

Aug. 19, 1941.

H. W. SCHAEFER

2,252,865

FLUID CONDITIONING APPARATUS

Filed Nov. 18, 1939

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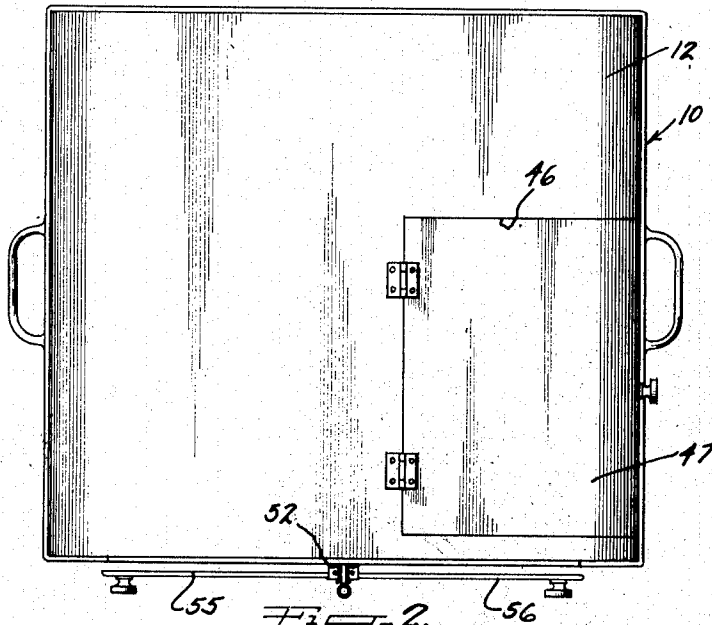
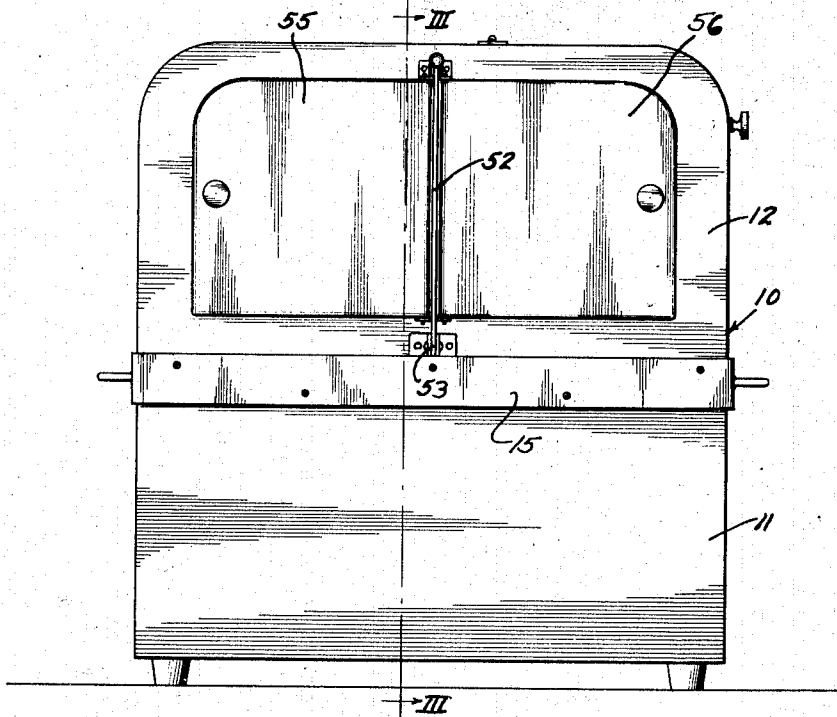
Fig. 1.

Fig-2.



