

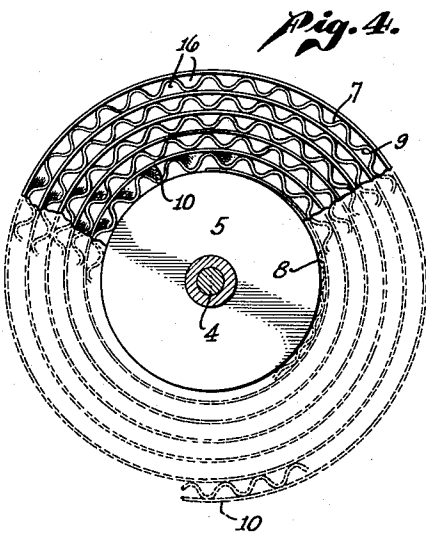
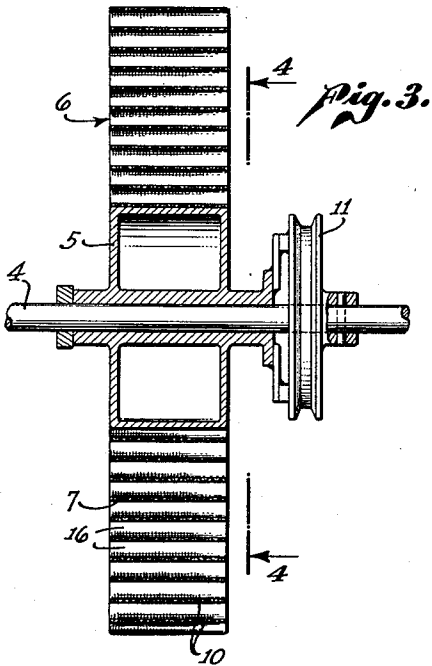
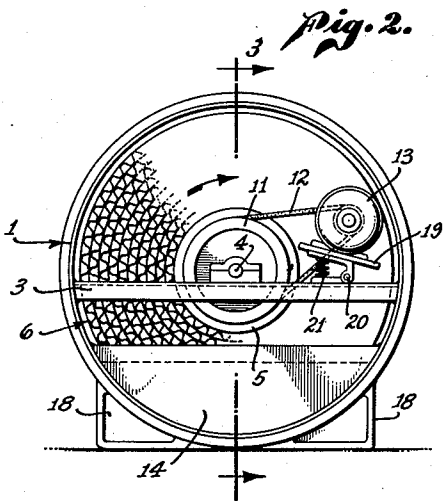
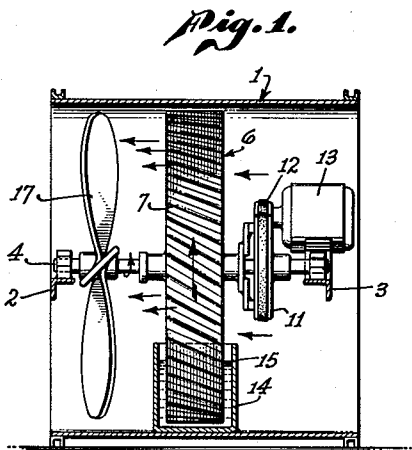
June 16, 1942.

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2,286,480

AIR PURIFIER OR CONDITIONER

Filed July 1, 1940



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2,286,480

AIR PURIFIER OR CONDITIONER

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Application July 1, 1940, Serial No. 343,449

2 Claims. (Cl. 261-92)

This invention relates to an air purifier or cleaner, the function of which is to remove dust or impurities from air. This improvement relates particularly to a type of apparatus of this kind, in which a reticulated body is mounted in an air duct, and constantly supplied with liquid, such as water, so that as the air passes through the reticulated body, the water or moisture carried on the superficial area of the reticulated body, will remove the impurities.

One of the objects of this invention is to provide an apparatus of this type, which will be efficient in operation, but which is so constructed as to prevent air-borne drops or particles of water from being carried along into the air stream that is being purified.

A further object of the invention is to provide a reticulated body having a construction which will provide an extraordinarily large superficial area to which the liquid will adhere so that a very large area of contact between the flowing air and the liquid will occur.

