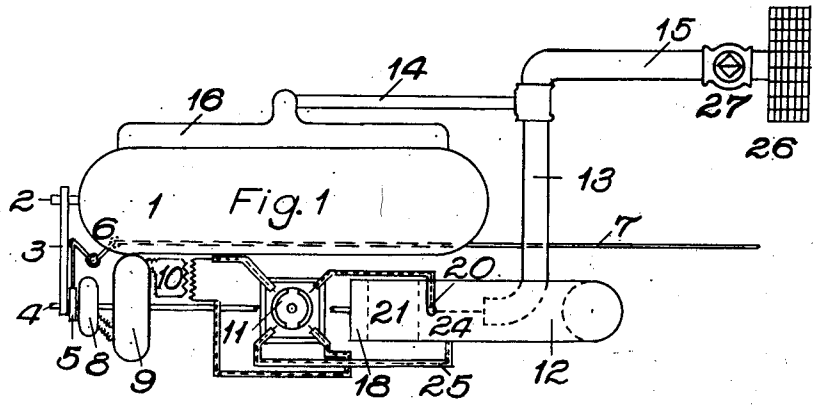
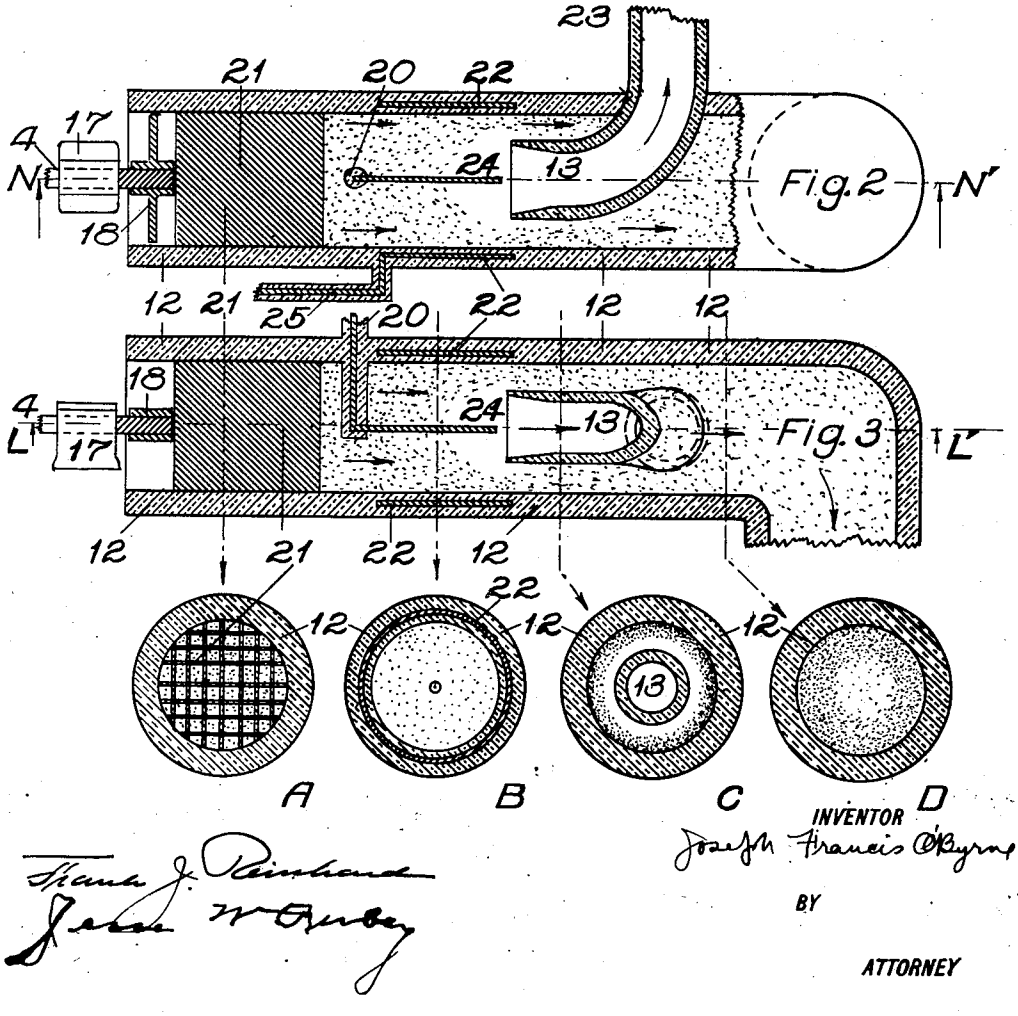
May 17, 1927. 1,628,906