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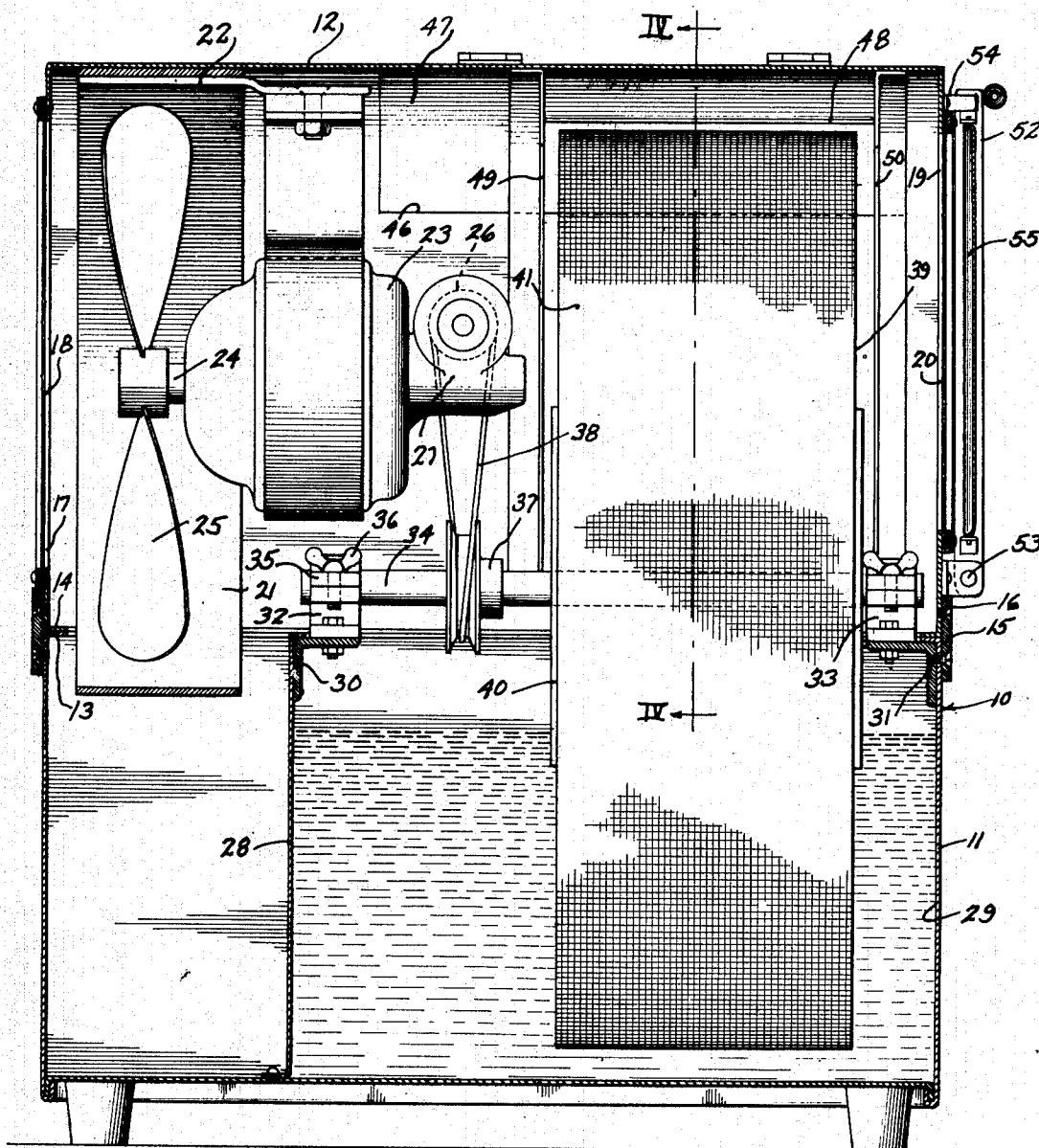
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Fig. 3.



