T. J. STURTEVANT.

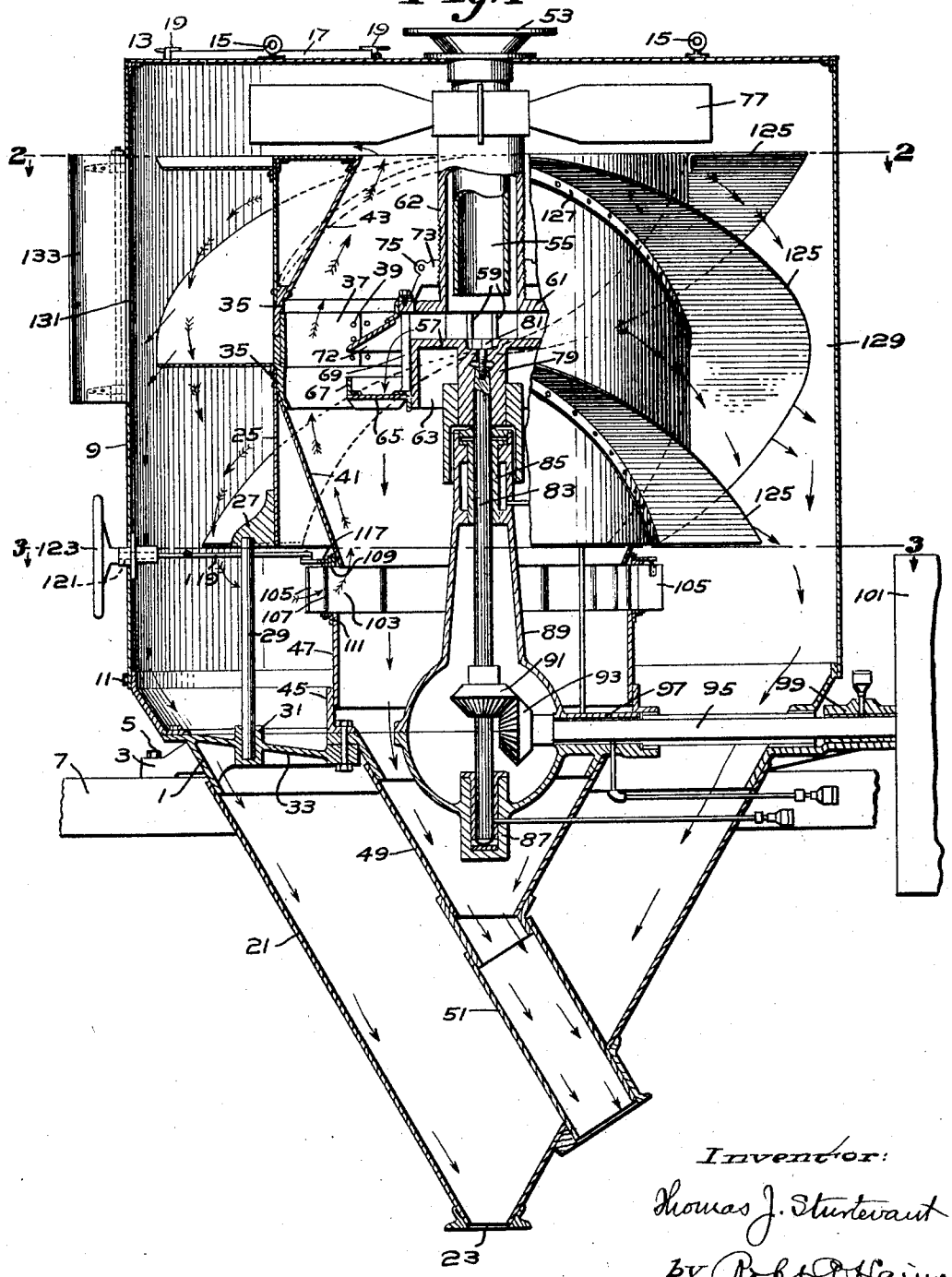
AIR SEPARATOR.

APPLICATION FILED NOV. 17, 1919.

1,385,847. Patented July 26, 1921.

2 SHEETS—SHEET 1.

Fig. 1



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2 SHEETS—SHEET 2.

