Feb. 16, 1932. A. H. STEBBINS 1,845,566

AIR CLASSIFIER

Filed May 24, 1929

Fig. 1

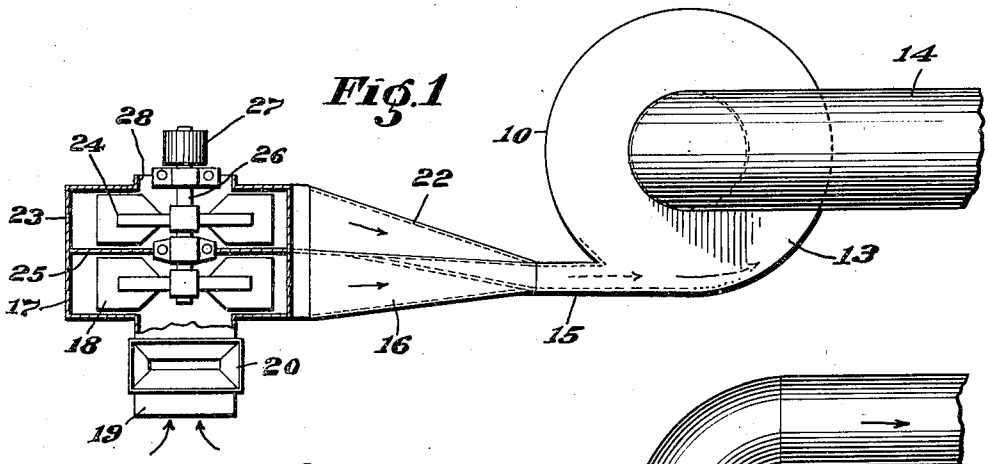


Fig. 2

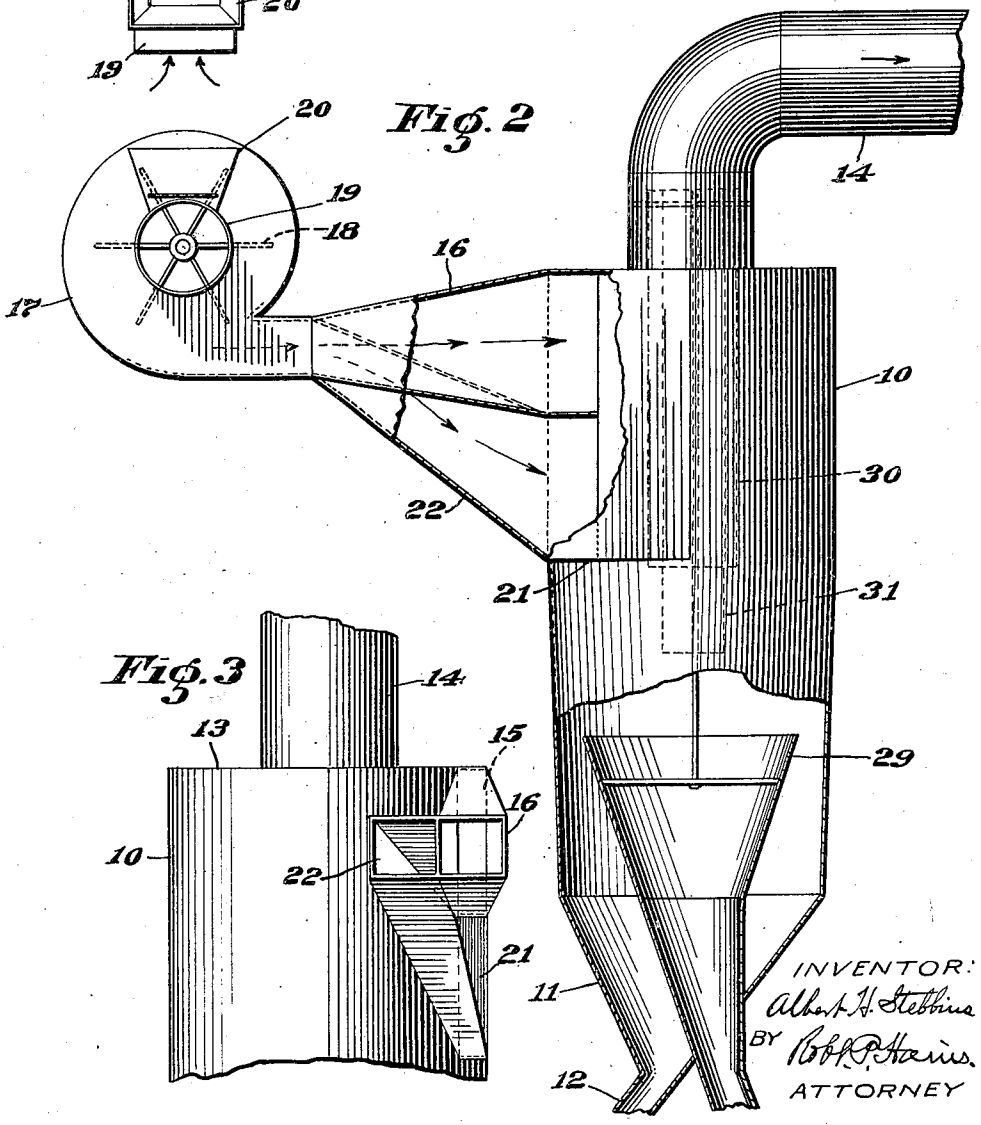


Fig. 3

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AIR CLASSIFIER

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This invention relates to air classifiers of the type in which material laden air is caused to rotate in a receptacle to promote a centrifugal separation of the heavier particles out of the whirling air.

In air classifiers of this general type employing centrifugal force to separate the heavier particles out of the whirling air, it is found that the finer particles tend to cling to the heavier particles, thus making it difficult to completely remove the finer from the heavier particles.

The present invention is therefore directed to an air classifier of the centrifugal type in which the particles that move downward in the receptacle toward the collecting hopper for the heavier materials are caused to pass through a zone of clean whirling air which serves to air-wash or air-cleanse the falling particles.

In carrying out this feature of the invention the material laden air is directed tangentially into the upper part of the classifying receptacle so that it will whirl therein to throw the heavier particles out by centrifugal force, and directly below this zone of whirling material laden air is directed tangentially into the receptacle a stream of clean air which serves to promote the whirling movement of the volume of material laden air and also to air-cleanse the particles moving downwardly into this zone of clean air.

The above and other features of the invention and novel combination of parts will be best understood from the following description when read in connection with the drawings showing one good practical form of the invention.

In the drawings—

Fig. 1 is a top plan view of an air classifier embodying the features of the present invention and having the double fan associated therewith, shown in section;

