This invention relates generally to a cooling and humidifying system for the air in oxygen tents and the like.

It has long been a problem to provide simultaneous cooling and humidifying of the air in an oxygen tent since conventional cooling systems cause considerable reduction in the relative humidity of the air within the tent and this dry air tends to irritate rather than clear up difficulties in the respiratory tract, and, in many instances, cause coughing spasms.

It is an object of this invention to provide a dual system for cooling and humidifying the air within an oxygen tent.

It is another object to provide apparatus having a refrigerated heat exchanger which cools both the humidifying water and the air circulated therethrough whereby cooled moisture laden air may be blown into the oxygen tent to thus maintain a predetermined relative humidity as well as air temperature therein.

It is still another object to provide apparatus constructed to withdraw warm air from an oxygen tent, cooling and humidifying said air, and recirculating the same back into the tent whereby a high oxygen content thereof may be maintained along with a controlled humidity.

More specifically, it is an object to provide a combination cooling and humidifying system for the air in oxygen tents whereby the air and humidifying liquid are simultaneously cooled by a refrigerating coil having a portion thereof submerged below the liquid level and having a blower for drawing air from the oxygen tent and delivering the same through said coil to cool said air which is then humidified and further cooled with cold mechanically diffused liquid immediately before being discharged back into the oxygen tent.

It is still a further object to provide a system for cooling and humidifying air wherein cold liquid is dispersed into the air in a fine spray to both cool and humidify said air.

These and other objects and advantages of this invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views and in which:

Fig. 1 is a perspective view showing my apparatus as attached to a conventional oxygen tent;

Fig. 2 is a top plan view of the cooling and humidifying apparatus with the cover removed and showing the blower and air intake and outlet connected with said apparatus;

Fig. 3 is a side elevation view of the complete apparatus with portions of the casing broken away; and

Fig. 4 is a vertical fragmental sectional view taken substantially along the line 4-4 of Fig. 2.

As illustrated in the accompanying drawings, I show a conventional type of oxygen tent 7 having an upstanding supporting structure 8 for holding said tent 7 in upwardly spaced relation above the patient's bed. The tent 7 is, of course, constructed of air-tight material to form a sealed closure around the patient to receive oxygen therapy.

I provide a cooling and humidifying system for recirculating air taken from within the tent, cooling and humidifying the same, and blowing the same back into the tent under pressure. The apparatus is housed within a suitable casing such as the wheeled casing 9 having the wheels 9a mounted thereunder. A conventional refrigeration system, designated as an entirety by the numeral 10, is mounted within the lower portion of casing 9 and has an evaporating coil 10a housed within the casing and humidifying chamber 11 of the air conditioning casing 12 mounted in the upper portion of said wheeled casing 9. The casing 12, in the form shown, is divided into two compartments, a liquid storage compartment 13 and the air conditioning compartment 11, and a partition 12a provides such a division in the form of the invention illustrated.

A float valve 14 is swingably mounted in compartment 11 and controls the flow of liquid from the supply reservoir 13 through an inter-communication conduit 15 extending through partition 12a. The level of the liquid in air conditioning compartment 11 is maintained so that the lower portion of the cooling coil 16a is submerged below the surface thereof, a suitable liquid level being shown by the dotted lines 16c of Figs. 3 and 4.

A mechanical liquid vaporizer, designated as an entirety by the numeral 16, is mounted within the air conditioning chamber 11 on the outlet side of cooling coil 16a, as best shown in Fig. 2, and has a high speed motor enclosed within a waterproof casing. This motor drives a high speed liquid dispersing and vaporizing impeller housing 18 which closely surrounds the outer periphery of impeller 17 at the bottom thereof and diverges outwardly therefrom toward the top to permit said impeller to discharge a vaporized spray upwardly in a diverging discharge pattern. The lower portion of the housing 18 has a liquid inlet 19 formed therein to permit the water level therewithin to be maintained equal to the level within the air conditioning chamber 11 which is controlled by the float valve 14.

