March 8, 1932. J. H. FEDELER 1,848,334

AIR CLEANER

Filed Jan. 16, 1928

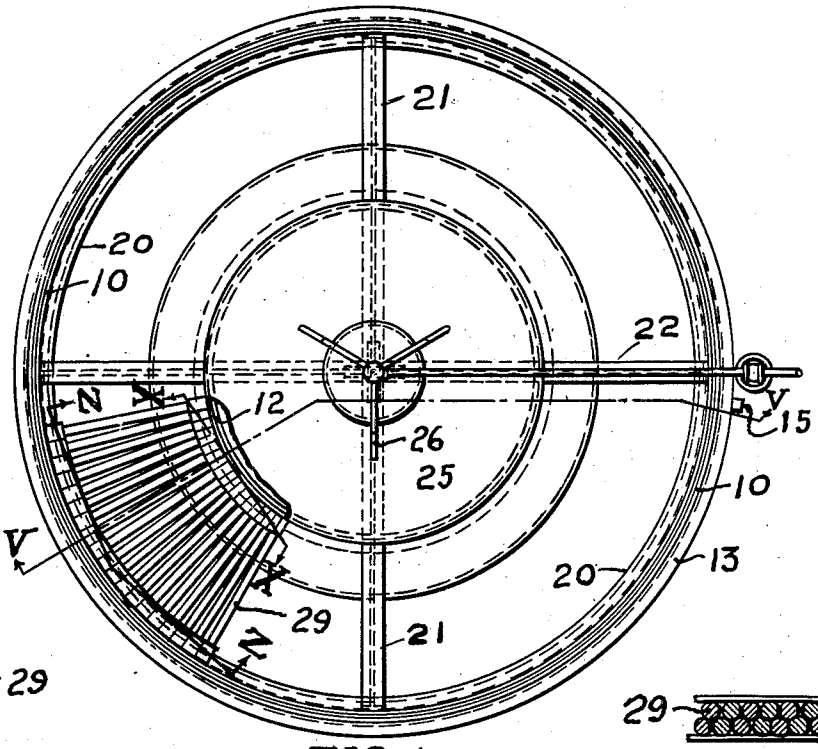


FIG. 1.

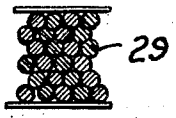


FIG. 3.

FIG. 4.

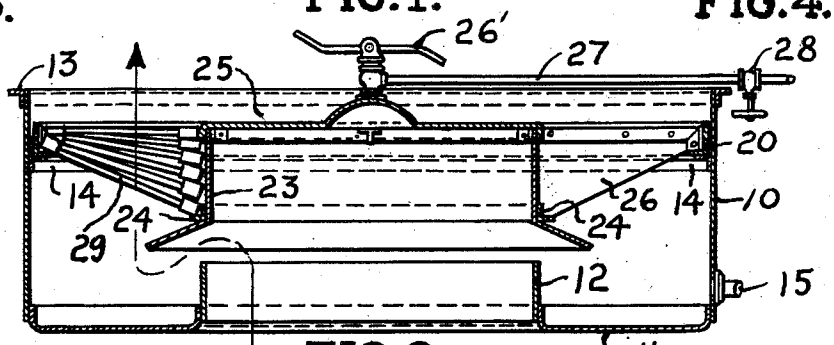


FIG. 2.

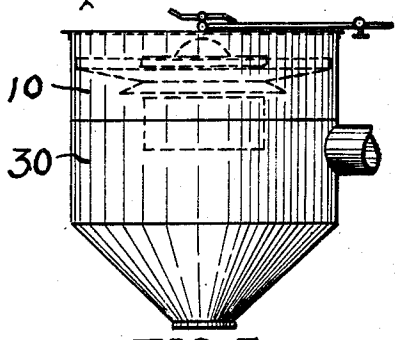


FIG. 5.

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UNITED STATES PATENT OFFICE

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AIR CLEANER

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My invention more particularly relates to means for separating gaseous from non-gaseous material, in which the means are self-cleaning.

