

May 26, 1936.

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2,042,142

AIR CONDITIONING APPARATUS

Filed Sept. 9, 1935

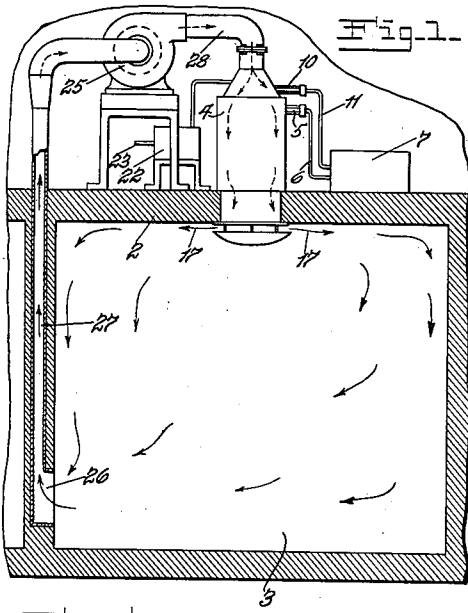


Fig. 1-

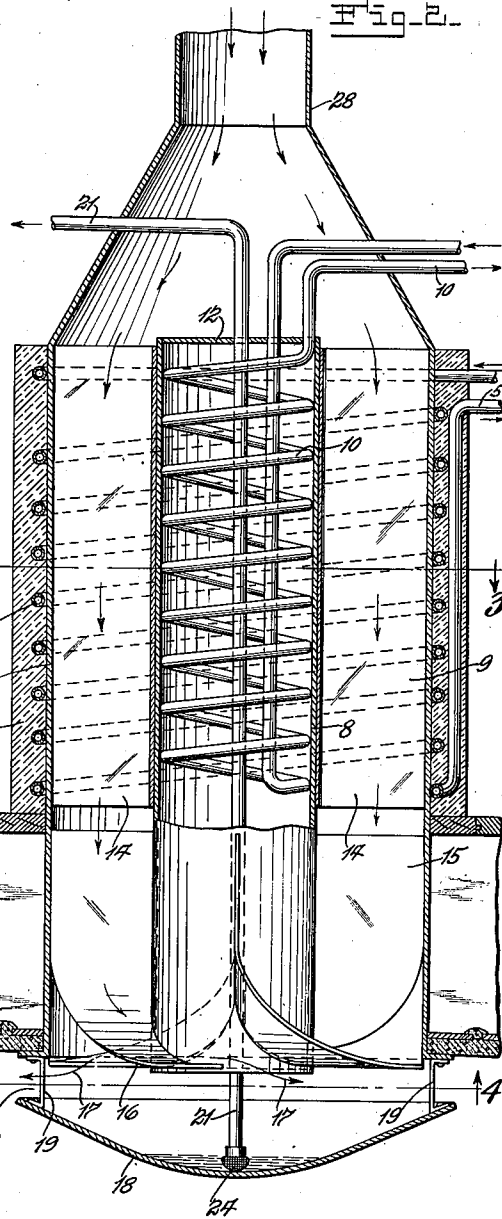


Fig. 2-

Fig. 3-

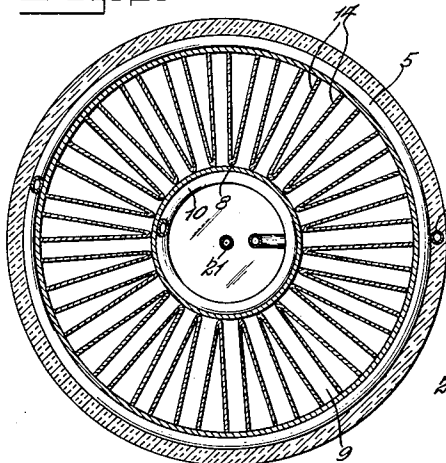
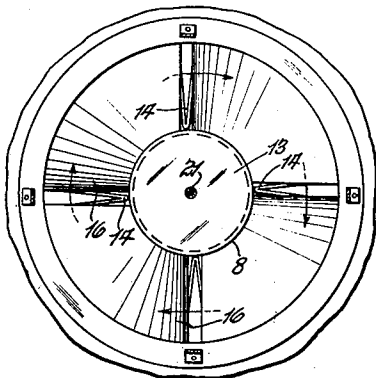


Fig. 4-



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UNITED STATES PATENT OFFICE

2,042,142

AIR CONDITIONING APPARATUS

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Application September 9, 1935, Serial No. 39,722

16 Claims. (Cl. 257-244)

This invention relates to air conditioning apparatus.

Objects of the invention are to provide an improved air conditioning apparatus comprising a pair of concentrically disposed wall structures separated by an intervening space for the passage of air and having a plurality of vanes in said space and functioning to temper or condition the air, as desired, and a series of deflectors for deflecting laterally the air passing from said space into the room receiving the conditioned air; to provide coils in association with said wall structures for cooling said wall structures and said vanes; and to provide means for circulating air through the apparatus into and through a room or building.