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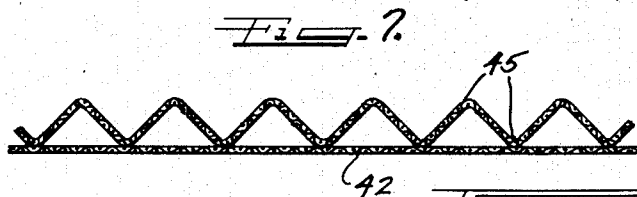
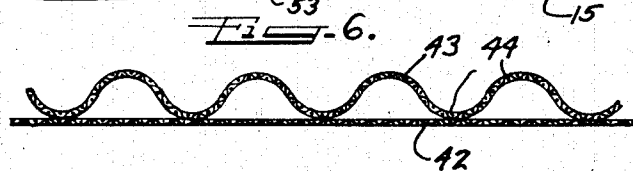
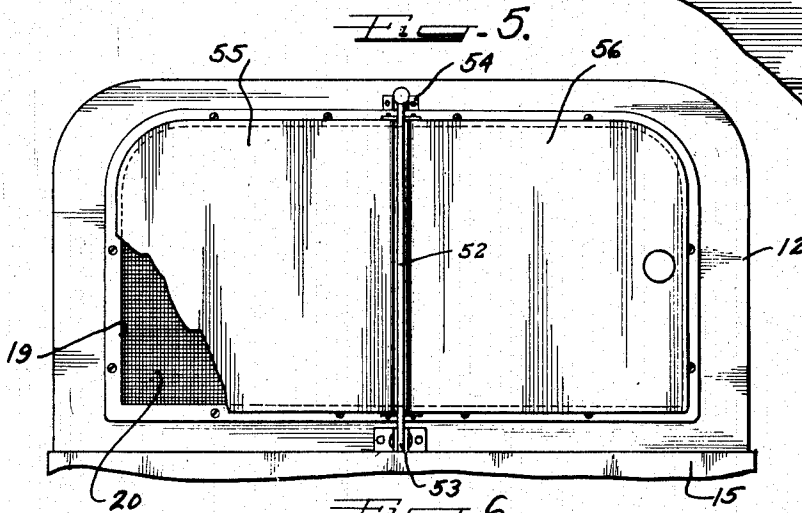
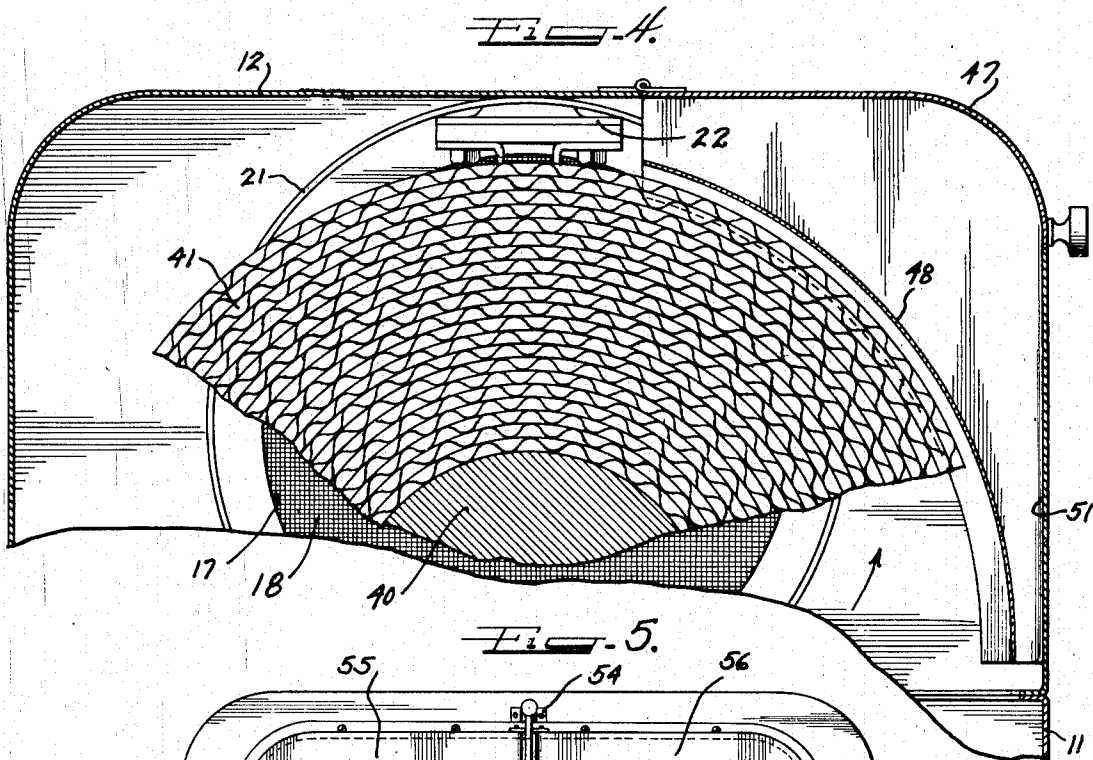
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UNITED STATES PATENT OFFICE

2,252,865

FLUID CONDITIONING APPARATUS

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Application November 18, 1939, Serial No. 305,067

1 Claim. (Cl. 261—92)

The present invention relates generally to fluid conditioning apparatus and is particularly concerned with improvements in humidifying and cooling apparatus.

The invention has as a primary object the provision of improved rotor means for dispersing a conditioning fluid, the rotor being designed to afford a greater surface area in a smaller space for evaporation than has heretofore been attainable.

A further object of the invention is to provide improved means for directing the conditioned medium or air.

Another object of the invention is to provide in apparatus of the type described an improved casing which may be easily disassembled for cleaning and to permit access to the working parts of the apparatus for inspection, replacement, repair, etc.

A still further object of the herein described invention is to provide improved apparatus for the humidifying and cooling of atmospheric air for buildings, rooms, and the like, which is of compact design and inexpensive of construction, yet highly efficient in operation.

