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VENTILATING AND AIR CONDITIONING APPARATUS

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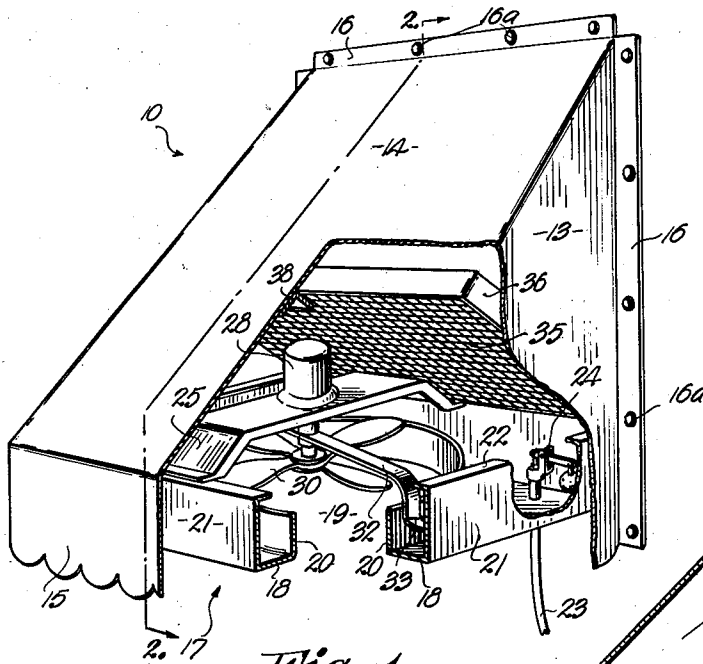


Fig. 1.

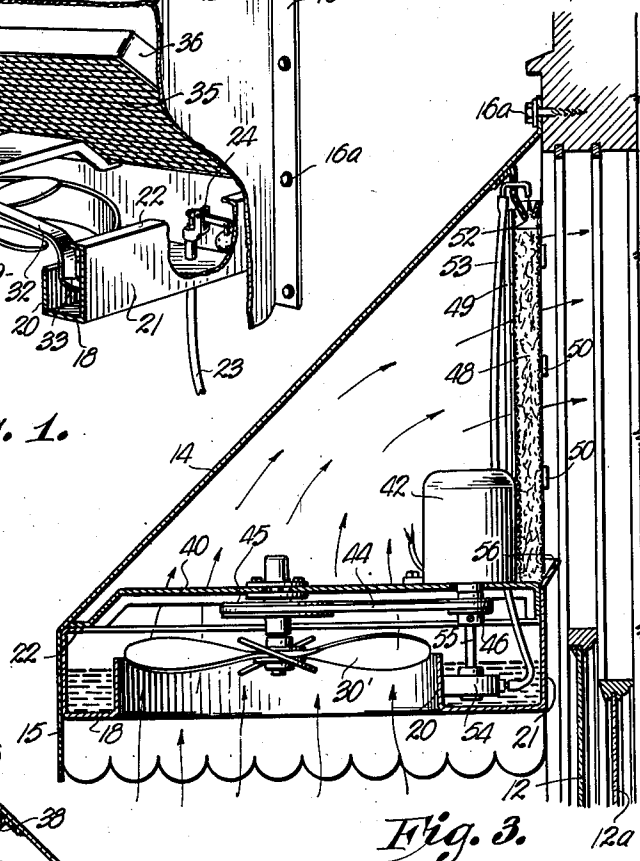


Fig. 3.