Various other objects and advantages of the invention should be apparent from the following description, reference being made to the annexed drawing, in which—

Fig. 1 is a diagrammatic view illustrating the application of the invention to a room or building.

Fig. 2 is an enlarged vertical sectional view of the apparatus.

Fig. 3 is a cross-sectional view approximately on the line 3-3 of Fig. 2.

Fig. 4 is a cross-sectional view slightly reduced on the line 4-4 of Fig. 2.

The outer cylindrical wall 1 extends vertically through the building or room wall 2 for circulating cooled or conditioned air through the room 3. The outer portion of the wall 1 is enclosed by insulating material 4 which embeds a coil 5 through which a refrigerant may be circulated, said coil 5 having pipe connections 6 connected with a compressor 7 whereby the refrigerant is forced through the coil 5.

The cylindrical wall 8 is mounted concentrically within the enclosure formed by the wall 1, and is separated therefrom by an intervening space 9 through which the air passes into the room 3. A refrigerant coil 10 is enclosed by the cylindrical wall 8 and has pipe connections 11 leading to and from the compressor 7 whereby said compressor forces the refrigerant to pass through the coil 10. The upper end of the cylindrical member 8 is closed by a wall 12 and the lower end thereof is closed by a wall 13.

An annular series of approximately radial vanes 14 are mounted in the space 9 having their inner edges contacting with the wall 8 and their outer edges contacting with the wall 1. These vanes are cooled by the refrigerant in the coils 5 and 10 so that the air passing through the space 9 is also thoroughly cooled. These vanes

extend vertically from the upper end of the wall 1 approximately to the wall 2, and the coils 5 and 10 also extend approximately the same distance in association with the walls 1 and 8.

An annular series of vertical plates 15 are mounted in the space 9 between the walls 1 and 8 below the vanes 14. As shown, there are four of these plates 15, but the number of said plates 15 may be varied as desired without departure from the principle of the invention. The plates 15 have their lower end portions 16 curved laterally in order to deflect the air laterally, as indicated by the arrows 17 (Fig. 2). Since the lower end of the device opens into the room 3 near the inner surface of the upper wall 2, a good circulation of the air throughout the room 3 is caused.

A plate 18 of larger diameter than the diameter of the space 9 is attached to the lower end of the device by supports 19, and is separated from the wall 2 by a space 20 through which the air is discharged into the room 3. The plate 18 is in the form of a receptacle and the receptacle receives condensed moisture which may be withdrawn therefrom through a pipe 21 leading to a pump 22 having a discharge pipe 23. A strainer 24 may be attached to the lower end of the pipe 21 in the receptacle 18. A blower 25 withdraws air from the lower portion of the room 3 through an opening 26 communicating with a pipe 27 leading to the blower, and the air is forced from the blower through a pipe 28 opening into the upper end of the space 9.

In practice, the apparatus is mounted in vertical position with the lower end thereof opening through the upper wall of a room or compartment. The compressor 7 is operated as desired to effect a circulation of a refrigerant through the coils 5 and 10. The blower 25 is operated to withdraw air from the lower portion of the room 3 and to discharge air into the upper end of the space 9, causing the air to flow into contact with the surfaces of the walls 1 and 8 and into contact with the surfaces of the vanes 14, whereby the air is cooled to the desired temperature. The air passing from the vanes 14 flows between the deflector plates 15 and is deflected laterally through the space 20 into the upper portion of the room. The pump 22 may be operated as desired to withdraw condensed moisture from the receptacle 18 and discharge the same through the discharge pipe 23.

It should now be apparent that this invention attains all of its intended objects and purposes efficiently, economically and satisfactorily. The construction, arrangement and relationship of

the parts may be varied and modified within the scope of equivalent limits without departure from the nature and principle of the invention as defined by the appended claims.

5 I claim:—

1. An air conditioning apparatus comprising two concentric cylinders separated by an intervening space constituting an air passage, approximately radial vanes mounted in said space, devices for cooling said cylinders, means for forcing air through said space between said vanes, and defectors for deflecting laterally the air passing from said space.

2. An air conditioning apparatus comprising two concentric cylinders separated by an intervening space constituting an air passage open at its opposite ends, means for confining a refrigerant adjacent to the walls of said respective cylinders, mechanism for forcing air through said space, and defectors for deflecting laterally the air passing from said space.

3. An air conditioning apparatus comprising an outer cylinder open at its opposite ends, an inner cylinder supported within and separated from said outer cylinder by an intervening space and having its opposite ends closed, approximately radial vanes located in said space and connecting said cylinders, defectors at one end of said space for deflecting laterally the air passing from said space, mechanism for circulating refrigerant adjacent to said cylinders, and mechanism for forcing air through said space.

