

Jan. 8, 1952

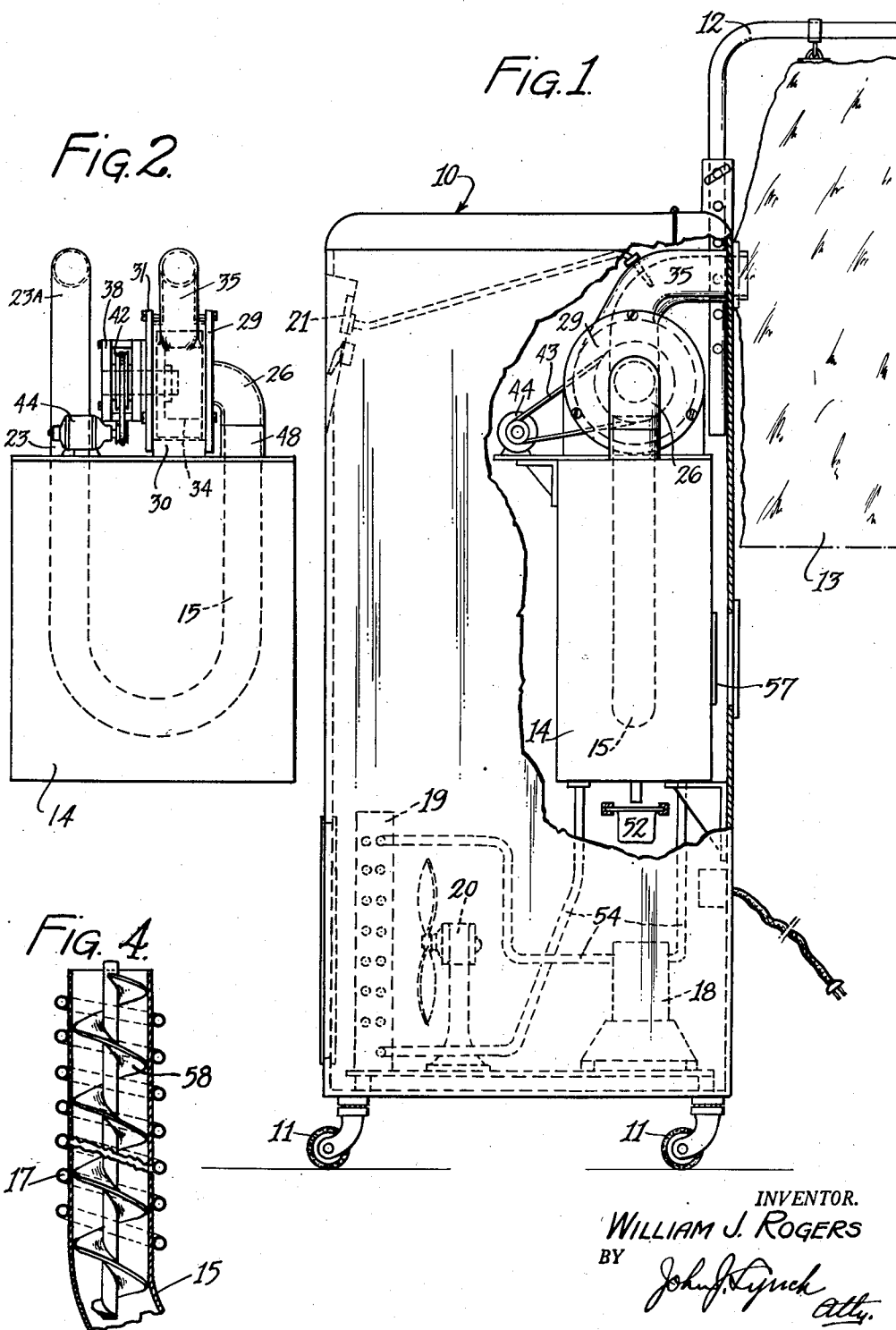
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2,581,709

