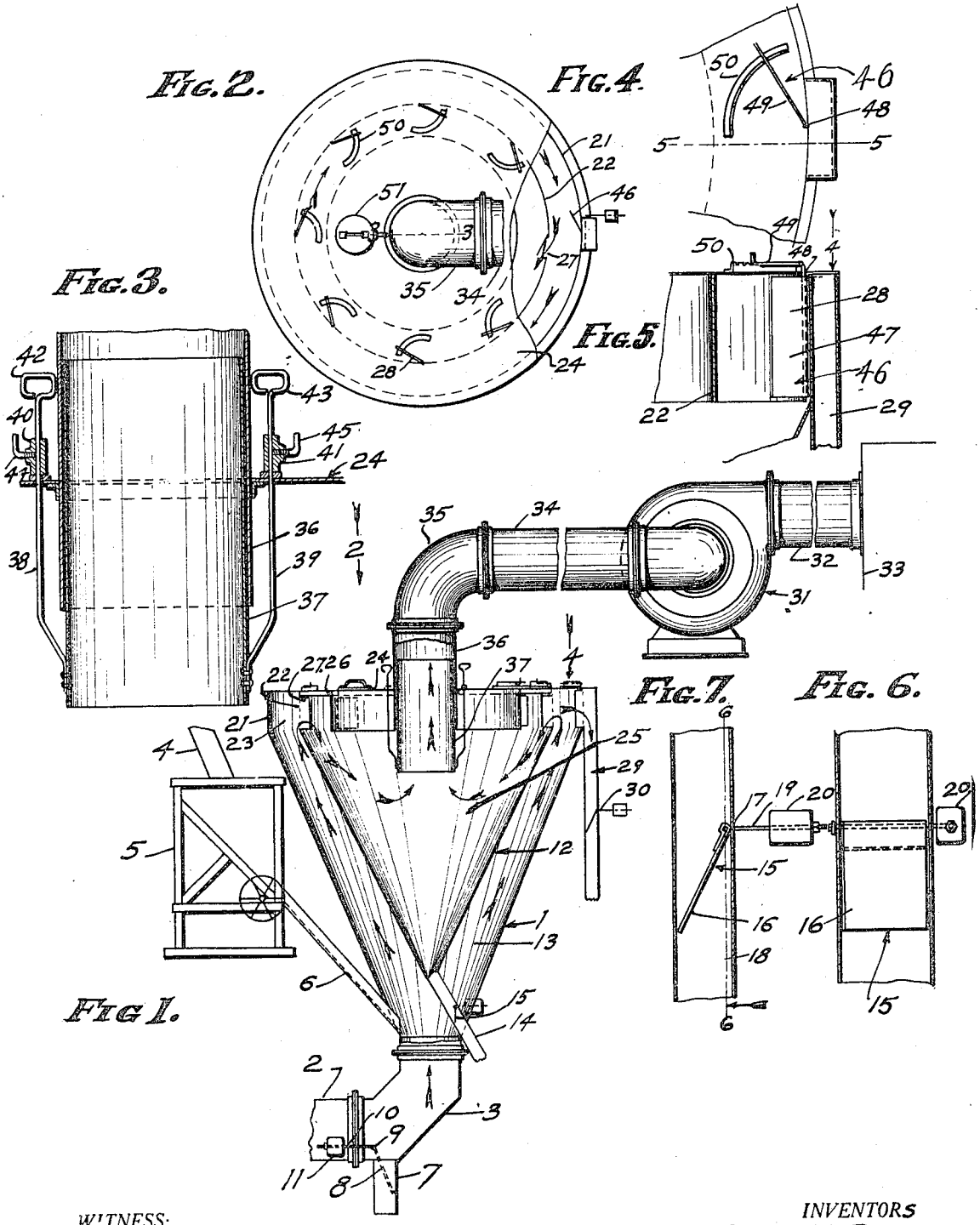
E. M. DAVIDS AND L. LINDSAY.

VACUUM AIR SEPARATOR.

APPLICATION FILED JAN. 6, 1919.

1,309,879.

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WITNESS:

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VACUUM AIR-SEPARATOR.

1,309,879. Specification of Letters Patent. Patented July 15, 1919.

Application filed January 6, 1919. Serial No. 269,921.

To all whom it may concern:

Be it known that we, ERNEST M. DAVIDS and LYCURGUS LINDSAY, citizens of the United States, residing at Tropico and Los Angeles, respectively, in the county of Los Angeles and State of California, have invented new and useful Improvements in Vacuum Air-Separators, of which the following is a specification.

Our invention relates to separators and consists of the novel features herein shown, described and claimed.

Specifically the object of our invention is to make a vacuum air separator for handling very light powered material such as talcum.

Broadly, the principles of our invention may be applied to separators for handling ore and any granular material where it is desired to separate the fine from the coarse.

