Nov. 12, 1940. J. VAN VLIET 2,221,010

AIR CONDITIONING DEVICE

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Fig. 1.

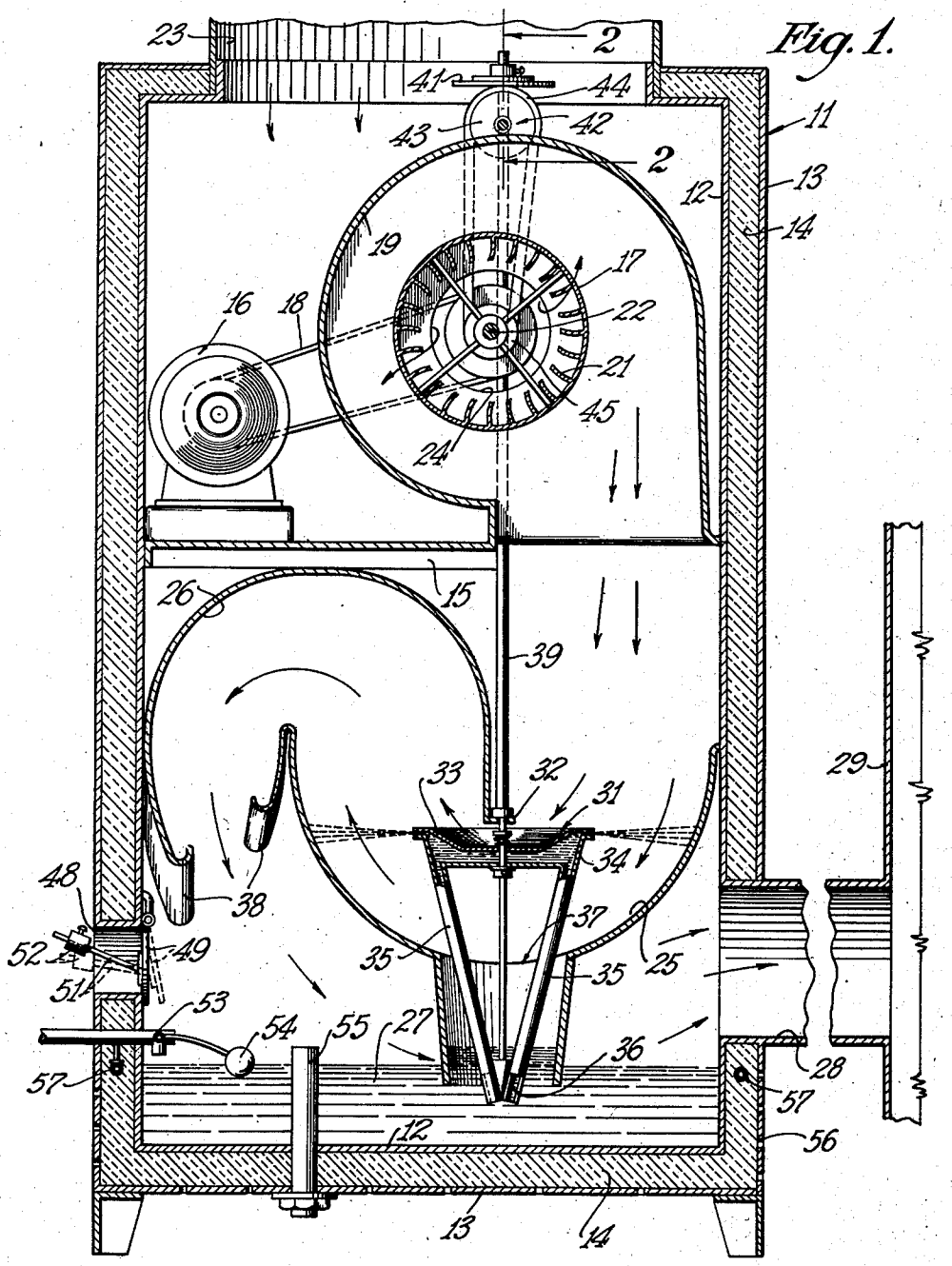

Fig. 2.

