Feb. 21, 1939. D. R. ISLES 2,148,161

AIR CONDITIONING UNIT

Filed May 15, 1937

Fig. 3.

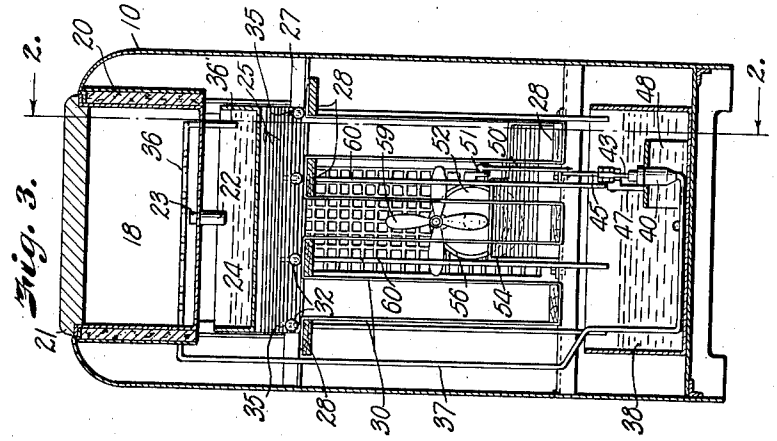


Fig. 6.

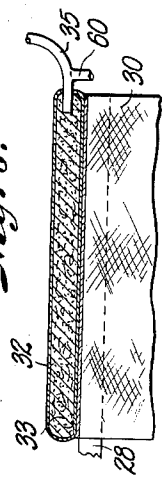


Fig. 2.

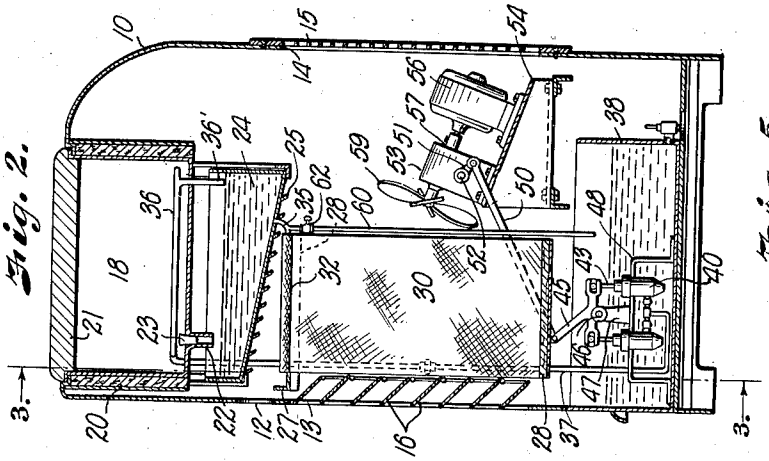


Fig. 5.

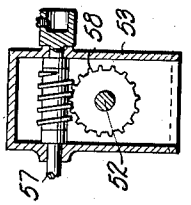


Fig. 1.

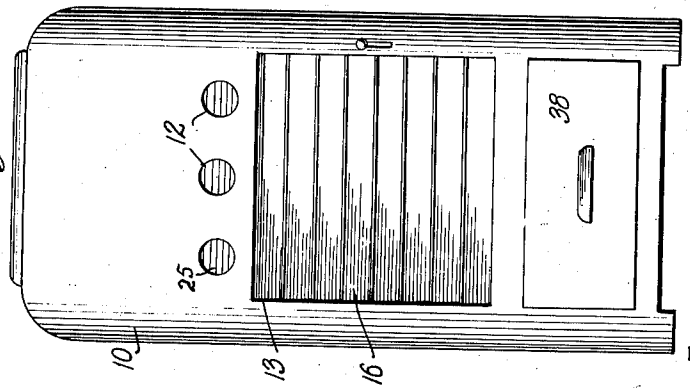
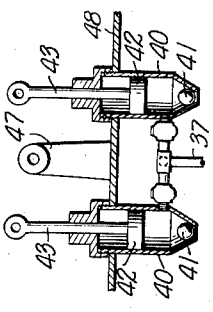


Fig. 4.



