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AIR SCRUBBER

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This invention relates to the separation of particulate matter from gas streams. In the suppression of dust dispersion by induced drafts, as well as in other processes, a variable portion of particulate matter is entrained in the gases; and because this particulate matter may have an intrinsic value and/or to exhaust such a laden gas to the atmosphere may be a nuisance, it is desirable to remove said matter from the gas stream.

Various devices have been employed to accomplish this separation, but none without objection, such as low collecting efficiency, high power consumption, lack of flexibility in operation, obstruction of gas flow by undue accumulation of the separated particles, or high maintenance cost. For example, the common wet washer or scrubber requires high power consumption at reasonably high collecting efficiency, and entails loss of collecting efficiency or increase of power consumption when other than the optimum volume for which it is designed is drawn through the collector. Other collectors involve not only reduced efficiency with reduction in air volume but also plugging of the gas passages by the formation of mud from accumulated dust particles on the dampened collector walls.

An object of my invention is the provision of a novel method and apparatus which overcomes the foregoing disadvantages. The invention provides for the separation of particulate matter from gas streams with marked efficiency, wide flexibility of operation, and pronounced operating economy. Other features and advantages of the invention will be hereinafter more particularly described and claimed.

In the accompanying drawing:

Fig. 1 is a view, partly in vertical section and partly in side elevation, of a form of apparatus for practicing the invention.

Fig. 2 is a diagrammatic view illustrating the operation of the apparatus shown in Fig. 1.

Fig. 3 is a diagrammatic view, on an enlarged scale, illustrating the operation of a portion of said apparatus.

Referring to the drawing, there is shown at 1 a duct or pipe through which the gas and entrained particles are led into the separating apparatus which comprises a series of divergingly tapered chambers 2, 3, 4, 5, and 6. In the present embodiment the diverging chamber 2 is shown integral with the inlet duct 1 and as an extension projecting from the end 1a of said duct. The terminal portion of said duct 1, together with the chambers 2—6, are enclosed in a larger chamber or shell 7, the walls of which may be vertical, as shown, and which may taper at its top to a discharge duct 8. Chambers 3, 4, 5, and 6 may be supported in any suitable manner from the walls of the shell 7.

Each chamber 2—6 terminates at its lower end in an orifice 9, the area of which is the same as or greater than the area of the end 1a of the inlet duct. Each of said orifices is formed by a baffle at the lower end of the respective chamber, the respective baffles being designated 10—14, respectively. It will be noted that the angles of the baffles with respect to the horizontal decrease progressively from baffle 10 to baffle 14, whereby said baffles offer increasing resistance to airflow in the neighborhood of the chamber walls as the air progresses from the inlet duct 1 to the chamber 6.

At the top of each of the chambers 3—6, adjacent the lower wall of the baffle of the preceding chamber, an opening is provided; said openings being designated 15—18, respectively. These openings are provided to enable portions of the air within the respective chambers to pass to exhaust, and also for other purposes hereinafter described.

While it is apparent that the chambers 2—6 and associated baffles might, for example, be of frustro-pyramidal form, they are shown as frustro-conical for purposes of illustration in the present embodiment.

A spray nozzle 19, connected to a water pipe 20, is arranged within the duct 1 to spray water on the walls of the chamber 2 at the terminal end of said inlet duct, thus effectively washing the walls of said chamber and the upper surface of the baffle 10. Also connected to said water pipe 20 is an annular spray 21, located at the level of the top of baffle 10 and above the opening 15; said spray directing water, in the form of a mist or fog, onto the exterior walls of all of the chambers 2—6. At each of the openings 15—18, some of this mist flows into the chambers 3—6, wetting the bottoms of the baffles 10—13, as well as the interior walls of said chambers, and the upper surface of the baffles 11—14.

In operation, the air or other gas carrying particulate matter passes through dust 1, as indicated by the arrows, and expands into the chamber 2 upon emerging from the end 1a of said duct. A portion of the gas impinges upon the wetted upper surface of the baffle 10 and some of the gas turns back upon itself into contact with the inner wetted walls of chamber 2, as indicated by the small arrows 22 (Fig. 3). This turning back of the air is evidently due to the effect of the pri-