Fig. 2

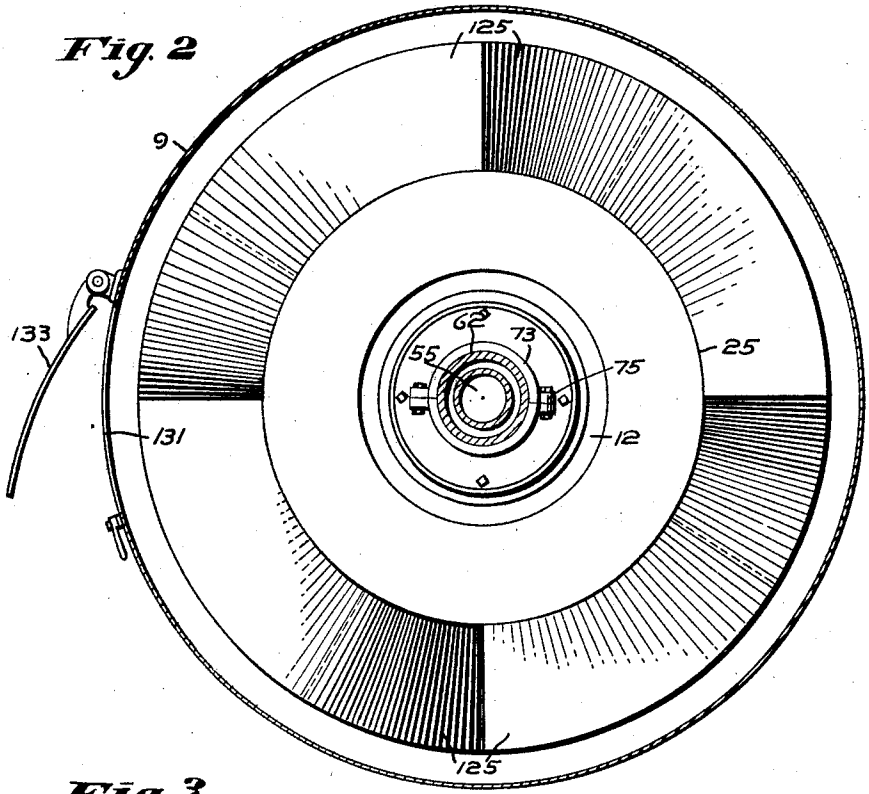
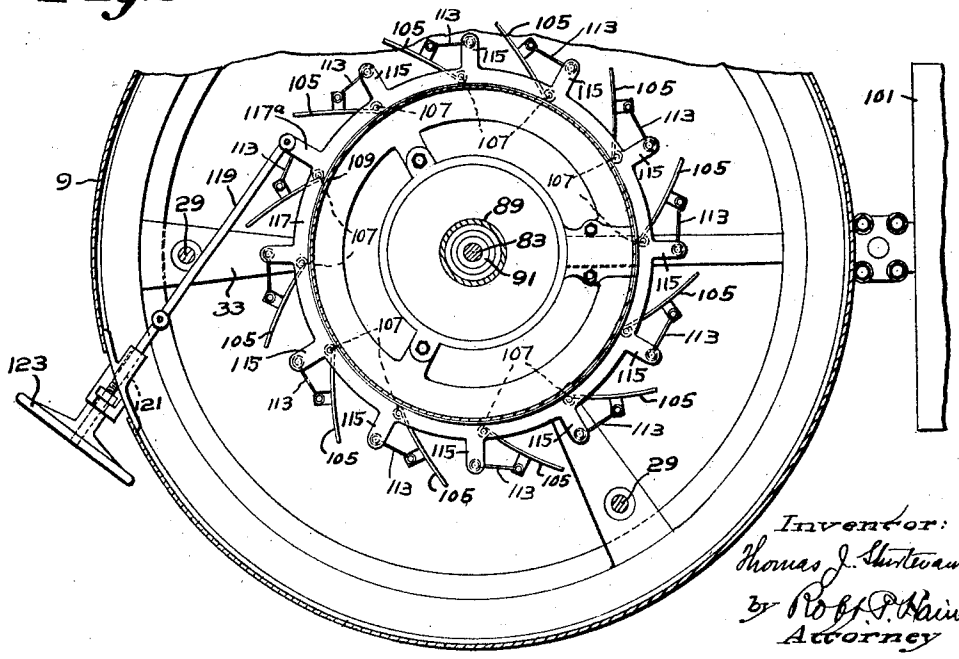


Fig. 3



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UNITED STATES PATENT OFFICE.

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AIR-SEPARATOR.

1,385,847. Specification of Letters Patent. Patented July 26, 1921.

Application filed November 17, 1919. Serial No. 338,622.