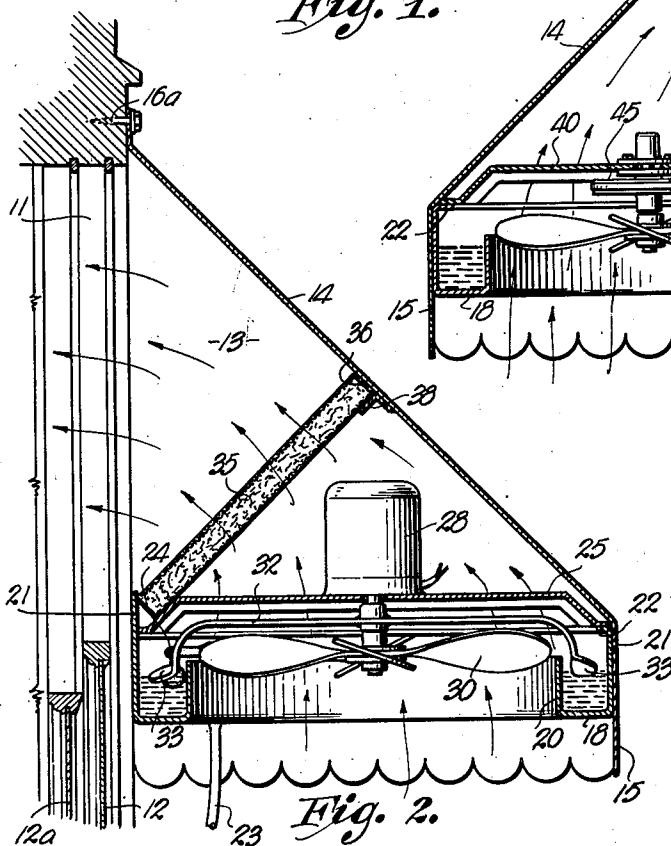


Fig. 2.

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VENTILATING AND AIR CONDITIONING
APPARATUS

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7 Claims. (Cl. 98—94)

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The present invention relates in general to the ventilation and air conditioning of rooms and buildings, and it deals more particularly with a self-contained ventilating and air conditioning unit adapted for window mounting.

One of the primary objects of the invention is to provide a unit of the character indicated which can readily be mounted outside a building in association with a window thereof; which is nowise subject to injury from exposure to the sun, inclement weather, etc.; and, which when installed, adds to rather than detracts from the over-all ornamental appearance of the building.

Another object is to provide a compact ventilating and air conditioning unit which is economical to manufacture, easy to install, simple and efficient in operation and capable of giving long and useful service with little or no maintenance.

A further object is to provide a ventilating and air conditioning unit whose housing simulates an awning, and in fact, serves as an awning to the extent that it shades and shelters the window over which it is mounted.

Still another object is to provide in connection with an awning type housing, concealed mechanism for producing a positive flow of air from outside the building through the housing and into the building through an open window behind the housing, the air being cleaned, cooled and humidified as it passes through the housing.

According to my invention, I employ a water circulating, evaporative air cooler and humidifier, an important feature residing in the particular construction, disposition and operation of the working parts of the system in a housing of the character indicated. A further feature resides in the novel type of water recirculating system embodied in the unit.

Other objects and features of the invention will appear in the course of the following description.

In the accompanying drawings which form a part of the specification and are to be read in conjunction therewith, and in which like reference numerals are employed to identify like parts of the various views:

Fig. 1 is a front perspective view of one form of my awning type room ventilating and air conditioning unit, parts having been broken away for purposes of illustration.

Fig. 2 is a vertical cross section taken along line 2—2 of Fig. 1 in the direction of the arrows, and

Fig. 3 is a vertical cross section similar to Fig. 2

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showing a modified form of unit embodying the invention.

Referring more particularly to the drawings, the numeral 10 designates generally a sheet metal housing shaped like an awning and adapted to be mounted over the upper portion of a double hung window 11 containing an upper sash 12 and a lower sash 12a. The housing has vertical side panels 13 and a sloping front panel 14 terminating at the bottom in a vertical valance 15. The awning canopy thus formed may be mounted against the outside of the window frame in any suitable fashion, for example, by means of integral flanges 16 secured to the frame by screws

16a. Within the lower portion of the canopy and forming the bottom of housing 10 is a shallow, open top tank or tray 17. This has a flat bottom 18 which is rectangular in outline with a large circular opening 19 centrally located therein; around the opening is an upstanding annular lip or rim 20, while around the outer margin of the bottom 18 is an upstanding outer wall 21 which may be welded or otherwise secured to the side panels 13 and valance 14 of the awning canopy. The three sides of the tank secured to these members are provided with an inturned flange 22 for rigidity, but the flange is omitted from the rear wall (see Fig. 2). As shown in the drawings, the tank is disposed well above the lowermost edges of the canopy, hence is inconspicuous from the vantage point of a casual observer outside the building on which the awning is mounted.