INVENTOR:
David R. Isles.
BY Chas. W. Gerard
ATTORNEY

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UNITED STATES PATENT OFFICE

2,148,161

AIR CONDITIONING UNIT

David R. Isles, Topeka, Kans.

Application May 15, 1937, Serial No. 142,821

2 Claims. (Cl. 261—103)

The present invention relates to air conditioning means, and aims to provide an efficient individual unit of this type of apparatus adapted for homes, shops, offices, and the like.

It is also thought to devise an economical unit adapted to be manufactured at relatively small expense, and which may be made up in neat and attractive form.

For this purpose I have devised a unit making use of a water circulation system, together with a suitable power unit operating to maintain both the water circulation and also the necessary circulation of air for the operation of the apparatus.

An important feature of the invention is the provision of an improved means for effectively distributing the water used as the refrigerant to the canvas sheeting employed for the vaporization of the water under the action of the air circulating means.

Various other objects of the invention, and features of improvement characterizing the same, will be brought out in the course of the detailed specification, after which those features deemed to be patentable as well as novel will be particularly set forth in the appended claims.

With the foregoing objects in view, the invention will now be described in detail in connection with the accompanying drawing illustrating one form of apparatus for embodying the features of improvement, and in which—

Figure 1 is a front elevation showing an air conditioning unit constructed in accordance with the present invention;

Figure 2 is a vertical sectional view of the same, representing a section taken on the line 2—2 of Figure 3;

Figure 3 is a similar view representing a section taken on the line 3—3 of Figure 2;

Figure 4 is a detail section of the pumping means, on a larger scale;

Figure 5 is an enlarged detail of parts of the drive to the pumping means, as hereinafter described; and

Figure 6 is an enlarged sectional detail of parts of the water distributing means.

Referring now to the drawing in detail, one type of unit adapted to embody the improved air conditioning means is shown as comprising a suitable form of cabinet 10 provided with front openings 12 and 13 for exit of the conditioned air, and also an opening 14 with appropriate grill work 15 for admitting air to the cabinet. Preferably, adjustable shutter means 16 is also provided for the principal front opening 13 for both controlling the extent of air flow as well as directing such flow upwardly as it is discharged from the cabinet.

In the top of the cabinet 10 is provided a compartment 18 lined with suitable insulating material 20, and having a lid or closure member 21. The bottom of the compartment 18 is provided with a drain outlet 22 (fitted with a drain plug 23) discharging into a sump tank 24 supported beneath said compartment and formed with a rearwardly inclined bottom as illustrated in Figure 2, which bottom is also formed with a set of transverse and rearwardly inclined metal fins 25 (for a purpose hereinafter explained), the forward part of the sloping bottom being located opposite the tops of the upper air discharge openings 12 at the front of the cabinet.

Beneath the tank 24 is located a frame work 27 supporting a series of upper and lower parallel slats 28 arranged with the upper and lower slats in staggered relation as shown in Figure 3, or in such a way that when supporting a canvas sheet 30 as illustrated in said Figure 3 the several intervening sections of said sheet will be in spaced parallel relation and at right angles to the front opening 14.

For distributing the water to the sheeting material 30 I provide sections of cotton sleeving 32 mounted endwise on each of the upper slats 28 and resting upon the canvas sheeting, which sleeving 32 is packed with suitable granular material 33 such as soft wood sawdust, adapted to conduct and distribute the water through the sleeve to the sheeting (see Figure 6), and the rear end of each sleeve section being provided with a water feed connection 35 with the bottom of the tank 24 as shown in Figure 2.

The water circulating means is shown as comprising a coil 36 in the bottom of the compartment 28 and discharging through an outlet 36' into the rear of tank 24, while at the front of said compartment the coil is provided with a pipe 37 extending down into a tank 38 in the form of a drawer located in the bottom of the cabinet 10. This tank 38 contains the water supply which is circulated by a pumping means comprising a pair of small cylinders 40 each fitted with a check valve 41 and piston 42, said pistons having rods 43 slidingly connected with the opposite arms of a bell crank lever 45 fulcrumed at 46 on a standard 47 carried by framework 48 in the tank 38. The lever 45 is pivoted to one end of a connecting rod 50, the other end of which is pivotally connected with a crank arm 51 on a gear shaft 52 at one side of a gear box

53 carried by a sloping platform 54 in the rear of the cabinet 10. This platform also carries a suitable motor 56, the shaft of which is connected for operating a worm shaft 57 provided with a worm element 57' inside the gear box 53, which worm is geared to a gear pinion 58 on the shaft 52 for operating the crank 51 and driving the pumping means. A suitable fan 59 is also secured to the forward end of the worm shaft 57, whereby it is also driven from the motor, and is located just to the rear of the canvas sheeting 30, as illustrated in Figures 2 and 3.

