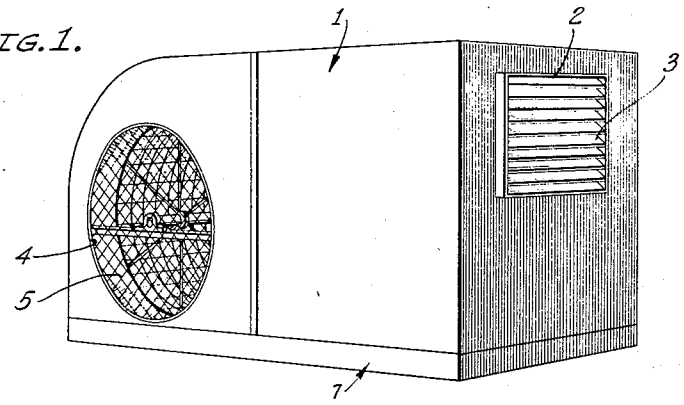
Nov. 3, 1942. J. LOPRICH 2,300,580

AIR CONDITIONING APPARATUS

Filed June 28, 1941

FIG. 1.



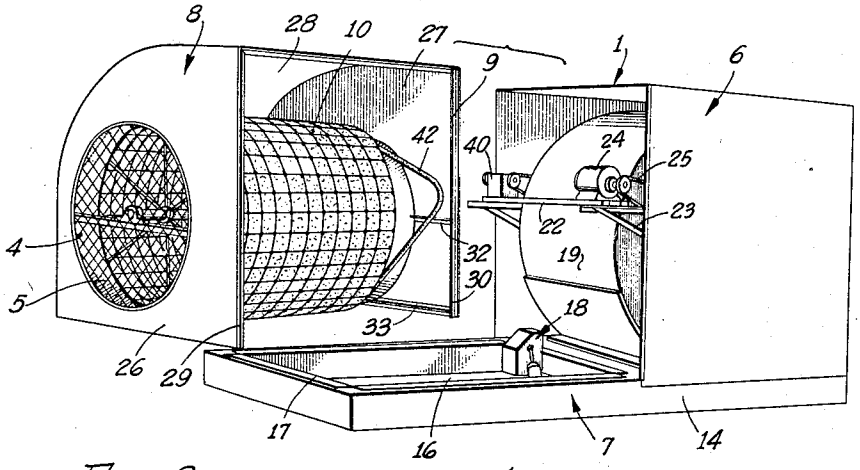
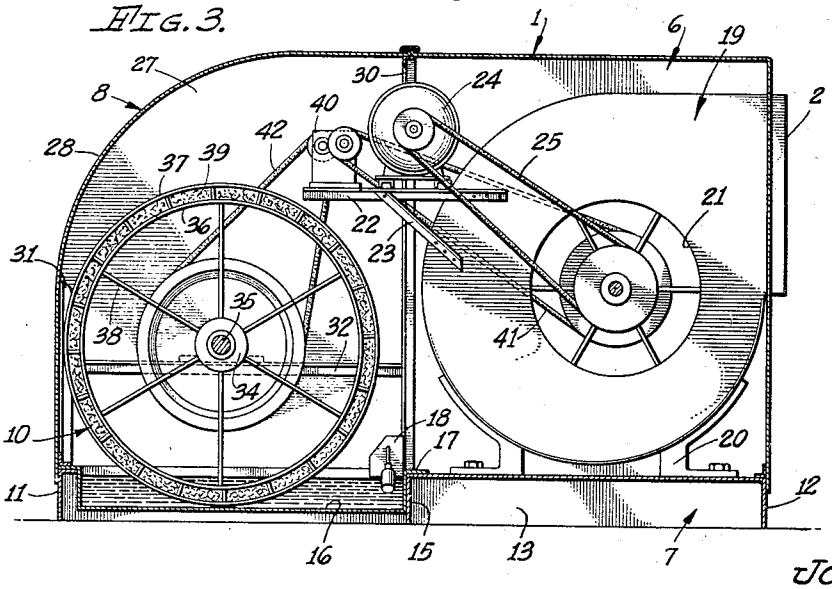


FIG. 2.

FIG. 3.



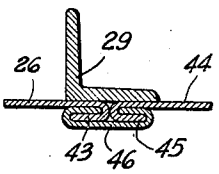


FIG. 4.