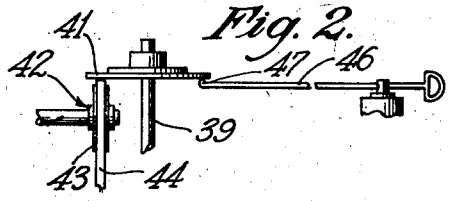

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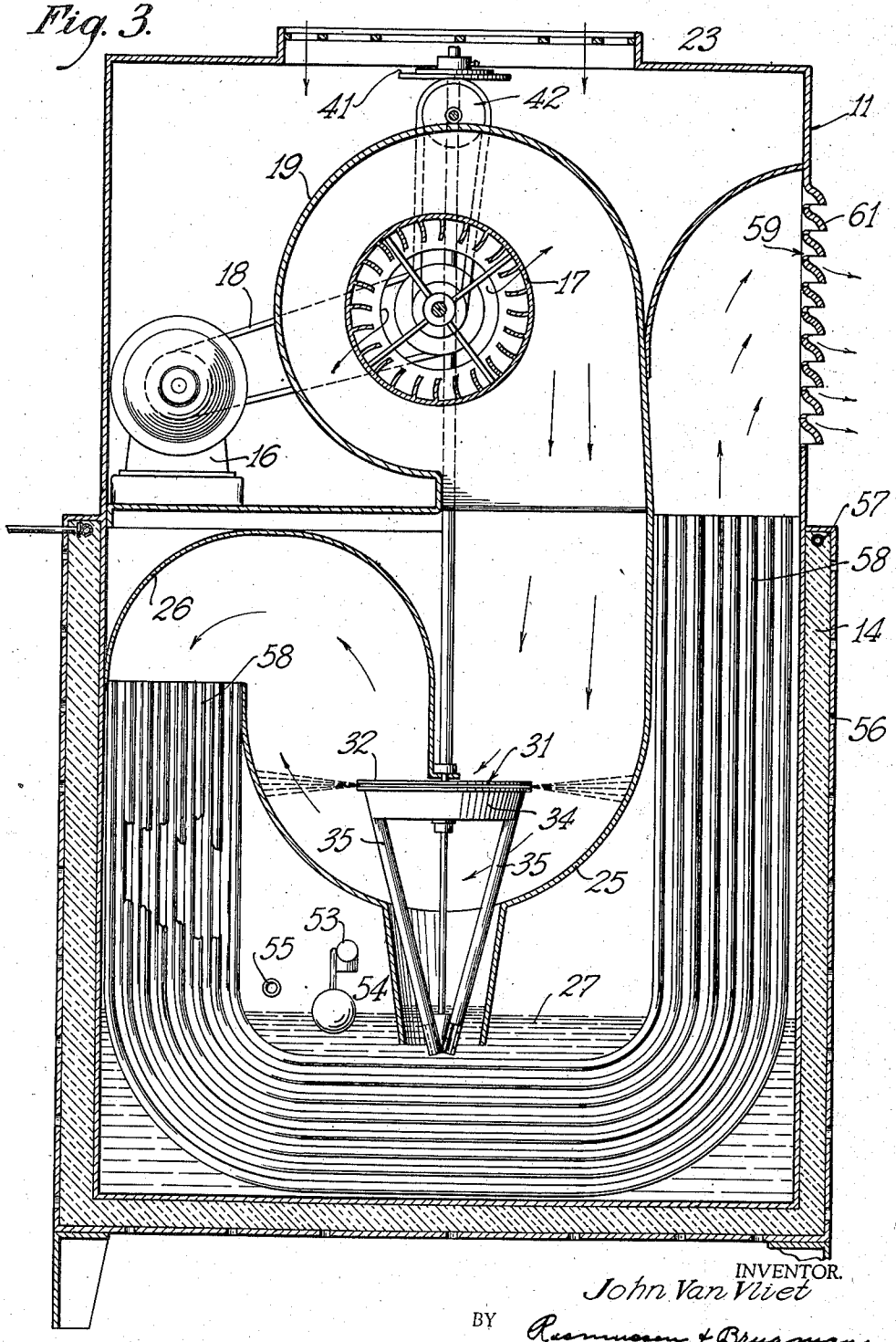
Fig. 3.



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UNITED STATES PATENT OFFICE

2,221,010

AIR CONDITIONING DEVICE

John Van Vliet, Chicago, Ill.

Application September 13, 1937, Serial No. 163,628

4 Claims. (Cl. 261—30)

This invention relates in general to an air conditioning device, and has more particular reference to a device in which the air is washed and cleaned before being discharged therefrom.