Fig. 2 is a side elevation of the construction of Fig. 1, parts being shown in section; and

Fig. 3 is a front elevation of part of the classifier of Fig. 2 and shows more particularly the air inlet pipes.

In the embodiment of the invention illustrated in the drawings the materials to be treated are delivered tangentially into a receptacle 10 which, in the construction shown, has the form of a cylinder and is supported in an upright position, and at the lower end of the receptacle 10 is provided the collecting hopper 11 having the discharge pipe 12 leading therefrom.

Air is conducted from the upper end 13 of the classifying receptacle by a pipe 14 which may lead direct to a second air classifier or dust collector, and since the material laden air and clean air employed in effecting the desired separation of materials is forced into the receptacle 10 by blast means to be described, it is unnecessary to connect the discharge pipe 14 to an exhaust fan or other mechanism for exhausting air from the receptacle 10.

In accordance with the present invention the materials to be separated are delivered tangentially into the receptacle 10 through the inlet pipe 15 which pipe, in the construction shown, is connected by a conduit 16 to the blast side of the fan casing 17. It will be apparent that the material laden air to be treated within the receptacle 10 may be supplied to the blast fan 18 within the casing 17 from various forms of dust producing machines, but in the construction shown air is supplied to the fan 18 from the atmosphere through the inlet pipe 19 which pipe is provided with the feed hopper 20 for delivering the materials to be treated into the stream of air entering the pipe 19 whereupon this material laden air will pass through the fan casing 17 and will be delivered to the receptacle 10 by the pipe 15 in the form of a blast which will promote whirling movement of the air within the receptacle to promote a centrifugal separation of the heavier particles out of the whirling air.

