G. S. EMERICK.

AIR SEPARATOR.

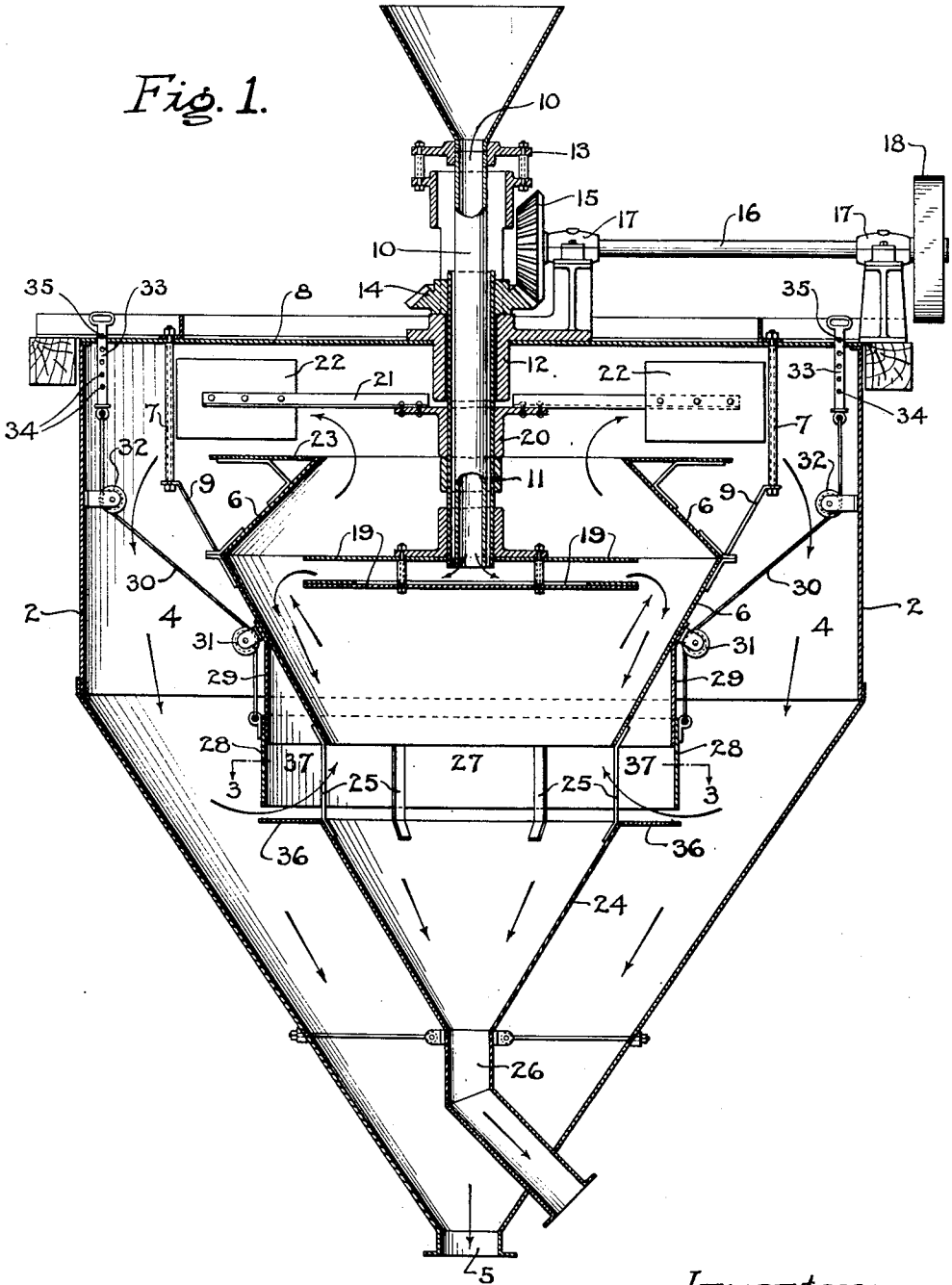
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1,355,596.

Patented Oct. 12, 1920.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor:-

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by his Attorney

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2 SHEETS—SHEET 2.

Fig. 2.