To all whom it may concern:

Be it known that I, THOMAS J. STURTEVANT, a citizen of the United States, residing at Wellesley, in the county of Norfolk and State of Massachusetts, have invented an Improvement in Air-Separators, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The invention to be hereinafter described relates to air separators, and more particularly to separators of the type disclosed in my copending application, Serial No. 329,094, filed October 7, 1919.

This type of separator comprises a casing containing outer and inner chambers in communication with each other and provided respectively with discharge outlets. A current of air is circulated through said chambers by a fan, and the materials to be graded are introduced into the inner chamber and thrown outward by a rotary distributer into the path of the air current rising in the inner chamber. The lighter particles are carried with the rising current over into the outer chamber and are discharged through the outlet therefor.

The air current passes downward in the outer chamber and returns to the inner chamber through an opening between them. Since the lighter particles are carried downward with this current in the outer chamber, it is important to prevent so far as possible return of the lighter particles with the air current into the inner chamber. In my said copending application, guides are disclosed in the form of conduits embracing the outer casing and arranged to receive the air current and the lighter particles from the fan, and to conduct the same to the outer chamber with a whirl effect producing a pronounced centrifugal force action on the lighter particles which causes them to tend to move downward in the outer chamber closely adjacent to the outer casing and remote from the air current return opening between the outer and inner chambers. Thus, only a small percentage of the lighter particles can return with the air current into the inner chamber.

The guides or conduits referred to, constitute good, efficient means for the purposes, but in some instances it may be desired more positively to guide or control the air current and the lighter particles in their transit through the outer chamber past the return opening between the chambers. One of the purposes of the present invention, therefore, is to provide guide means for more positively controlling the air current and lighter particles. In the present instance of the invention, in carrying this feature of the invention into practical effect, a plurality of guides or chutes are provided in the outer chamber, and are of a winding or spiral character. The construction is such that a pronounced whirl effect of the air currents and lighter particles is produced which reduces the percentage of the lighter particles returned with the air current into the inner chamber to such an extent that highly efficient grading effect of the particles is accomplished.

Another purpose of the invention is to provide a simple, compact and readily accessible construction for the purposes.

With the aforesaid and other objects in view, the character of the invention may be best understood by reference to the following description of one good form thereof shown in the accompanying drawings, wherein:

Figure 1 is a vertical section through the separator shown herein as one good form of the invention;

Fig. 2 is a horizontal section taken on line 2—2 of Fig. 1; and

Fig. 3 is a horizontal section taken on line 3—3 of Fig. 1.

Referring to the drawings, the separator shown therein as one good form of the invention, comprises a support, in the present instance, in the form of a ring 1 (Fig. 1) having feet 3 adapted to be secured by bolts 5 to beams 7 or other appropriate supporting means.

Mounted on the foundation ring is an outer casing 9 detachably secured to the foundation ring by screw bolts 11. The outer casing may be provided with a head 13 provided with eyes 15 adapted to be connected to a suitable tackle which may be used for lifting the outer casing from the foundation ring when access to parts contained within said casing is desired. To permit access to the interior of the outer casing without removal thereof, it may be

provided with a manhole normally closed by a cover 17 adapted to be secured by fasteners 19.

A conical casing 21 is secured to and depends from the foundation ring 1, and is provided with an outlet 23 at the lower end thereof.

Within and spaced from the outer casing is an inner casing 25 conveniently of cylindrical form and provided at the lower end thereof with feet 27 resting on posts 29 set in sockets 31 in brackets 33 projecting inward from the foundation ring 1. The construction is such that when the outer casing is removed from the foundation ring, the inner casing 25 may be readily lifted from the posts 29 to allow ready access to parts within the inner casing.

The inner casing, in the present instance, has a pair of rings 35 secured thereto receiving between them a baffle plate 37 which may be formed in three or more sections as desired. These sections may be detachably secured between the rings 35 by suitable bolts 39, the construction being such that when the baffle plates become worn, others may be readily substituted therefor.

Depending from one of the rings 35 is a conical casing 41, and rising from the other ring 35 is a conical casing 43. Mounted on the inner ends of the brackets 33 is a ring 45 having a collar 47 secured to the upper end thereof, and a conical casing 49 secured to the lower end thereof, said conical casing communicating with a discharge chute or outlet 51 for conducting the heavier particles from the inner chamber, as more fully hereinafter described.

Suitable means may be provided for introducing the materials to be graded into the inner chamber. To accomplish this, in the present instance, a hopper 53 is mounted on the head of the outer casing, and has a feed tube 55 depending therefrom.

