Feb. 28, 1928. 1,660,682

A. H. STEBBINS

AIR BLAST CLASSIFIER

Filed Jan. 8, 1926

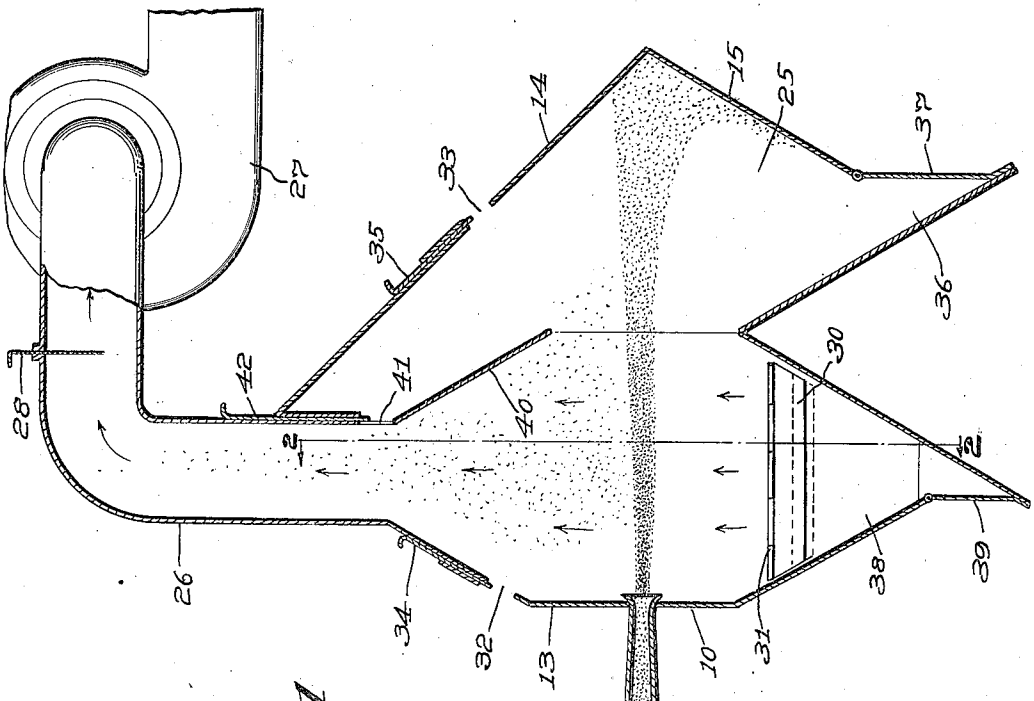


Fig. 1

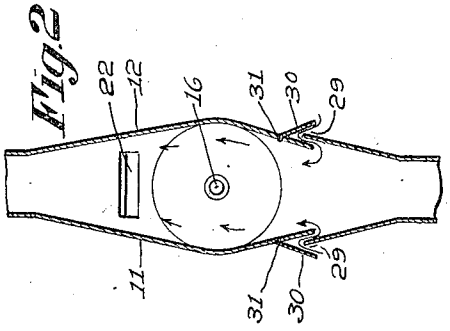


Fig. 2

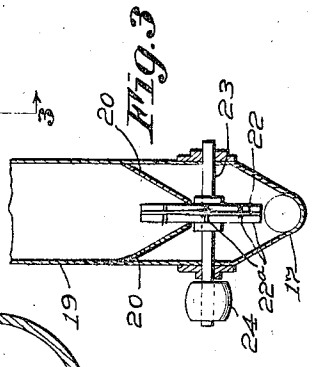


Fig. 3

INVENTOR:
Albert H. Stebbins
BY Robt. P. Haines.
ATTORNEY

Patented Feb. 28, 1928. 1,660,682

UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LOS ANGELES, CALIFORNIA.

AIR-BLAST CLASSIFIER.

Application filed January 8, 1926. Serial No. 79,935.

This invention relates to classifiers for separating fine dust-like materials and employs a strong air blast having the materials suspended therein in effecting the separating operation.

If a strong blast of air bearing fine particles that vary in size and specific gravity is discharged from a pipe or nozzle, the heavier particles will be carried a greater distance by the force of the air blast than the fine particles, due to their greater momentum, and the fine particles will tend to move laterally out of the direct path of the air blast.