AIR-COOLING SYSTEM FOR TENTS OR CANOPIES

Filed Jan. 21, 1950

2 SHEETS—SHEET 1



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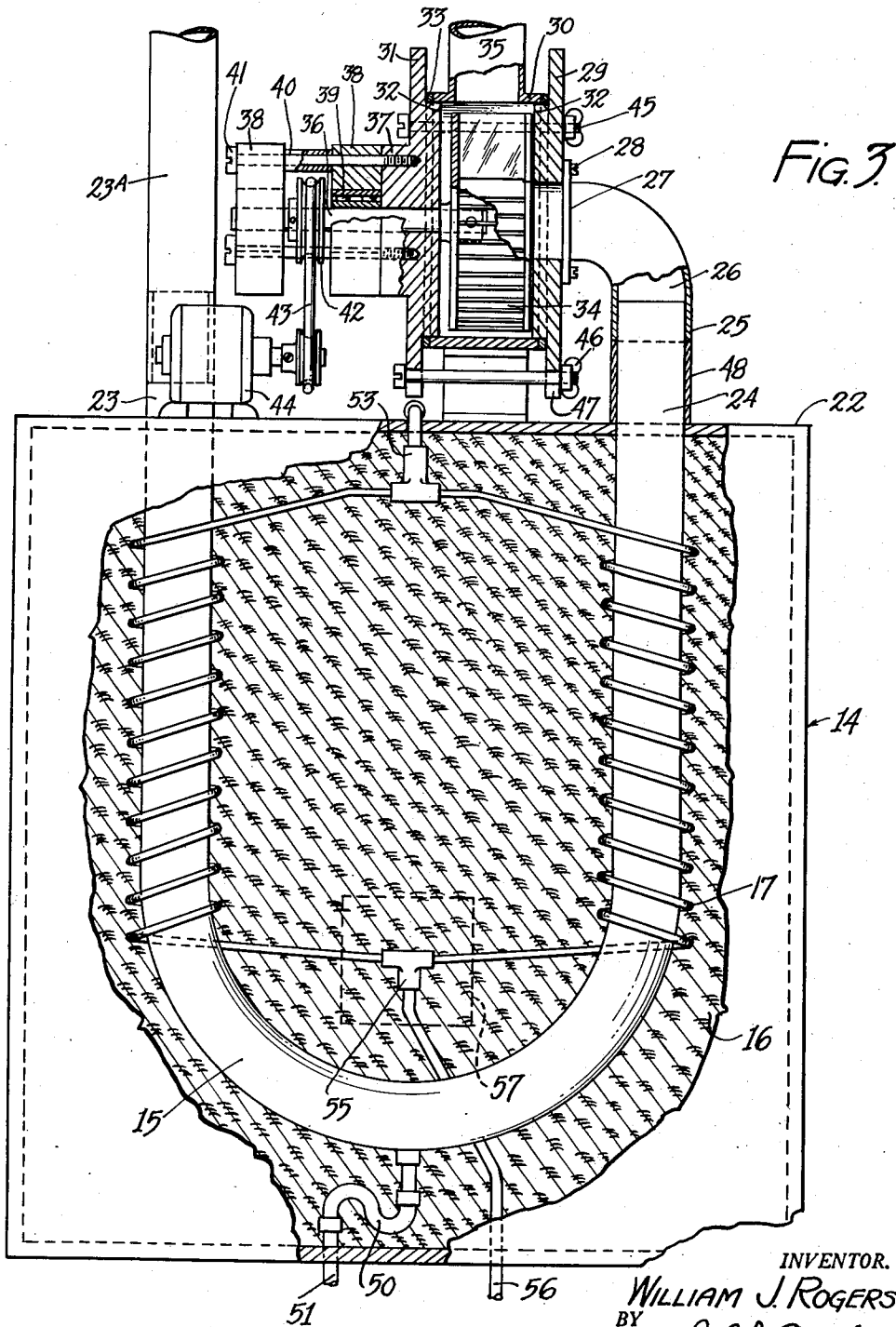
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Filed Jan. 21, 1950

2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

2,581,709

AIR COOLING SYSTEM FOR TENTS OR CANOPIES

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Application January 21, 1950, Serial No. 139,879

2 Claims. (Cl. 62-129)

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The invention relates to air conditioning units and in particular to a type adapted for use in connection with oxygen tents or in restricted areas of like nature.

The present type of air cooling system has been found unsatisfactory in its application to oxygen chambers or the like as used in hospitals or homes where oxygen therapy is employed. While my invention is described in connection with this type of use, it is evident that the novel features thereof can be applied to any air conditioning equipment deemed desirable; the use of an air conditioning unit as used with an oxygen tent being by way of offering one of the best instances in which it can be used.