Water is supplied to the tank through a pipe or hose connection 23, and is automatically maintained at a predetermined level therein by a float controlled valve 24.

Spanning the tank from front to rear is an upwardly arched channel frame 25, the ends of which are welded or otherwise secured to the outer tank walls 21. This frame supports a motor 28 located centrally over opening 19, the motor having a downwardly extending vertical shaft with a fan blade 30 mounted thereon. The radial length of the blade is such that its tips travel in an arc just within the circle defined by the annular rim 20, and it will be seen therefore, that this rim forms a short vertical air duct for the fan.

Mounted on the motor shaft above the fan and rotating therewith is an arm 32 having its ends curved downwardly beyond the annular rim 20; its tips, bent outwardly and canted or pitched slightly, form scoops 33 that just break the surface of the water in the tank. As the motor

turns the fan to draw air upwardly into the awning housing through opening 19, the scoops lift a fine spray of water from the tank and projects same into the air stream.

Within the housing above the fan assembly is a downwardly and rearwardly inclined filter screen comprising a mat 35 of corrosion resistant metal wool or mineral and/or vegetable fibers retained in a suitable frame 36. The upper edge of the filter rests against an angle member 33 welded on the underside of the sloping top panel 14 while the lower edge rests on channel member 25 and is held against rearward movement by the outer rear wall 21.

It will be obvious that the filter may be otherwise supported in the position illustrated, but the arrangement described is preferred for its simplicity and also because it makes possible the convenient removal of the filter; thus, when it is desired to clean or replace the filter, or when it is necessary to service the motor or valve, it is only necessary to swing the upper edge of the filter rearwardly, then lift the lower edge over the wall of the tank and remove the filter through the open window behind the awning.

When my unit is in operation, the upper sash 12 of the window is, of course, lowered as shown in Fig. 2, so that the open rear side of the housing is in direct communication with the room to be ventilated and cooled. The rotating fan draws air upwardly into the housing through the central aperture 19; moving it through the filter and through the open window into the room. Dust or other solid foreign matter in the air is caught by the filter so the air discharged into the room is very clean.

As previously indicated, the scoops 33 rotate with the fan lifting a spray of water into the air stream. The larger globules of water are blocked by the filter 35 which soon becomes wet; as its saturation increases, the excess moisture trickles downwardly through the filter returning to the tank and establishing a cyclic recirculation of the water. The air passing through the filter causes evaporation of some of the moisture contained therein, which moisture is, of course, taken up by the air stream and carried into the room; not only does this humidify the air, but also due to the heat absorbed in the process of evaporation, it causes a reduction in the temperature of the air supplied to the interior of the building. The moisture carried away from the tank is replenished automatically through the supply line 23; valve 24 serving to maintain the water level in the tank substantially constant.

In the modification shown in Fig. 3, the housing is substantially identical to the one already described and the parts thereof accordingly have been designated by like reference numerals.

In this unit, however, the fan 30' is carried on a vertical jack shaft which in turn is supported in suitable bearings mounted on the frame member 40; a motor 42 mounted rearwardly of the jack shaft on the same frame member drives the fan through the medium of a belt 44 and pulleys 45 and 46.