This tendency of the lighter particles to separate out of the direct path of an air blast is taken advantage of in carrying out the present invention, and one important feature of the present invention resides in the arrangement whereby a strong blast of air bearing the materials to be separated is subjected to air currents that move transversely to the path of the air blast and carry off the lighter particles without disturbing the heavier particles.

A more specific feature of the invention resides in a casing having a nozzle for delivering a strong blast of air bearing the materials to be treated into the casing, and in means for exhausting air from the casing at one side of the air blast to produce air currents traveling around and laterally from the air blast to carry off the lighter particles.

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; and

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1.

The classifier of the present invention is designed more particularly for the treatment of fine, dust-like materials and the casing 10 in which the separation of the materials is effected may be given any desired shape, but is shown as comprising an upright casing having the opposite side walls 11 and 12 and the end walls 13, 14 and 15. The materials to be treated are blown into the casing 10 thru the pipe or nozzle 16 which may enter the casing thru the end wall 13. The opposite end walls 14 and 15 are shown as disposed a substantial distance from the wall 13 so that the air blast discharged by the nozzle 16 may travel a substantial distance before reaching the opposite walls of the casing.

Air under pressure is supplied to the nozzle 16 by the conduit 17 which may be provided with a fan or blower 18 of any suitable construction, but since the air should be discharged from the nozzle 16 in the form of a strong blast the fan or blower 18 should be so constructed that it will force air into the conduit 17 under relatively high pressure.

As stated, the fine dust-like materials to be treated are carried into the casing 10 with the blast of air, and in the construction shown means is provided for feeding a continuous supply of materials to the air passing to the nozzle 16. In the present case the fine, dust-like materials are fed to the conduit 17 by a hopper 19 which is provided near its lower end with the spaced inclined walls or floor plates 20 arranged to form a slot between them thru which the materials may pass into the conduit 17. The lower end of the hopper 19 is preferably secured to an enlarged portion 21 formed upon the conduit 17. The fine, dust-like materials supplied by the hopper 19 may tend to pack in the lower portion of the hopper against the inclined floor plates 20, and in order to insure a continuous flow of these materials to the conduit, a feed disk 22 may be provided secured to the operating shaft 23 the opposite ends of which shaft are journaled in the side walls of the hopper 19, and this shaft may be rotated by a pulley 24 secured to one end of the shaft. The disk 22 is preferably provided with ribs 22^a at its opposite sides which will engage the materials in the hopper when the disk is rotated, and will force the materials thru the slot into the conduit 17. This type of feeding means will feed the materials to the conduit 17 as long as the disk is rotated by the pulley 24, but the feeding of these materials will stop when the disk 22 stops rotating, as they tend to pack between the floor plates 22 and the sides of the disk. Due to the pressure of the air within the conduit 17 this air may tend to force its way up thru the materials in the hopper 19 and the hopper

is therefore made relatively tall as shown so that it will contain sufficient materials to prevent the air from moving upwardly thru the entire mass of materials.

As stated, the heavier materials within the blast of air delivered by the nozzle 16 will be carried further by the force of the air blast than the lighter particles, and as a result these heavier particles will be carried by the air blast over into the chamber 25 of the casing 10, while the lighter particles will tend to separate out of the air blast before they reach the chamber 25. Air currents which travel at substantially a right angle to the path of the air blast are provided for carrying out of the casing 10 the lighter particles that tend to separate out of the air blast, and while various constructions might be provided for producing these air currents, they are produced in the present case by exhausting air from the upper portion of the casing 10. This is accomplished by providing a pipe or conduit 26 which leads from the upper end of the casing 10 to a suction fan 27 and the amount of air drawn out of the casing by the suction fan 27 may be controlled by adjusting the valve 28 within the pipe 26. The casing 10 is preferably made relatively narrow in cross section, as will be apparent from Fig. 2, this construction being desirable because it will cause air currents rising within the casing 10 to pass relatively close to the air blast.