J. F. O'BYRNE

AIR CLEANER

Filed May 12, 1926





INVENTOR

Joseph Francis O'Byrne

BY

ATTORNEY

Patented May 17, 1927. 1,628,906

UNITED STATES PATENT OFFICE.

JOSEPH FRANCIS O'BYRNE, OF GOLDEN, COLORADO.

AIR CLEANER.

Application filed May 12, 1926. Serial No. 108,550.

This invention relates to improvements in devices for separating dust, pollen, and moisture from air or gases.

It is often desirable to remove dust or other solid matter from gases or from air, and it is also often desirable to remove moisture from the air.

In the operation of automobiles it has long been recognized that the dust that enters the engine cylinders when the machine travels over dusty highways acts as an abradant and causes the parts to wear excessively, and for the purpose of removing the dust from the air before it enters the engine various devices have been proposed.

Many people are sufferers from the disease known as hay fever and experience has shown that they suffer most during the season when the air is full of pollen and fine dust, and that they are apparently well as long as they breathe pure clean air free from dust and pollen.

It is the object of this invention to produce a device that can be used for removing dust and pollen from the air before it enters dwelling houses as well as for cleaning air for automobile engines.

Another use to which my invention can be put is to remove moisture from air before it enters a dwelling house. This is very desirable in places where the temperature is high and the air is humid as human beings are quite uncomfortable when the temperature is about 85° F. and the humidity 98%, for in these circumstances very little evaporation of perspiration takes place, and hence very little latent heat of evaporation disappears.

It is the object of this invention also to remove moisture from the air used for blast furnaces without lowering the temperature of the air. It must be understood that the air has been passed through refrigerated chambers so that the moisture would condense on cold pipes in some blast furnace installations, thus losing the heat originally contained in the air, while removing the moisture.

The object, then, of this invention is to produce a simple device by means of which the above objects may be attained in an effective way and at a reasonable cost.

The apparatus by means of which the above objects are attained will now be described in detail and reference for the purpose will be had to the accompanying drawing where the preferred embodiment has been illustrated and in which,

Fig. 1 is a top plan view of an internal combustion engine which has been equipped with my improved dust separator. Fig. 2 is a section taken on line L—L′ of Fig. 3. Fig. 3 is a section taken on line N—N′ of Fig. 2, and sections A, B, C, and D are transverse sections taken at the points indicated by the arrows which point to them.

Numeral 1 indicates an ordinary internal combustion engine of the type employed in connection with automobiles and 2 indicates the crank shaft. A belt 3 serves to transmit power from the shaft 2 to the shaft 4 which power is again transmitted by clutch 5 to the direct current exciter dynamo 8 which is mounted on the same shaft as the alternating current dynamo 9. The clutch 5 is controlled by the rod 7. The alternating current generator 9 is connected to the primary of the high tension transformer 10 in which the voltage is "stepped up" to the desired value. The high tension secondary of the transformer 10 is connected to a rotary rectifier 11 of any well known and suitable construction, which serves to charge the wires 20 and 25 with high potential pulsating current of constant polarity. In Fig. 1 the rectifier has been turned through 90° and is shown in plan view; this has been done in order to simplify the drawing. Numeral 12 designates the separator tube which is open at both ends, and is constructed of insulating material. A discharge pipe 13 of insulating material extends into the tube 12 and has an angular bend so that its open end is concentric with the tube 12 in the manner shown in Figs. 2 and 3. A pipe 14 is connected to the pipe 13 in the manner shown in Fig. 1 and connects it with the intake manifold 16. Another pipe 15 extends from the junction of pipes 13 and 14 to the register 26 which connects with the interior of the car body. A valve 27 controls the passage through pipe 15. Numeral 17 (Figs. 2 and 3) indicates a bearing for the end of shaft 4, and 18 designates a two blade fan or propeller that is secured to the shaft 4 at its end, and sets up an air current in the direction of the arrows. Directly in front of the fan 18 is a section 21 that has a plurality of parallel longitudinal openings and which prevents the air from being set in rotary motion by the fan blade. The high potential positive

wire 20 extends into the interior of the tube 12 and in line with the axis of the opening in tube 13. A cylindrical electrode 22 is embedded in the material of the tube 12 and is connected with the high tension negative conductor 25.

