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AIR BLAST CLASSIFIER

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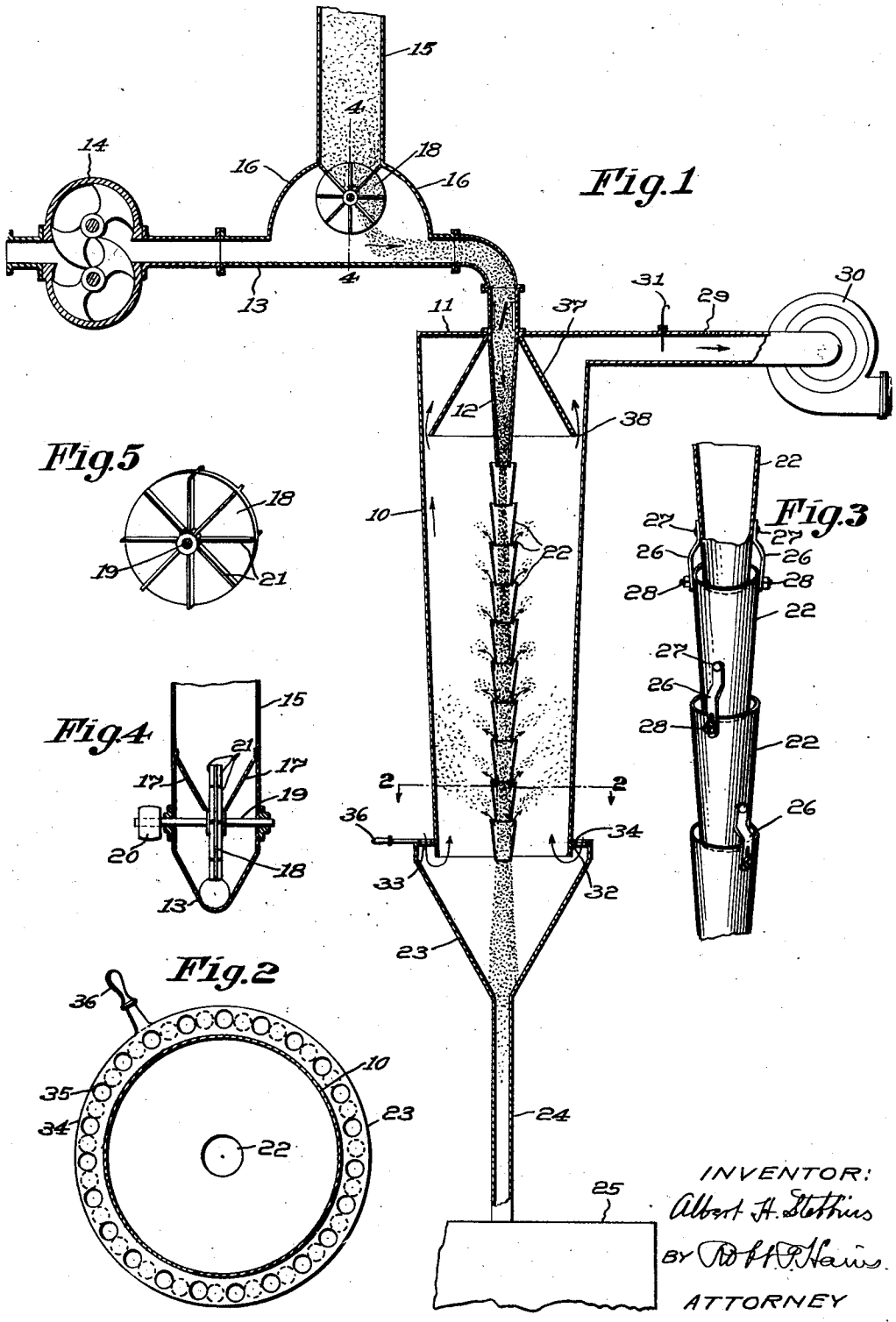


Fig.1

Fig.5

Fig.4

Fig.2

Fig.3

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AIR-BLAST CLASSIFIER.

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This invention relates to a classifier for separating fine materials by blowing air bearing the materials to be treated from a discharge pipe or nozzle in the form of an air blast.

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.

In carrying out the present invention this difference in the momentum of the particles in the air blast is utilized in effecting their separation, and one important feature of the present invention resides in a series of baffles arranged along the path of the air blast so that they will retard the progress of the lighter particles in the air blast without similarly retarding the movement of the heavier particles.

Another feature of the invention resides in a casing that encloses the air blast bearing the materials to be treated; and in means for producing air currents in the casing to carry off the lighter particles that escape laterally from the path 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 on an enlarged scale is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a perspective view of several of the nested nozzles or baffles;

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

Fig. 5 is a perspective view of a feed disk to be described.

The classifier of the present invention is designed for the treatment of fine, dust-like materials and the separating operation is effected in a casing 10 the shape of which may be varied as desired. This casing is shown in the drawings as approximately cylindrical in shape, altho it tapers slightly inwardly in a downward direction; however, this is not an essential feature of its construction.