An upright filter 48 extends across the rear of the housing from one side thereof to the other and is supported along its lateral edges by a vertical angle member 49 abutting one face of the filter and ears 50 bent inwardly at intervals along the opposite face. Over the filter is a trough 52 extending along the upper edge of the filter and having a row of perforations in its bottom. Water is supplied to this trough through a hose

53, the lower end of which is connected to the discharge side of the small pump 54 driven by the motor shaft 55. As shown, the pump preferably is submerged in the water contained in the tank. The water may be maintained at a predetermined level in the tank by a float controlled supply arrangement similar to that described in connection with Figs. 1 and 2; alternatively, the tank can be filled manually at intervals, as needed, an outwardly projecting lip 56 being provided on the rear wall to facilitate pouring water into the unit.

The mode of operation of the modified device is basically like that already described. That is to say, air is drawn upwardly through the central opening in the tank and discharged through the filter 48 and the open window into the interior of the building. At the same time, the motor driven pump 54 pumps water from the tank through hose 53 into the perforated trough 52 from which it flows by gravity through the filter and back into the tank. The air passing through the filter thus is cleaned, cooled by evaporation of the moisture it contacts, and humidified as explained hereinbefore.

Thus it will be seen I have provided a self-contained type of unit for ventilating and air conditioning room or buildings, which unit is both effective in operation and ornamental in appearance, complementing the natural architectural lines of the structure and therefore well adapted to residential use as well as for office and factory ventilation. The device is relatively economical to manufacture, and, being free of complicated mechanisms, is capable of giving long and trouble-free service with a minimum of maintenance. All working parts are well sheltered from the weather and the housing shades the window from the direct rays of the sun to enhance the over-all cooling effect produced upon the interior of the room served by the unit.

From the foregoing it will be appreciated that this invention is one well adapted to attain all of the ends and objects hereinbefore set forth, together with other advantages which are obvious and which are inherent to the apparatus.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

Inasmuch as many possible embodiments of the invention may be made without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In combination with a window opening having a frame, a rigid awning canopy comprising an outwardly and downwardly inclined imperforate roof panel and a pair of laterally spaced imperforate side panels, means supporting the awning canopy with the rear edges of said panels engaging the window frame along the top and two sides of the window opening, a water storage trough within the lower portion of the awning canopy having an inner wall forming an air intake duct centrally disposed in the bottom opening of the canopy and the bottom of the trough extending outwardly from said wall and closing the balance of the bottom opening of the canopy, air moving means within the canopy operative to draw air into the canopy through said duct and discharge it through said

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window opening, a fibrous filter in the canopy extending across the path of the air stream, and means for continuously transferring water from said trough to said filter to maintain same in moistened condition.

2. In combination with a window opening having a frame, a rigid awning canopy comprising an outwardly and downwardly inclined imperforate roof panel and a pair of laterally spaced imperforate side panels, means supporting the awning canopy with the rear edges of said panels engaging the window frame along the top and two sides of the window opening, a water storage trough within the lower portion of the awning canopy and having an inner wall forming an air intake duct centrally disposed in the bottom opening of the canopy and the bottom of the trough extending outwardly from said wall and closing the balance of the bottom opening of the canopy, a filter screen within the canopy spanning same from side to side with its lower edge disposed over the portion of said trough which is toward the window and its upper edge adjacent said sloping roof panel, air moving means within the canopy operative to draw air into the canopy through said duct and advance it through said filter and discharge it through said window opening, and means for continuously lifting water from said trough onto said filter screen to maintain same in moistened condition, the excess moisture in said screen being effective to drain down the screen and back into said trough for recirculation by said last means.

3. In combination with a window opening having a frame, a rigid awning canopy comprising an outwardly and downwardly inclined imperforate roof panel and a pair of laterally spaced imperforate side panels, means supporting the awning canopy with the rear edges of said panels engaging the window frame along the top and two sides of the window opening, a water storage trough within the lower portion of the awning canopy and having an inner wall forming an air intake duct centrally disposed in the bottom opening of the canopy and the bottom of the trough extending outwardly from said wall and closing the balance of the bottom opening of the canopy, air moving means within the canopy operative to draw air into the canopy through said duct and discharge it through said window opening, a water scoop in said trough, means supporting said scoop for movement in a circular orbit along the trough, and means for driving said scoop in said orbit thereby to lift a spray of water from the trough into said air stream.