A blower 20 driven by an electric motor 21 is provided for drawing the air out of the tent 7 through conduit 22 and discharging said air through an air inlet 23 into said air conditioning chamber 11 on the intake side of said heat exchanger cooling coil 16a. An air discharge outlet 24 is disposed through the opposite side of casing 12 and discharges the cooled humidified air back into the tent 7 through conduit 25. Obviously, both outlet 24 and inlet 23 are disposed a substantial distance above the liquid level within the air conditioning chamber 11.

The refrigeration system 10 and the motor 21 are controlled by a master switch having the switch button 26 best shown in Fig. 1, and the motor of vaporizer 16 is controlled by button 27. A filler cap 28 permits easy filling of liquid supply reservoir 13. A dial type thermometer 29 has its temperature sensing element 29a disposed in front of the air inlet 23 and the refrigeration system thermostat of conventional design has its sensing element 30 also disposed in close association to said air inlet 23 and has a control knob 31, best shown in Figs. 1 and 3, for varying the setting thereof.

The following is a description of the operation of the invention disclosed herein. If it is desired to both cool and humidify the air simultaneously, both of the switch buttons 26 and 27 are shifted to the "on" position and the control knob 31 turned to the desired cooling position whereby the operation of the refrigeration system will be thermostatically controlled. The air is drawn from
the tent 7 through intake tube 22 by the blower 20 and is discharged into the air conditioning chamber 11 through intake opening 23. The air flows through the cooling coils 10a and into the humidifying portion of chamber 11 where the mechanically vaporized moisture is constantly dispersed by the vaporizing impeller 17. It should be noted that the position of the densest dispersion from said impeller is disposed directly in front of the outlet 24 in order to obtain maximum absorption of the moisture by the cooled air which has been passed through the coil 10a and is traveling outwardly through the outlet 24 back into the oxygen tent 7 through conduit 25. Since the lower portion of the cooling coil 10a is submersed below the water surface, said coil of course continuously cools the water so that said water being diffused into the area through which the air is constantly flowing will also serve to further reduce the temperature of said air and will also serve to substantially saturate said air as the same passes through the humidifying portion of chamber 11. While it is true that this saturation temperature is relatively low, it should be noted that even at this temperature a substantial amount of moisture is added to the air after the same has been cooled by being passed through the coils 10a and the humidity thereof is materially increased by this humidifying operation and a healthful humidity is maintained constantly in the air within the oxygen tent 7 even after the same has been warmed by the heat produced by the patient's body and breathing confined therewith. Obviously, in certain instances, high relative humidity is not necessary or desirable and, in such instances, the cooling system may be operated without the vaporizer 16. It is also obvious that any desired means for introducing oxygen into the tent may be used such as connecting the same for discharge directly into the air conditioning chamber 11 as by the oxygen inlet tube 32 extending downwardly into said chamber and controlled by any suitable valve such as the stop valve 32a.

It will be seen that I have provided a relatively simple, yet highly efficient, apparatus for controllably maintaining a predetermined temperature within an oxygen tent and constantly humidifying the air therein simultaneously with the cooling thereof. The coils 10a not only cool the air but also cool the humidifying liquid whereby the liquid spray further cools the air passed therethrough while humidifying the same.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of my invention, which consists of the matter shown and described herein and set forth in the appended claims.

What I claim is:

1. Air conditioning apparatus particularly adapted for use in conditioning the air of an oxygen tent, said apparatus comprising a casing defining an air conditioning chamber, mechanism within said chamber for maintaining a predetermined liquid level therein, heat exchanger cooling means disposed in said chamber and having a minor portion thereof submerged below the liquid level in said chamber with a substantially greater major portion thereof disposed above the liquid level and extending transversely across said chamber and occupying a major portion of the cross sectional area of the chamber, a blower for discharging air into said air conditioning chamber through an inlet disposed on one side of said cooling means and directing substantially the entire discharge onto said heat exchanger cooling means, said air conditioning chamber having a discharge outlet on the oppo-

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