4. An air conditioning apparatus comprising an outer cylinder having an inlet end and an outlet end, an inner cylinder supported within said outer cylinder and separated therefrom by an intervening space constituting an air passage and having a closed end at said inlet end of said outer cylinder, vanes located in said space, means for cooling said cylinders, and defectors adjacent to the outlet end of said space for deflecting laterally the air passing from said space.

5. An air conditioning apparatus comprising an outer cylinder having an inlet end and an outlet end, an inner cylinder supported within said outer cylinder and separated therefrom by an intervening space constituting an air passage and having a closed end at said inlet end of said outer cylinder, vanes located in said space, means for cooling said cylinders, defectors adjacent to the outlet end of said space for deflecting laterally the air passing from said space, a receptacle below said outer cylinder and separated therefrom by a space through which the air passes laterally from said defectors, and means for withdrawing moisture from said receptacle.

6. An air conditioning apparatus comprising two concentric cylinders separated by an intervening space constituting an air passage having an inlet end and an outlet end, means for forcing air into the inlet end of said space, defectors at the outlet end of said space for deflecting laterally the air passing from said space, a plurality of vanes mounted in said space between said cylinders, and mechanism for circulating a refrigerant adjacent to said cylinders, respectively, and adjacent to the edges of said vanes.

7. An air conditioning apparatus comprising two vertical concentric cylinders separated by an intervening space constituting an air passage having an inlet end and an outlet end, a wall closing the end of the inner cylinder at the inlet end of said space, approximately vertical vanes mounted in said space between said cylinders, means for forcing air into and through said

space, defectors for deflecting laterally the air passing from said space, and mechanism for cooling said cylinders and said vanes.

8. An air conditioning apparatus comprising two vertical concentric cylinders separated by an intervening space having an inlet at the upper end thereof, vanes mounted in said space and connecting said cylinders, a refrigerant coil surrounding the outer cylinder, a refrigerant coil mounted in the inner cylinder, mechanism for forcing a refrigerant through said coils respectively, mechanism for forcing air through said space, and defectors at the outlet end of said space for deflecting laterally the air passing from said space.

9. An air conditioning apparatus comprising two vertical concentric cylinders separated by an intervening space having an inlet at the upper end thereof, vanes mounted in said space and connecting said cylinders, a refrigerant coil surrounding the outer cylinder, a refrigerant coil mounted in the inner cylinder, mechanism for forcing a refrigerant through said coils respectively, mechanism for forcing air through said space, defectors at the outlet end of said space for deflecting laterally the air passing from said space, and a plate below the outlet end of said space and separated from the outer cylinder by a space for the outward passage of air from said defectors.

10. An air conditioning apparatus comprising a cylinder open at its upper and lower ends for the passage of air into and through the cylinder, a plate supported below said cylinder and separated therefrom by a space for the passage of air from said cylinder, defectors within said cylinder for deflecting laterally from said cylinder the air passing therethrough, and mechanism for circulating a refrigerant adjacent to said cylinder.

11. An air conditioning apparatus comprising a cylinder for conducting air and having an inlet end and an outlet end, a plate supported adjacent to the outlet end of said cylinder and separated therefrom by a space, devices for deflecting air from said cylinder through said space, mechanism for forcing air into and through said cylinder, and means for circulating a refrigerant adjacent to said cylinder.

12. An air conditioning apparatus comprising two cylinders one within the other and separated by a space constituting an air passage open at its opposite ends, defectors for deflecting laterally the air passing from said space, mechanism for forcing air into and through said space, and mechanism for circulating a refrigerant adjacent to one of said cylinders.

13. An air conditioning apparatus comprising two cylinders one within the other and separated by a space constituting an air passage open at its opposite ends, defectors for deflecting laterally the air passing from said space, mechanism for forcing air into and through said space, and mechanism for circulating a refrigerant adjacent to both of said cylinders.

14. An air conditioning apparatus comprising two cylinders one within the other and separated by an intervening space constituting an air passage open at its opposite ends, means closing the ends of the inner cylinder, mechanism for forcing air into and through said space, and mechanism for circulating a refrigerant adjacent to one of said cylinders.

15. An air conditioning apparatus comprising two cylinders one within the other and separated by an intervening space constituting an

air passage open at its opposite ends, means closing the ends of the inner cylinder, mechanism for forcing air into and through said space, mechanism for circulating a refrigerant adjacent to one of said cylinders, and a series of vanes in said space in contact with the wall of the cylinder adjacent to which said refrigerant is circulated.

16. An air conditioning apparatus comprising an outer cylinder open at its opposite ends for the passage of air into and from said cylinder, an inner cylinder supported within and sepa-

rated from said outer cylinder by an intervening space and having closed that end thereof which is adjacent to the inlet end of said outer cylinder, mechanism for circulating a refrigerant adjacent to said cylinders, heat exchange elements in said space adjacent to the walls of said cylinders, mechanism for forcing air through said space, and means cooperating with said outer cylinder to form a space for the lateral passage of air therefrom.

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