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AIR CONDITIONING APPARATUS

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Application June 28, 1941, Serial No. 400,209

4 Claims. (Cl. 261—30)

My invention relates to an air conditioning apparatus and has particular reference to an air cooler of the evaporative type.

Evaporative coolers operate to cool the air by employing the heat in the air to evaporate a suitable liquid, usually water. Prior to my invention numerous difficulties were encountered in making a practical use of the evaporative cooling principle. Some of the earlier devices employed spray systems for atomizing the water to hasten the evaporation. The cost of these devices was prohibitive because of the auxiliaries, such as pumps and the like, which were employed to operate the spray systems. The later devices operated by directing the air from a fan or blower through a porous pad which was kept saturated with water. These devices were inefficient because the porous pads offered considerable resistance to the flow of air, being made relatively thick in order to maintain contact between the air and water for a sufficient length of time to permit the water to absorb an appreciable quantity of heat from the air. Furthermore, great difficulty was encountered in feeding the water to the pad in such manner that the pad was kept continuously and uniformly moistened.

The present invention is directed to an evaporative cooler construction which overcomes the above noted disadvantages and which is characterized by being of simple construction, permitting the inexpensive manufacture thereof.

It is, therefore, an object of my invention to provide an evaporative cooler which includes a blower or fan adapted to draw air through a moistened porous pad and in which the pad is of cylindrical form, whereby a large pad area may be enclosed within a relatively small space.

It is also an object of my invention to provide an evaporative cooler of the character set forth in the preceding paragraph in which the pad is so positioned as to have its lower surface immersed in a reservoir or pan of water and in which means is provided for slowly rotating the pad to maintain the same continuously and uniformly moistened.

It is an additional object of my invention to provide an evaporative cooler of the character set forth in the preceding paragraph which embodies a two unit construction, the blower and pan comprising one unit and the pad and housing therefor comprising a second unit.

It is a still further object of my invention to provide an evaporative cooler of the character set forth in the preceding paragraph in which the two units are removably associated with each other to permit their being readily separated to facilitate adjustments, repairs and cleaning.

It is an additional object of my invention to provide an evaporative cooler construction of the character set forth in the preceding paragraphs in which the drive mechanism for operating the blower and rotating the pad cylinder is supported upon the blower, whereby correct cooperative relation between the drive mechanism and the blower is maintained irrespective of the positioning of the blower relative to the pan and supporting structure.

Other objects and advantages of my invention will be apparent from a study of the following specifications, read in connection with the accompanying drawing, wherein:

Fig. 1 is a perspective view of the preferred embodiment of my invention;

Fig. 2 is a perspective view illustrating the manner in which the two units comprising the two unit construction of my invention may be separated to provide ready access to the mechanism which is enclosed within the housing;

Fig. 3 is a longitudinal sectional view illustrating the details of construction of the device and the manner in which the power mechanism is drivably connected to the blower and the pad cylinder; and

Fig. 4 is an enlarged fragmentary cross sectional view illustrating the details of construction of a locking mechanism used to join the two units of the two unit construction to each other.

Referring to the drawing, I have illustrated in Fig. 1 the general form and appearance of the preferred embodiment of my invention. This embodiment includes a housing 1 formed of sheet metal or other suitable material and being of generally rectangular form, the housing 1 defining a discharge opening 2 which may be provided with a suitable grill or louvers 3 as desired. The opposite end of the housing 1 is provided in opposite sides with inlet openings 4 which may be covered as by means of screens or ornamental grills 5.

As is clearly illustrated in Fig. 2, the evaporative cooler of my invention is preferably embodied in a two unit construction, one unit of which includes a blower housing portion 6 and a supporting base frame 7 and the other unit of which includes a pad cylinder housing 8 and associated supporting structure 9 for supporting a pad cylinder 10.

The base frame 7 is preferably of rectangular form and may comprise an angle iron frame defined by end members 11 and 12, the ends of which are interconnected by side frame members

13 and 14. Between the end members 11 and 12 and extended parallel thereto I position an intermediate cross member 15 and in the rectangular space defined between the end member 11 and the cross member 15 I position a pan or reservoir 16. The reservoir 16 may be formed of sheet metal or other suitable material and is supported upon the frame 7 as by flanging the upper edges of the side walls outwardly as indicated at 17 to rest upon the upper surfaces of the base members 11, 13, 14 and 15. The pan is adapted to be filled with water and for this purpose a float operated valve 18 connected to a suitable source of water supply may be mounted within the pan 16 to maintain a suitable supply of water within the reservoir 16.