To distribute the materials from the feed tube into the path of the air current rising in the inner chamber, a rotary distributer may be provided, in the present instance, in the form of a table 57 having vanes 59 rising from a peripheral portion thereof and surmounted by a ring 61 at the lower end of a sleeve 62 encircling the feed tube 55. Depending from an edge of the table is an apron 63. An annular dish 65 encircles said apron, and has an upstanding flange 67. The annular dish is carried by posts 69 depending from a ring which is secured to a split ring 73 threaded to the sleeve 62, and secured by bolts 75. A hood 71 is secured to the ring from which the posts depend, and the hood is supported over the dish 65 so as to direct or deflect materials from the table down to the dish 65. The construction is such that when the distributer is rotated, the materials delivered by the feed tube thereto will strike the table 57, pass outward between the vanes 59 onto the table 65 and under the influence of centrifugal force will flow over the upstanding flange 67 of the table into the path of the air current rising in the inner chamber.

Suitable means may be provided for producing the air current circulating through the inner and outer chambers. This means, in the present instance, is in the form of a fan 77 mounted on the upper end of the sleeve 62 referred to.

Suitable means may be provided for rotating the distributer, the sleeve 62 and the fan 77. This means, in the present instance, comprises a hub 79 depending from the table 57 and detachably secured by a screw bolt 81 to the conical upper end of an upright shaft 83 journaled in bearings 85 and 87 in a casing 89. The upright shaft 83 may be driven by a bevel gear 91 thereon meshing with a bevel gear 93 on a horizontal shaft 95 journaled in a bearing 97 carried by the casing 89 and in a bearing 99 carried by the foundation ring. At the outer end of the horizontal shaft 95 is a pulley 101 which may be driven by a belt from any suitable source of power.

The construction is such that the table, dish, hood, sleeve and fan may be readily rotated by means of the simple transmission described. The fan will create an air current which will circulate through the inner and outer chambers, and may flow in the general direction indicated by the tail arrows in Fig. 1.

The air current may return from the outer chamber into the inner chamber through an opening 103 conveniently between the conical casing 41 and the collar 47. It is desirable to vary the strength of the air current passing through this opening. To accomplish this, in the present instance, said opening may be provided with a series of valves or deflecting vanes 105 (Figs. 1 and 3) having inner ends pivotally mounted on vertical pins 107 between and secured to angle rings 109 and 111 mounted on the conical casing 41 and the collar 47 respectively.

To open and close these valves or vanes and hold them in different positions of adjustment, in the present instance, said valves or vanes are connected by links 113 with arms 115 projecting radially from an adjusting ring 117 mounted on the angle ring 109 referred to. One of the arms 117^a may be longer than the others and may be connected by a rod 119 to a screw 121 threaded in the hub of a hand wheel 123 located externally of the outer casing 9, where it is conveniently accessible. On rotation of the hand wheel the screw 121 will be adjusted in the hand

wheel hub and will thereby adjust the rod 119 longitudinally and adjust the ring 117 rotatably on the angle ring 109, and said adjusting ring in turn will operate through the links 113 to open and close the valves or vanes any extent desired.

As stated, one of the purposes of the invention is to provide means for guiding the air current and the lighter particles carried thereby in their transit through the outer chamber, and to produce a centrifugal force action on the lighter particles which will cause the same to pass downward through the outer chamber remotely from the return opening between the outer and inner chambers. This means, in the present instance of the invention, comprises one or more guides or chutes 125, in the present instance, four such guides or chutes being shown extending in a spiral or winding path about the cylindrical inner casing 25 from the upper end of the inner casing to the lower end thereof. These guides or chutes may be supported by any suitable means, but in the present instance, their inner edges are provided with flanges 127 which may be riveted or otherwise secured to the inner casing 25. The width of these guides or chutes may vary according to conditions as desired. When extremely light material, such, for example, as tobacco stems are to be graded, it may be expedient to have said guides or chutes of a width to extend from the inner casing to the outer casing, but in the present instance, said guides or chutes are shown as having a width such that they terminate short of the outer casing so as to leave a passage 129 between them.

Access may be had to the sectional baffle plate and other parts within the inner chamber through the manhole referred to, in the head of the outer casing. To furnish access to parts within the outer chamber and to enable observance of conditions in said chamber, the outer chamber may be provided with an opening 131 normally closed by a door 133.