My invention is a device which may be used as an exhaust head of steam plants, or as an air cleaner at an air intake or exhaust. My invention also includes a new filter medium forming old and well-known means into new combinations for coating and cleaning the same. The object I particularly desire to attain is to provide an efficient exhaust air cleaner which may be attached to the present centrifugal dust collector drums now commonly employed on exhaust systems of mills and manufacturing plants. Since the destructive effects of dust have been recognized, means to confine the same have been desired. In several states, labor laws have been enacted prohibiting the operation of mill saws and buffing machines unless they are provided with exhausters drawing the dust and air away from the operator of the machine, and at the same time other laws prohibiting the free exhaust of the dust-laden air from mills into the atmosphere. A mill-owner is thus forced to employ a dust collector, and the simplest of these is a vertical drum in which the inlet is at a tangent to the periphery, and the outlet of the air is at the top, and the outlet of the dust in a cone-shaped bottom.

The rapidly moving air entering this drum creates a cyclone within the drum, which arrests and collects the heavier dust particles by centrifugal action, but carries the lighter ones out into the atmosphere with the air. Such a device is therefore usually placed on the outside of a building, and is satisfactory to the workman within the building, but it is inefficient at all times and wasteful of heat units in the winter months, or in colder climates.

In my invention I have provided a device which is placed over the outlet of a cyclone dust collector, and which will collect the finer dust and can, therefore, be placed on the inside of a building so that the heat units are not wasted because the air can be used over again.

My invention will be best understood by referring to the accompanying drawings in which I have illustrated a preferred emobdiment of the same, and in which Fig. 1 shows an assembled top view of the device with some of the filter mediums in place.

Fig. 2 is a sectional view on line V—V of Fig. 1.

Fig. 3 is an illustrative section of line X—X of Fig. 1.

Fig. 4 is an illustrative section of line Z—Z of Fig. 1.

Fig. 5 illustrates the relative position of my device on a cyclone dust collector 30.

Like reference characters indicate like parts throughout the drawings.

Referring now to Figs. 1 and 2 of the drawings, 10 is the cylindrical casing, 12 is the cylindrical inlet, and 11 is the bottom of an open pan, cylinder 10 is provided with a means to strengthen the outside upper edge which in this case is an angle 13 and, with a means of holding an inner frame angle 20 which in this case is an angle 14. Angles 20 and 13 are fastened around the inside and the outside of cylinder 10 respectively. Cylinder 10 is further provided with a pipe connection 15 for discharging liquids which collect inside of the same.

The inner frame is composed of two T irons 21 and 22 welded to form a cross and bent over at the ends, to which ring-formed angle 20 is secured; one leg of this angle is wider to form a shallow outside cylinder to the inner frame. An inner cylinder 23 is fastened and suspended from T-irons 21 and 22, and is dished at the lower end to form a cone-shaped baffle to air coming up through cylinder 12 of the pan. Cylinder 23 is further provided with an angle 24 and a cover 25 closing the cylinder at the top. There is an open space formed between cylinder 23 and angle 20 which is divided into four parts by gusset plates 26, which are suitably secured to outside of cylinder 23, T-irons 21 and 22 and angle 20. In these spaces the filter medium is placed.

It will be observed that the filter mediums are enclosed in a frame work and angular

flange which is supported within cylinder 10 upon angle 14, and is a removable unit.

In an air cleaner, the heavier particles are easily removed by a cyclone dust collector, or shaking screens, but the finer particles are more difficult to collect. Fine screens become choked up, particularly if a liquid is used to clean them, because of the capillary attraction of the liquid which holds the liquid and dirt in the mesh. Experience verifies that frequent change of direction of a current of air by baffles coated with a liquid is a more efficient way to trap the dust. Dry baffles allow the fine dust to blow through, but when the baffles are coated with a liquid, the dust particles get stuck in this moisture, becomes moist itself, and other particles attach themselves to form the mud found on the baffles.

In my invention, I have taken advantage of this experience and though a number of forms of baffles and filter mediums may be used, I have elected to introduce here a series of baffles composed of rods of suitable material and length, the ends of which are enlarged, or are provided with short ferrules so that when they are placed on top, or alongside of each other, an open slot is formed between the rods, as wide as the rods are enlarged at the ends, or as the ferrules allow for. These rods may be of wood boiled in creosote or paraffin. They are assembled staggered, as shown in section Figures 3 and 4. The ferruled part of the rods rest upon angle 24 on the inner end and upon angle 20 on the outer end. This feature has an advantage inasmuch as the baffles offer more resistance near the center where they are deeper than further out, thus equalizing the flow of air. These baffles may be tied together in bundles to facilitate their removal and renewal, but these bundles must be formed to allow for the difference in depth on the inner and outer ends of the rods.

