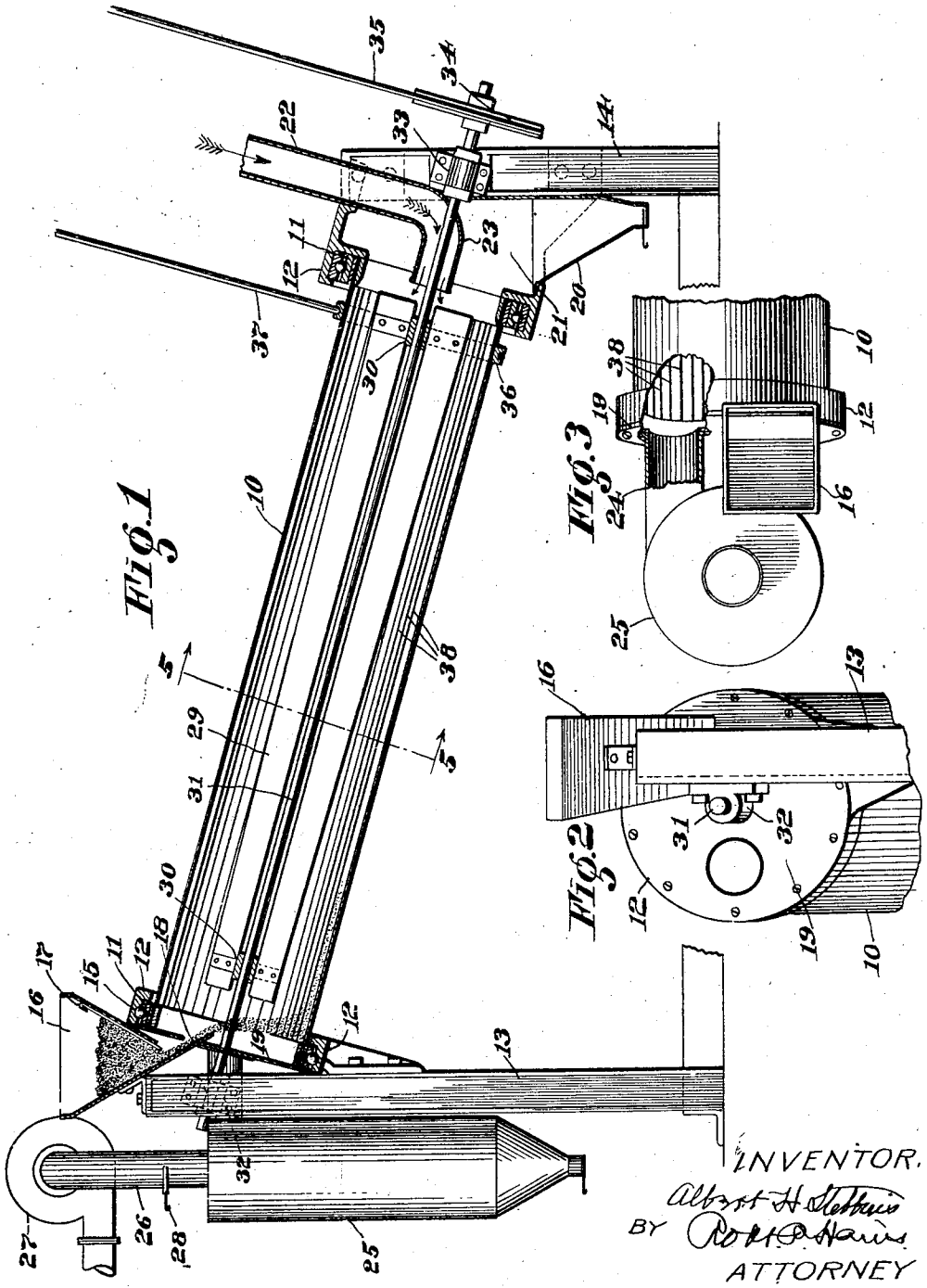
June 19, 1928. 1,673,848

A. H. STEBBINS

AIR CLASSIFIER

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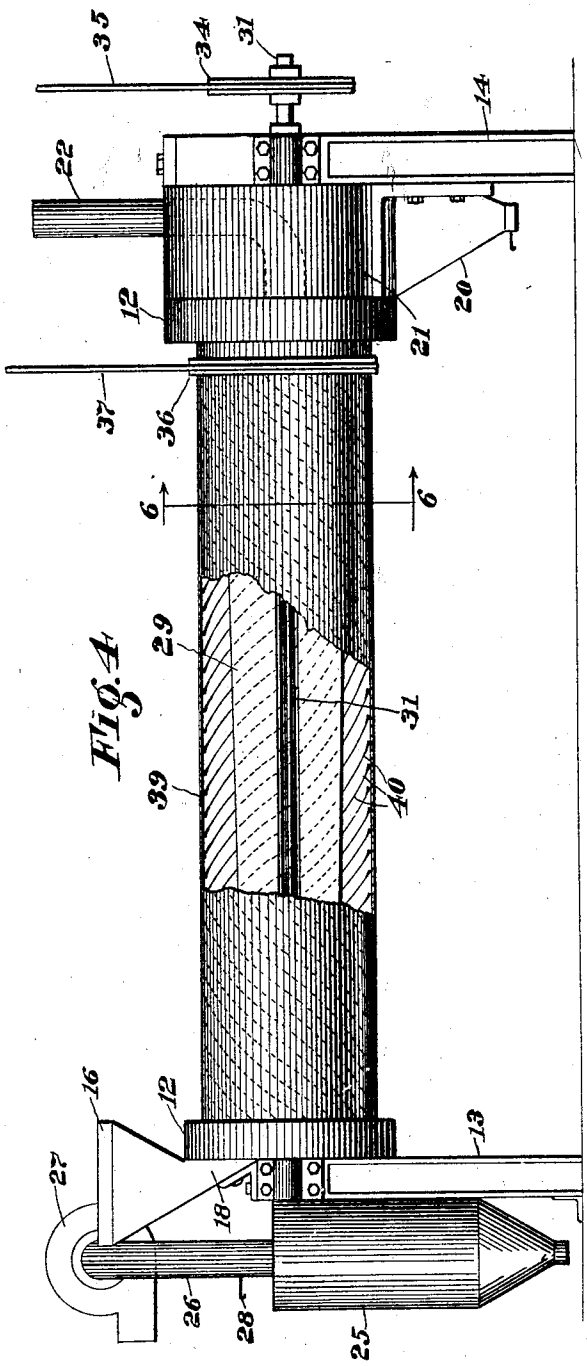


Fig. 4

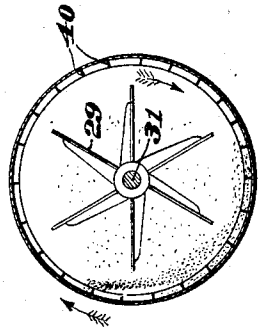


Fig. 6

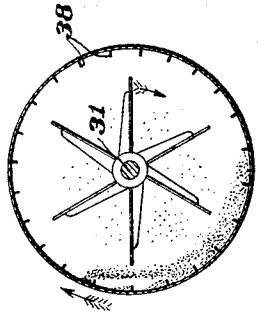


Fig. 5

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Patented June 19, 1928. 1,673,848

UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LOS ANGELES, CALIFORNIA.

AIR CLASSIFIER.

Application filed March 16, 1927. Serial No. 175,692.

This invention relates to air classifiers of the type in which separation of the materials is effected by employing air currents that are strong enough to carry off the lighter particles but which are not strong enough to carry off the heavier particles.

In carrying out the present invention air currents are produced that travel lengthwise of the treatment chamber and the materials to be separated are repeatedly introduced into the path of the air traveling through the treatment chamber.

This is accomplished by supporting the treatment receptacle or drum in more or less of a horizontal position so that when it is rotated it will elevate and drop the materials lying upon its lower side. In order to insure the passage of air through the falling materials a rotative movement is given to the air within the receptacle which causes it to sweep through the falling particles.

An important feature of the invention therefore, resides in a revolving receptacle having a fan therein for producing rotating air currents that pass through the falling materials to pick out 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 good practical forms of the invention.

In the drawings:—

Fig. 1 is a vertical sectional view through an inclined air classifier constructed in accordance with the present invention;

Fig. 2 is an end view of the feed end of the classifier of Fig. 1;

Fig. 3 is a top plan view of Fig. 2;

Fig. 4 is a side elevation with parts in section of a modified construction in which the classifier is supported in a horizontal position;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1; and

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 4.

In carrying out the present invention the rotating receptacle may be supported in an inclined position as shown in Fig. 1 to advance the materials lengthwise of the receptacle; or it may be supported in a horizontal position as shown in Fig. 4, and spiral ribs may be employed to advance the materials lengthwise of the receptacle.