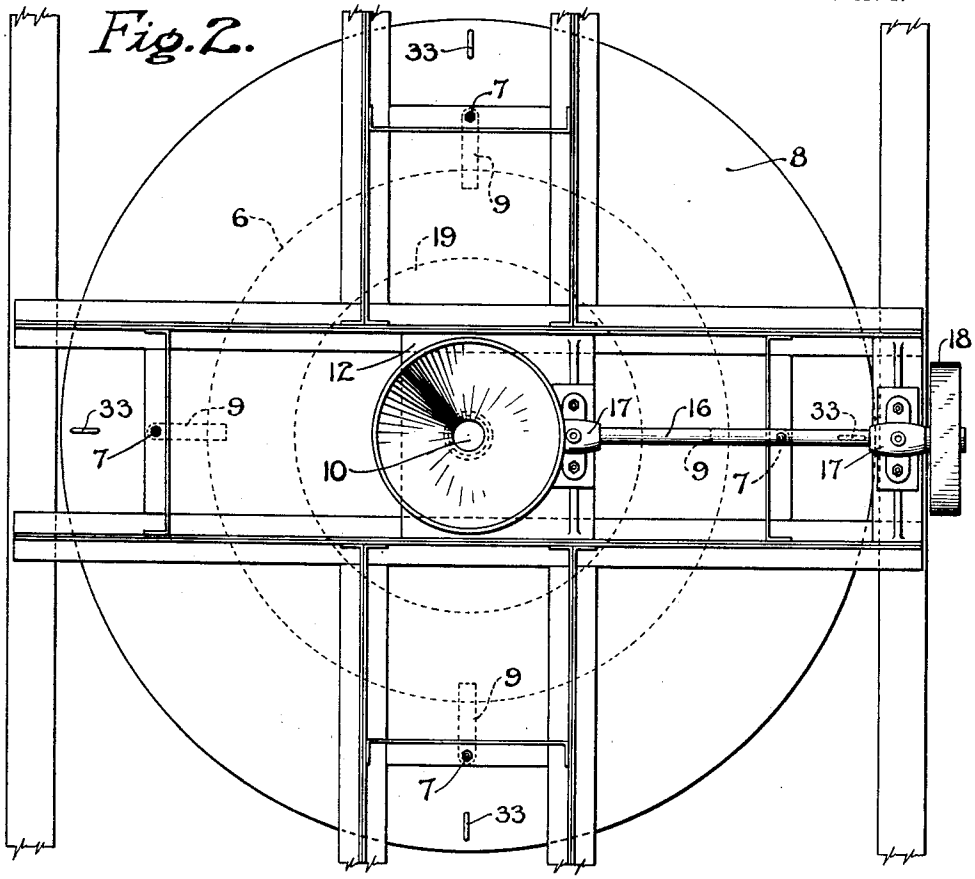
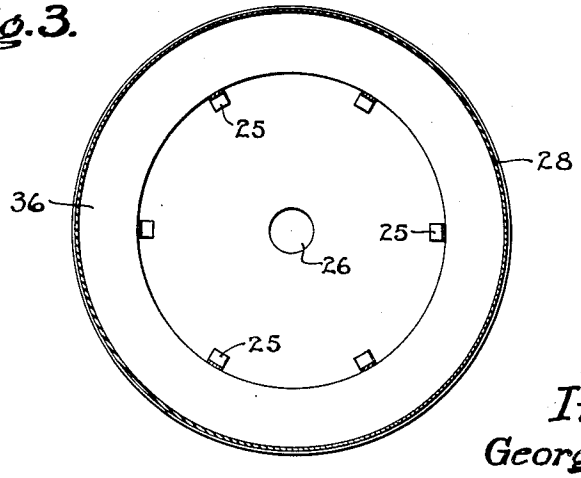


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE S. EMERICK, OF EASTON, PENNSYLVANIA, ASSIGNOR TO EMERICK MILL CO., OF EASTON, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

AIR SEPARATOR.

1,355,596. Specification of Letters Patent. Patented Oct. 12, 1920.

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To all whom it may concern:

Be it known that I, GEORGE S. EMERICK, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Air Separators, of which the following is a specification.

My invention relates to improvements in air separators of the general type disclosed in my previous Letters Patent No. 1,263,394, dated April 23, 1918, which may be referred to; and the object of my present invention is to provide a novel and advantageous means for regulating and diffusing or spreading the volume of separating air as it approaches the space between the two receptacles through which the material descends in its passage through the receptacles, during the separating operation.

With this above object in view, my invention consists in the novel construction and combinations of parts hereinafter described and claimed.

In the accompanying drawings, illustrating my invention,

Figure 1 is a vertical section through a separator, embodying my invention.

Fig. 2 is a top view thereof.

Fig. 3 is a horizontal section through a portion of the air controlling means, on line 3—3 of Fig. 1.

