

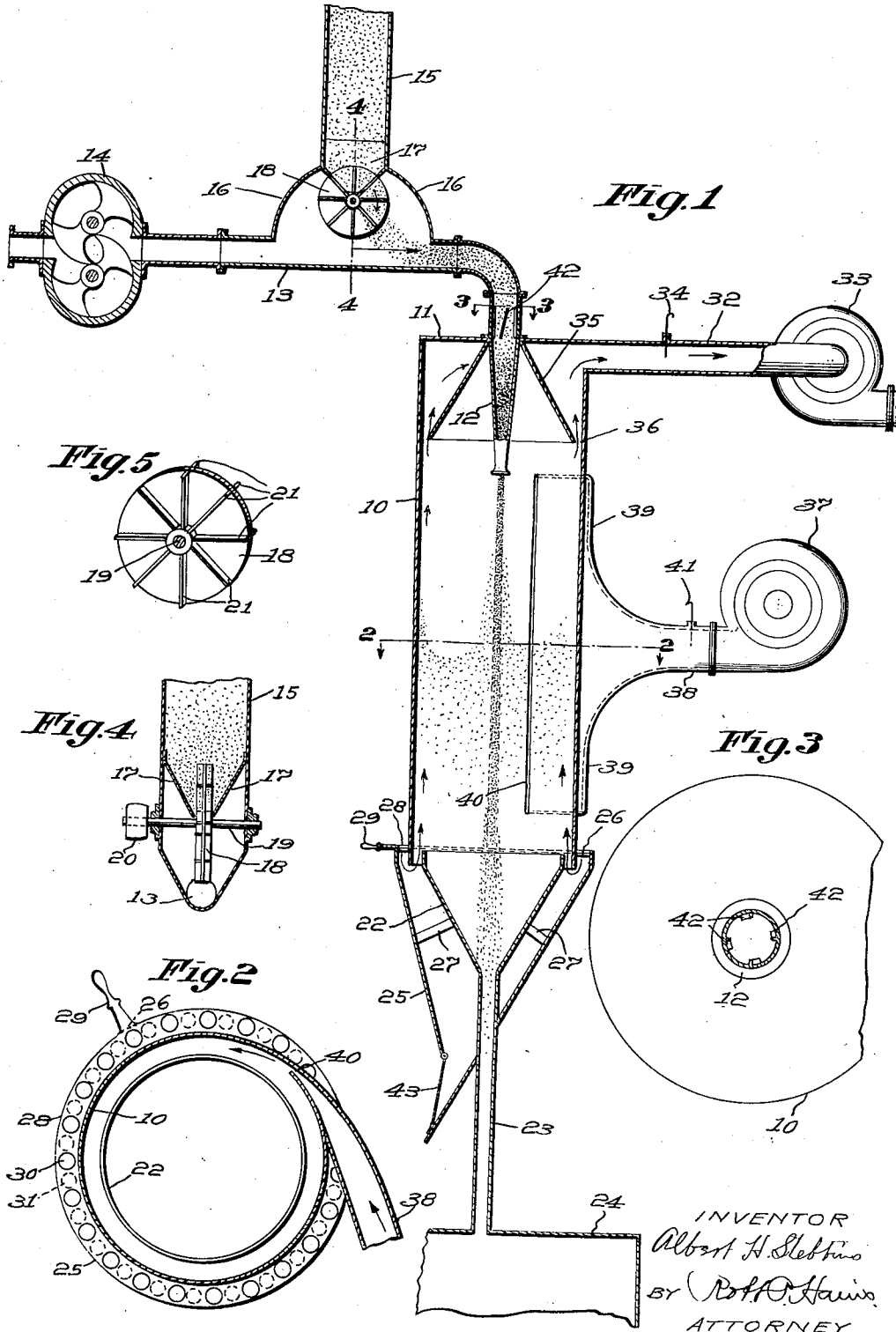
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AIR BLAST CLASSIFIER

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AIR-BLAST CLASSIFIER.

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This invention relates to a classifier for separating fine dust-like materials thru the use of a strong air blast that carries the materials to be treated into a separating casing.

If a strong blast of air bearing fine dust like particles is discharged from a pipe or nozzle the heavier particles in the air blast will be blown a greater distance from the nozzle than the lighter particles; in other words, the finer particles within the air blast will have less momentum than the heavier particles and will tend to move laterally out of the direct path of travel of the air blast.