That portion of the base frame 7 lying between the members 12 and 15 is employed to support a centrifugal blower 19, the supporting feet 20 of which may be secured to the base frame 7 to support the blower 19 in a position such that the discharge thereof is aligned with the discharge opening 2 provided in the housing 1. The housing 1 is made with a width somewhat exceeding the width of the blower 19 so that air may flow between the side walls of the housing and the side walls of the blower and enter the blower intake openings indicated at 21.

Upon the housing portion of the blower 19 I position a supporting shelf 22 which may be suitably braced as by means of diagonal bracing 23. Upon the shelf 22 I position an electric motor 24 or other suitable source of power, such source of power being drivably connected with the rotating fan portion of the blower 21 as by means of a chain or belt 25. By so mounting the motor 24 the proper cooperative relation between the motor and the blower is assured irrespective of the positioning of the blower within the housing 1.

The other or second unit 8 of the cooler comprises a housing defined by side walls 26 and 27 and a curved wall 28 serving both as a top and end wall. The walls 26—28 are preferably secured to and supported by the supporting framework 9 which may be conveniently formed of angle iron or other structural members and include a pair of forwardly positioned uprights 29 and 30 and a pair of rearwardly positioned uprights 31 interconnected by means of upper and lower longitudinally extending members 32 and 33. Upon the upper members 32 I position journals 34 in which is rotatably supported a transversely extending shaft 35.

The shaft 35 rotatably supports the pad cylinder 10 which may comprise a pair of spaced concentric screen members 36 and 37 concentrically disposed with respect to the shaft 35 as by means of spoke members 38. The space between the screens 36 and 37 is filled with a suitable pad material 39, excelsior or sisal fiber being found to be a material eminently suitable for this purpose.

The upper longitudinal members 32 are so disposed as to position the pad cylinder 10 in the manner illustrated in Fig. 3 with the lower portion of the cylinder spaced from the bottom of the reservoir 16 but being immersed within the water contained within the reservoir. The pad cylinder 10 is adapted to be slowly rotated during the operation of the device and for this purpose I mount upon the shelf 22 a double reduction worm gear unit 40 which may be belt driven as by means of a belt 41 from the opposite end of the shaft of the blower 21. The power take-off shaft of the reduction unit 40 is connected as by a belt 42 to rotate the pad cylinder shaft 35.

The axial length of the pad cylinder 10 is preferably made such as to extend substantially the full distance between the side walls 26 and 27 and the inlet openings 4 provided in the side wall 26 are disposed concentrically with respect to the pad cylinder 10 and are made of a diameter no greater than the interior diameter of the pad cylinder. Thus, as the blower 19 is operated, air enters the housing 1 through the inlet openings 4 and in so doing passes into the interior of the pad cylinder 10. The air then passes solwly through the porous pad material 39 into the interior space of the housing from whence it passes forwardly and into the blower intake openings 21 and is discharged through the housing discharge opening 2. In passing through the porous pad material 39, a part of the water carried thereby is evaporated with the result that the temperature of the air is lowered.

Attention is directed to the fact that by making the pad cylinder 10 in the form of a relatively large diameter, elongated cylinder a very large pad area is provided within a relatively small space. This provides for a low velocity of air flow through the pad material with a corresponding reduction in friction losses and a corresponding reduction of the required thickness of the pad material in order to produce a given amount of cooling. By slowly rotating the pad cylinder through the reservoir 16 the same is kept continually and uniformly moistened.

By forming the device as a two unit construction, the two units may be readily separated in the manner illustrated in Fig. 2 to permit cleaning of the reservoir 16 and the ready making of any adjustments or repairs which may be necessary.