In a hospital where an air conditioning unit is used with different oxygen tents and circulates the air breathed by patients having different diseases often of a contagious respiratory character, an important factor is the maintenance of a sterile condition in the air circulating unit. Filters are employed but the type necessary to do the work effectively also impede the flow of air and reduce the efficiency of the air cooling unit by retarding the flow. The use of inefficient filters or none at all results in the bacteria laden air sweeping over the outer rough surface of the cooling coil itself and also stagnating in the corners and lower reaches of the container in which the cooling unit is housed. These units are extremely difficult to maintain in a sanitary condition and their continued use with different patients and under different circumstances is detrimental to the health of the patient.

It is an important object of my invention therefore to produce an air conditioning unit particularly adapted for use in oxygen therapy that does not allow the air being circulated to come into direct contact with the cooling coil or the walls of the chamber in which the coil and its associated parts is housed and one in which for the sake of minimum noise and vibration may use a small motor and air circulating blower that would not ordinarily be sufficient if used with units in which air filters of efficient structure are employed.

A further object of the invention is to provide a unit in which the circulated air cannot enter pockets or corners to deposit foreign matter but instead will circulate through a smooth duct which can be thoroughly cleaned and sterilized after use by each patient, if necessary, with a minimum of time and effort.

A still further object is to provide a unit in which the air cooling unit is not bathed directly

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by the air being circulated. In present day units if the temperatures of the coils is below 32° F., condensation gradually freezing thereon lowers the efficiency of the coil as a cooling unit and lessens the circulation of the air. The latter remains in the lower part of the chamber and is not circulated and deposits the bacteria laden particles as beforementioned. Due to the shape and construction of my unit the flow of air is uniform and moves with greater velocity so that freezing is obviated even at comparatively low temperatures applied to the duct through which the air passes, and a maximum amount of moisture will be condensed out leaving the air drier.

Other objects of my invention are to produce an air duct having an effectively placed drain so that odor emitting bacteria laden stagnant water cannot collect in the air passage; one in which all refrigerant circulating lines and associated parts are isolated from the circulatory system so that gas or fumes accidentally escaping cannot do any damage and one which can be encased in a portable container to hold the tent structure and be readily movable about with little manual effort.

With these and other objects in view, the invention comprises certain construction herein-after described and then particularly pointed out in the claims and a preferred embodiment of my invention is illustrated in the accompanying drawings in which:

Figure 1 is a view in elevation showing an air conditioning apparatus being broken away to show the air circulatory unit and its relation to the cooling system,

Figure 2 is an exterior view of the air conditioning or cooling unit showing the mounting of the upper connection ducts and the associated blower parts,

Figure 3 is an enlarged view in elevation with some of the parts being broken away to disclose the interior structure of the air cooling unit and the circulating means, and

Figure 4 is a sectional view of one side of the duct showing the use of an air swirling device.

Referring to the drawings in detail 10 indicates an air cooling or conditioning cabinet mounted for easy movement on casters 11 and supporting through one or more adjustable arms 12 the material 13 of a tent or canopy to which oxygen is supplied in the well known manner, not here shown. The combined air and oxygen mixture is circulated through an air cooling unit 14 in which a duct 15 or airway is contained in an insulating material 16 such as

ground cork or other suitable substance. The duct is cooled by a coil 17 surrounding a portion thereof, the coil forming part of a cooling system of any well known type including the usual compressor 18, condenser 19, fan 20 and the necessary control instruments and electric circuits controlled from a panel board 21 mounted in a convenient location in the cabinet 10.

The particular type of cooling system in itself is not an important part of my invention, the latter being directed particularly to the construction of the cooling unit 14 which is positioned on suitable brackets in the cabinet 10 so that the ends of the duct extending out of the cabinet can be connected in any suitable airtight manner to the material 13 of the tent or canopy.

The circulation of the air about a patient and through the cooling unit duct gradually causes a deposit of bacteria laden lint, dust and other foreign matter to accumulate on the inside of the duct and the blower, and in order that these may be kept clean they are so arranged and constructed that they can be readily taken apart for cleaning. Reference is made to Figure 3 in which the cooling unit housing 14 made of any suitable material is filled with the insulating material 16 packed about the U-shaped duct 15 of relatively large diameter. The upper ends of the duct protrude through the top 22 of the housing 14 and are designated the intake and output ends 23 and 24 respectively. The end 24 fits snugly into the depending end 25 of a blower intake elbow 26 which, through the medium of a flanged end 27, is detachably secured by bolts 28 to the inlet side 29 of a blower housing 30, mounted on the top 22 through a suitable bracket or support.

