Sept. 19, 1939. N. J. BORDNER 2,173,645

AIR CONDITIONING UNIT

Filed March 7, 1938

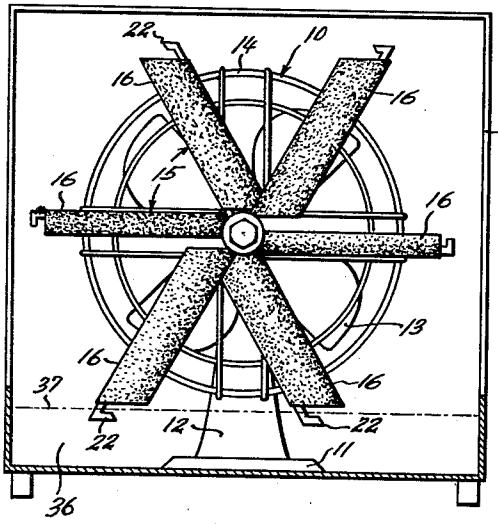


FIG. 1

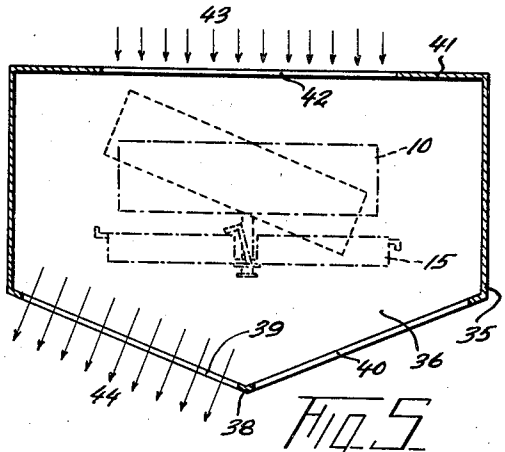


FIG. 5

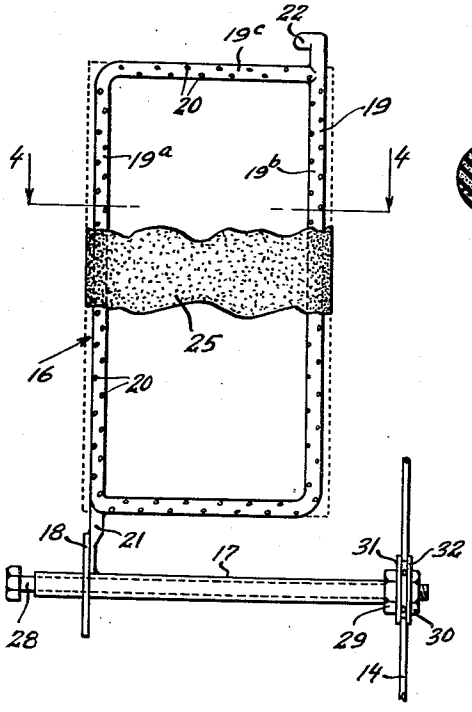


FIG. 2

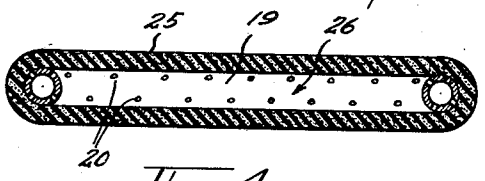


FIG. 4

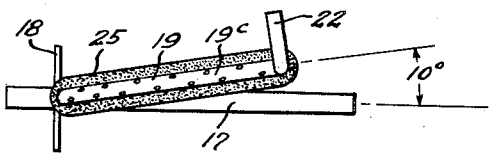


FIG. 3

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AIR CONDITIONING UNIT

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10 Claims. (Cl. 261—92)

This invention relates to air cooling and humidifying apparatus.

The principal object of this invention relates to the provision of an air cooling and humidifying attachment for electric fans which includes a rotor comprising a plurality of properly pitched water carrying blades extending radially from the axis of the rotor which rotor is mounted coaxially with the fan blades on the fan guard, both the electric fan and rotor being placed within a suitable housing providing at its base a water tank, so that upon rotation of the rotor by the air blown by the fan axially through the rotor, water will be picked up by the blades of the rotor for properly supplying moisture to the air blown outwardly by the electric fan to thus cool and humidify the atmosphere.

Another object of this invention relates to the rotor blade construction embodying a perforated tubular frame encased in a sheath of sponge rubber to provide a water chamber within the frame interiorly of the sheath, said tubular frame being provided at one corner thereof with a tubular scoop in communication with the tubular frame and adapted to dip into the water so as to force the water through the tubular frame and perforations therein to be absorbed by the sponge rubber sheath.

Other objects of the invention relate to the manner of mounting the rotor on the guard of the electric fan and the construction of the housing for the air conditioning unit.

With the preceding objects in view, other objects and advantages of the invention will become apparent from the description of the invention which may be readily understood from a perusal of the following detailed description thereof, taken in connection with the accompanying drawing, forming a part of this specification, and in the drawing:

Figure 1 represents a front elevational view of an electric fan with the rotor water carrying blades in mounted position thereon, the housing and water tank for the entire device being shown diagrammatically and partly in section.