I have illustrated in Fig. 4 a convenient form of attaching means which may be used to secure the two units to each other when the same are positioned as indicated in Fig. 1. The construction illustrated in Fig. 4 is employed on each of the vertical joinings and the upper horizontal joining of the unit 8 to the unit 6—7. As shown in this figure the wall portion of the unit 8, as for example the side wall 26, is turned back upon itself to define a U-shaped clip 43 and the corresponding wall portion 44 of the unit 6 is similarly formed to provide an oppositely directed U-shaped clip 45. These clips portions are interengaged by a C-shaped attaching member 46 which may be slid over the clips 43 and 45 and with the inwardly directed leg portions of the C-shape being received between the arms of each of the U-shapes. By merely sliding these clip members lengthwise of the joining between the two units, the two units are disengaged from each other and may be readily operated. If a more secure attachment of the unit 8 is desired, the same may be secured at intervals by removable attaching means to the base structure 7.

From the foregoing it will be observed that I have provided a novel form of evaporative cooler which is characterized particularly by embodying a two unit construction wherein one unit comprises the pan, blower and drive mechanism assembly and wherein the other unit comprises the pad cylinder assembly, these two units being removably associated with each other to permit their ready separation from each other for the purpose of cleaning and repairs.

It will also be observed that I have provided a relatively large cooling pad area with respect to the space which is occupied by such cooling

pad and that I have also provided a novel means for maintaining the pad continuously and uniformly moistened.

While I have shown and described the preferred embodiment of my invention, I do not desire to be limited to any of the details of construction shown or described herein, except as defined in the appended claims.

I claim:

1. In an evaporative cooler including a blower including a casing, a pan, and a pad cylinder supported for slow rotation with the lower portion immersed in water contained in said pan, the combination of: a base structure; means securing said pan and blower to said base structure; a fixed housing portion secured to said base structure and enclosing said blower, said fixed housing portion being spaced from said blower casing and having a discharge opening formed therein and communicating solely with the discharge of said blower; a removable housing portion including means for supporting said pad cylinder and having an inlet opening communicating with the interior of said cylinder; and means detachably securing said removable housing portion to said fixed housing portion.

2. In an evaporative cooler construction, the combination of: an elongated base frame including an intermediately disposed cross member dividing said frame into front and rear portions; a blower including a casing, a front housing portion spaced from and enclosing said blower casing; means securing said blower casing and said front housing portion to said front frame portion; a pan carried by said rear frame portion; a separate supporting frame; a pad cylinder rotatably mounted on said supporting frame; a rear housing portion for said pad cylinder secured to said supporting frame; and means detachably securing said supporting frame and said rear housing portion to said base frame and to said front housing portion in a position disposing said pad cylinder above said pan with the under surface of said cylinder immersed in water contained in said pan.

3. In an evaporative cooler, the combination of: an elongated base frame including an intermediately disposed cross member dividing said frame into front and rear portions; a blower including a casing having an inlet and an outlet secured to said front frame portion; a front housing portion secured to said front frame portion spaced from said casing and having a discharge opening communicating solely with said blower outlet; a pan carried by said rear frame portion; a separate supporting frame; a hollow porous pad cylinder rotatably mounted on said supporting frame; a rear housing portion for said pad cylinder secured to said supporting frame and having an inlet opening communicating with the interior of said pad cylinder; and attaching means detachably securing said supporting frame and said rear housing portion to said base frame and to said front housing portion in a position disposing said pad cylinder above said pan with the under surface of said cylinder immersed in water contained in said pan, said attaching means serving to connect said front and rear housing portions into a single air-tight housing, whereby air may enter said housing only through said inlet opening and by passing through said porous pad cylinder and whereby air may leave said housing only through said blower and discharge opening.

4. In an evaporative cooler, the combination of: a base frame; a blower having a casing carried by said base frame; a pan for containing water carried by said base frame; an air-tight housing secured to said base frame and having a discharge opening communicating solely with the discharge of said blower and having an inlet opening spaced from said discharge opening; a hollow porous pad cylinder supported for rotation within said housing in axial alignment with said inlet opening and in a position immersing the lower portion of said pad cylinder in water contained in said pan; a supporting shelf carried by said blower casing; motive means mounted on said shelf and drivably connected to said blower; a double reduction worm gear unit carried by said shelf and drivably connected to said motive means; and drive means interconnecting said worm gear unit and said pad cylinder, whereby said pad cylinder is slowly rotated as said blower is operated.

JOHN LOPRICH.