The blower housing or frame 30 comprises a cylindrical chamber closed at its opposite sides by the side plate 29 and a side plate 31 each having shouldered portions 32 that seat in the opposite open sides of the housing and abut sealing rings 33 that render the blower chamber leak proof so that all of the air drawn in by the bladed blower or impeller 34 through the intake 26 is discharged through an outlet pipe 35 or nozzle formed integrally with the housing 30 at any convenient place on the periphery thereof as at the top, as herein shown. The end of the pipe 35 that extends out of the unit 14 to be attached to the tent material may be conveniently situated adjacent the projecting end of the intake extension 23A of duct 23 and while one position of the unit 14 is shown, it can be placed in any position in the cabinet 10 as desired.

The impeller 34 is removably secured to a shaft 36 which passes through the boss portion 37 of the side plate 31 on which is mounted bearing rings 38 of plastic or other suitable material in which anti-friction bearings 39 may be molded or otherwise held. The rings 38 are separated by spacer sleeves 40 on stud bolts 41 extending from the boss 37 of plate 31 and provide room for a pulley 42 on shaft 36 driven by a belt 43 from a motor 44 which is mounted in any convenient manner adjacent thereto. The side plates or discs 29 and 31 constituting covers for the blower housing are connected by bolts 45 having wing nuts 46 and mounted in radial slots 47 at the periphery of said plates. The exposed portion of duct 24 below the elbow 26 is covered with a sleeve 48 of insulating material in order

to prevent any accumulation of the moisture of condensation. With the structure of the blower and its associated parts arranged for quick and easy dismantling, it is evident that all of the parts can be thoroughly cleaned with a minimum of time and effort and without the necessity of removing any of the other parts of the system housed in the cabinet 10.

The duct 15 is completely insulated in the unit 14 and is surrounded in the vertical portions thereof by the cooling coil 17 whose convolutions are pitched downwardly to return any oil collecting therein into the compressor crankcase. A trap 50 is included in an outlet pipe 51 leading from the lowest point of the loop end of the duct to the exterior of the unit 14 to deposit condensation in a drip pan 52 that is removably mounted in the cabinet 10 in any suitable manner. The refrigerant tubing of the coil is of non-corrosive metal and is connected at its upper ends through the refrigerant control valve 53 to the refrigerating liquid line 54 and at its lower ends is joined through the connection 55 to the suction side 56 of the circulating system 54. A door 57 in the wall of unit 14 provides access to the interior of the unit 14 for necessary adjustment or replacement of the parts. In order that the air to be cooled may be forced into contact with the cooling wall of the duct the latter is provided in its upright portions with a removable swirling device such as a spiral 58 of light twisted metal (Fig. 4).

My invention is to be restricted to the precise details of construction shown since various changes and modifications may be made therein without departing from the scope of the invention or sacrificing the advantages to be derived from its use.

What I claim is:

1. An air conditioning unit adapted to be maintained in a sanitary condition including a housing, a filler of insulating material for the housing, an air duct of relatively large diameter presenting an unbroken smooth interior wall for easy cleaning, a refrigerant conveying pipe coiled about the major portion of said duct, said duct and said pipe being solidly embedded in said insulating material, the ends of said duct and the ends of said pipe protruding from said housing, a blower for circulating air through said duct, an extension detachable from the blower and from a protruding end of said duct for joining the duct and blower, and means for taking said blower apart including said detachable extension for providing access to the blower and the duct for cleaning purposes.

2. An air conditioning unit adapted to be maintained in a sanitary condition including a housing, a filler of insulating material for the housing, an air duct of relatively large diameter presenting an unbroken smooth interior wall for easy cleaning, a refrigerant conveying pipe coiled about the major portion of said duct, said duct and said pipe being solidly embedded in said insulating material, the ends of said duct and the ends of said pipe protruding from said housing, a blower for circulating air through said duct, means for circulating a refrigerant through said pipe, extensions on the protruding ends of said duct detachable therefrom to permit access to said duct for cleaning the interior thereof, said duct being shaped to provide straight end portions and an air swirling means positioned

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in the straight end portions of said duct and removable through the protruding ends thereof for cleaning.

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