housing **85**, not visible in the drawings, are connected to a junction box **98** which in turn is electrically connected to the terminals of a main pressure cutout switch housed in switch box **99** to which the power cord **97** is also connected. Suitable wiring also connects the motor **66** of the circulating fan **65** to the switch box **99**. Thus when the master switch is turned to the "on" position, all the motors, being connected to the switch box **99**, receive power from the power source through cord **97**. The main pressure cutout switch is adapted to stop the compressor in the event that the compressor head pressure exceeds its prescribed operating limits.

The invention, of course, is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

We claim:

1. A supporting structure for an oxygen canopy comprising a base, hangers adapted to support the roof of a canopy from the inside thereof, means supporting said hangers at their centers permitting the outer ends of said hangers to be free, said means including a supporting rod adjustably mounted at its lower end in said base and having a horizontal portion at its upper end whereon said hangers are received, locking holes in said supporting rod spaced at intervals along the lower end thereof, a locking device in said base for locking said supporting rod in adjusted positions having a locking pin adapted for engagement in said spaced locking holes, a locking plate mounted on said base on the outside thereof carrying said locking pin, said plate having an angle portion which extends away from the base and is adapted to pivot said locking plate when it is depressed causing said pin to be retracted, and spring means normally urging said locking plate and pin inwardly for insertion of the pin in one of said locking holes.

2. An oxygen tent comprising a cabinet, a canopy having a top and side walls, said canopy adapted to be supported over a bed to form an enclosure, a support for said canopy, a heat insulated cooling box in said cabinet forming a refrigerating chamber, refrigerating coils therein and blower means for producing forced circulation within said cooling chamber, said cooling box having an open top, the box being set into the top of the cabinet so as to constitute a well depending downwardly into the top of said cabinet, a neck portion on said box extending upwardly from the sides of the box around said open top, said neck portion projecting above the top of said cabinet, a resilient collar thereon, a sleeve formed in one side of said canopy extending outwardly therefrom and forming part of said enclosure, said sleeve having a mouth at its outer end which is received over said resilient collar to form a gas-tight connection therewith, a diffuser duct housing seated on the top of said cooling box over said top opening and contained within said enclosure, ducts within said housing registering with said open top of said cooling box and opening at their opposite ends into said enclosure, said ducts cooperating with said blower means to deliver gas from said enclosure to one side of said cooling chamber and discharge it from the other side back into said enclosure, and a perforated diffuser plate over the ends of said ducts providing a substantially draught-free circulation of the atmosphere within said enclosure.

3. An oxygen tent canopy comprising a plastic hood having a roof and side wall sections depending therefrom forming an enclosure open at the bottom in which a patient may be received and isolated in an oxygen enriched atmosphere, said canopy being adapted to be positioned over a patient supporting means and the lower ends of said side wall sections being adapted to be folded around portions of the patient supporting means to substantially close said bottom opening, an opening in one of said side wall sections extending vertically substantially from the top to the bottom of said enclosure, a sleeve extending outwardly of said enclosure from said opening and a draw-string type opening at the outer end of said sleeve.

4. In an oxygen tent apparatus comprising a cabinet and a canopy adapted to be supported over the bed to form an enclosure, a heat insulated cooling box in said cabinet forming a refrigerating chamber, having inlet and outlet openings and containing refrigerating coils for cooling oxygen enriched air circulated by way of said

inlet and outlet openings through said canopy enclosure and said chamber by a blower located within said refrigerating chamber, said refrigerating chamber and said canopy enclosure being connected by a sleeve formed in one side of said canopy and extending outwardly therefrom and forming part of said enclosure, said sleeve having a mouth portion at its outer end which is secured around a resilient collar on an upwardly projecting portion of said cooling box to form a gas tight connection therewith, said inlet and outlet openings both being located in an upwardly projecting portion of said cooling box within the perimeter of said sleeve mouth portion.