A further object of the invention is to produce an apparatus of this type, which will accomplish the above indicated objects, but which will be very inexpensive to manufacture and install.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient air purifier or conditioner.

A preferred embodiment of the invention is described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawing:

Fig. 1 is a vertical section taken through a portion of an air duct or flue, and illustrating my apparatus within the same partially in elevation and partially in section.

Fig. 2 is an end elevation of the apparatus illustrated in Fig. 1.

Fig. 3 is a vertical section taken about on the line 3-3 of Fig. 2, through the evaporator element, certain parts being shown in elevation, and other parts broken away.

Fig. 4 is a cross-section taken on the line 4-4 of Fig. 3, and showing a portion of the inner part of an incompletely evaporator element such as illustrated in Fig. 3.

In Figs. 2 and 4 portions of the coils of the purifier element are merely indicated.

In practicing this invention, I provide a purifier element located in the air duct, and this purifier element is constructed of reticulated material to which the purifying liquid such as water, is supplied. In its preferred construction the purifier element is of a rotary type, and mounted so as to rotate on a substantially hori-

zontal axis, and in such a way that moisture or liquid supplied to its under side will be carried up and distributed by gravity to the entire superficial area of the purifier as it rotates. The purifier is constructed so that it presents a multiplicity of small ducts or channels through which the air current passes, and is so constructed that these air ducts are inclined to the axis of the flue or main duct in which the apparatus is mounted. In this way the air current passing through the purifier will be baffled and "broken up" as it were, so that all the molecules of air passing through the purifier must come in contact with the moisture laden areas of the purifier. In practice, this effect is accomplished preferably by providing a reticulated body, the lower edge of which dips into a bath of liquid or water, and as the purifier rotates, its wetted under portion carries up a considerable quantity of water which continuously gravitates downwardly so that all the reticulated area of the purifier carries moisture to contact with the flowing air stream passing through the purifier. In accordance with my invention, I construct the purifier in such a way that the natural gravitation of the liquid carried up out of the water bath, will be toward the side of the purifier into which the air current passes. This tends to prevent the formation of the droplets at the delivery side of the purifier, and tends to prevent such droplets being carried along in suspension in the air. In other words, in accordance with my invention I attain a cleaning and purifying effect on the air stream, and at the same time prevent adding liquid particles in suspension in the air stream. While my improvement is intended primarily as an air purifier, it is also capable of being used as an air conditioner, its effect in this capacity being controlled largely by the temperature of the air and its moisture content when it flows through the purifier.

Referring more particularly to the parts, in practicing my invention I provide an air duct section or flue section 1, which is adapted to be connected into the flue or air duct carrying the air that is to be purified or conditioned. This flue section is, of course, in the form of a cylindrical shell, and in order to support the air conditioning or purifying apparatus, I provide it with two transverse substantially horizontal cross bars 2 and 3 which support bearings for a horizontal shaft 4. This shaft carries a drum 5 of cylindrical form, on the outer face or rim of which the body 6 of the purifier element is carried. This body is constructed of foraminous or reticulated material, preferably wire mesh of fine gauge. This body 6 is so formed that it presents a multiplicity of air passages or channels through which the air passes in passing through the flue. These air passages, however, are not

parallel with the direction of flow of the air. In other words, they are inclined to the direction of flow, so that while they do deflect to a certain extent the air currents passing through them, a large portion of the air will, by its own momentum, tend to move through the purifier element in a straight line. This insures intimate contact between the air molecules and the large superficial area of the purifier. This purifier body 6 is preferably constructed of a continuous web 7 of wire mesh, that is wrapped around the drum 5 in a spiral coil (see Fig. 4) in which the starting point of the wrapped coil is located at the point 8 where the web of mesh can be soldered or secured by mechanical fasteners to the outer face of the drum. The web 7 is preferably formed with transverse convolutions 9, and these convolutions do not extend straight across the web but they have pitch, as will be described hereinafter. In order to prevent the convolutions from nesting together in an undesired manner, I prefer to provide an intermediate web 10 which is wrapped around the drum and lies between the successive coils of the convoluted web 7. Both of these webs are preferably formed of reticulated material.

