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2,361,076

AIR CONDITIONING APPARATUS

Filed Feb. 19, 1941

3 Sheets-Sheet 2

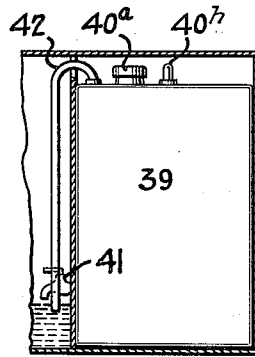


FIG. 5.

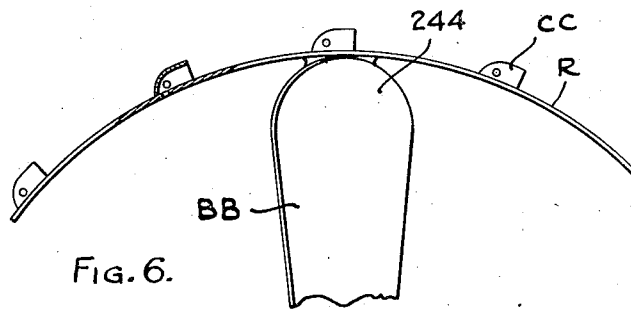


FIG. 6.

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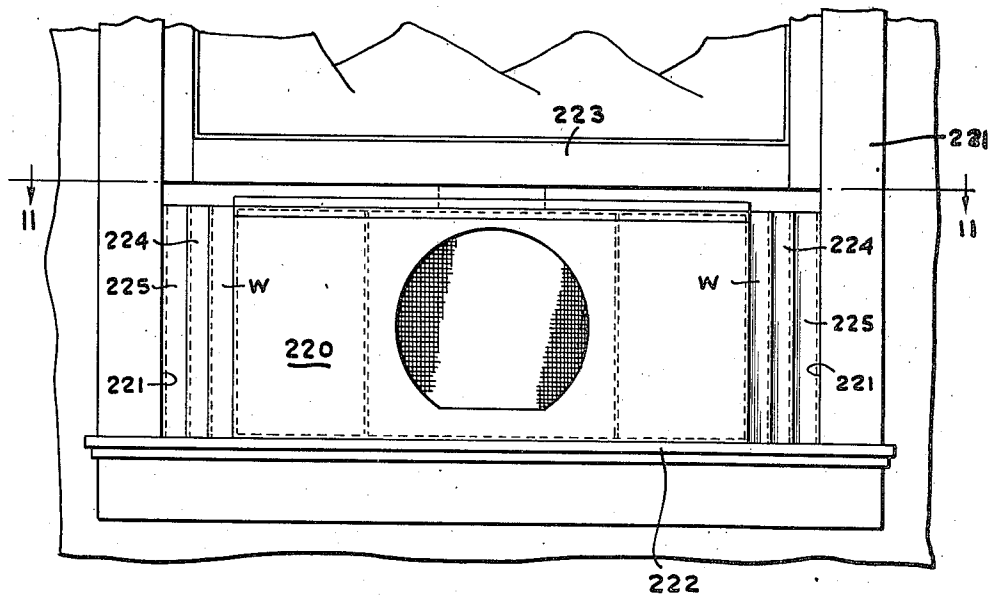


Fig. 7.

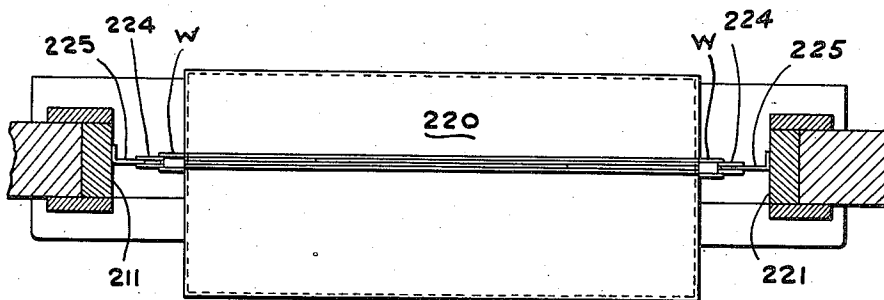


Fig. 8.

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UNITED STATES PATENT OFFICE

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AIR CONDITIONING APPARATUS

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1 Claim. (Cl. 261—92)

This invention relates to air conditioning, and more particularly to the air conditioning of rooms and houses by the utilization of window conditioning units with or without auxiliary equipment.

Prior to the instant invention various types of room conditioners have been proposed which have been relatively expensive to manufacture and awkward to locate in the space to be conditioned without provision for special supports and the taking up of considerable space. These prior conditioning units have also required considerable attention during their operation.

