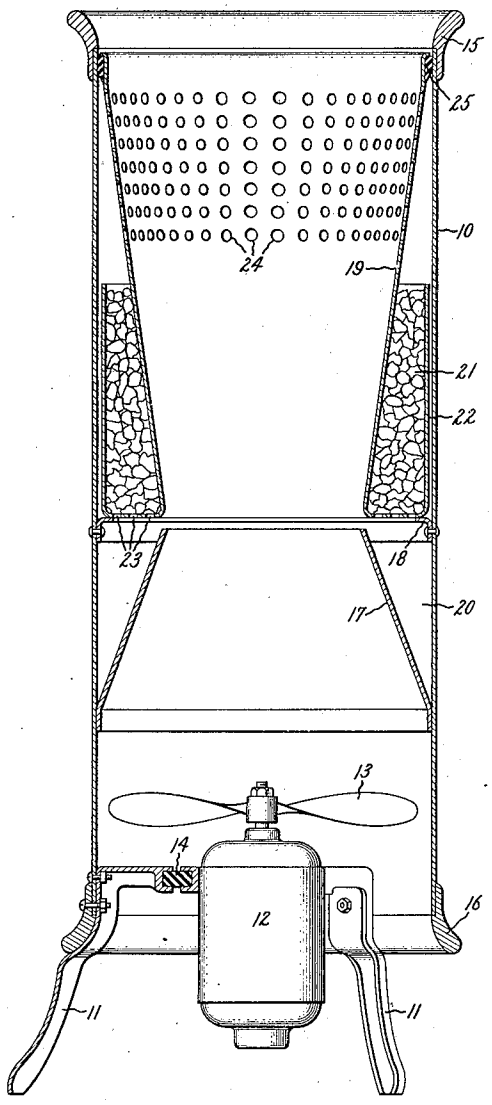
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AIR TREATING AND CIRCULATING APPARATUS

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Inventor:
Osmund Holm-Hansen,
by Harry E. Dunham
His Attorney.

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AIR TREATING AND CIRCULATING APPARATUS

Osmund Holm-Hansen, Bridgeport, Conn., assignor to General Electric Company, a corporation of New York

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8 Claims. (Cl. 183—35)

My invention relates to air treating apparatus and particularly to devices for circulating air in a room and for removing odors or other impurities from the air in the room.

It frequently happens that the comfort condition of the air in the room may be improved by forcibly circulating the air so that substantially the same temperature prevails throughout the room. The comfort of persons occupying the room may further be increased by removing odors, smoke and other objectionable matter from the circulated air. For purposes of circulating the air, it is desirable to employ fairly high velocities of air in the circulating device; however, if air treating material such as activated charcoal is placed in the path of the air in the device, the velocity of the stream is necessarily reduced and the effectiveness of the air circulator may be hampered.

It is an object of my invention to provide an improved apparatus for circulating and otherwise treating the air within a room.

Another object of my invention is to provide an improved air circulating and treating apparatus wherein sufficient velocities for proper circulation of the air in the room are attained while a portion of the air is continuously treated to remove objectionable odors or foreign material.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention reference may be had to the accompanying drawing, the single figure of which is a sectional elevation view of an air circulating device embodying my invention.

The device as shown in the drawing comprises a cylindrical casing within which is arranged a duct constituting a Venturi tube, a motor driven fan circulates air from the bottom of the casing through the tube to the venturi and openings are provided at the throat and near the discharge end of the venturi so that there is a recirculation of a portion of the air from the discharge end through the space between the tube and the casing and back to the main air stream through the opening at the throat of the tube. The recirculated air is subjected to the desired treatment by providing a container within the space between the tube and the casing and placing a suitable air treating substance in the container. A portion of the circulated air is thus recirculated in the casing and treated to remove odors, smoke, etc., and the main air stream is maintained at sufficient velocity to provide adequate circulation of the air in the room.