Turning our attention first to the construction shown in Fig. 1, the tubular receptacle 10 is preferably made relatively long as shown, so that the materials traveling therein will be repeatedly subjected to the action of the separating air currents. The receptacle 10 is supported so that it may be rotated about its longitudinal axis, and to this end the bearing rings 11 are provided at the opposite ends of the receptacle 10 and these rings are mounted within the supporting brackets 12, which brackets are supported by the uprights 13 and 14. Ball or roller bearings 15 are preferably provided between the rotating rings 11 and the fixed brackets 12. The upright 13 may be taller than the upright 14 as shown so as to support the receptacle at a sufficient inclination to promote the travel of the materials lengthwise therethrough towards the lower end of the receptacle. The materials to be treated may be delivered to the upper end of the receptacle by the hopper 16 having the sliding gate 17 which may be adjusted to control the flow of material from the hopper to the receptacle. The hopper 16 has a delivery spout 18 which delivers the materials into the receptacle through an opening formed in the end plate 19, which end plate is secured to the fixed bracket 12. The heavier materials which are not removed by the air passing through the receptacle are delivered from the lower end of this receptacle into the hopper 20 supported by the upright 14. The supporting bracket 12 at the lower end of the receptacle is preferably so constructed that it forms the closed housing 21 about the lower end of the receptacle, as best shown in Fig. 4, and the hopper 20 extends downwardly from this housing.

Air is passed through the receptacle 10 to remove the lighter from the somewhat heaver particles within the receptacle, and to this end in the construction shown air is introduced into the lower end of the receptacle 10 by the air supply pipe 22 having the bent inner end 23 which is disposed at the central axis of the drum. This arrangement of the discharge end 23 of the air supply pipe is desirable because it directs the air through the housing 21 into the lower end of the receptacle 10. In the construction shown air is removed from the upper end of the receptacle through the exhaust pipe 24 the outer end of which is secured to the head plate 19, and an opening is formed

in this plate, as will be apparent from Fig. 3, to permit the air to escape from the receptacle 10 into the exhaust pipe. The exhaust pipe 24, in the construction shown, leads to a dust-removing or settling receptacle 25 of any well-known or preferred construction, and air is exhausted from the upper end of the receptacle 25 through the pipe 26 which pipe leads to the suction side of the fan 27. The rate at which the air is exhausted from the receptacle 10 may be controlled by adjusting the gate or valve 28 provided in the pipe 26. The air passing into the lower end of the receptacle 10 through the supply pipe 22 may be taken directly from the atmosphere, or if desired the air may be forced through this pipe from a blast fan (not shown).

In order to give the air passing through the receptacle 10 ample opportunity to remove the finer from the coarser particles the receptacle is rotated so that the materials lying upon the lower side of the receptacle will be carried upwardly by this rotative movement and dropped, as will be apparent from Fig. 5, so that the air may pass through these falling materials. If the longitudinal movement of the air through the receptacle is relied upon to force the air through the falling materials, the air may fail to completely remove the finer from the coarser particles. An important feature of the present invention therefore resides in the construction whereby a rotative movement is imparted to the air within the receptacle to force this air through the falling materials. This rotation of the air is produced, in the construction shown, by providing a fan within the receptacle having the blades 29 which are secured to the brackets or spiders 30, and these spiders are rigidly secured to the shaft 31 which is mounted at the center of the receptacle 10 to support and rotate the fan. In the construction shown one end of the shaft 31 is journaled in a bracket 32 secured to the upper portion of the upright 13, and the opposite end of this shaft is supported by the bearing bracket 33 secured to the upright 14. It will be noted that the discharge end portion 23 of the air supply pipe surrounds the shaft 31 and that the shaft extends through the curved outer wall of this pipe. The fan shaft 31 may be driven in the direction indicated by the arrows by a pulley 34 about which passes the driving belt or cable 35. The receptacle 10 may be rotated in the same direction as the fan, but at a slower speed, by the pulley 36 having the driving cable 37.

The inner wall of the receptacle 10 is preferably provided with longitudinally extending ribs 38 which are constructed to carry the materials upwardly within the rotating receptacle a substantial distance before dropping them, as will be apparent from Fig. 5. This is desirable in order to expose the falling materials to the air currents. The ribs 38 preferably are given more or less of a spiral arrangement since they will release the falling materials more uniformly if they are inclined somewhat to the longitudinal axis of the receptacle. As a result of the construction described it will be seen that the materials lying upon the lower side of the receptacle 10 will be carried upwardly time and time again by the rotative movement of this receptacle so that they will be subjected repeatedly to the sweeping action of the rotating air which is forced through the falling particles, with the result that the finer particles will be completely removed from the heavier particles. As previously stated the receptacle 10 is preferably made relatively long to give the air ample opportunity to remove the finer from the coarser particles and the fan blades 29 preferably extend throughout the greater portion of the receptacle to cause the entire volume of the air within this receptacle to rotate therein. The rotative force of the air should preferably be stronger near the lower or discharge end of the receptacle than at its upper end, so that the heavier particles which may have been picked up by the air will have an opportunity to settle out of the air near the upper end of the receptacle. This result is accomplished in the construction shown by decreasing the width of the fan blades 29 as they approach the upper end of the receptacle; however, a similar result might be obtained by tapering the outer walls of the receptacle.