As above pointed out it is found that the lighter particles tend to cling to the heavier particles moving downwardly within the classifying receptacle so that it is difficult to completely separate the finer from the heavier particles. An important feature of the present invention therefore resides in means for directing a blast of clean air tangentially

into the receptacle 10 below the feed pipe 15 so that this blast of clean air will promote the whirling movement of the material laden air within the receptacle and will also provide a zone of clean air which will serve to cleanse the heavier particles as they move downwardly within the receptacle through the zone of clean air.

In the construction shown this blast of clean air is delivered tangentially into the receptacle 10 below the inlet pipe 15 by the pipe 21 which, in the construction shown, is connected by the conduit 22 to the fan casing 23 of the double fan casing shown in the drawings, and in this casing 23 is provided the fan 24. The arrangement is such that the inlet pipes 15 and 21 are disposed one below the other in vertical alignment to direct parallel blasts of air into the receptacle so that the materials that settle out of the stream delivered by the pipe 15 will be effectively swept by the clean air delivered by the pipe 21. The fan casings 17 and 23 are separated by a partition 25 and the two fans 18 and 24 may be mounted upon the driving shaft 26 provided with a driving pulley 27. Air from the atmosphere passes into the casing 23 through the air inlet pipe 28 and since it is desirable that the lower air supply pipe 21 deliver clean air into the receptacle 10, no provision is made for introducing the materials to be treated into the fan casing 23 or pipes leading therefrom.

The two fans just described will serve to impart a pronounced rotative movement to the air within the receptacle 10 which will serve to throw the heavier particles outwardly against the walls of the receptacle so that they will move downwardly adjacent these walls and settle in the collecting hopper 11, and as above stated these heavier particles will be subjected to a cleansing action as they pass through the zone of clean air supplied by the inlet pipe 21. The lighter particles which remain suspended in the air that reaches the discharge pipe 14 will pass out of the receptacle through this pipe.

The air near the central axis of the receptacle 10 will necessarily whirl less rapidly than the air traveling close to the walls of the receptacle and as a result the lighter particles tend to settle out of the air occupying the central portion of the receptacle. It is desirable to prevent these lighter particles from entering the hopper 11 containing the heavier materials and this may be accomplished by providing a second collecting hopper 29 disposed in the lower portion of the receptacle and in spaced relation to the side walls thereof, as shown in Fig. 2, to collect the finer particles moving downwardly within the central portion of the receptacle.

It may be desirable to remove a predetermined amount of air from different zones or levels within the receptacle 10 and this may be accomplished by providing a plurality of pipes 30 and 31 which are arranged to extend downwardly different distances within the receptacle 10 to conduct air from different zones or levels within the receptacle to the discharge pipe 14.

It will be seen that as a result of the construction above described whereby clean air is delivered into the classifying receptacle below the point at which material laden air is directed into the classifier, the heavier particles moving downwardly into this zone of clean air will be subjected to a cleansing operation which serves to remove the finer particles therefrom in a very satisfactory manner.

What is claimed is:

1. An air blast classifier comprising in combination, a receptacle having a collecting hopper at its lower end, means for conducting air from the upper portion of the receptacle, an inlet pipe extending tangentially into the receptacle and provided with an elongated discharge opening that extends lengthwise of the receptacle a substantial distance and which is divided transversely to form aligned upper and lower discharge nozzles, means for forcing a blast of material laden air into the receptacle through said upper nozzle and a blast of clean air into the receptacle through said lower nozzle to cause the materials to rotate within the receptacle to promote their centrifugal separation and to air-cleanse the heavier particles moving downwardly through the whirling clean air.

2. An air blast classifier comprising in combination, a receptacle having a collecting hopper at its lower end, means for conducting air from the upper portion of the receptacle, and means for delivering a blast of material laden air into the receptacle and a blast of clean air into the receptacle below the blast of material laden air, comprising a double fan, pipes leading from the double fan into the receptacle through a side wall thereof and arranged one directly below the other to direct blasts of air tangentially into the receptacle, means for supplying the materials to be treated to the upper pipe so that these materials will be carried into the receptacle by the air blast from one compartment of the fan to rotate in the receptacle so that the particles that move downwardly into the zone of the clean air supplied by the lower pipe will be subjected to an air sweeping action.

In testimony whereof, I have signed my name to this specification.

ALBERT H. STEBBINS.