Jan. 15, 1935. W. L. FLEISHER 1,988,076

CONDITIONING UNIT

Filed June 18, 1931 3 Sheets-Sheet 1

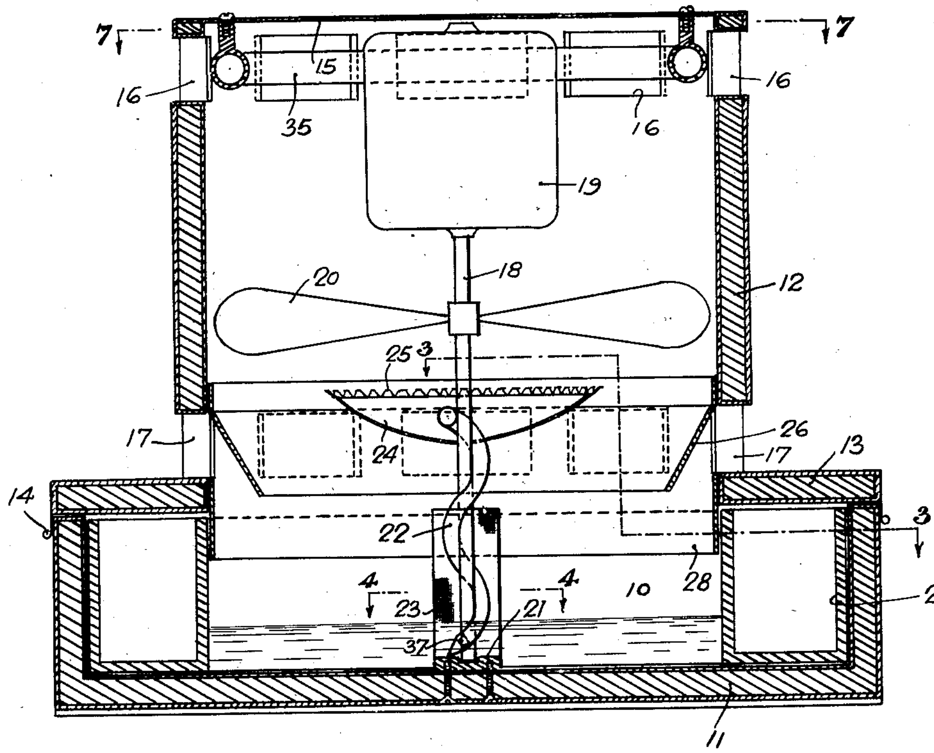

Fig.1.

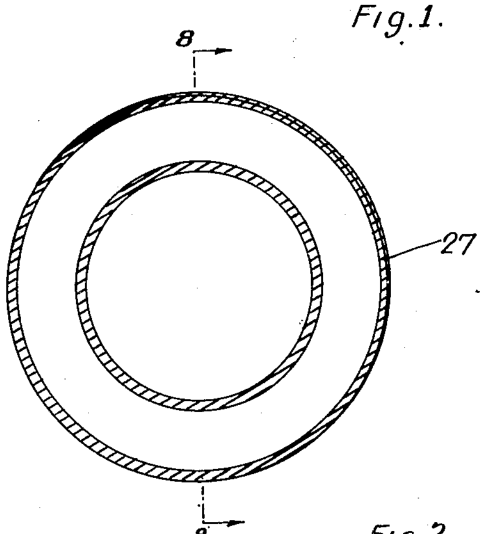

Fig.2.

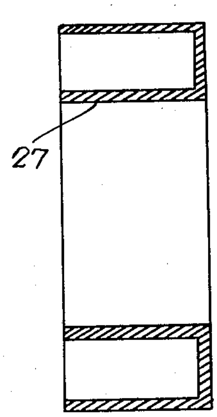

Fig.7.