Figure 1 is a diagrammatic elevation of a separator embodying the principles of our invention and adapted for handling talcum, and the like.

Fig. 2 is a fragmentary top plan view looking in the direction indicated by the arrow 2 in Fig. 1.

Fig. 3 is an enlarged fragmentary sectional detail on a plane parallel with Fig. 1 and on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary plan looking in the direction indicated by the arrows 4 in Figs. 1 and 5.

Fig. 5 is a fragmentary vertical sectional detail on a plane parallel with Fig. 1 and on the lines 5—5 of Figs. 2 and 4.

Fig. 6 is an enlarged fragmentary vertical section on the lines 6—6 of Fig. 7.

Fig. 7 is a fragmentary sectional detail on the line 7—7 of Fig. 6.

Referring to the drawings in detail, the funnel-shaped outer shell 1 is connected at its lower end to a horizontal intake pipe 2 by an elbow 3. The ground material comes from the grinding mill through the spout 4 to the feeder 5 and is discharged from the feeder 5 through the spout 6 to the lower end of the outer shell 1. If the air circulation is stopped the material will pass downwardly through the spout 6 to the elbow 3 and downwardly through the elbow 3 to the first take-off spout 7. The spout 7 extends vertically downwardly from the lower end of the elbow 3. A swinging valve 8 is mounted on the spout 7 upon a horizontal pivot 9, an arm 10 extends from the pivot 9 horizontally, and an adjustable weight 11 is mounted upon the arm 10, the force of the weight 11 being exerted to swing the valve 9 to its closed position. When the material coming down from the elbow 3 upon the valve 9 overbalances the weight 11, the valve will swing open and let the material pass.

An inner shell 12 is mounted within the outer shell 1 so as to form a chamber 13 between the inner and outer shells. The inner shell 12 is more flaring than the outer shell 1 so as to reduce the horizontal cross sectional area of the chamber 13 from the bottom upwardly. A second take-off spout 14 is connected to the lower end of the inner shell 12 and extends downwardly and laterally through the wall of the outer shell 1, there being an overbalanced gravity valve 15 in the spout 14. The valve blade 16 of the valve 15 is mounted upon a horizontal pivot 17, so that when the valve blade 16 swings to a position diagonally across the spout the spout passage 18 is closed, and so that when the valve blade swings to a position parallel with the passage the passage is opened. An arm 19 extends horizontally and at right angles from one end of the pivot 17, and a weight 20 is adjustably mounted upon the arm 19, so that by adjusting the weight 20 the operation of the valve 15 may be regulated.

An annular rim 21 extends upwardly from the top of the outer shell 1, and a second annular rim 22 extends upwardly from the top of the inner shell 12, the rims 21 and 22 being in a horizontal plane concentric to each other, thereby forming a chamber 23 serving as an extension of the chamber 13. A cover 24 is secured to the upper edge of the annular rim 21 and closes the extension chamber 23 between the rims 21 and 22 and closes the chamber 25 within the inner shell 12. An annular baffle 26 extends downwardly from the cover 24 concentric to the rim 22. Openings 27 are formed through the rim 22, said openings being evenly spaced apart all the way around, so that material passing upwardly through the chamber 13 and the extension chamber 23 will pass inwardly through the openings 27, and if there is sufficient force the material will strike against the baffle 26 and fall downwardly into the chamber 25. An adjustable swinging gate 28 is arranged to con-

trol the openings 27. A third take-off spout 29 leads through the rim 22 from the extension chamber 23, the passage downwardly through the spout 29 being controlled by an adjustable gravity valve 30.

A suction fan 31 has a discharge pipe 32 leading into a dust collector 33, and an intake pipe 34 extending to a position above the cover 24. An elbow 35 leads downwardly from the pipe 34, and a nipple 36 leads downwardly from the elbow 35 and is fixed through the cover 24 at the axial center of the cover. A pipe nipple 37 telescopes within the pipe nipple 36 and extends downwardly into the chamber 25. Hand rods 38 and 39 are connected to the lower end of the nipple 37 and extend upwardly outside of the nipple 36 through bearings 40 and 41 mounted upon the cover 24, and have handles 42 and 43 upon their upper ends. Set screws 44 and 45 mounted in the bearings 40 and 41 engage the hand rods 38 and 39, so that the set screws may be loosened and the handles 42 and 43 manually grasped to raise or lower the nipple 37 to a desired position, and then the set screws tightened to hold the nipple in its adjusted position. The nipple 37 extends downwardly to near the center of the chamber 25.