Figure 2 is a side elevational view of one of the rotor water carrying blades.

Figure 3 is a plan view of the blade of Figure 2.

Figure 4 is a sectional view of the blade of Figure 2, taken on line 4—4.

Figure 5 is a diagrammatic view showing the air conditioning unit within the housing, the flow of air therethrough and the oscillating movement of the fan within said housing.

Referring to the drawing, 10 denotes a conventional form of oscillating electric fan comprising a base 11, a pedestal 12, fan blades 13 and a wire guard 14. No further structure of the electric fan is shown as the same is not necessary to an understanding of the invention, the parts of the electric fan as above identified being sufficient. The rotor 15 carrying the water supplying blades 16 constitutes a separate unit which is attached to the guard 14 of the fan 10. The rotor 15 is provided with an elongated cylindrical hub 17, and adjacent its outer end is a disc 18 rigidly secured thereto in any desired manner, and to which disc the rotor blades 16 are fixed.

Each rotor blade 16 is identical in structure, so that a description of one will suffice. Referring to Figure 2, the rotor blade 16 is shown made of a rectangular frame 19 formed out of tubular stock of any suitable dimensions, and provided on the four sides thereof with rows of perforations 20. At the lower outside corner of the frame 19 there is provided an extension 21 co-extensive with the front side 19a of the frame and rigidly secured thereto as by welding, said extension serving to attach the frame 19 to the inside of the disc 18, the extension 21 being joined to said disc also by welding. Manifestly, by this construction the rectangular frame 19, disc 18 and hub 17 constitute a rigid integral unit.

At the upper inside corner of the frame 19, the rear side 19b is formed to extend beyond the upper side 19c, and terminates in a horizontal open ended extension 22 arranged substantially at right angles to the plane of the frame 19, the extension 22 serving to supply water to the interior of the tubular sides of the frame in the manner to be hereinafter described. The extension 22 constitutes a scoop and is imperforate, and the tubular sides of the frame are in open communication with each other. In assembling each tubular frame 19 to the disc 18, the same is given a 10 degree pitch with reference to the axis of the hub 17, see Figure 3.

Arranged to encircle the tubular frame 19 is a sheath of sponge rubber 25 so formed as to be preferably held onto the frame by being stretched thereon, said sheath extending for the full length of the frame 19 so as to completely enclose the same. The sheath 25 thus provides a chamber 26 within the side walls of the frame serving to hold a supply of water within the blade 16 for the purpose to be hereinafter described. It is to be understood that the width of the chamber 26 is dependent on the dimensions of the tubular

stock from which the tubular frame 19 is formed. While in the preferred form shown the tubular frame 19 is formed of cylindrical stock, tubular stock of any desired shape may be utilized which at the same time will vary the size of the chamber 26. For example, in the present form of construction should it be desired to make the chamber 26 of a less width, the tubular frame 18 embodying the perforated sides may be flattened so that each tubular side of the frame 19 will be in section of oval shape instead of circular, thereby narrowing the water space between the walls of the sponge rubber sheath.

Referring to Figure 1 it will be observed that the rotor 15 comprises six blades 16 arranged on the disc 18 at 60 degrees apart, the length of each blade being such as to extend a distance beyond the outer periphery of the guard 14 of the electric fan. The rotor 15 is attached to the guard 14 of the fan by means of a bolt 28 extending through the hub 17 and provided on its inner end with lock nuts 29, 30 and washers 31, 32, for rigidly clamping said bolt to the wire guard 14 which is disposed, as clearly shown in Figure 2, between the washers 31 and 32. The bolt 28 is of a length slightly greater than the length of the hub 17, said hub and bolt being of such dimensions that the hub has a sliding and bearing fit on the bolt. Any suitable means (not shown) may be utilized for properly lubricating the rotating and sliding bearing of the hub on the bolt. For proper operation of the rotor 15, it is necessary that the bolt 28 be mounted co-axial with the axis of rotation of the fan blades 13.

The electric fan 10 and rotor 15 attached thereto are placed within a suitable casing or housing 35 of any desired shape or size, formed to provide a water tank 36 at its base, of a depth sufficient so that when the fan 10 is placed in position within the housing and tank the level of the water, as indicated by the "dot and dash" line 37, Figure 1, will be above the scoop extensions 22 of the blades 16. The size of the housing 35 is such as to allow oscillation of the fan 10 and is formed with a wide V-shaped front wall 38 having large openings 39 and 40 provided therein and suitably protected by a grating or screen (not shown). Also the rear wall 41 of the housing 35 is provided with a like grated or screened opening 42.

