

[54] AIR CLASSIFIER ASSEMBLY
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[57] ABSTRACT

Air classifier assembly for sizing particulate material includes a sizing chamber, a rotary distributor plate located in a lower portion of the sizing chamber for flinging particulate material supplied to the plate into the sizing chamber, a substantially cylindrical fine-particle separating chamber coaxially surrounding the sizing chamber and communicating therewith through an opening in the upper portion thereof, ventilating means located in the separating chamber for drawing into the separating chamber fine particles from the particulate material in the sizing chamber, ventilating means and a fine-material separator located externally to the separating chamber, the externally located ventilating means having a suction line connected to the fine-material separator and therethrough to an upper portion of the separating chamber and a compression line connected tangentially to the separating chamber.

2 Claims, 2 Drawing Figures

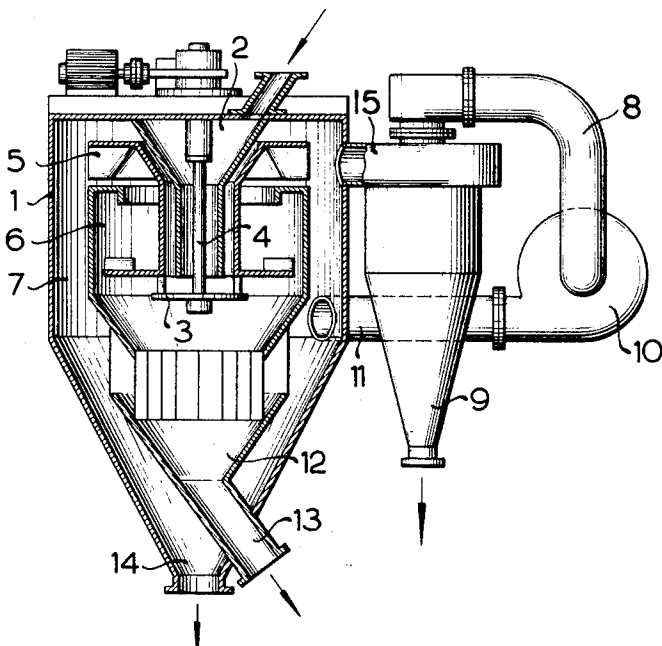


FIG.1

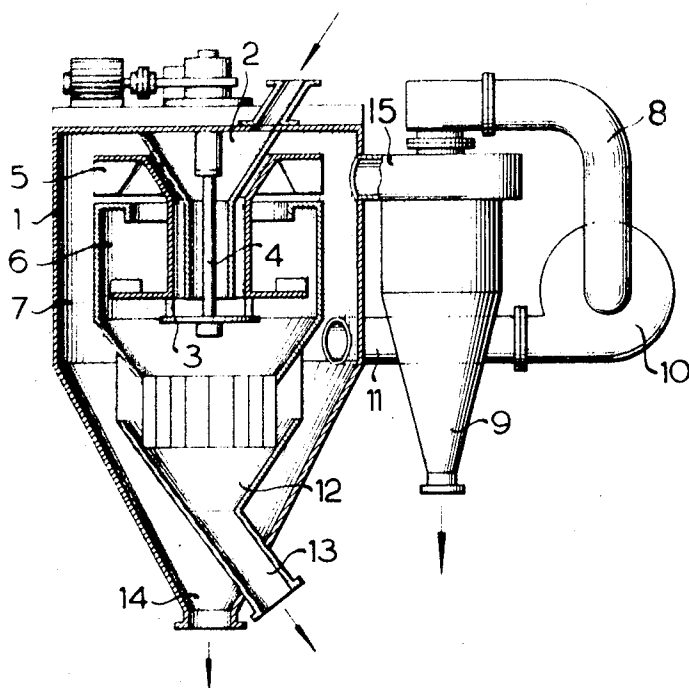
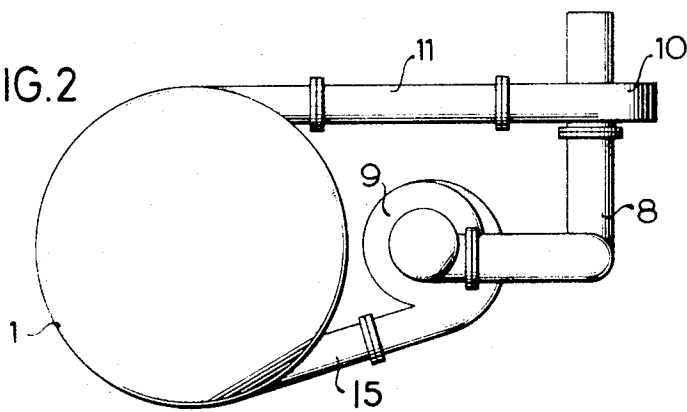


FIG.2



INVENTOR

AIR CLASSIFIER ASSEMBLY

My invention relates to air classifier assembly and more particularly to such device having a distributor plate delivery and an internally disposed ventilating fan and a sizing chamber coaxially surrounded by a dust or fine-particle separating chamber.

In known construction types of such air classifiers, refined dust passes into the fine-particle separating chamber after it leaves the sizing chamber. The air current entraining the dust or fine particles travels upwardly in the fine-particle separating chamber along a helical path, the dust or fine being hurled toward the outer wall of the fine-particle separating chamber and thereby dropping downwardly along the wall to the fine-material outlet at the bottom of the fine-particle separating chamber. However, since the fine particles are not completely separated in the fine-particle separating chamber, a fraction thereof is returned with the circulating air flow through a vane or jalousy structure into the sizing chamber. Enrichment of the fines in the sizing chamber then occurs, sharply reducing the throughput efficiency as well as the separating or classifying action of the device with respect to the area of the sizing chamber.