It is desirable to admit air from the atmosphere into the lower portion of the casing 10 so that it will be drawn upwardly toward and around the air blast to carry off the lighter particles, and in the construction shown the air inlet openings or slots 29 are provided in the lower portion of the casing 10, as will be apparent from Figs. 1 and 2. The size of these openings may be varied by providing the swinging doors 30 secured to the side walls 11 and 12 of the casing by hinges 31. These hinges may be made relatively stiff so that they will retain the doors in any position to which they may be adjusted; or other means may be provided for retaining the doors 30 in the desired position of adjustment. It may be desirable to admit air into the casing 10 at points above the air blast to vary the operation of the classifier, and to this end the casing is provided with the openings 32 and 33 which may be controlled by the sliding gates 34 and 35. From the construction just described it will be seen that the gates 31, 34 and 35 may be adjusted to determine whether air will be delivered to the casing 10 at points below or above the air blast.

The heavier materials that are carried a substantial distance across the casing 10 by the force of the air blast will settle in the chamber 25 and move downwardly into the discharge hopper 36 having the discharge gate 37, and the particles which settle out of the air blast before they reach the chamber 25 will move downwardly into the hopper 38 from which they may be discharged thru the gate 39. It may be desirable to provide a partition or wall 40 within the casing 10 and extending transversely within the casing to confine the rising air currents to the left hand side of the casing, viewing Fig. 1, and an opening 41 may be provided at the upper end of the partition 40 which opening is controlled by a sliding gate 42 to vary the strength of the air currents rising in the right-hand side of the casing 10. The lighter materials that are drawn out of the casing 10 by the suction fan 27 may be delivered to any suitable dust collector for further treatment.

The successful operation of the present classifier is due largely to the fact that when air under pressure is discharged from a nozzle it expands laterally from the central path of the air jet in more or less of the form of a cone, and the lighter particles are carried out of the direct path of the air jet by this expansion whereupon they are carried upwardly by the rising air currents within the receptacle. The heavier particles due to their greater momentum will not be deflected appreciably by the lateral expansion of the air just mentioned or by the rising air currents, and will be carried by their propelling force against the walls 14, 15. Such lighter particles as may be carried by the force of the blast into the second chamber 25 before they separate out of the air blast will be carried upwardly by the air exhausted from the chamber 25 through the opening 41, while the heavier particles that settle in the chamber 25 will move downwardly into the hopper 36 as above pointed out. The rotating disk 22 serves to feed the fine, dust-like materials continuously to the conduit 17 to be carried into the casing 10.

What is claimed is:—

1. An air blast classifier for separating fine dust-like materials, comprising in combination, a casing constructed to form a long narrow treatment chamber within which an air blast may travel a substantial distance along a straight uninterrupted path, a nozzle having a reduced discharge end located at one end of the casing to direct a jet-like blast of dust-laden air lengthwise of the treatment chamber so that the heavier particles will be shot by the force of the blast against the opposite end wall of the casing, means for forcing air bearing the materials to be separated through the nozzle under high pressure to impart to the different materials the same initial velocity so that as they travel along the path of the air jet the finer particles will be carried laterally out of the direct path of the air jet by the expansion of the air with-

in the air jet, means for introducing air into the treatment chamber below the air jet, and means for exhausting air from the upper portion of the casing to produce rising air currents that flow upwardly around the air jet to carry upwardly the lighter particles as they work out of the direct path of the air jet.

2. An air blast classifier for separating fine dust-like materials, comprising in combination, a casing constructed to form a long narrow treatment chamber within which an air blast may travel a substantial distance along a straight uninterrupted path, means for dividing the chamber transversely into different compartments, a nozzle having a reduced discharge end located at one end of the casing to direct a jet-like blast of dust-laden air lengthwise of the treatment chamber so that the heavier particles will be shot by the force of the blast lengthwise of the entire casing and against the opposite end wall thereof, means for forcing air bearing the materials to be separated through the nozzle under high pressure to impart to the different materials the same initial velocity so that as they travel along the path of the air jet the finer particles will be carried laterally out of the direct path of the air jet by the expansion of the air within the air jet, and means for exhausting air from the casing at one side of the air blast to produce air currents flowing around said air blast to carry off the lighter particles as they work out of the direct path of the air jet.

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

ALBERT H. STEBBINS.