The casing 10 is provided at its upper end with the wall 11, and the discharge nozzle 12 extends downwardly thru the upper wall 11 of the casing. Air under pressure is supplied to the nozzle 12 by the conduit 13, and this conduit may be connected to a blower or fan 14 of any desired construction for supplying air to the nozzle 12 under pressure. Since it is desirable that the nozzle 12 shall deliver air into the casing 10 in the form of a strong blast, the construction of the fan or blower 14 should be such that it will supply air to the nozzle at a relatively high pressure.

The materials to be treated are carried into the casing 10 with the air blast and means is therefore provided for feeding the materials into the path of the air traveling thru the conduit 13. This means might be variously constructed and as shown comprises a feed hopper 15 the lower end of which is secured to an enlarged portion 16 upon the conduit 13. At the lower end of the hopper 15 are provided the inclined walls or floor plates 17 positioned to form a slot between their lower ends thru which the materials may pass from the hopper 15 into the conduit 13. Since the air within the conduit 13 is under relatively high pressure, it will tend to work upwardly thru the materials in the hopper 15, and this hopper should therefore be sufficiently tall to contain a large quantity of the dust like materials which will prevent the air from working upwardly thru this entire mass of materials.

The fine dust like materials within the hopper 15 may tend to pack at the lower end of the hopper against the plates 17 and in order to insure a continuous feed of the materials into the conduit, a disk 18 may be provided to rotate within the slot at the lower end of the feed hopper, as best shown in Fig. 4. This disk may be secured to the operating shaft 19 the ends of which shaft may be journaled in the opposite walls of the hopper 15, and the shaft may be rotated by the pulley 20 secured to an end of the shaft. The disk 18 is preferably provided with shallow ribs 21 which will engage the materials in the lower end of the hopper and force them thru the feed slot into the conduit 13.

As stated, air bearing the materials to be treated is discharged from the nozzle 12 in the form of a strong air blast, and the heav-

ier particles within the air blast, due to their greater momentum, will be carried a greater distance by the air blast than the lighter particles. This tendency of the lighter particles to separate out of the air blast is taken advantage of in carrying out the present invention, and in order to increase the tendency of the lighter particles to separate out of the air blast, a number of baffles or nozzles 22 are positioned within the casing 10 in alignment with the discharge end of the air blast nozzle 12. The baffles 22 may be variously constructed, but are shown as conical shape and are disposed one in front of the other in nested relation. The arrangement is such that as the blast of air carrying the materials to be treated passes thru the row of baffles or nozzles 22, the air will crowd thru the smaller end of one nozzle after the other and this crowding action will cause some of the air bearing the lighter particles to pass outwardly in a lateral direction between adjacent baffles or nozzles 22, as indicated by the arrows. As a result of this construction the lighter particles will escape from the air blast between the various baffle plates or nozzles. The heavier particles which pass thru the series of baffles or nozzles 22 will be discharged into the receptacle 23 disposed at the lower end of the casing 10. This receptacle may be variously constructed and as shown is conical shaped and is provided with a pipe 24 leading from the lower end of the receptacle into a closed bin 25 in which the heavier particles may accumulate.

Various means might be provided for holding the individual nozzles or baffles 22 in spaced relation to each other and the means shown to this end consists of straps 26 the upper ends of which may be riveted to side walls of a baffle 22 as at 27, while the lower ends of the straps 26 may be adjustably secured to the upper end of the next baffle 22 by bolts 28. As a result of this construction one baffle or nozzle 22 may be raised or lowered relatively to the baffle to which it is secured to thereby vary the size of the opening between the baffles.

It is necessary to remove from the casing 10 the lighter particles that pass out between the baffles into this casing, and in the present case these lighter particles are removed by exhausting air from the upper end of the casing to produce air currents rising in the casing that will carry off the lighter particles. The means shown for exhausting the air from the upper portion of the casing 10 consists of a pipe 29 leading from the casing to a suction fan 30 and the volume of the air passing thru the pipe 29 may be controlled by adjusting the valve 31.

It is desirable to admit air at the lower end of the casing 10 to pass upwardly therein, and it is also desirable to provide means for controlling the volume of the air admitted at the lower end of the casing. In the construction shown this is readily accomplished by forming the receptacle 23 so that its upper portion surrounds the lower end of the casing 10 and is connected thereto by an annular flange 32 provided with a series of air holes 33 thru which air may pass into the casing, as indicated by the arrows. The amount of air admitted thru the openings 33 is conveniently controlled by providing a ring 34 that rests upon the annular flange 32 and has a number of air holes 35 which may be moved into or out of alignment with the holes 33 by rotating the ring thru a slight angle. A handle 36 provided upon the ring 34 enables the same to be easily rotated.

The air currents rising within the casing 10 may tend to flow more rapidly towards the exhaust means at one side of the casing than at the other. In order to equalize these air currents a hood 37 may be provided in the upper end of the casing and which extends downwardly in a flaring direction to form a relatively narrow slot or annular space 38 between the walls of the casing 10 and the lower end of the hood 37. This restricted air passage 38 will prevent the air at one side of the casing from flowing more rapidly towards the exhaust means than the air at the other side.