Other objects and features of the invention will more fully appear from the following detailed description taken in connection with the accompanying drawings which illustrate a single embodiment thereof, and in which:

Figure 1 is a plan view of a fluid conditioner embodying the features of the present invention;

Figure 2 is an end elevational view of the same looking towards the discharge for fluid which has been conditioned;

Figure 3 is an enlarged longitudinal section through the device showing the cooperative relationship of the internal parts thereof, taken substantially on line III—III of Figure 2;

Figure 4 is an enlarged fragmentary view partly in section and showing details of construction of the evaporator means, the section being taken substantially on line IV—IV of Figure 3;

Figure 5 is a fragmentary view looking at the discharge end of the apparatus and showing details of construction of the means for controlling the direction of the discharged conditioned fluid;

Figure 6 is a detailed view showing one construction of the strips utilized in forming the evaporator means; and

Figure 7 is a similar view showing a slightly different construction for the strips.

As shown on the drawings:

In the illustrated embodiment of my invention, the apparatus embodies a casing or housing as

generally indicated at 10, this housing in the present instance constituting a substantially cubical shell of sheet metal, wood, or other suitable material. The casing is of two-part construction, being provided with a lower portion 11 and an upper portion 12, which are respectively provided at their upper and lower edges with joint forming flanges 13 and 14 arranged to be disposed in abutting relation substantially midway between the top and bottom of the casing. The two sections of the casing may be removably secured together by suitable joint overlying straps 15 secured to the joined casing portions by screws 16.

The upper portion of the casing is provided at one end with an inlet opening 17 for the admission of a fluid such as room air which is to be conditioned. The inlet opening is preferably covered with a protective screen 18.

At the opposite end of the casing in substantial alignment with the inlet opening there is provided an outlet opening 19 for the egress of fluid after it has been conditioned, this opening also being preferably provided with a screen 20.

Adjacent the inlet opening 18, there is provided a tubular member 21 which is slightly larger in diameter than the inlet opening and is supported in axial alignment therewith from the top of the casing. Supported also from the top of the casing is a suitable bracket 22 which extends inwardly from the member 21 to form a support for a driving motor 23, the motor being thus supported in depending position. A driving shaft 24 of the motor extends into the member 21 and has secured thereon for rotation therewith a suitable fan 25. It will be noted that the member 21 surrounds the fan and axially extends past the leading and trailing edges of the fan blades to form an entrance duct for the fluid entering the inlet opening.

The opposite end of the driving shaft 24 of the motor is preferably provided with a driving pulley 26 which is driven at reduced speed through suitable speed reducing mechanism 27 which may be in the form of a worm and gear.

As clearly shown in Figure 3, the lowermost section 11 of the casing may be provided adjacent one end with a partition 28 which cooperates with the casing to define a liquid reservoir 29 in the lower portion of the casing for a liquid, in this instance water, to be utilized as a fluid conditioning medium.

The upper margin of the outlet end wall of the casing and the partition 28 have transversely extending rail members 30 and 31, which may be of angle-bar construction, secured thereto to

form bearing brackets for spaced bearing members 32 and 33 for rotatably supporting a horizontally extending shaft 34. The bearing members are provided with removable cap portions 35 which are retained in operative position by wing bolts 36 so as to enable removal of the shaft when desired.

This shaft is provided with a pulley 37 which is operatively connected with the pulley 26 on the motor drive by means of a suitable belt 38.

Mounted on the shaft 34 and disposed between the motor 23 and the outlet opening 19 of the casing is a wheel 39 which forms an evaporator element arranged to pick up liquid from the reservoir 29 and carry it into the stream of fluid to be conditioned as it passes from the inlet opening to the outlet opening of the casing.

This wheel comprises a hub portion 40 which is preferably of solid construction. Disposed around the hub 40 is a peripherally extending rim portion 41 which is formed by simultaneously spirally winding on the hub an initially flat strip of foraminous material such as a screen 42 and a second strip 43. The latter strip, as shown in Figures 6 and 7, is undulated throughout its length by transversely extending corrugations 44.

The undulated strip may have various types of corrugation formed therein. As shown in Figure 6, the corrugations may be of rounded form, or, as shown in Figure 7, the corrugations may have definitely formed edges as shown at 45.

In winding the strips on the core, the strips are wound surface-wise, so that in the completed wheel alternate layers of corrugated foraminous material will be provided, these layers being interspersed by the non-corrugated strips which serve to provide additional area for evaporation and also maintain the corrugated strip from assuming nested relation.