Let us now assume that the engine is operating and that the clutch 5 is closed so as to rotate the shaft 4. The alternator 9 will deliver high tension current to the step up transformer 10 and the rectifier 11 serves to deliver very high tension positive and negative charges to conductors 20 and 25 respectively. The fan 18 causes a current of air to flow inwardly through tube 12 in the manner indicated by the arrows. As the engine operates (or as the blower operates in conjunction with a blast furnace) it will produce a partial vacuum in the manifold 16 and this will cause air to flow from the interior of pipe 13 to the manifold. When the dust or moisture laden air comes into the zone of influence of the electrode 24, which is charged with positive electricity, the dust particles will become positively electrified and will be repelled by the electric charge on the electrode 24 and attracted by the negative charge on the electrode 22 and will therefore travel outwardly towards the electrode 22 thereby passing by the sides of the tube 13. The air that enters the tube 13 will therefore be free from dust, pollen, and moisture, and will be clean and dry. Where it is desired to regulate the moisture the air will be dry when conductors 24 and 22 are positive and negative respectively; but will be very moist when the polarities of these electrodes are reversed as the particles tend to move toward the negative electrode.

In hot moist climates the device can be employed with great advantage in providing dry air to dwellings. The dry air increases evaporation and this helps to cool the body and increase its comfort.

It is important to understand the operation of my device in connection with blast furnaces, namely, that it removes the moisture from the air, and retains in the air after taking out the moisture all of the heat originally there. This dry air saves in fuel the number of calories represented by the latent heat of evaporation of the contained moisture, and therefore results in a large saving in fuel.

In addition to the above uses there are a large number of other uses to which the device can be put among which may be mentioned the cleaning of air for operating rooms in hospitals. Also the cleaning of air for paint shops. It is obvious that the device can be used wherever clean air is desired.

I am aware that dust collectors employing the principle of my invention have been made and I therefore intend to limit my claims to improvements in the apparatus.

Having described my invention, I claim as new:

1. A dust separator comprising, in combination, a tubular member of insulating material, a second tubular member extending through the wall of the first tubular member, and having its open end located concentrically inside the first member, means for causing a current of air to flow through the first mentioned tubular member in a direction opposite to the direction that the open end of the second member points, a high tension electrode located axially of the tubular members, a cylindrical electrode located in the walls of the first mentioned tubular member and means for charging said electrode to a high potential.

2. A dust separator comprising, in combination, a tubular member of insulating material, means for causing a stream of air to flow through said member, a second tubular member of insulating material having one end within the first member and opening in the direction from which the air comes, an electrode located centrally of the tubular member between the end where the air enters and the open end of the second member, a cylindrical electrode enclosing said central electrode and means for maintaining the central electrode at a high positive potential and for maintaining the cylindrical electrode at a correspondingly high negative potential.

3. A device for separating solid and liquid particles from air and gases comprising an elongated tubular member, means for causing a stream of air to flow through the same, a pipe having an opening within the tubular member, said opening being toward the air stream, an electrode within said tubular member, a second electrode enclosing the first mentioned electrode and means of charging each of said electrodes with high potential charges of electricity of opposite polarity.

4. A device for separating gaseous from non-gaseous material, comprising, in combination, a tubular member of insulating material, means for causing a current of gas to flow in one direction, an electrode located within the tubular member and extending longitudinally thereof, a second electrode enclosing the first electrode, means for charging said electrodes with high potential electricity of opposite polarity and a conduit opening within the tubular member the opening in said conduit being in axial alignment with the longitudinal electrode.

JOSEPH FRANCIS O'BYRNE.