In the operation of the air conditioning unit, water is placed within the tank 36 to the proper level 37. Upon starting of the fan 10, air is drawn in by the blades of the fan 10 through the rear opening 42 as indicated by the arrows 43, and is blown outwardly through the openings 39 and 40 as indicated by the arrows 44, in the oscillation of the fan. The air thus blown outwardly by the blades of the fan 10 impinges on the blades 16 of the rotor 15 which in view of the pitch of the same will be caused to rotate, thus rotating the rotor 15. As each blade 16 moves downwardly, the scoop extension 22 thereon will enter the water to thus force a quantity of water into the tubular frame 19 of each blade. Under the action of centrifugal force the water will be forced out of the tubular frame through the perforations therein to be absorbed by the sponge rubber sheath 25 as the water is collected within the chamber 26 of each blade. Thus after a short interval each blade 16 of the rotor is carrying a supply of water, which acts to properly moisten the air which is blown through, around and between the blades 16 by the fan 10, the water evaporating and humidifying the air, thereby cooling and conditioning the breeze from the electric fan. In view of the perforations in the tubular frame being on the inside of the sponge sheath, the saturation is from the inside out, through the sponge rubber. In this manner the problem of water being blown by the electric fan, off of the rotor blades is overcome.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention, especially as defined in the appended claims.

Having thus described my invention, what is claimed as new is:

1. An air conditioner comprising a fan, a water tank at the base of the fan, a rotor including a plurality of water carrying blades supported by said fan and operated by the blowing of air by said fan, each rotor blade including a chamber and adsorbing means for storing a supply of water and operating above in spaced relation to the normal level of water in said tank, and means on each rotor blade for taking water from said water tank.

2. An air conditioner comprising a fan, a water tank at the base of the fan, a rotor unit including a plurality of water carrying blades, means mounting said rotor unit in front of said fan with the axis of rotation of said rotor unit co-axial with the axis of said fan whereby said rotor unit will be rotated by the blowing of air by said fan, each rotor blade including a chamber and adsorbing means for storing a supply of water and operating above in spaced relation to the normal level of water in said tank, and rigid scoop means on each rotor blade for taking water from said water tank.

3. An air conditioner comprising a fan structure including fan blades, a water tank at the base of the fan, a rotor unit including a plurality of radial water carrying blades, means mounting said rotor unit on a part of said fan structure in front of said fan blades with the axis of rotation of said rotor unit co-axial with the axis of rotation of said fan blades whereby said rotor unit will be rotated by the blowing of air by said fan, each rotor blade including a chamber for storing a supply of water having opposed porous and absorbent side walls and operating above in spaced relation to the normal level of water in said tank, and rigid conduit means carried by each blade for taking water from said water tank and conducting the same to said chamber.

4. The air conditioner as set forth in claim 3, wherein said fan structure comprises an electric fan including a fan guard surrounding said fan blades, said rotor unit having a cylindrical hub supporting said water carrying blades, and a stationary shaft extending through said hub and fixed to said fan guard, said shaft constituting said mounting means for said rotor unit.

5. In an air conditioner comprising fan blades and a fan guard, a rotor unit comprising a hub, a disc rigid with said hub, a plurality of radial water carrying blades, each blade comprising a rectangular tubular perforated frame encased by an absorbent sheath to define a water receiving chamber within said blade, and a scoop rigid with a corner of said frame at the rear edge thereof remote from said hub, the front edge of each frame at its lower end being rigidly secured to said disc and hub and each blade lying in a plane inclined at an angle to the axis of said hub

with the front edge of each blade lying in the same transverse plane and intersecting said hub axis, a bolt-like shaft extending through said hub for rotatably supporting said rotor unit and of a greater length than said hub whereby to permit sliding movement of said hub axially thereon, and means on one end of said shaft for rigidly securing the same to said fan guard.

6. A rotor unit for an air conditioner comprising a hub and a plurality of radial water carrying blades fixed to said hub, each blade comprising a rectangular frame formed of tubular stock with the tubular sides of said frame perforated and in open communication with each other, means at the lower outer corner of said frame for connecting said frame to said hub, a tubular scoop extension at the diagonally opposed corner of said frame in communication with the tubular sides of said frame and arranged substantially at right angles to the plane of said frame, and an absorbent sheath encasing each frame and extending the full length thereof.

7. In the rotor unit as set forth in claim 6, said absorbent sheath being of sponge rubber and defining with the sides of said frame a chamber within each blade adapted to receive water scooped up by said scoop extension and conducted through said tubular sides, outwardly through the perforations therein to be absorbed by said sheath.

8. In the rotor unit as set forth in claim 6, wherein each of said blades extend lengthwise of said hub and are disposed at an equal pitch with reference to the axis of said hub, the front tubular edge of each blade lying in the same plane and intersecting the axis of said hub.

9. An air conditioner comprising a fan, a water tank, a rotor including a plurality of water carrying blades supported above said tank, each rotor blade operating above in spaced relation to the normal level of the water in said tank, and each rotor blade including individual reservoir and adsorbing means for storing a supply of water and individual scoop means for taking water from said tank.

10. An air conditioner comprising a fan, a water tank, rotor supporting means mounted adjacent at least one side of said fan, a rotor including a plurality of water carrying blades supported thereon above said tank, each blade comprising a tubular frame, an absorbent sponge rubber sheath enclosing said frame and defining a reservoir therein, said frame being perforated, and rigid scoop means on a corner of said frame and in communication therewith for taking water from said tank, whereby rotational movement of said rotor will provide a supply of water in each blade reservoir to cause a cooling of the air moving through the blades thereof.

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