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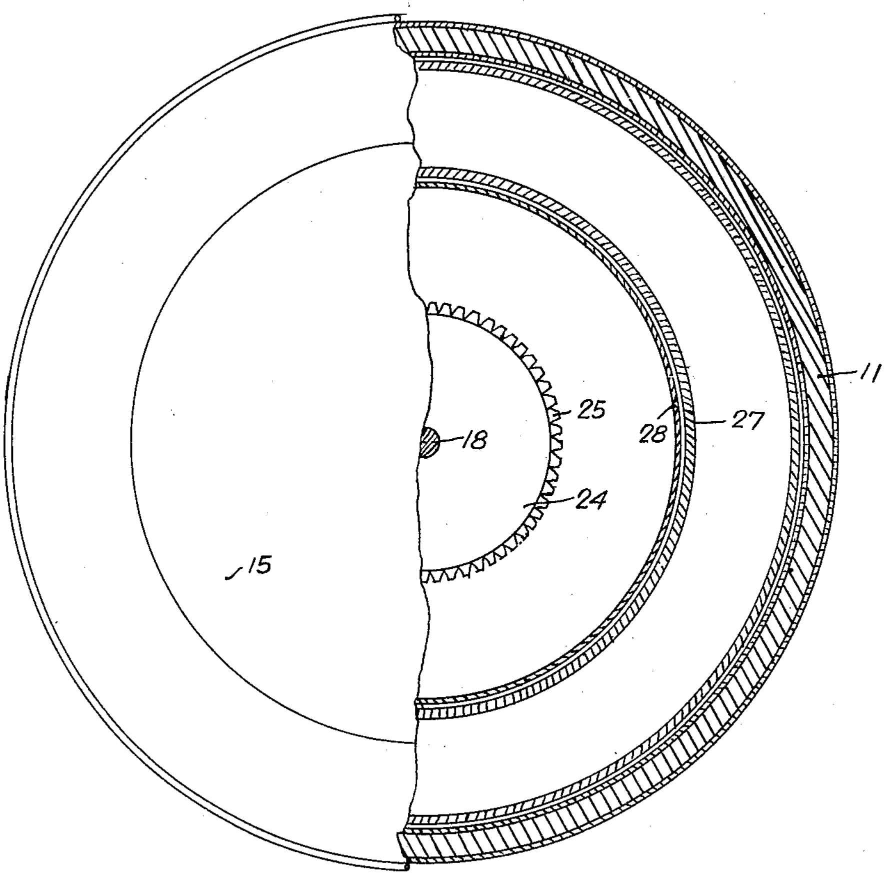

Fig. 3

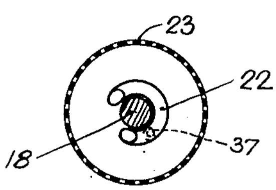

Fig. 4

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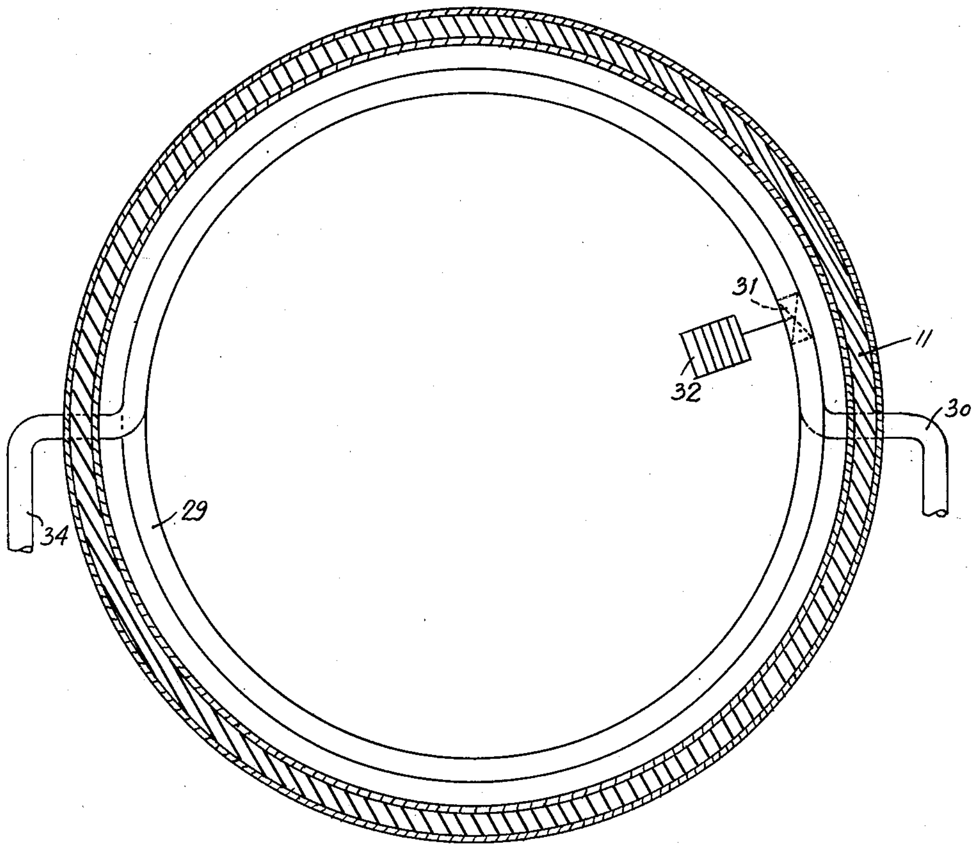