In operation, the materials to be graded are introduced into the hopper 53 and pass thence through the feed tube 55 to the rotary distributer. They are thrown out by the latter under the influence of centrifugal force into the path of the air current rising through the inner chamber. The lighter particles will be carried by the air current upward through the inner chamber into the fan chamber, and thence outward past said fan into the outer chamber. On reaching the latter, the particles will slide down along the winding or spiral guides which will serve positively to guide the air current and particles in a winding or whirling path down through the outer chamber. The whirling movements generate a centrifugal force which causes the particles to tend to slide outward laterally along the guides toward the outer casing, and if the guides terminate short of the latter so as to leave a passage 129, the lighter particles will fall from the outer edges of the guides and be carried down through the passage 129. In either case the lighter particles will be caused to move downward closely adjacent to the outer casing and pass the return opening 103 between outer and inner chambers sufficiently remotely therefrom, so that only a very small percentage of the lighter particles will be carried by the air current back through the return opening into the inner chamber. The lighter particles thus positively guided and thrown outward toward the outer casing will gravitate downward through the conical casing 21 and issue from the outlet 23 at the lower end thereof. The heavier particles, on the other hand, will gravitate down through the air current rising in the inner chamber and pass through the collar 47, the conical casing 49 and issue through the chute 51.

The valves or vanes 105 may be set at an angle to further promote the whirl effect of the air current passing through the return opening between the outer and inner chambers, and the angle of said valves or vanes may be varied according to conditions to vary the strength of the air current for producing the most efficient grading effect.

It will be understood that the invention is not limited to the specific embodiment shown, and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What is claimed is:—

1. An air separator, comprising, in combination, a casing having communicating outer and inner chambers, a vertical shaft within said casing, a fan secured to said shaft and operated thereby to produce a rising air current in the inner chamber and a downward air current in the outer chamber, a distributer operated by said shaft to introduce materials to be graded into the path of the rising air current, and winding guides in the outer chamber for directing the whirling air current produced by the fan spirally downward within the outer chamber, thereby to throw the lighter particles by centrifugal force away from the communication between the chambers, said winding guides having their upper ends positioned adjacent the fan.

2. An air separator, comprising, in combination, a casing having communicating outer and inner chambers, a fan in the upper part of the casing for producing a rising air current in the inner chamber and a downward air current in the outer chamber, means to introduce materials to be graded in the path of the rising air current in the inner chamber, and spiral means in the outer chamber for directing the whirling air current produced by the fan downward within

the outer chamber, thereby to throw the lighter particles by centrifugal force away from the communication between the chambers, said spiral guide means having their upper ends positioned in close proximity to the fan.

3. An air separator, comprising in combination, a casing having communicating outer and inner chambers, a fan in the casing for producing an air current traveling in a circuit through said chambers, means to introduce materials to be graded in the path of the air current in the inner chamber, and spiral guide means in the outer chamber for directing the whirling air current from the fan laterally to the plane in which the fan rotates while the current continues its general whirling direction, thereby to direct the whirling current past the communication between the chambers and to throw the lighter particles by centrifugal force outward away from the communication to prevent the lighter particles from entering the communication.

4. An air separator, comprising in combination, a casing having communicating outer and inner chambers, a fan in the casing for producing an air current traveling in a circuit through said chambers, means to introduce materials to be graded in the path of the air current in the inner chamber, winding guide means in the outer chamber for directing the whirling air current from the fan laterally to the plane in which the fan rotates while the air current continues to whirl in the same general direction, thereby to direct the whirling current past the communication between the chambers and to throw the lighter particles by centrifugal force away from the communication, and valve means at the communication for controlling the passage of the air current from the outer to the inner chamber.

5. An air separator, comprising in combination, a casing having communicating outer and inner chambers, a fan in the casing for producing an air current traveling in a circuit through said chambers, means to introduce materials to be graded in the path of the air current in the inner chamber, and winding guides in the outer chamber extend laterally from the fan to direct the whirling air current produced by the fan laterally to the plane in which the fan rotates while the air currents continue to whirl the same general direction, thereby to direct the whirling current past the communication between the chambers and to throw the lighter particles by centrifugal force away from the communication, said winding guides having outer edges spaced from the casing to allow lighter particles to pass down between said edges and casing.

6. An air separator, comprising in combination, a casing having communicating outer and inner chambers, a fan in the outer chamber for producing an air current traveling in a circuit through said chambers, means to introduce materials to be graded in the path of the air current in the inner chamber, said fan operable to produce whirling air currents within the outer chamber, and winding guide means within the outer chamber and extending from a position adjacent the fan laterally to the plane in which the fan rotates to direct the whirling air currents laterally from the fan while they continue to whirl about the outer chamber, thereby to throw the lighter particles by centrifugal force away from the communication between the outer and inner chambers.

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

THOMAS J. STURTEVANT.