The wheel rim dips into the liquid throughout a substantial portion of the lowermost part of the rim, whereas the uppermost part of the rim is disposed in the path of travel for the fluid being circulated from the inlet 18 to the outlet 19 of the casing. By constructing the evaporator with alternate layers of corrugated and non-corrugated foraminous strips, multitudinous passages are provided through the rim in an axial direction and the air stream forced therethrough is highly dispersed and divided over a large evaporative area. Surface tension of the liquid picked up by the rotor causes the formation of liquid films in the screen interstices thus affording ideal conditions for rapid evaporation. Thus, the humidifying and cooling effect is greatly enhanced and carried out with increased efficiency.

As shown in Figures 3 and 4, the upper portion of the casing is provided adjacent its top with an opening 46 which is normally closed by a hinge cover 47. This opening is disposed adjacent the peripheral rim of the evaporator wheel and is of sufficient length to also extend over and permit access to the pulley 26 and belt 38 of the driving mechanism.

The opening 46 permits the adding of additional fluid to the reservoir 29 when desired, and in order to shield the evaporator wheel relative to this opening, there is provided an arcuate baffle 48 which is laterally connected to baffle side walls 49 and 50 respectively disposed on the opposite sides of the wheel periphery.

It will be noted that the baffle 48 cooperates with the adjacent wall of the casing to form a passageway 51 for conducting liquid from the opening 46 into the liquid reservoir 29, and at the same time shields the opening against liquid being thrown out therethrough from the wheel. Moreover, the baffle 48 prevents engagement with the evaporator wheel through the opening and enables filling of the reservoir while the apparatus is in operation.

Novel means are provided for controlling the direction of the fluid leaving the outlet opening. For this purpose I provide a bar 52 which is pivotally supported at its lowermost end on the casing as shown at 53 for vertical swinging movement to a position extending across the outlet opening or to a depending position in which it is removed from the outlet opening. This bar may be latched in the first position by means of a suitable latch or retaining member 54 adapted to engage the bar when it is swung to a position across the outlet opening.

The bar 52 serves as a support for a pair of winglike deflectors 55 and 56, which are pivotally supported along their innermost adjacent edges on suitable pivots carried by the bar.

With the foregoing construction, it will be evident that with the bar in the position shown in Figure 5 the deflectors 55 and 56 may be independently swung to adjust the direction of the conditioned fluid as it leaves the outlet opening. Moreover, by swinging the bar downwardly, the deflectors and bar as a unit may be moved to ineffectual position and permit undeflected discharge of the conditioned fluid from the outlet opening.

The apparatus as described above may be readily inspected through the opening 46, and may readily and easily be disassembled for cleaning, further inspection, or replacement of any of the operative parts therein when desired. For this purpose, it is only necessary to open the closure 47 and remove the belt 38 from the pulley 26. The straps 15 are then disconnected relative to the upper and lower sections of the casing which may then be readily separated. In separating the casing sections, it will be noted that the fluid circulating mechanism is removed bodily with the upper section, while the liquid pick-up wheel or evaporator is bodily retained as a unit with the lowermost section. However, when the upper section is removed, the reservoir is exposed so that it may be readily cleaned. If it is desired to remove the evaporator wheel, this is easily accomplished by simply releasing the wing bolts, which permit the bearing caps 35 to be removed so as to release the shaft 34.

From the foregoing description, it will be apparent that the present invention provides an improved fluid conditioning apparatus having a novel rotor designed to afford a greater surface area in a small space for evaporation than has heretofore been obtainable; which embodies improved means for directing the conditioned medium or air; in which the casing is constructed in a novel manner to permit its easily being disassembled for cleaning, and to permit access to the working parts of the apparatus for inspection, replacement, repair, and the like; and which is of compact design and inexpensive construction, yet highly efficient in operation.

It will be further appreciated by those skilled in the art that my novel rotor wheel with its increased evaporation area is useful as a separate article of manufacture, and may be incor-

porated in different types of air conditioning apparatus for general and specific installations such as automobiles, steamships, aeroplanes, buildings, etc., and in fact wherever it is desired to humidify and cool the air.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention, and it is, therefore, not the purpose to limit the patent granted hereon 10 otherwise than necessitated by the scope and spirit of the appended claim.

I claim as my invention:

Fluid conditioning apparatus comprising a casing defining upper and lower portions separably connected together, the lower portion providing a reservoir for a liquid and the upper portion 5 having an inlet and outlet opening for said fluid, fluid circulating means in the casing supported for removal with the upper portion of the casing, liquid pick-up and evaporator means rotatably supported on the lower portion of the casing, and a detachable motion transmitting member within the casing interconnecting the first means and second means.

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