Fig. 5.

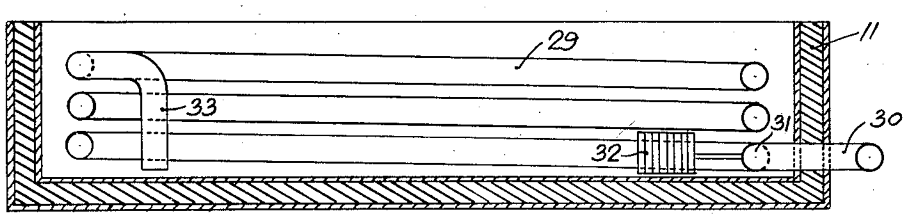

Fig. 6.

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1,988,076

CONDITIONING UNIT

Walter L. Fleisher, New York, N. Y.

Application June 18, 1931, Serial No. 545,170

5 Claims. (Cl. 261—15)

This invention relates to a structurally and functionally improved conditioning unit.

It is an object of the invention to provide an apparatus of this nature particularly intended to be used in rooms and other spaces and which when operating will serve to produce and maintain the condition of the air at a standard such that a healthful and pleasing atmosphere will prevail.

A further object of the invention is that of furnishing a conditioning unit primarily intended to be employed for the conditioning of air and which will operate under winter conditions to efficiently add moisture to the air and under summer conditions to remove excess moisture and also, if desired, to reduce the dry bulb temperature.

A still further object is that of furnishing a conditioning unit in which the parts may readily be separated and assembled. Accordingly a maximum of portability will exist and additionally it will be easy to empty or recharge the apparatus and also to clean the same.

Another object is that of furnishing a device of this character in which cooling effects may readily be achieved with minimum cost and in which moreover these cooling effects will not be accomplished at the expense of too radical a change in air conditions.

An additional object is that of providing a unit the parts of which will be relatively few and simple and rugged in construction, these parts being capable of ready assembly and of operating over long periods of time with freedom from difficulties.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating practical embodiments of the invention and in which

Fig. 1 is a sectional side view of a conditioning unit;

Fig. 2 is a sectional plan view of the conditioner which may receive the cooling medium;

Fig. 3 is a sectional plan view taken along the lines 3—3 of Fig. 1;

Fig. 4 is a sectional plan view taken along the lines 4—4 and in the direction of the arrows of Fig. 1;

Fig. 5 is a sectional plan view of a modification showing a cooling coil disposed within the fluid-receiving portion of the unit;

Fig. 6 is a transverse sectional view of the parts as shown in Fig. 5; and

Fig. 7 is a transverse sectional view taken along the lines 8—8 and in the direction of the arrows shown in Fig. 2.

In these views the numeral 10 indicates a basin or pan. This member may be constructed in any convenient manner but preferably, and as shown, has a base and walls 11 which embody one or more thicknesses of heat insulating material. Removably supported upon this pan is a casing 12, the walls of which are also preferably formed of non-heat conducting material. The diameter of the casing is preferably less than that of the pan and with a view to assuring a proper relative positioning of these parts the casing has its lower end terminating in an outwardly extending portion or deck 13 which is continued in the form of a downwardly extending flange 14 lying in contact with the outer face of the casing. The upper end of the casing is preferably closed by a cover plate 15 and below the same the casing may be formed with a series of discharge ports 16. Adjacent its lower end intake ports 17 are formed in the casing and thus air may enter through the latter and be discharged through the ports 16.