In order to drive the purifier element 6, the drum 5 is continuously rotated. In the present instance, this is accomplished by providing the end of the drum with a belt wheel 11 which enables the drum and the shaft 4 to be continuously rotated through the medium of an endless belt 12 and an electric motor 13. The under side of the purifier element 6 is constantly supplied with a purifying liquid such as water, and although this can be accomplished in any desired manner, in the present instance I provide a segmental formed bowl or basin 14 which carries a water bath 15 within it. The direction of rotation is indicated by the arrows in Figs. 1 and 2.

The convolutions 9 cooperate with the intermediate reticulated web 10 to form a multiplicity of air channels or passages 16, and the pitch of the convolutions is such that on the rising side of the purifier element, these passages incline upwardly. This is indicated clearly in Fig. 1. Any means may be employed for causing the movement of air through the purifier element 6. In the present instance this may be accomplished by means of a fan 17 mounted on the shaft 4, the pitch of the blades of this fan being such that with the direction of rotation indicated, the fan will draw the air through the purifier element 6.

If desired, the duct 1 can be constructed so that in use it need not be connected into an air duct. For instance, it could be placed on a shelf in a compartment, the air in which is to be purified or conditioned as to moisture content. In that case the lower side of the duct shell 1 can be formed with abutments or feet 18 (see Fig. 2), which are capable of supporting the shell 1 on a horizontal support. In order to insure that the belt 12 will be maintained sufficiently tight to insure rotation of the shaft 4, the motor may be mounted on the base plate 19 supported on a hinge connection 20 and pressed in a direction away from the shaft 4 by a coil spring 21.

The mode of operation of the purifier element 6 is indicated graphically in Fig. 1 by means of the horizontal arrows. The inertia or momentum of the flowing air, of course, tends to cause

it to pass directly through the element 6 in a direction parallel with the axis of the shaft 4. The open spaces in the inclined passages 16 tend to conduct portions of the air current longitudinally in an inclined direction. In this way the air entering the receiving end of each passage, has a portion that will pass down the passage in an inclined direction, and other portions that are more or less deflected, but which pass on through the reticulated material without ever reaching the other end of the passage. In this way a very intimate contact is effected between the passing air and the large superficial area of the purifier that has been wet by contact with the bath 15.

Furthermore, it should be understood that the wettest part of the rotating purifier element 6 is on the side of the element that is rising out of the water. On this side the passages 16 incline upwardly toward the delivery end of the flue or duct 1, and the natural direction of gravitation of the water on this wet side will be downward and toward the side at which the air enters in passing through the purifier. Hence droplets falling down toward the receptacle 14, will tend to move away from the delivery side, and if any droplets become air-borne and carried along with the moving air, they should come in contact with other reticulated parts of the purifier to which the droplets would adhere. In this way the development of air-borne droplets in the air stream is discouraged. In this explanation, of course, reference is had to relatively large droplets, and not to water vapor that can be taken up by the air passing through the apparatus, if such air is deficient in moisture content.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

What I claim is:

1. An air purifying apparatus, comprising a member forming an air duct, a rotatable reticulated body mounted in the air duct with its axis of rotation aligned with the direction of flow of air through the air duct, the reticulated body having a multiplicity of air passages extending from side to side of said body which are open to the air passing through said duct, means for wetting a portion of the lower part of said reticulated body, the passages through said reticulated body being formed on a bias so that such passages immediately after they rotate upwardly from the wetting means each incline upwardly towards the outlet side of the reticulated body.

2. An air purifying apparatus, comprising a member forming an air duct, a rotatable reticulated body mounted in the air duct with its axis aligned with the direction of flow of air through the air duct, means for wetting a portion of the lower part of said reticulated body, the reticulated body being formed of alternate sheets of flat and crimped mesh members wound in a spiral manner around the axis of the body, whereby a multiplicity of air passages are formed extending from side to side of said body, which air passages are opened to the air passing through said duct, the crimps of said crimped members being formed on a bias so that the air passages immediately after they rotate upwardly from the wetting means each incline upwardly towards the outlet side of the reticulated body.

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