Referring to the drawings, 2 designates the outer casing of the machine which incloses the separating chamber 4. The lower portion of the casing 2 is made tapering and is provided with a discharge opening 5 in the bottom thereof for the discharge of the finer particles of the separated material.

Within the upper portion of the chamber 4 and spaced from the casing 2 is the upper receptacle 6 which has an open top and an open bottom and which is supported by bolts 7 depending from the top 8 of the casing 2 and connected to brackets 9 which project outwardly from the receptacle 6.

Extending vertically through the top 8 of the casing 2, centrally thereof, is a feed pipe 10 through which the material to be separated is fed to the machine. This pipe 10 extends down into the receptacle 6 through a hollow, vertical shaft 11 which is mounted to turn in a suitable bearing on the top 8 of the casing 2. The pipe 10 is supported by a bracket 13 on the top 8. The shaft 11 is provided with a bevel gear wheel 14 in mesh with a similar wheel 15 on a horizontal shaft 16 which turns in bearings 17 on the top 8 of the casing 2. The shaft 16 is provided with a pulley 18 by means of which it and the shaft 16 may be rotated. The bottom of the shaft 11 carries a pair of spaced, round disks 19, the upper one of which has a central opening therein through which the lower end of the feed pipe 10 extends. The material to be separated is discharged from the bottom of the pipe 10 upon the lower plate 19, and, during the rotation of the shaft 16, the material is discharged by centrifugal force from the edge of the lower plate 19 into the receptacle 6.

Secured to the shaft 11 is a collar 20 provided with outwardly projecting arms 21 which carry fan blades 22 within the chamber 4 and above a horizontal plate or flange 23 which extends outwardly from the top of the receptacle 6, whereby, when the shaft 11 is rotated, air is caused to circulate through and around the receptacle 6, as will be hereinafter explained.

The central portion of the receptacle 6 is expanded and the feed plates 19 extend into the expanded portion of the receptacle, and the diameter of the plates 19 is equal to or greater than the diameter of the open top and the diameter of the open bottom of the receptacle 6, so that all air passing up through the receptacle 6 will be caused to pass through the curtain of material falling from the feed plates 19. The portion of the receptacle 6, below the feed plates 19 is tapered inwardly and downwardly to receive the ground material from the feed plates 19 and cause it to descend by gravity and to be thereby discharged from the open bottom of the receptacle 6.

The lower receptacle 24 is located below the upper receptacle 6 and is spaced therefrom and has an upper open end of a diameter which is equal to or greater than the diameter of the open bottom of the upper receptacle 6, so that the curtain of material falling from the bottom of the upper receptacle 6 will be received within the lower receptacle 24. The lower receptacle 24 is supported by spaced arms or brackets 25 which extend vertically between the receptacles 6 and 24 and are secured thereto. The lower

receptacle 24 is made tapering or funnel shaped and its lower end terminates in a downwardly extending pipe 26 which extends outwardly through the casing 2 for the discharge of the larger particles of the separated material.

The construction and operation of the parts thus far described are substantially the same as disclosed in my previous Letters Patent hereinbefore referred to.

Surrounding the space 27 between the receptacles 6 and 24, outwardly thereof, is a cylindrical valve 28 the upper portion of which surrounds the lower portion of a cylindrical wall 29 which depends from and has its upper end secured to the upper receptacle 6. The valve 28 is slidably fitted to the wall 29 to permit the valve 28 to be adjusted vertically thereon.

The valve 28 is supported by suitable cables 30 having their lower ends connected to the upper end of the valve and extending upwardly therefrom, over and under guiding rollers 31 and 32 supported on brackets on the receptacle 6 and casing 2, respectively. The upper ends of the cables 30 are connected to the lower ends of vertically movable bars 33 which extend through openings in the top 8 of the casing 2 and have suitable handles on the upper ends thereof, by means of which the bars 33 and therewith the valve 28 may be raised and lowered. The bars 33 are provided with perforations 34 which extend horizontally therethrough to receive pins 35 which are adapted to engage the top of the casing 2 and support the bars 33 and valve 28 in different positions of adjustment. By simultaneously raising or lowering the bars 33, the valve may be raised or lowered, and after the valve 28 has been raised or lowered, the pins 35 are inserted into the perforations immediately above the top wall 8 of the casing 2 to engage the same and support the valve 28 in the desired position of adjustment.