In order to accomplish this a drive shaft 18 is rotatably mounted within the casing and preferably extends into the pan. This drive shaft may be actuated by a motor 19 which is also conveniently disposed within the casing. A multi-bladed fan 20 is secured to the shaft 18 and at a point between the series of ports 16 and 17 and it is thus apparent that circulation of air will obtain. The lower end of the shaft 18 may simply rest against a bearing block 21 secured to the upper face of the basin base, or else this lower end of the shaft may be otherwise supported in a manner which seems to be most desirable.

Now with a view to furnishing means whereby the air in its passage through the unit will receive moisture or be subject to contact with moisture, it will be observed that a pump structure is provided as part of the unit. This structure may take various different forms. However, preferably, according to the present invention, it includes one or more tubes 22 spirally disposed around the shaft 18 (conceding that the latter extends into the basin) and which tubes have their lower ends terminating in a plane just above the plane of the base. Concentrically disposed with respect to the tubes is a screen member 23 and it will thus be apparent that as the shaft 18 revolves fluid within the basin will force into the tube or tubes and upwardly through the same to be discharged from their upper ends. In this connection it is of course apparent that the upper ends of the tubes preferably extend in a direction radial to the shaft axis and that by means of the screen 23—conceding that this unit is employed—the entrance of foreign particles into the pump structure is prevented.

Thus it is apparent that the spray of water will be distributed simultaneously with the flow of air. Now in order that the water may be in such form as to have a proper affinity for the air, it is preferred that one or more distributors be employed. If a number are utilized they are preferably disposed one above the other along the shaft and each of them has at least one tube discharging adjacent its body.

For the sake of simplifying the illustration, only a single distributing member and tube have been shown. This member takes the form of a cup 24, which, as shown, may be arranged to extend upwardly rather than invertedly. Also, as shown, the member is secured to the shaft. The upper edge of the member is serrated, as at 25, or is otherwise formed to assure a water distribution of maximum efficiency.

Thus it will be apparent that with the power shaft 18 rotating the air will primarily pass below the lower edge of the splash apron 26 which is preferably provided within the casing. Thereupon the flow of the air is reversed and it passes through the zone of the distributor or distributors. In this zone it meets the water mist which occurs incident to the minute subdivision of the water body and the radial distribution thereof towards the side walls of the casing. Consequently the air is saturated and then escapes through the outlet opening 16 for the purpose of conditioning the air within the enclosure in which the unit is positioned. This action will cause an air condition to obtain which will promote human efficiency and well being, particularly during the winter months when steam heating is resorted to and the air consequently has too low a moisture content. Thus a light-weight portable unit is provided in which the parts may readily be separated for the purpose of transportation, emptying of the basin, etc.

However, by means of the present invention there is also provided an apparatus which will function efficiently to improve air conditions under summer temperatures. This is accomplished, for example, by filling the basin with ice which will reduce the temperature of the water therein to a point such that the air in passing through the casing will give off moisture. Under these conditions it is of course obvious that the amount of water within the basin will be constantly supplemented by extraction of moisture from the air. Therefore the initial water level within the basin should be as low as practicable, it being noted that the pump structure has its intake end at the lower end of the basin with this purpose in mind. Moreover, if ice particles are employed they will not detrimentally affect the operation of the unit for the reason that the screen 23 is provided to prevent their entrance into the pump structure.

The foregoing is one broad aspect of the invention. It has been found that under summer operating conditions the use of ice freely disposed within the basin results in such variation in the water level—and consequently the resulting spray—that the efficiency of the apparatus is impaired materially. With this in mind the present invention contemplates the use of a separate expedient for assuring efficient operation under summer conditions. One of the simplest forms is that of providing a separate container for the cooling medium whether the latter be cracked ice or otherwise. Such a container may take the form of a ring-shaped member comprising a body U-shaped in cross section and within which cracked ice may be disposed. This container has been shown in Figs. 2 and 7 and indicated at 27. With the use of a structure of this nature it is obvious that the water level will not be affected, except as the unit removes moisture from the air.

According to a third aspect of the invention CO_2 may be employed within the container. This can take the form of a ring of solid carbon dioxide and under these circumstances the walls of the container 27 are preferably constructed of a material which does not readily transmit heat. Thus dangerously low temperatures will not occur within the basin but at the same time the temperature of the water will be maintained at such a low degree that the most efficient conditions will prevail. If solid carbon dioxide or similar material is employed the casing may be provided with a downwardly extending flange 28 which partially encloses the receptacle 27, thus preventing a free circulation between the body of the basin and the receptacle containing the solid carbon dioxide.