This tendency of the lighter particles to separate out of the direct path of travel of an air blast is taken advantage of in carrying out the present invention, and one important feature of the invention resides in a casing having an air blast nozzle for delivering a strong blast of air carrying the materials to be separated into a casing, and in means for exhausting air from the casing to carry out of the casing the lighter particles that separate out of the air blast.

Another feature of the invention resides in a casing having an air blast nozzle at one end and a receptacle at its opposite end to receive the heavier particles blown into the receptacle by the force of the air while the lighter particles work laterally out of the path of the air blast before they reach the receptacle.

Still another feature of the invention resides in means for imparting a rotative movement to the air within the casing so that this air will more effectively remove the lighter particles that separate out of the air blast.

Other features of the invention and novel combination of parts in addition to the above will be hereinafter described in connection with the accompanying drawings which illustrate one good practical form of the invention.

In the drawings:—

Fig. 1 is a vertical sectional view thru an air blast classifier constructed in accordance with the present invention;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 on an enlarged scale is a sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1; and

Fig. 5 is a perspective view of a material feeding disk.

The air blast classifier of the present invention is designed to separate fine, dust-like materials, and the casing 10 in which the separation of the materials is effected may be variously constructed, and its shape may be varied as desired, but in the present case is shown as having the form of a cylinder which is supported in an upright position. The upper end of the casing 10 is closed by an upper wall 11.

An air blast bearing materials to be treated is delivered into the casing 10 by a nozzle 12 extending downwardly thru the upper wall 11 of the casing, and air under pressure is supplied to the nozzle by the conduit 13. A fan or blower 14 of any preferred or well known construction may be provided to supply air to the nozzle 12, but the fan or blower 14 should be constructed to supply air to the nozzle 12 under high pressure, because it is desirable that the nozzle deliver a strong blast of air into the casing 10. The means shown for delivering the dust-like materials to be treated to the air entering the casing 10 consists of a hopper 15 the lower end of which is connected to the conduit 13 by a hood like portion 16, and the lower end of the hopper 15 is provided with the inclined walls or floor plates 17 between which is provided a slot thru which the materials may pass into the conduit 13.

Since the air within the conduit 13 is under relatively high pressure the feed hopper 15 should be tall enough to retain a large amount of material so that the air under pressure within the conduit 13 will not be able to force its way up thru the materials within the receptacles 15. The materials within this receptacle may be quite fine and they may tend to pack therein at the lower end of the receptacle without passing thru the opening between the inclined walls 17. A rotating disk 18 mounted upon the shaft 19 may therefore be provided to rotate within the space between the plate 17 so that it will feed the materials thru this space into the conduit 13. The shaft 19 has its opposite ends journaled in the side walls of the receptacle 15 and the disk 18 may be driven by a pulley 20 secured to

one end of the shaft 19. The disk 18 is preferably provided with ribs 21 upon its opposite faces adapted to engage the materials and force them thru the space between the plates 17.

The heavier materials within the blast of air delivered by the nozzle 12 will be carried a substantial distance within the casing 10 by the force of the air, while the lighter particles having less momentum will tend to work laterally out of the path of the air blast. In order to separate the heavier particles from the lighter particles a receptacle of any suitable construction is provided in the lower portion of the casing 10 to receive these heavier particles. The receptacle shown has the form of a conical hopper 22 and a pipe 23 leads from the lower end of the hopper 22 to a closed receptacle 24 in which the heavier materials may accumulate.

It is desirable to provide an air inlet opening at the lower end of the casing 10 and it may also be desirable to provide a second receptacle at the lower end of the casing 10 to receive the materials that move downwardly within the casing adjacent its inner walls. In the construction shown an outer receptacle 25 is provided which surrounds the lower end of the casing 10 and may be secured to the casing by the annular flange 26 located between the upper end of the receptacle 25 and the outer wall of the casing 10; and the inner receptacle 22 may be supported within the outer receptacle 25 by the braces 27. It is desirable that means be provided for regulating the amount of air that enters the casing 10 at the lower end thereof, and this may be accomplished by providing a ring 28 mounted upon the annular flange 26 and having a handle 29 for rotating the ring thru a slight angle. Air inlet openings 30 and 31 are provided in the ring 28 and flange 26 respectively and the volume of air entering the lower end of the casing may be readily controlled by shifting the ring 28 to move its openings 30 into or out of alignment with the openings in the annular flange 26.