On top of cover 25 a sprinkler 26', like the ordinary revolving lawn sprinkler, is secured and connected with a source of liquid, such as water or oil by pipe 27, and controlled by a valve 28. The nozzles of these sprinklers are usually adjustable, and when used in combination with my device, they must be adjusted to spray liquid upon the baffles within the confines of cylinder 10. The liquid passing down over the baffle rods 29 with a tendency to flow toward cylinder 23 upon the baffle plate projection, because of the angularly disposed baffle rods 29. The liquid finally flows into the pan and out through pipe 15.

The air flows up from the cyclone dust collector through cylinder 12 as indicated by arrow, passing outward under the baffle projection of cylinder 23 and finally up through the coated, or moistened rods, which act as baffles and interrupt the dust particles which adhere to them and are carried back into the pan, where they collect or flow out of drain 15 with the liquid. In this case, it will be observed that the downward flowing liquid coats and cleans the baffle units. When the device is used to clean air for ventilating purposes the intake of a blower may be connected to cylindrical inside of pan, and the air will then flow downward with the liquid.

Having thus described my invention, what I claim as new and desire to cover by Letters Patent is:

1. In combination with a conduit for dust laden air or gas, a cleaner unit mounted in superposed relation to the outlet of the conduit, said unit comprising a casing, transverse filter means supported concentrically within said casing around the path of flow of the air or gas from the conduit outlet, said means embodying a multiplicity of staggered and superposed filter members, means for providing the surfaces of said members with dust entrapping liquid films, and means for diverting the flow of the dust laden air or gas through said filter means.

2. In combination with a conduit for dust laden air or gas, a cleaner unit mounted in superposed relation to the conduit outlet, said unit comprising a casing having an inlet to register with the conduit outlet, a baffle dome mounted in the casing in opposed relation to said inlet, an annular filter means supported within said casing between the baffle dome and the casing wall, said baffle dome having means for directing the dust laden air or gas laterally and upwardly through the filter means, means carried by said unit for discharging liquid upon said filter means, and means embodied in said cleaner unit for collecting and draining the liquid therefrom.

3. In an air or gas cleaner, a casing having an air inlet, a baffle mounted in the casing in opposed relation to said inlet, and an annular staggered filter means transversely bridging the space between said baffle and the casing wall and composed of a multiplicity of closely spaced filter members, whereby the streams of dust laden gas or air are deflected against the members to facilitate the separation of the dust therefrom.

4. In an air or gas cleaner, a casing having an air inlet, a baffle mounted in the casing in opposed relation to said inlet, an annular superposed filter means bridging the space between said baffle and the casing wall and composed of a multiplicity of closely spaced filter members, and angularly disposed means for removably supporting said filter members in operative position within the casing, whereby the end of the members adjoining the casing are substantially centrally located to impart a fan-shaped cross section to said members.

5. In an air or gas cleaner, a casing having an inlet, a baffle dome mounted in the

casing with its open side opposed to said inlet and having means for directing the air or gas laterally within the casing, a multiplicity of closely massed radially disposed filter rods supported at their ends upon the casing wall and the baffle dome respectively to provide a substantially continuous annular filter means surrounding said dome, and means for discharging a liquid upon said filter members.

6. In combination with a conduit for dust laden air or gas, a cleaner unit mounted in superposed relation within the outlet portion of said conduit, consisting of a cylindrical casing, a concentrically disposed inner cylinder with a cone-shaped baffle for deflecting the flow of air within said conduit, and a plurality of staggered transverse filter rods concentrically placed around the inner cylinder, whereby the streams of dust laden gas or air deflected by the cone-shaped baffle are impacted against said filter rods and deprived of the dust present therein.

7. In a dust laden gas or air filtering device, the combination of a cylindrical casing mounted in superposed relation within the outlet portion of a dust laden air or gas conduit, an inner cylinder within the casing concentrically disposed to the outer cylindrical casing and having a passage for air to pass from the interior of the inner cylinder to the outside thereof, transversely disposed filtering means within the casing extending from the casing wall to the outer wall of the inner cylinder in the path of the air flowing from the outlet of the inner cylinder and rotary sprinkler means for delivering to the filtering means fluid whereby dust entrapping liquid films are formed on the filtering means against the action of the air or gas passing upwardly through the filtering means.

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