In the modified type of classifier shown in Fig. 4 the general construction and operation is the same as that shown in Fig. 1, except that the revolving receptacle 39 is supported in a horizontal position and travel of the materials lengthwise of the receptacle is produced by arranging the ribs 40 therein at a pronounced inclination to the longitudinal axis of the receptacle, as will be apparent from the drawing. The spiral arrangement of these ribs serves to work the materials lengthwise of the receptacle towards its discharge end. The ribs 40 will serve to pick up materials and drop them in the manner above described so that the revolving air currents produced by the fan 29 within the receptacle will sweep through the falling materials to remove the finer particles. If desired, the fan blades 29 may extend in a more or less spiral manner about their driving shaft so that they will serve not only to rotate the air within the receptacle, but also to help force this air lengthwise of the receptacle towards the feed hopper 16.

What is claimed is:—

1. An air classifier, comprising in combi-

nation, an annular receptacle having material lifting ribs upon its inner walls, means for supporting the receptacle in more or less of a horizontal position, means for introducing the materials to be treated into the receptacle to travel lengthwise thereof, means for producing air currents traveling lengthwise through the receptacle to carry off the lighter particles, means for rotating the receptacle to elevate and drop the particles lying upon its lower side, a fan within the receptacle and provided with fan blades that are supported in spaced relation to the walls of the receptacle to provide a substantial clearance space therebetween and means for rotating the fan to produce revolving air currents which pass through the falling materials.

2. An air classifier, comprising in combination, an annular receptacle having material lifting ribs upon its inner walls, means for supporting the receptacle in more or less of a horizontal position, means for introducing the materials to be treated into the receptacle to travel lengthwise thereof, means for passing air through the receptacle in a direction opposite to that in which the materials travel to carry off the lighter particles, means for rotating the receptacle to elevate and drop the particles lying upon its lower side, a fan within the receptacle and provided with fan blades that are supported in spaced relation to the walls of the receptacle to provide a substantial clearance space therebetween in which the materials may fall, and means for rotating the fan to produce revolving air currents that sweep upwardly through the falling materials.

3. An air classifier, comprising in combination, a tubular receptacle having material lifting ribs upon its inner walls, means for supporting the receptacle in more or less of a horizontal position, means for introducing the materials to be treated into the receptacle to travel lengthwise thereof, means for passing air through the receptacle to carry off the lighter particles, means for rotating the receptacle to elevate and drop the particles lying upon its lower side, a fan within the receptacle and having blades that extend lengthwise of the receptacle throughout the greater portion of its length, and means for rotating the fan to produce revolving air currents which sweep upwardly through the falling materials.

4. An air classifier, comprising in combination, a tubular receptacle having an air inlet at one end and an air outlet at its other end for the passage of air through the receptacle, means for supporting the receptacle in more or less of a horizontal position, means for introducing the materials to be treated into the receptacle to travel lengthwise thereof, ribs upon the inner walls of the receptacle to elevate and drop the particles lying at the lower side of the receptacle, means for rotating the receptacle, and a fan adapted to be rotated to produce revolving air currents within the receptacle that pass upwardly through the falling materials to remove the finer particles therefrom.

5. An air classifier, comprising in combination, a tubular receptacle having material lifting ribs upon its inner walls, means for supporting the receptacle in more or less of a horizontal position, means for introducing the materials to be treated into the receptacle to travel lengthwise thereof, means for rotating the receptacle to elevate and drop the particles lying upon its lower side, a fan mounted within the receptacle and having fan blades that extend lengthwise of the major portion of the receptacle, and means for rotating the fan to produce revolving air currents that pass upwardly through the falling materials to remove the finer particles therefrom.

6. An air classifier, comprising in combination, an annular receptacle having material lifting ribs, means for supporting the receptacle in more or less of a horizontal position, means for introducing the materials to be treated into the receptacle to travel lengthwise thereof, means for passing air through the receptacle in a direction opposite to that in which the materials travel to carry off the lighter particles, means for rotating the receptacle to elevate and drop the particles, a fan within the receptacle and having its blades tapered to produce the strongest rotating air currents near the air intake end of the receptacle, and means for rotating the fan to force the air through the falling materials.

7. An air classifier, comprising in combination, a tubular receptacle, means for supporting the receptacle in more or less of a horizontal position, means for introducing the materials to be treated into the receptacle to travel lengthwise thereof, spirally disposed ribs provided upon the inner walls of the receptacle to pick up the materials and to advance them along the receptacle, means for passing air through the receptacle in a direction opposite to that in which the materials are advanced to carry off the lighter particles, means for rotating the receptacle to elevate and drop the materials, a fan mounted within the receptacle and provided with relatively long blades disposed in spaced relation to the ribs, and means for rotating the fan to impart a rotative movement to the air within the receptacle to force it through the falling materials.

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

ALBERT H. STEBBINS.