The lighter materials that move laterally out of the direct path of the air blast may be removed from the casing by exhausting the air therefrom, and in the construction shown a pipe 32 is provided leading from the upper end of the casing 10 to a suction fan 33, and the volume of air passing thru the pipe 32 may be controlled by adjusting the valve 34. The fan 33 serves to exhaust the air from the upper portion of the casing 10 and this causes air to enter the casing at its lower end and to pass upwardly within the casing, as indicated by the arrows, so that these rising air currents will carry off the lighter materials suspended within the air in the casing. The rising air currents at the opposite sides of the air blast within the cas-

ing should be substantially uniform, and a hood 35 is therefore provided in the upper portion of the casing so that it forms a relatively narrow air space between the inner walls of the casing 10 and the lower end of the hood, as indicated by 36. This annular air space will prevent air near one wall of the casing from flowing towards the exhaust means more rapidly than the air at the other side of the casing.

In some constructions it may be desirable to impart a rotative movement of the air rising within the casing 10 and to this end, in the construction shown, a blast fan 37 is provided having an air discharge pipe 38 the discharge end of which flares outwardly as at 39, and has a narrow slot like opening 40 which delivers air under pressure into the casing 10 near the wall thereof, to impart a rotative movement to the air within the casing, in the direction indicated by the arrow. The air delivered by the blast fan 37 may be controlled by adjusting the valve 41. In some cases it may be desirable to impart a slight rotative movement to the blast of air delivered by the nozzle 12 and this may be accomplished by providing inclined ribs 42 within the nozzle 12, which ribs may operate somewhat like the rifling of a gun barrel provided to impart a rotative movement to a bullet discharged from the rifle. The length of the ribs 43 and the distance they are located from the end of the nozzle may be varied as desired depending upon the strength of the whirling movement it is desired to impart to the air as it leaves the nozzle. In many constructions a very slight whirling movement will suffice to initiate the spreading movement of the lighter particles in the air and the ribs 42 are therefore shown as disposed at some distance from the end of the nozzle 12.

The operation of the air blast classifier above described is as follows: Air under relatively high pressure is delivered to the nozzle 12 by the fan or blower 14 and the materials to be treated are introduced into this air by the feed chute 15 having a rotating disk 18 at its lower end for insuring a continuous flow of materials from the feed chute into the conduit 13. The dust laden air delivered by the nozzle 12 enters the casing 10 in the form of a strong air blast which serves to carry the heavier particles thruout the length of the casing into the receptacle 22 while the lighter particles move laterally out of the path of the air blast before they reach the receptacle 22, and these lighter materials are carried upwardly by the air rotating within the casing 10 and moving upwardly towards the exhaust fan 33. The strength of the air used in carrying out the operation may be varied as desired by adjusting the valves 34 and 41 and the ring 28. The materials that move downwardly with-

in the casing 10 close to its walls will settle in the outer receptacle 25 and may be discharged therefrom at the lower end of the receptacle thru the swinging gate 43. The lighter materials that pass thru the suction fan 33 may be delivered thereby to any suitable type of dust collector to remove these fine particles from the air.

What is claimed is:—

1. An air blast classifier, comprising in combination, a casing constructed to provide a relatively long spacious air chamber therein and having a material receiving receptacle at one end, a nozzle located at the other end of the casing to deliver a strong blast of air carrying the materials to be treated lengthwise of the casing toward said receptacle so that the lighter particles are given an opportunity to work laterally out of the path of the air blast under the gradual retarding effect of the air within said chamber while the heavier particles are shot by the air blast into said receptacle, and means for conducting air from the casing to remove the lighter particles that work laterally out of the air blast.

2. An air blast classifier, comprising in combination, a substantially cylindrical casing mounted in an upright position and constructed to provide a relatively long spacious air chamber therein, a material receiving receptacle at the lower end of the casing, a nozzle located at the upper end of the casing to deliver a strong blast of air carrying the materials to be treated lengthwise of the casing toward said receptacle so that the lighter particles are given an opportunity to work laterally out of the path of the air blast under the gradual retarding effect of the air within the casing while the heavier particles are shot by the air blast into said receptacle, and means for removing air from the casing to carry out of the chamber the lighter particles that work laterally out of the air blast.