It is an object of the instant invention to provide relatively simple, rugged room conditioning units adapted to be located in a window of the room to be conditioned and which will require a minimum of attention during operation.

Other objects and the nature and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a fragmentary elevational view illustrating a window conditioning unit in accordance with the invention in place in a window;

Fig. 2 is a top view with parts broken away of the unit shown in Fig. 1;

Fig. 3 is a vertical sectional view taken along the lines 3—3 of Fig. 2 and looking in the direction of the arrows;

Fig. 4 is a view in perspective of the moisture absorbing and storing element of the unit shown in Figs. 1, 2 and 3;

Fig. 5 is a fragmentary detail view of a water reservoir incorporated in the conditioning unit;

Fig. 6 is a fragmentary detail view of a modified form of rotor unit;

Figure 7 is a view similar to Figure 1 showing a modified form of installation of the device in elevation; and

Figure 8 is a horizontal section taken along line 11—11 on Figure 7 and looking in the direction of the arrows.

Referring to Figs. 1 to 5 inclusive, the window conditioning unit 20 is adapted to be located directly within the window frame 21 and resting on the window sill 22 with the window 23 brought down directly on top of the conditioning unit 20. The unit 20 may be anchored to the window frame 21 by the screws 24 which pass through the extending end portions 25 into the window frame 21, it being understood that other equivalent fastening means may be utilized.

The conditioning unit 20 comprises a box 26 including similar front and back portions 27 and 28 respectively, end portions 29 and 30 respectively, a bottom 31 and a top 32. The front 27 and the back 28 are each formed with a generally circular opening 33 which may be covered by a wire mesh screen 34 to prevent the entry into the room to be conditioned of insects and other

objectionable matter. The lower portions 33a of the openings 33 are generally horizontal whereby the lower portions of the front 27 and the back 28 may serve as walls of a water reservoir in the bottom of the conditioning unit 20.

Located within the conditioning unit 20 and at one end thereof is the main water supply tank 35 which may be provided with a lifting handle 36 at its top and the capped filling opening 37 also located in its top. On that side of the water tank 35 which faces the interior of the conditioning unit 20 is a hand operated outlet valve 38 which may be operated manually from time to time to fill the lower portion of the box 26 with water, the utilization of which will later be described.

Located at the opposite end of the box 26 and adjacent the wall 27 is an auxiliary tank 39 provided with a lifting handle 40a, a capped filling opening 40a, a manually operated outlet valve 41 adjacent the bottom and normally open, and a level control tube 42 connected to the upper portion of the tank 39 and extending toward the bottom of the box 26 to a level corresponding to the desired maximum water level therein, and slightly lower than the horizontal portion 33a of the opening 33. The water feeding operation of the auxiliary tank 39 is automatic and will be explained later.

Located between the main tank 35 and the auxiliary tank 39, and centrally located of the box 26, are the bearing supports 70 and 71 which support in rotatable relation the shaft 72 to which are secured at opposite ends the inner fan or conditioned air moving element 43, which is specially designed to move a relatively great quantity of air, and the outer rotor 44 which serves to draw air into the unit, set up a screen of water through which the air must pass, and throw water onto the water absorbing element 45. The shaft 72 comprises an inner portion 72a and an outer portion 72b removably secured together by the coupling element 46. Between the coupling element and the bearing support 40, and fixedly mounted on the shaft portion 72a, is a pulley 47. The endless belt 48 connects in driving relation the pulley 47 and the pulley 49 secured to the shaft of the electric motor 50 located in back of the auxiliary tank 39 and mounted on the bottom 32 of the box 26 of the conditioning unit 20.

Transversely of the shaft 72 and located between the rotating elements 43 and 44 is the water absorbing element 45 which extends from the top to the bottom of the box 26 and from the panel 51 adjacent the main water tank 35 provided with slot 51a to accommodate the valve 38 to the panel 52 adjacent the auxiliary tank and the motor 50. The water absorbing element 45 may be a generally flat box-like structure com-

prising relatively tall narrow ends 53 which may be of canvas or metal, and a front and back 54 of the same height as the ends 53 and extending therebetween, fabricated of mosquito netting or metal screening. Between the ends 53, the moisture absorbing element 45 has a cut out portion 55 to accommodate the shaft 42 and coupling 46 when the same is mounted in place. The inner walls forming the cut out portion 45 may be of the same material as the ends 53 and the bottom 56 may also be of the same material. The water absorbing element is adapted to be opened at its top and house wick-like material 57 such as excelsior, raw cotton, rope and the like.