An adjustable swinging gate 46 controls the passage from the extension chamber 23 to the third take-off spout 29. The adjustable swinging gate 46 consists of a plate 47 mounted upon a pivot 48, an arm 49 extending from the pivot 48 at right angles to the pivot and in the same direction as the plate 47, and the sector 50 mounted upon the cover to be engaged by the arm 49, so that the location of the plate 47 may be readily seen by the position of the arm 49 upon the sector 50, and so that the position may be changed by moving the arm 49. The adjustable swinging gate 28 is constructed in the same way as the adjustable swinging gate 46. A manhole construction 51 provides access through the cover 24 to the chamber 25.

In the practical operation the suction fan 31 is started after the parts have been properly assembled and proportioned to produce a vacuum of about four ounces to the square inch in the intake pipe 2. The air passing inwardly through the pipe 2 and upwardly through the elbow 3 to the chamber 13 will meet the pulverized material coming downwardly through the spout 6 from the feeder 5, and the lighter particles will pass upwardly into the chamber 13, and the heavier particles will pass downwardly to the gravity valve 8. Normally the valve 8 is held closed by the weight 11 to prevent air passing upwardly through the spout 7. When a sufficient quantity of the heavier particles are accumulated upon the valve 8 an increase of the accumulation will cause the valve to open and discharge the surplus downwardly through the spout 7. It is intended that there will always be a quantity of material upon the valve 8 to form an air trap. The velocity of the air passing upwardly through the chamber 13 will carry the lighter particles through the openings 27 and inwardly against the baffle 26. The gates of the valves 28 are all turned in the same direction, and the material passing inwardly through the openings 27 will be deflected by the gates, and the adjustment of the gates will regulate to some extent the fineness of the material which passes through the openings 27. This operation will cause a centrifugal circulation of the air and material in the extension chamber 23, thereby causing the heavier particles to fly outwardly against the inner face of the rim 21, and these heavy particles will strike the plate 47 and be deflated outwardly and fall down the spout 29. The gravity valve 30 keeps the passage in the spout 29 closed until sufficient material falls upon the valve to overcome the balance of the valve and open the valve.

The material passing through the openings 27 against the baffle 26 will fall downwardly into the chamber 25, and the fine talcum, or the like, will pass upwardly through the pipe 34 to the suction fan 31 and dust collector 33, and the grade of this fine material may be accurately regulated by adjusting the nipple 37 up and down. The material which passes into the chamber 25 and which is not fine enough to go to the settling chamber 33 as finished material will pass downwardly to the valve 15, and ultimately pass through the spout 14.

The separator shown and described will produce four grades of material: The heavier grade passing through the spout 7, and next lighter grade passing through the spout 29, the third lighter grade passing through the spout 14, and the finished material passing through the suction fan 31. If desired, the material coming from the spouts 7, 29 and 14 may be returned to the grinding mill and reground, then fed into the separator again through feeder 5.

Various changes may be made without departing from the spirit of our invention as claimed.

We claim:

1. A separator comprising a funnel-shaped outer shell; means for discharging material into the bottom of the outer shell; an elbow extending downwardly from the bottom of the outer shell; a spout extending downwardly from the bottom of the elbow; an air intake leading horizontally into the bottom of the elbow; an inner funnel-shaped shell concentrically mounted in the outer funnel-shaped shell and forming a chamber between the two shells; a take-off spout leading from the bottom of the second funnel-shaped shell downwardly and outwardly

through the first shell; rims extending upwardly from the inner and outer shells and forming an extension chamber, there being openings through the inner shell from the extension chamber; said openings being evenly spaced apart around the shell; adjustable swinging gates arranged in the openings, the gates all pointing in the same direction; a cover fitting upon the rims; a baffle extending downwardly from the cover concentric to the inner rim; a suction pipe extending downwardly through the cover concentric to the baffle; a suction fan connected to the suction pipe; a spout leading outwardly and downwardly through the outer rim; and adjustable gates for controlling the circulation.

2. A separator comprising a funnel-shaped outer shell connected at its lower end to a horizontal intake pipe by an elbow; a grinding mill discharging downwardly into the lower end of the outer shell; a spout extending downwardly from the lower end of the elbow; a gravity swinging valve in the spout; an inner shell concentrically mounted within the outer shell so as to form a chamber between the two shells; a second take-off spout leading from the lower end of the inner shell downwardly and outwardly through the outer shell; a gravity valve in the second take-off spout; an annular rim extending upwardly from the top of the outer shell; a second annular rim extending from the top of the inner shell, the rims being on a horizontal plane concentric to each other and forming an extension chamber; a cover fitting upon the rims; a baffle extending downwardly from the cover concentric to the rims, there being openings through the inner rim discharging against the baffle; adjustable swinging gates for controlling the openings, the gates all pointing in the same direction; a third take-off spout leading through the outer rim; an adjustable swinging gate for controlling the third take-off spout; a gravity valve in the third take-off spout; a suction fan having an intake pipe extending downwardly through the center of the cover; and means for adjusting the length of the intake pipe.

In testimony whereof we have signed our names to this specification.

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