Formed on or secured to the top of the lower receptacle 24 is a horizontally-arranged, annular wall 36 which extends outwardly therefrom to a position below the bottom of the valve 28 in spaced relation thereto. This wall 36 forms the bottom of an air chamber 37 which surrounds the space 27 between the receptacles 6 and 24, and the outer wall of which is formed by the valve 28 and annular wall 29, previously referred to.

The operation of the machine is as follows:

Power is applied to the pulley 18 to rotate the shaft 16 and therewith the fans 22 and feed plates 19. This operation causes air to circulate within the chamber 4 up through the upper receptacle 6, over the top and down the outside thereof, in through the space between the bottom of the valve 28 and wall 36, through the chamber 37 and through the space 27 between the receptacles 6 and 24 back to the receptacle 6, as shown by the full line arrows, the blades 22 being set to cause this action. The material to be separated is fed through the funnel 10 and pipe 11 and is deposited upon the lower plate 19 and passes by centrifugal action out through the space between the plates 19 and is discharged from the outer edges thereof into the expanded portion of the receptacle 6 and into the air passing upwardly therethrough and around the outer edges of the feed plates 19. The material falls through the upper receptacle 6 and from the open bottom thereof through the space 27 between the receptacles 6 and 24 in a curtain-like form to the lower receptacle 24; and, during this operation, the finer and lighter particles of the material are carried upwardly by the ascending air and are discharged outwardly over the top of the upper receptacle 6, while the larger and heavier particles of the material descend and pass through the lower receptacle 24 and out through the discharge pipe 26 leading from the bottom thereof. The finer and lighter particles of material, after being discharged over the top of the upper receptacle 6, descend through the chamber 4 exteriorly of the receptacles 6 and 24 and chamber 37 and are discharged from the machine through the opening 5 in the bottom of the casing 2.

By adjusting the valve 28 to vary the space between it and the wall 36 the volume of air permitted to pass through the chamber 37 to and through the space between the receptacles 6 and 24 may be varied and nicely regulated. The interposition of the chamber 37 between the regulating valve 28 and the curtain of material falling through the space 27 causes a diffusion of the volume of air before it reaches the said curtain of material, so that, irrespective of the position of the valve 28, the volume of air will pass through the curtain of material substantially in a uniform manner from the top to the bottom thereof, resulting in increased efficiency in the operation of the separator.

I claim:—

1. In an air separator, the combination of an outer casing inclosing a chamber, an upper receptacle supported within the chamber in spaced relation to said casing and having an open top and an open bottom, a lower receptacle supported within the chamber below the upper receptacle and in spaced relation to said casing and having its upper end spaced from the lower end of the upper receptacle, walls connected to and extending from said receptacles and forming an air chamber surrounding and in communication with the space between said receptacles and having a passage therein to admit air to said air chamber, means to cause air to

circulate through said passage and between said receptacles and through and around said upper receptacle, and adjustable means to vary the size of said passage, the air passing through said passage being permitted to pass directly through said air chamber to all parts of the space between said receptacles in all positions of said adjustable means.

2. In an air separator, the combination of an outer casing inclosing a chamber, an upper receptacle supported within the chamber in spaced relation to said casing and having an open top and an open bottom, a lower receptacle supported within the chamber below the upper receptacle and in spaced relation to said casing and having its upper end spaced from the lower end of the upper receptacle, a wall connected to the lower receptacle and extending outwardly from the upper end thereof and forming the bottom wall of an air chamber which surrounds and communicates with the space between said receptacles, a wall connected to the upper receptacle and extending downwardly therefrom and forming the outer wall for said air chamber and having a passage therein to admit air to said air chamber, means to cause air to circulate through said passage and between said receptacles and through and around said upper receptacle, and adjustable means to vary the size of said passage.

3. In an air separator, the combination of an outer casing inclosing a chamber, an upper receptacle supported within the chamber in spaced relation to said casing and having an open top and an open bottom, a lower receptacle supported within the chamber below the upper receptacle and in spaced relation to said casing and having its upper end spaced from the lower end of the upper receptacle, a wall connected to the lower receptacle and extending outwardly from the upper end thereof and forming the bottom wall of an air chamber which surrounds the space between said receptacles, a wall connected to the upper receptacle and extending downwardly therefrom and forming the outer wall for said air chamber and having a passage therein to admit air to said air chamber, means to cause air to circulate through said passage and between said receptacles and through and around said upper receptacle, a vertically adjustable valve ring surrounding said outer wall and the passage therein for varying the size of the passage, and means operative to raise and lower said valve ring.

In testimony whereof I affix my signature hereto.

GEORGE S. EMERICK.