Referring now to the drawing, I have shown an upright cylindrical casing 10 spaced from the floor and supported on a plurality of legs 11. Within the lower end of the casing is mounted a motor 12 for driving a propeller type fan 13. The motor is secured in the lower portion of the casing in any suitable manner and preferably by employing a resilient mounting including supports 14 of rubber or other similar material. The top and bottom of the casing are provided with suitable collars 15 and 16, respectively, to provide a finished appearance. Within the casing is provided a cone-shaped duct or reducing orifice 17 through which the air is forced immediately after leaving the fan 13. Above the orifice 17 and resting on a suitable support 18 on the walls of the casing is an expansion duct or nozzle 19 extending upwardly from the outlet of the orifice 17 toward the top of the casing. The support 18 is located so that the inlet end of the discharge nozzle 19 is spaced from the discharge end of the orifice 17 to provide an annular opening between the orifice and the nozzle. The orifice and the nozzle constitute a Venturi tube, the annular opening between the orifice and the nozzle being located at the throat of the venturi intermediate the ends of the casing. Between the casing 10 and the duct structure comprising the orifice 17 and the nozzle 19, there is formed a space or chamber 20. In a Venturi tube the velocity of the air is highest at the throat and decreases in the expanding nozzle. The pressure at the throat is the lowest pressure, and hence is lower than the pressure at the discharge end of the nozzle. I utilize this difference in pressure to circulate a portion of the air through the chamber 20 thereby providing recirculation of a portion of the air circulated by the fan 13. This recirculated portion of the air is treated by a mass of air treating substance 21 arranged in a container 22 which I have shown as comprising an integral portion of the nozzle 19, although it is obvious that any other arrangement for holding the air treating substance in the chamber 20 in the path of the recirculated air would be satisfactory. The bottom of the container 22 is provided with a plurality of perforations 23, and the discharge end of the nozzle 19 is provided with a plurality of perforations 24. It can readily be seen that air will be drawn

into the main stream in the duct from the chamber 20 through the annular opening between the orifice and the nozzle, and that air will be supplied to the chamber 20 from the main stream through the openings 24 in the discharge end of the nozzle. The air flowing from the openings 24 to the annular opening at the throat of the venturi must pass through the mass of air treating material 21 and the perforations 23. This portion of the air is, therefore, treated by the substance 21 which, for example, may be activated carbon provided to remove objectionable odors from the air. The main body of air circulated by the fan 13 will pass upwardly through the casing at a substantial velocity and a portion of the treated air will be added to the main stream so that there is a continual treatment of a fraction of the air circulated by the fan and the air in the room may be maintained free from objectionable odors or foreign matter such as smoke.

The nozzle 19 together with the container 22 may be removed from the casing 10 by lifting the nozzle directly through the top of the casing and a suitable hook may be inserted in one of the openings 24 in order to grip the duct 19 and lift it. In order to prevent rattling or vibration in the duct 19 and the casing 10, there is provided an annular gasket 25 of rubber or other suitable resilient material between the top of the nozzle 19 and the walls of the casing. The nozzle 19 and the container 22 may thus be removed easily in order to renew the air treating substance.

From the foregoing it is readily apparent that I have provided an air circulator including a simple and effective arrangement for maintaining a stream of air at a relatively high velocity while treating a portion of the stream to remove odors, smoke or other objectionable matter.

While I have shown a particular embodiment of my invention in connection with a portable air circulating unit, other applications will readily be apparent to those skilled in the art. I do not, therefore, desire my invention to be limited to the particular construction shown and described and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An air circulator including a casing having an air inlet and an air discharge outlet, means for circulating air through said casing from said inlet to said outlet, means dependent upon the flow of air through said casing for producing a pressure of the air at an intermediate portion of the casing lower than the pressure at the discharge end thereof, means providing a chamber for containing an air treating substance, and means arranged to utilize the difference in pressure between the discharge end of said casing and said intermediate portion thereof to produce a circulation through said chamber of a portion of the air flowing through said casing whereby said portion of the air is removed from the main stream of air flowing through said casing and circulated through said chamber and treated by the substance therein and then returned to the main stream of air.