3. An air blast classifier, comprising in combination, a casing constructed to provide a relatively long spacious air chamber therein and having a material receiving receptacle at one end, an air blast nozzle located at the other end of the casing, means for delivering air to the nozzle at a pressure considerably in excess of atmospheric pressure to produce a strong jet of air carrying the materials to be treated lengthwise of the casing toward said receptacle so that the lighter particles are given an opportunity to work laterally out of the path of the air blast under the gradual retarding effect of the air within the casing while the heavier particles are shot by the air blast into said receptacle, and means at the nozzle end of the casing for removing from the casing the air bearing the lighter particles that work laterally out of the air blast.

4. An air blast classifier, comprising in combination, a substantially cylindrical casing mounted in an upright position and constructed to provide a relatively long spacious air chamber therein, a material receiving receptacle at the lower end of the casing, a nozzle located at the central portion of the upper end of the casing to deliver a strong blast of air carrying the materials to be treated lengthwise of the casing toward said receptacle so that the light particles are given an opportunity to work laterally out of the path of the air blast under the gradual retarding effect of the air within the casing while the heavier particles are shot by the air blast into said receptacle, means for introducing air into the casing through a side wall thereof to cause it to whirl around the air blast and produce rising air currents that carry upwardly within the casing the lighter particles that work laterally out of the air blast.

5. An air blast classifier, comprising in combination, a substantially cylindrical casing mounted in an upright position and constructed to provide a relatively long spacious air chamber therein, a material receiving receptacle at the lower end of the casing, a nozzle located at the upper end of the casing to deliver a strong blast of air carrying the materials to be treated lengthwise of the casing toward said receptacle so that the lighter particles are given an opportunity to work laterally out of the path of the air blast under the gradual retarding effect of the air within the casing while the heavier particles are shot by the air blast into said receptacle, means at the lower end of the casing for admitting air into the casing, and an air outlet at the upper end of the casing for conducting from the casing the lighter particles that work laterally out of the air blast.

6. An air blast classifier, comprising in combination, a casing constructed to provide a relatively long spacious air chamber therein and having a material receiving receptacle at one end, a nozzle located at the other end of the casing to deliver a strong blast of air carrying the materials to be treated lengthwise of the casing toward said receptacle so that the lighter particles are given an opportunity to work laterally out of the path of the air blast under the gradual retarding effect of the air within the chamber, means associated with the nozzle for imparting a rotative movement to the air as it issues from the nozzle, and means for conducting air from the casing to carry off the lighter particles that work laterally out of the air blast.

7. An air blast classifier, comprising in combination, an upstanding casing, a receptacle at the lower end of the casing and having its walls disposed inwardly and in

spaced relation to the side walls of the casing, a nozzle at the upper end of the casing for delivering air bearing the materials to be treated into the casing in the form of a blast that drives the heavier particles lengthwise of the casing into the receptacle, means for producing rising currents of air within the casing to carry upwardly therein the lighter particles that separate out of the air blast, and a second receptacle surrounding the first and positioned to receive the particles moving downwardly within the casing adjacent its walls.

8. An air blast classifier, comprising in combination, a casing mounted in an upright position, a receptacle at the lower end of the casing, a nozzle in the upper part of the casing for blowing a blast of air bearing the materials to be separated into the casing so that the heavier particles are shot into the receptacle by the air blast, means at the upper part of the casing for exhausting air from the casing to produce rising air cur-

rents therein that will carry out of the casing the lighter particles that separate out of the air blast, and a hood in the upper part of the casing and arranged in spaced relation to the walls of the casing to equalize the force of the rising air currents.

9. An air blast classifier, comprising in combination, a casing having a material receiving receptacle at one end, means for exhausting air at the other end of the casing to produce air currents traveling lengthwise of the casing, and a nozzle located centrally of the end of the casing last mentioned for blowing a blast of air carrying the materials to be treated lengthwise of the casing towards said receptacle so that the heavier particles are shot into the receptacle by the air blast while the lighter particles are carried in the opposite direction about the air blast by the first mentioned air currents.

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

ALBERT H. STEBBINS.