5. An oxygen tent canopy comprising a plastic hood having a roof and side wall sections depending therefrom forming an enclosure open at the bottom in which a patient may be received and isolated in an oxygen enriched atmosphere, said canopy being adapted to be positioned over a patient supporting means and the lower ends of said side wall sections being adapted to be folded around portions of the patient supporting means to substantially close said bottom opening, an opening in one of said side wall sections extending vertically substantially from the top to the bottom of said enclosure, a sleeve extending outwardly of said enclosure from said opening having a drawstring type opening at its outer end, and pockets on the underside of said roof panel arranged in at least two pairs, each of said pockets comprising an open-ended loop elongated in a direction parallel to the side wall in which said sleeve is formed, said pockets in each pair being in alignment and extending from opposite sides of the tent toward the center, and being spaced at the center whereby the free ends of supporting hangers for the canopy extending outwardly toward opposite sides of the tent may be received therein.

6. An oxygen tent apparatus as set forth in claim 2 having a receptacle within said cooling box for receiving liquid condensate formed therein, a flexible drainage tube connecting with said receptacle having a transparent portion at its outer end extending externally of said cabinet, and means including detachable retaining means for holding such outer transparent portion in a substantially vertical position so arranged and constructed that the terminal opening of said tube is normally disposed above the level of the liquid in said receptacle whereby the level of the accumulated liquid condensate is visible and said tube may be positioned alternatively with its terminal opening below the level of the liquid condensate to allow the drainage thereof from said receptacle.

7. Apparatus for circulating and conditioning the gaseous atmosphere within an oxygen canopy for a hospital bed comprising, a portable cabinet unit containing air circulating and conditioning means including an insulated cooling box open at the top and forming a well recess in the top of said cabinet, a housing set on and positioned over the top opening of said cooling box projecting upwardly from the top of said cabinet unit and containing inlet and outlet ducts for passing the gaseous atmosphere of an oxygen tent through said circulating and conditioning means, said housing being carried wholly by said portable cabinet unit and adapted to be positioned substantially wholly within the confines of said oxygen canopy, said ducts in said housing terminating in openings in the side wall of said housing positioned respectively at the top of said housing and at the bottom of said housing.

8. Apparatus for circulating and conditioning gaseous atmosphere within an oxygen canopy for a hospital bed according to claim 7 wherein a resilient collar extends around the periphery of the cooling box at substantially the junction of said cooling box and said housing which is adapted to receive thereon an aperture of the oxygen canopy.

9. An oxygen tent comprising a cabinet containing air circulating and conditioning means including an insulated cooling box open at the top and forming a well recess in the top of said cabinet, a housing positioned over the top opening of said cooling box projecting upwardly from the top of said cabinet and a tent canopy having an aperture received in substantially gas-tight fashion on said cooling box so as to enclose the open top of said cooling box within said canopy, said housing being disposed substantially wholly within said canopy and having inlet and outlet ducts for passing the gaseous atmosphere within said tent canopy through said cooling box and said ducts terminating in openings in a side wall of said housing positioned respectively at the bottom of said housing and at the top of said housing.

10. An oxygen tent apparatus comprising a canopy having a top and side walls, said canopy adapted to be supported over a bed to form an enclosure, an opening formed in one of said side wall sections extending vertically substantially from the top to the bottom of said enclosure, a sleeve extending outwardly of said enclosure from said opening, a housing disposed substantially wholly within said sleeve having a vertical side face disposed substantially in confronting relation to said opening in the side wall of the canopy and having inlet and outlet ducts terminating respectively in lower and upper sections of said side wall, means forming a substantially gas-tight closure of said sleeve around a lower portion of said housing, and a base containing air circulating and conditioning means on which said housing is supported, including a heat-insulated cooling box having openings in the top thereof, said ducts in said housing registering therewith for circulation of the gaseous atmosphere within said enclosure through said cooling box.

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