2. An air circulator comprising a duct having an inlet end and an outlet end, means for circulating air through said duct, said duct being formed to produce a change in velocity of the air circulated therethrough to provide a low pressure region intermediate the ends of said duct, means providing a chamber externally of said duct and affording communication between said low pressure region and a higher pressure region adjacent the discharge end of said duct whereby a portion of the air passing through said duct is removed from the main stream of air and circulated through said chamber and then returned to the main stream, said chamber being arranged to contain a substance for treating the air circulating therethrough.

3. An air circulating apparatus comprising a duct structure formed to provide a Venturi tube means for circulating air through said tube, means providing a chamber adapted to contain an air treating substance, means arranged to connect said chamber in an air path between the discharge side of said tube and the throat of said tube for affording a circulation of air through said chamber whereby a portion of the air passing through said tube is recirculated and subjected to the treatment of the substance in said chamber.

4. An air circulating apparatus comprising a duct structure formed to provide a Venturi tube, means for circulating air through said tube, a perforated container adapted to contain an air treating substance and arranged in communication with said duct adjacent the throat of the venturi, means providing communication between said container and the discharge end of said duct for providing an air circulating path from the discharge end of said duct through the container to the throat of the venturi whereby a portion of the air passing through said duct is recirculated and subjected to the treatment of the substance in said container.

5. An air circulating apparatus comprising a casing, a duct structure constituting a Venturi tube arranged within said casing, means for circulating air through said duct, means providing communication between the interior of said duct and the space between said duct and said casing adjacent the throat of the venturi and also adjacent the discharge end of the duct, means arranged between said casing and said duct for retaining a quantity of air treating substance therein whereby the circulation of air through said duct produces a recirculation of a portion of the air through the space between said duct and said casing to be subjected to treatment by the air treating substance therein.

6. An air circulating apparatus comprising a casing, a duct structure constituting a Venturi tube arranged within said casing, said duct structure having a plurality of perforations therein near the discharge end of the tube and having an opening therein adjacent the throat of the tube, means for circulating air through said duct, said casing and said duct defining a space therebetween in communication with the interior of said duct through said perforations and said opening whereby a portion of the air circulated through said duct is recirculated through the space between said duct and said casing, and means for retaining a quantity of air treating substance in the path of the air circulated through the space between said casing and said duct.

7. An air circulating apparatus comprising a casing, a duct structure constituting a Venturi tube arranged within said casing, said structure comprising a pressure reducing orifice and an expanding nozzle spaced from said orifice at the throat of the venturi, a container for an air

treating substance secured to said nozzle and arranged within the space between said nozzle and said casing and having perforations to afford passage of air therethrough, said nozzle having perforations adjacent the discharge end thereof, means for circulating air through said duct and for causing a recirculation of a portion of the air from the perforations in said nozzle through said container and back to the duct through the space between said nozzle and said orifice whereby the recirculated air is subjected to treatment by the substance within said container.

8. An air circulating apparatus comprising an upright cylindrical casing, a cone-shaped reducing orifice in the lower portion of said casing, a removable expansion nozzle arranged in the upper portion of said casing and constituting with said orifice a Venturi tube and forming a chamber between the casing and the tube, said nozzle and said orifice being spaced apart longitudinally to provide communication between the Venturi tube and the chamber between the tube and said casing adjacent the throat of the tube, said expanding nozzle having perforations near the discharge end thereof opening into said chamber, a motor driven blower in said casing below said nozzle for circulating air from the lower end of said casing through said nozzle and said discharge orifice and thence out of said casing at the top thereof whereby a portion of the air passes through the perforations in said nozzle and is returned to the throat of the Venturi tube through the space between said orifice and said nozzle, and a container for holding a quantity of air treating substance in the path of air circulated through said chamber between said discharge nozzle and said casing.

OSMUND HOLM-HANSEN.