A further form, and in certain respects, more preferred example of this feature of the invention, is illustrated in Figs. 5 and 6, in which the basin has within it a coil 29. The intake end of this coil, as at 30, extends beyond the basin and may be connected to a suitable source of compressed refrigerant (not shown). This refrigerant will preferably—as covered in a copending application—be supplied in a flask removable from the intake end of the coil. Disposed within the basin, or otherwise suitably situated, is an expansion valve 31, the action of which may be controlled by a thermostat 32 in contact with the water within the basin. Consequently the coil will set up a very low temperature and the refrigerant, after having passed through the convolutions, thereafter may, as in Fig. 6, either discharge into the basin by having the outlet end 33 turned downwardly, or else this coil may extend, as at 34, in Fig. 5, beyond the basin and be connected to a suitable exhaust duct directly to the outer atmosphere or otherwise.

Regardless of the manner in which the refrigerant is ultimately disposed, it will not harm human beings, but if any objection should be noted to the casual disposition of this waste product, an absorber should be installed in the discharge line, as described in my copending application previously referred to.

Finally, it may be desired to have the conditioned air discharged in a certain direction only and with this in mind a band damper or dampers may be provided adjacent the discharge end of the casing so that air will flow only through one of the outlet ports. This is particularly advantageous where it is desired to have the conditioned air projected in the form of a blast against any given object.

From the foregoing it will be appreciated that an apparatus is provided in which, among others, the several objects of the invention as specifically aforenoted are achieved. It will be noted that the pump structure is so designed that it is practically independent of the depth of water in the container as long as the entry orifice is covered with liquid. The delivery of the pump structure will be constant, irrespective of the depth of the water in the basin. Consequently, in the winter time the basin may have a maximum depth of water to increase the working range of the apparatus, while in the summer time when the cooling medium is below the dew-point of the air which is to be conditioned, moisture is extracted from the air and deposited in the basin. Consequently the apparatus under those circumstances may start with a minimum amount of water in the basin. If a plurality of tubes are employed the operation of one pump is entirely independent of the other. Consequently if, as shown in Fig. 4, a thermostatic valve 37 is provided in association with the tube, the temperature of the water may govern the volume of spray through which the air will pass. Due to the fact that the tube is arranged in the form of a spiral, the shaft will not be unbalanced and this shaft may rotate at comparatively slow speed, thus eliminating many objections, including noise. Incidentally, due to the provision of the container for the refrigerant it is obvious that the effective water capacity of the basin is increased under winter operating conditions (when the container is eliminated and the basin filled with a maximum amount of water), while only in the summer time will the container be necessary. On the latter occasion only a lesser amount of water-receiving space is required.

Obviously numerous changes in construction and rearrangements of the parts may be resorted to without departing from the spirit of the invention as defined by the claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A conditioning unit including a basin adapted to receive a liquid, means for inducing the flow of air adjacent the same, a power shaft, a pump structure coupled to said power shaft and including a spirally disposed tube having its lower end extending into said basin and a screen unit encircling said tube and disposed within said basin.

2. A conditioning unit including a basin, a casing removably associated with said basin, means carried by said casing for producing a current of air therethrough and also for distributing water into said current of air, said basin containing water, and a separate compartment surrounding said water for retaining a refrigerant in out of contact relation with said water.

3. A conditioning unit including a basin and a casing, means carried by said casing for producing a current of air therethrough, and also for discharging water in contact with said air, said basin being divided into two concentric compartments, the inner compartment being adapted to contain water, and the outer compartment being adapted to contain a refrigerant.

4. In an air conditioning unit, a casing, a motor carried by said casing, a shaft, a fan, a distributor and a pump carried by said shaft, and a basin removably associated with said casing, a refrigerant compartment concentric with and separable from said basin, the inner wall of said refrigerant compartment forming an outer wall of a water retaining compartment.

5. A conditioning unit including a basin and a casing, means carried by said casing for producing a current of air therethrough and also for discharging water in contact with said air, the basin being divided into two compartments, the inner compartment being adapted to contain water, the outer compartment being adapted to contain a refrigerant.

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