An important object of the invention is the provision of an air conditioning apparatus in which the incoming air is forced successively through two layers of finely divided particles of moisture or water sprays, thereby washing the air and adding sufficient moisture so as to temper and cool it.

A further important object of the invention is the provision in such an air conditioning device of baffle means which are so arranged as to guide the air successively through two water sprays and then over the surface of a body of water before the air is discharged from the device.

Another important object of the invention is the provision in an air conditioning device of novel means for producing a fine water spray, which comprises an element adapted to be rotated at a high rate of speed to discharge water therefrom by centrifugal force and which has inlet means associated therewith and extending into a body of water so as to draw water therefrom without unduly agitating said body of water.

A further object of the invention is the provision in an air conditioning device having such a spray generating means of a plurality of tubular members which pass through the body of water or other cooling medium and through which the air is forced to further cool it before it is discharged from the device.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, when taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

In the drawings,

Figure 1 is a vertical sectional view of a preferred embodiment of the invention;

Figure 2 is a detail sectional view taken substantially on the line 2—2 of Fig. 1 and showing the driving means in inoperative position; and

Figure 3 is a view similar to Fig. 1 of a modified form of the invention.

Referring more particularly to the drawings, reference numeral 11 indicates in general the casing of the air conditioning apparatus which comprises an inner wall 12, an outer wall 13 and insulating material 14 such as felt, asbestos, or the like, inserted between the wall portions 12 and 13, respectively. Mounted on a shelf 15 within the casing 11 is an electric motor 16. The motor 16 is adapted to drive a blower 17 by means of a belt 18. The blower 17 is located within a substantially cylindrical member or duct 19. While only one cylindrical member 19 is shown, it is understood that several such ducts may be used if desired. The blower 17 has a plurality of blades 21 on its inner surface and is rotatable on a shaft 22, which is horizontally disposed and may be of sufficient length to enable several blowers 17 to be placed thereon. If the blower 17 is rotated in a counter-clockwise direction (Fig. 1), air is drawn in through a suitable opening 23 formed in the upper part of the casing 11 and through inlet apertures 24 provided in the cylindrical member 19. The air is then forced downwardly, as indicated by the arrows, until it strikes a baffle or deflecting member 25 which reverses the flow of the air forcing it upwardly until it strikes a second baffle or deflecting member 26. The air will then pass downwardly and over a body of water 27 through an outlet opening provided in the lower part of the casing 11. In one type of installation of the device, the outlet 28 may lead into a furnace, or the like, indicated generally by reference numeral 29.

A spray wheel 31 is rotatably mounted at 32 on the deflecting member 26, and comprises a dish-shaped member 33 and a shallow fluid retaining member 34. A plurality of tubes 35 are formed integrally with or secured to the member 34, extending downwardly and converging so as to intercept each other below the body of water 27. The lower ends of the tubes 35 are open and have a cutaway portion 36 in each of them so that when the wheel 31 is rotated, water is drawn up through the tubes 35 into the retaining member 34. As the wheel revolves, water is ejected from the retaining member 34 and passes through an opening formed by the loosely fitting plate member 33 which fits over the retaining member 34. As the water passes outwardly, it is divided into finely divided particles and forms a sheet or spray through which the air, as it passes downwardly from the cylindrical member 19, is forced to pass twice, due to the shape of the baffles 25 and 26. The air which passes through this finely divided spray is washed and a certain amount of moisture is retained in the air. The surplus moisture, upon striking the member 25 will flow downwardly through the opening 37 and back into the body of water 27. Also, any surplus moisture which might be carried by the flow of air will be trapped

by troughs or the like 38 and will flow back into the water 27. The spray wheel 31 is driven by a vertical shaft 39, upon which the members 33 and 34 are mounted, which in turn is fastened to a disk member 41 at its upper end. The disk member 41 is adapted to be rotated by means of a frictional drive 42. The frictional drive 42 comprises a pulley 43 and a belt 44 which in turn is connected to a pulley 45 fastened upon the shaft 22. In order to provide means for stopping the spray wheel 31 from rotating, a lever 46 is placed within the casing 11 having its end 47 L-shaped so that by simply rotating the lever 46 the end 47 will strike the disk 41 and raise the same away from the driving member 42.