From the above description when read in connection with the drawings it will be understood that the air bearing the materials to be treated is delivered by the nozzle 12 into the casing 10 in the form of a strong air blast and that this air blast will serve to carry the heavier particles downwardly thru the series of nozzles or baffles 22 into the receptacle 23, while the lighter particles will be crowded out by the expanding air between the different baffles 22, as indicated by the arrows. The lighter particles that escape from the air blast into the casing 10 are carried upwardly by the rising air currents to the suction fan 30, which fan may deliver the air bearing these lighter particles to any suitable form of dust extractor for further treatment. The strength of the air passing upwardly within the casing 10 may be varied by adjusting the valve 31 and the ring 34.

What is claimed is:—

1. An air blast classifier, comprising in combination, a casing, a nozzle for blowing a blast of air bearing the materials to be treated thru the casing, a plurality of conical nozzles arranged in nested relation in alignment with the air blast nozzle so that the heavier particles will be shot by the air blast along a straight, uninterrupted path thru the series of nozzles while the lighter particles that tend to separate out of the direct path of the air blast will be crowded

out by the force of the air blast between the adjacent nozzles, and means for removing from the casing the air in which the lighter materials are suspended.

2. An air blast classifier, comprising in combination, a casing, a nozzle for blowing a blast of air bearing the materials to be treated thru the casing, a plurality of annular baffles arranged in alignment with the nozzle so that the heavier particles will be shot by the air blast along a straight, uninterrupted path thru the series of baffles while the lighter particles that tend to work laterally out of the path of the air blast will be crowded out between the baffles by the force of the air blast, and means for removing from the casing the air in which the lighter materials are suspended.

3. An air blast classifier, comprising in combination, a casing, a nozzle for blowing a blast of air bearing the materials to be treated thru the casing, a plurality of conical baffles arranged in alignment with the nozzle and having the tapered baffle walls converging in the direction in which the blast of air passes thru the baffles so that the heavier particles will be blown in a straight path by the air blast thru the successive baffles while the lighter particles that tend to work laterally out of the air blast are crowded by the force of the air blast out between the baffles, and means for removing the air bearing the lighter materials from the casing.

4. An air blast classifier, comprising in combination, an upstanding casing having an air inlet opening at its lower end, a nozzle at the upper end of the casing for blowing a blast of air bearing the materials to be treated centrally downwardly within the casing, to drive the heavier particles in a straight path through the successive baffles, a plurality of baffles that surround the blast of air delivered by the nozzle and constructed to cause the air blast to crowd out between the baffles the lighter materials that tend to work laterally out of the direct path of the air blast, and means for exhausting air from the upper portion of the casing to produce rising currents of air within the casing that carry off the lighter particles.

5. An air blast classifier, comprising in combination, an upstanding casing having an air inlet opening at its lower end, a nozzle at the upper end of the casing for blowing a blast of air bearing the materials to be treated downwardly within the casing, a plurality of baffles surrounding the blast of air delivered by the nozzle and disposed lengthwise thereof so that the heavier particles are shot along a straight uninterrupted path through the baffles while the lighter particles are crowded out between the baffles, means for exhausting air from the upper portion of the casing to produce rising currents of air within the casing that carry off the lighter particles, and a hood in the upper portion of the casing for rendering uniform the strength of the air rising about the air blast.

6. An air blast classifier, comprising in combination, a casing having a material receiving receptacle at one end, a nozzle at the other end of the casing for blowing a blast of air bearing the materials to be treated into the casing toward the receptacle so that the heavier particles are shot by the force of the air blast along a straight uninterrupted path into the receptacle, and a plurality of baffles surrounding the path of the air blast and constructed and arranged to form a passage that is sufficiently small in diameter to cause the air blast to crowd out between the baffles the lighter particles that work out of the direct path of the air jet while permitting the heavier particles to be shot along a straight path through the baffles into the receptacle.

7. An air blast classifier, comprising in combination, a nozzle for delivering a strong blast of air bearing the materials to be separated, a receptacle spaced a substantial distance from the nozzle and in position to receive the heavier particles carried into the receptacle by the air blast, and a plurality of baffles disposed around the air blast and longitudinally thereof and adapted to cause the air blast to crowd the lighter particles out between the baffles without arresting the heavier particles, the air blast being of sufficient strength to shoot the heavier particles through the successive baffles.

8. An air blast classifier, comprising in combination, a casing, a nozzle for blowing a blast of air bearing the materials to be treated centrally through the casing in the form of a strong jet, a plurality of annular baffles arranged in alignment with the nozzle so that the heavier particles are shot by the air blast along a straight uninterrupted path through the series of baffles while the lighter particles that tend to work laterally out of the jet will be crowded out between the baffles, and means for removing from the casing the air in which the lighter particles are suspended.

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

ALBERT H. STEBBINS.