4. In combination with a window opening having a frame, a rigid awning canopy comprising an outwardly and downwardly inclined imperforate roof panel and a pair of laterally spaced imperforate side panels, means supporting the awning canopy with the rear edges of said panels engaging the window frame along the top and two sides of the window opening, a water storage trough within the lower portion of the awning canopy and having an inner wall forming an air intake duct centrally disposed in the bottom opening of the canopy and the bottom of the trough extending outwardly from said wall and closing the balance of the bottom opening of the canopy, air moving means within the canopy operative to draw air into the canopy through said duct and discharge it through said window opening, a water scoop in said trough, means supporting said scoop for movement in a circular orbit along the trough, means for driv-

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ing said scoop in said orbit thereby to lift a spray of water from the trough into said air stream, and a filter screen within the awning canopy spanning same from side to side and having its lower edge over the portion of said trough which is toward the window, said screen inclined forwardly and upwardly with its upper edge adjacent the mid-section of the roof panel.

5. In combination with a window opening having a frame, a rigid awning canopy comprising an outwardly and downwardly inclined imperforate roof panel and a pair of laterally spaced imperforate side panels, means supporting the awning canopy with the rear edges of said panels engaging the window frame along the top and two sides of the window opening, a water storage trough within the lower portion of the awning canopy and having an inner wall forming an intake duct centrally disposed in the bottom opening of the canopy and the bottom of the trough extending outwardly from said wall and closing the balance of the bottom opening of the canopy, an upright shaft, means rotatably supporting said shaft with its axis centrally disposed relative to said duct, a fan in said duct secured to said shaft, a prime mover connected to the shaft for turning the fan thereby to draw air into the canopy through said duct and discharge it through said window opening, a fibrous filter in the canopy extending across the path of the air stream, and means for continuously transferring water from said trough to said filter to maintain same in moistened condition.

6. In combination with a window opening having a frame, a rigid awning canopy comprising an outwardly and downwardly inclined imperforate roof panel and a pair of laterally spaced imperforate side panels, means supporting the awning canopy with the rear edges of said panels engaging the window frame along the top and two sides of the window opening, a water storage trough within the lower portion of the awning canopy and having an inner wall forming an air intake duct centrally disposed in the bottom opening of the canopy and the bottom of the trough extending outwardly from said wall enclosing the balance of the bottom opening of the canopy, an upright shaft, means rotatably supporting said shaft with its axis centrally disposed relative to said duct, a fan in said duct secured to said shaft, a prime mover connected to the shaft for turning the fan thereby to draw air into the canopy through said duct and discharge it through said window opening, a water scoop in said trough, and means connecting said scoop to said fan to travel therewith thereby to jet water from the trough into the air stream.

7. In combination with a window opening having a frame, a rigid awning canopy comprising an outwardly and downwardly inclined imperforate roof panel and a pair of laterally spaced imperforate side panels, means supporting the awning canopy with the rear edges of said panels engaging the window frame along the top and two sides of the window opening, a water storage trough within the lower portion of the awning canopy and having an inner wall forming an air intake duct centrally disposed in the bottom opening of the canopy and the bottom of the trough extending outwardly from said wall and closing the balance of the bottom opening of the canopy, an upright shaft, means rotatably supporting said shaft with its axis centrally disposed relative to said duct, a fan in said duct secured

to said shaft, a prime mover connected to the shaft for turning the fan thereby to draw air into the canopy through said duct and discharge it through said window opening, a water scoop in said trough, means connecting said scoop to said fan to travel therewith thereby to jet water from the trough into the air stream, and a filter screen within the awning canopy spanning same from side to side and having its lower edge over the rear portion of said trough, said screen inclined forwardly and upwardly with its upper edge adjacent the mid-section of the roof panel.

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