It is accordingly an object of my invention to provide air classifier which avoids the foregoing disadvantages of the heretofore known classifiers of this general type and which more particularly avoids reduction in the throughput efficiency as well as the classifying action of the device.

With the foregoing and other objects in view I provide, in accordance with my invention, an air classifier assembly for sizing particulate material comprising a sizing chamber, a rotary distributor plate located in a lower portion of the sizing chamber and defining an annular space therewith for flinging particulate material supplied to the rotary distributor plate into the sizing chamber, a substantially cylindrical fine-particle separating chamber coaxially surrounding the sizing chamber and communicating therewith through an opening in the upper portion thereof, ventilating means located in the fine-particle separating chamber for drawing into the separating chamber fine particles from the particulate material in the sizing chamber, ventilating means and a fine-material separator located externally to the fine-particle separating chamber, the externally located ventilating means having a suction line connected to the fine-material separator and therethrough to an upper portion of the fine particle-separating chamber and a compression line connected tangentially to the fine-particle separating chamber. In this way, fine particles are additionally separated continuously from part of the particle-laden sizing air which is returned to the fine-particle separating chamber.

In accordance with a further feature of my invention, means are provided for returning the sizing air from which the fine particles have been separated to the sizing chamber in a tangential direction thereto whereby an additional ascending rotational movement of the sizing air is produced in the sizing chamber.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in air classifier assembly, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from

the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is an elevational view, partly in section, of an air classifier assembly in accordance with my invention; and

FIG. 2 is a top plan view of FIG. 1.

Referring now to the drawings, there is shown in the figures a classifier housing 1 provided with a supply hopper 2 extending downwardly, as shown in FIG. 1, to a location above a distributor plate 3 rotatable by a drive shaft 4 which is driven by a suitable drive transmission located at the top of the classifier housing 1. A ventilating fan wheel 5 is suitably mounted on the distributor plate 3, for example, as shown in FIG. 1 so as to be rotatable therewith. A sizing chamber 6 is disposed within the classifier housing 1 and is spaced therefrom so as to define a fine-particle separating chamber 7 coaxially surrounding the sizing chamber 6. The fan wheel 5 is located in the upper part of the fine-particle separating chamber 7 above an opening at the top of the sizing chamber 6 providing communication between the latter and the fine-particle separating chamber 7. An externally located fine-particle separator 9, in the form of a cyclone, for example, is connected by a tube 15 tangentially to a fine-particle and air mixture outlet formed in an upper portion of the fine-particle separating chamber 7 and is also connected by a suction line 8 to the suction side of an externally disposed ventilating fan or blower 10. A return line 11 extends from the compression side of the externally disposed ventilating fan 10 and connected tangentially with the fine-particle separator chamber 7 of the classifier.

The operation of the air classifier of my invention is as follows. Particulate material is supplied in the direction of the arrow at the top of FIG. 1 through the hopper 2 onto the rotary distributor plate 3 and is flung thereby in radial direction into the sizing chamber 6, the coarse particles thereby falling into a collecting chamber 12 and discharged through an outlet 13. Due to the suction created by the rotating ventilating fan wheel 5, the fine-particle fraction of the material located in the sizing chamber 6 is withdrawn from the opening at the top of the sizing chamber 6 and blown into the fine-particle separator chamber 7. The fines are accordingly flung by centrifugal forces against the inner surface of the classifier housing 1, slide downwardly along the surface and discharge through an outlet 14 at the bottom of the classifier. Part of the sizing air flow is sucked out of the fine-particle separating chamber 7 by the externally located blower or ventilating fan 10 through the tube 15 into the fine-material separator 9 wherein most of the fines entrained in the sizing air flow are precipitated and discharged from an outlet at the bottom thereof as shown by the associated arrow. The sizing air flow thus freed in the fine-material separator 9 of the fine-particles entrained thereby then passes through the ventilating fan 10 and is returned by the compression line 11 to the classifier.

Although in the embodiment shown in FIG. 1 the compression line 11 is connected tangentially to the

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fine-particle separating chamber 7, it may also be desirable in accordance with the invention to extend the line 11 so that it passes through the fine-particle separating chamber 7 and connects tangentially with the sizing chamber 6.

In the assembly according to my invention a further advantage is obtained in that two different end products can be produced, namely a product from the classifier per se and a second product from the fine-material separator 9 by varying the degree of separation of classifying in the fine-material separator 9 in response to a suitable variation in the rotary speed of the external ventilating fan 10.

I claim:

1. Air classifier assembly for sizing particulate material comprising a sizing chamber, a rotary distributor plate located in a lower portion of said sizing chamber and defining an annular space therewith for flinging particulate material supplied to said rotary distributor plate into said sizing chamber, a substantially cylindrical fine-particle separating chamber coaxially surrounding said sizing chamber and communicating therewith through an opening in the upper portion

thereof, ventilating means located in the fine-particle separating chamber for drawing into said separating chamber fine particles from the particulate material in said sizing chamber, said fine-particle separating chamber having an outlet at an upper portion thereof for venting therefrom a mixture of fine particles and air produced in said separating chamber, ventilating means and at least one fine-particle separator located externally to said fine-particle separating chamber, said externally located ventilating means having a suction line connected to said externally located fine-particle separator and therethrough to said outlet and tangentially to said fine-particle separating chamber at said upper portion thereof, and having a compression line connected tangentially to said fine-particle separating chamber at a lower portion thereof.

2. Air classifier assembly according to claim 1 wherein said externally located ventilating means comprises a fan having means for varying the rotary speed thereof so as to vary the degree of separation effected by said fine-particle separator.

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