In utilizing the conditioning unit 20, it is only necessary to locate the conditioner within a window frame as illustrated in Fig. 1, open the valve 38 of the main tank 35 to permit sufficient water to enter the reservoir formed by the lower portions of the panels 51 and 52 and the lower center portions of the front wall 27 and the rear wall 28 to effect a water level slightly below the horizontal portions 33a of the openings 33. The electric plug 58 may then be connected to a convenient electric outlet within the room to be conditioned, the switch 59 flicked to its "on" position, causing the motor 50 to operate and thereby effecting rotation of the shaft 42. The water in the lower portion of the box 26 will be absorbed and stored by the water absorbing element 45 and at the same time the rotating element 44 will effect a water screen in the path of the air movement from the outside of the space to be conditioned to the inside of said space. The incoming air will first be washed and slightly cooled as it passes through the water screen referred to. Upon passage of the clean slightly cooled air through the moisture absorber 45, it effects evaporation thereinto of the moisture in the absorber with an accompanying marked cooling effect corresponding to the amount of moisture evaporated into the air. For every pound of moisture evaporated, approximately 900 to 1000 B. t. u.'s are absorbed and the air forced into the room to be conditioned by the rotating element 43 will be clean and pleasantly low in temperature.

After continued operation of the device, when the water in the lower portion of box 26 needs replenishing, the hand valve 38 may be operated, or the auxiliary tank by means of the level control tube 42 will automatically maintain the proper level of water. When the water level is above the lower end of the tube 42, no water can pass from the tank 39 because the space above the water within the tank is not connected to the atmosphere. However, as soon as the water level within the box 26 drops below the lower end of the tube 42, there is an atmospheric connection to the top of the tank 39 and water will flow through the open valve 41 until the level rises sufficiently to cover the lower end of the tube 42. Accordingly, the device may operate for long periods of time without attention.

Although the rotor 44 has been illustrated in Figures 2 and 3 as being of the propeller type with cups C formed on the end of the blades B; a modified form of rotor 244 may be substituted comprising blades BB; a peripheral rim R and water cups CC, mounted on the rim R to pick up and release water from the reservoir to effect the water screen.

It is to be understood that it is within the scope of the invention to eliminate the screws 24 and merely utilize expansible partitions or telescopic slides which cooperate with the vertically extending U-shaped fittings "W", shown in Figure 2, and the sides of the window frame for effecting the installation of the device. If desired, both means may be utilized. Referring to Figures 6 and 7, such modified form of installation is illustrated. The window conditioning unit 220 is adapted to be located directly within the window frame 221 and rest on the window sill 222 with the window 223 brought down directly on top of the window conditioning unit 220. At the sides of the conditioning unit 220, the fittings W, which are secured to the conditioning unit 220, are adapted to cooperate with the extensible or telescopic elements 224 and 225. As already explained the fittings W are U-shaped and they are adapted to house the elements 224 within which the elements 225 are in turn adapted to slide. The elements 225 may be formed as best shown in Figure 8 to fit snugly against the window frame 221 and if it is desired the elements 225 may be fastened to the window frame 221 by screws, or specific fastening means may be omitted.

It will be obvious to those skilled in the art that various changes may be made in this device without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claim.

What is claimed is:

In an air-conditioning apparatus, a relatively narrow, low, wide, box-like structure including a bottom adapted to be set on a window sill within a window frame with a sash lowered to the top of said structure, the front and back of said box-like structure being provided with aligned openings, a main water tank located within the box-like structure at one side of the openings, an auxiliary tank and a motor located within the box-like structure and on the other side of said openings, a rotatably supported shaft mounted substantially axially of the connecting projection of the said openings, a pulley mounted on said shaft, a second shaft for said motor, a pulley on said motor shaft, an endless belt connecting said first pulley with said second pulley, a panel adjacent said main water tank reaching to the bottom of said box-like structure, a second panel adjacent said motor and said auxiliary tank and reaching to the bottom of said box-like structure; the said bottom, the two panels, the said front and the said back forming a water reservoir, a water-absorbent element located in said reservoir and extending through the connecting projection between the said two openings, a rotor mounted on said shaft on one side of said water-absorbent element of a size extending into said water reservoir and adapted to move air through the connecting projection between the said two openings whereby air will be moved through the screen of water effected by said rotor, a second rotor mounted on said shaft on the opposite side of said water-absorbent element for inducing the flow of washed and cooled air passing through the water-absorbent element into the space to be conditioned.

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