A secondary air inlet opening 48 is formed in the casing 11 in order that the air might be allowed to pass therethrough in the event the blower 17 should stop and thus prevent the furnace, or the like, from overheating or burning up. A swinging door 49 is fastened to the inner casing 12 adjacent the opening 48 and is adapted to swing inwardly to the dotted line position of Fig. 1. This swinging movement is caused by the arm 51 which is fastened to the door 49 and has an adjustable weight 52 placed thereon, which is set in such a position that when no air is blown through by means of the blower 17, the weight 52 will cause the door 47 to swing inwardly.

Water is supplied to the casing 11 by means of a valve 53 which is controlled by a float member 54 so that the level of the body of water 27 will always remain constant. An overflow pipe 55 is also inserted in the event the valve 53 should become stuck and allow water to flow constantly. When it is desired to use the air conditioning apparatus as a cooler as well as an air washer, the flow of air may be passed directly through the unfired furnace, or the like, 29 or may be diverted into suitable other passages and a secondary cooling means is provided therefor. The lower portion of the outer wall 13 is formed with a plurality of small apertures 56 and a small drip pipe 57 is placed in the insulating material 14 and a quantity of water is allowed to flow therefrom and moisten the insulating material 14. It will be seen that as the moisture passes through the aperture 56 and evaporates on the outer wall 13, a cooling effect is provided which will cool the body of water 27 and the air passing thereover. This water will be much cooler than the air in the room.

Fig. 3 illustrates a modified embodiment of the mechanism shown in Fig. 1. The motor 16 drives the blower 17 by means of the belt 18 and forces the air downwardly, as guided by the baffle members 25 and 26, through the spray from the water wheel 31 and then through a plurality of tubes 58. The tubes 58 pass through the body of water 27 and provide added cooling means for the cleaned and moistened air. The air then passes from the tubes 58 through an opening 59 having louvres 61 attached thereto so that the direction of flow of air may be regulated. The louvres 61 as shown in Fig. 3 are stationary, but it is to be understood that adjustable louvres may also be used. The lower portion of the casing 11 is similar in construction to that shown in Fig. 1, having a drip pipe 57 which provides moisture to the insulating material 14 and, as the moisture which passes out of the apertures 56 evaporates, cooling will result and maintain a temperature within the casing 11 lower than the temperature on the outside.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore being merely a preferred embodiment thereof.

I claim:

1. An air conditioning device, comprising a casing having double walls and porous insulating material therebetween, means for supplying water to the interior of said casing, means for forcing air through said casing, means for cooling and cleaning the air as it is forced through said casing, and means for supplying water to said porous insulating material, the exterior wall of said casing having apertures formed therein to permit the evaporation of the water from said insulating material to cool the interior of said casing and the water therein.

2. In a device of the class described, a casing having air inlet and outlet openings, a blower for forcing air entering the inlet opening out through said outlet opening, a supply of water, means for maintaining said supply of water at a substantially constant depth in the bottom of said casing, means for utilizing the water to form a substantially horizontal, annular spray, baffle means mounted interiorly of said casing above said supply of water for directing the air from the inlet opening first downwardly through one side of the annular spray and thence upwardly through the other side of the same spray, and a second baffle means mounted interiorly of said casing for reversing the flow of air from said spray and directing it downwardly toward said supply of water.

3. In a device of the class described, a casing having air inlet and outlet openings, a blower mounted in the upper part of said casing for forcing air entering the inlet opening downwardly through the casing, a supply of water, means for maintaining said supply of water at a substantially constant depth in the bottom of said casing, auxiliary wall members mounted interiorly of said casing for reversing the downward flow of air from said fan and then reversing the air stream again to direct it downwardly toward said body of water and said outlet opening, and means for utilizing the water to form a substantially horizontal, annular spray, comprising a hollow rotatable member mounted upon and supported by a said auxiliary wall member in said air stream at the point of first reversal thereof and having tubular portions extending downwardly into the water in the bottom of the casing.

4. An air conditioning device, comprising a casing having air inlet and outlet openings, means for forcing air entering said inlet opening out through said outlet means for maintaining a body of water at a substantially constant level in the lower portion of said casing, means extending into said body of water for projecting an annular spray of water, and baffle means mounted within said casing for directing the entire flow of air successively first through different portions of said spray and then over the surface of said body of water before it is ejected from said casing.

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