In the operation of the apparatus, the motor drives both the fan and also the pumping means by alternating strokes of the pump pistons for forcing water from the tank 38 up through the coil 36 and into the sump tank 24, from which the water is fed through the connections 35 to the sleeving 32 and thereby distributed to the sheeting 30 where the water is obviously subjected to the air currents produced by the fan, and thus caused to evaporate for lowering the temperature of the air which is discharged from the cabinet.

Both the position of the fan and the more or less inclined position of the shutters 16 are adapted to direct the air flow from the cabinet in a somewhat upward direction or away from the floor, as is preferable for greater comfort to the occupants of the room,—any modification of this flow being of course readily made by appropriate adjustment of said shutters.

In connection with this operation the cooled fins 25 projecting down from the tank 24 serve to condense and extract a part of the moisture from the air which may be directed against them, thereby serving a dehumidifying function for conditioning air that may contain excess moisture.

Among the many advantages characterizing the improved construction is the efficiency of the water distributing means provided by the fabric sleeving packed with the granular sawdust material, which serves to evenly and uniformly distribute the water entirely across the canvas sheeting, and an important feature of the action of this distributing means is the fact that it does not become waterlogged, and thereby serves to produce a continuous flow and distribution of the water to the sheeting from one side clear across the sheeting to the other side thereof. I have also found that packing the sleeves with a satisfactory grade of excelsior material will give similarly efficient results.

Another feature of advantage is the balanced pump construction for maintaining the water circulation, which comprises two balanced pumping units each with a single check valve for its operation, and requiring no lubrication and only a minimum of power for driving the same. The water submerged condition of the pump also serves to maintain a practically noiseless and vibrationless operation. The method of installing the fan and pumping means in direct operative relation to the motor also affords an economical arrangement for driving both from the same power unit as well as mounting the fan in its most effective relation to the sheeting or evaporating means.

If desired, other refrigerants may be used along with the water, such as water ice, dry ice, or the like, which may be placed in the compartment 18 and which would of course have a chilling effect on the coil 36; or this compartment may be simply used for storing food or beverages, if desired, since such use would not interfere with the operation of the water circulation.

Since some conditions of operation may require or permit of reduction of the amount of water distributed to the canvas sheeting 30, the operation may be correspondingly modified by bypassing more or less of the water from the tank 24 down to the tank 38 by way of a pipe 60 provided with a valve 62 by which the bypass flow may be regulated. By opening this valve 62 it is apparent that the amount of water distributed to the sheeting 30 may be diminished or practically shut off, with corresponding reduction of the temperature modifying effects due to vaporization of water from said sheeting.

It will therefore be apparent that I have devised a practical and efficient construction for carrying out the desired objects of the invention as regards a simple and economical unit of the character described, and while the foregoing represents one of the preferred forms of embodiment of the improvements, I desire to reserve the right to make whatever changes or modifications may fairly fall within the scope of the appended claims.

What I claim as new and desire to secure by Letters-Patent, is:

1. An air conditioning unit comprising upper and lower water tanks and an intervening assembly of water absorptive sheets in spaced relation, the bottom of said upper tank sloping to the rear of the unit and being provided with a series of downwardly extending fins for moisture condensing purposes, a fan located to the rear of said sheet assembly for maintaining an air flow over said sheets and upwardly over said fins, water feeding means for distributing water from the upper tank to said sheeting, and pumping means having connections for supplying the upper tank with water from the lower tank.

2. An air conditioning unit comprising upper and lower water tanks and an intervening assembly of water absorptive sheets in spaced relation, a fan operating to maintain an air flow over said sheets, water feeding means for distributing water from the upper tank to said sheets and provided also with connections for bypassing water directly from the upper to the lower tank instead of to said sheeting, and pumping means having connections for supplying the upper tank with water from the lower tank.

DAVID R. ISLES.