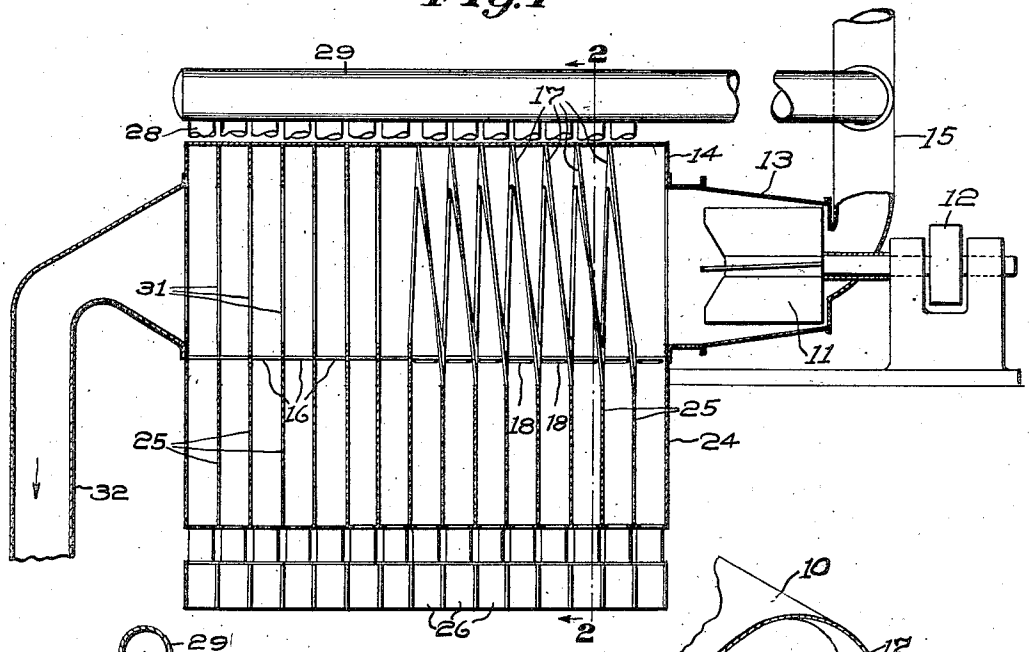
Aug. 19, 1924. 1,505,741

A. H. STEBBINS

CONCENTRATOR

Filed June 30, 1922

Fig. 1



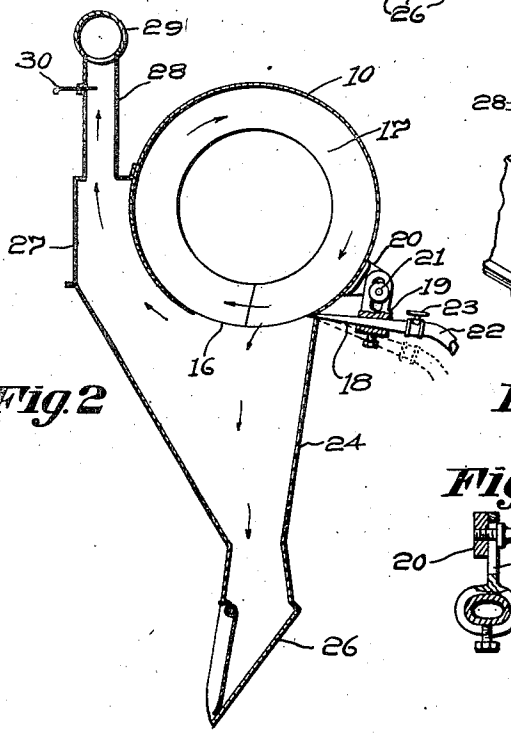




Fig. 2

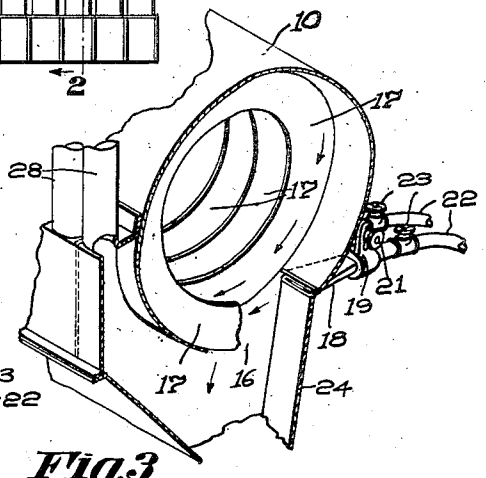



Fig. 3

Fig. 4

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# UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LOS ANGELES, CALIFORNIA.

## CONCENTRATOR.

Application filed June 30, 1922. Serial No. 572,046.

*To all whom it may concern:*

Be it known that I, ALBERT H. STEBBINS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented an Improvement in Concentrators, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to concentrators of the type in which the materials to be treated are caused to whirl about the interior of a container.

Concentrators are adapted to separate materials by reason of their differences in specific gravity, shape or frictional properties, or by a combination of two or more of these properties and are extensively used in the treatment of ores to separate the values from the usual impurities.

The concentrator of the present invention is designed more particularly for the treatment of ores or other materials that are in a relatively fine state, and effects separation of the materials in accordance with their differences in specific gravity.

One important feature of the present invention resides in a casing having a wall disposed spirally within the case to impart a spirally whirling movement to air bearing the materials to be treated so that the heavier particles within the air will be thrown outwardly by centrifugal force.

Another feature of the invention resides in a casing having an aperture in a wall thereof through which the heavier particles are thrown by centrifugal force, and in a nozzle adjustably mounted adjacent the aperture for directing a blast of air inwardly to deflect the lighter materials inwardly away from the aperture.

Another feature of the invention resides in a casing having a spiral wall within one portion thereof to impart a spiral movement to the air within the casing and having spaced baffle walls in another portion of the casing to promote separation of the materials.

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 thereof.

In the drawings:

Fig. 1 is a longitudinal vertical sectional view through a concentrator constructed in accordance with the present invention;

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the portion of the concentrator shown in section in Fig. 2; and

Fig. 4 is a view of a detail of the invention to be described.

The concentrator of the present invention has a casing 10 which may be cylindrical in shape and is shown as supported in a horizontal position. The materials to be treated are carried into the casing 10 by air, and in the present case a fan 11 is mounted at one end of the casing 10 and is rotated by a pulley 12 to force the material bearing air into the casing and lengthwise thereof with a whirling movement. The fan 11 is enclosed by a housing 13 secured to an end wall 14 of the casing, and the housing preferably flares outwardly toward the casing as shown. The air bearing the materials to be treated is delivered to the fan housing by a pipe 15 that enters the housing through an end thereof.

The whirling movement imparted to the air by the fan serves to throw the heavier particles within the air outwardly by centrifugal force against the wall of the casing 10, and a slot or opening 16 is formed longitudinally within the wall of the casing at the lower side thereof through which the heavier materials may pass.

It is found desirable to protect from the direct path of the air the heavier particles that have been thrown outwardly therefrom by centrifugal force, and to arrest their movement longitudinally of the casing, and to this end a spiral wall 17 may be provided within the casing extending inwardly from the wall of the casing. The spiral wall helps to promote whirling movement of the air within the casing, and directs toward said slot the heavier materials that enter between adjacent spirals so that they will escape through the slot 16. It should be noted that the spiral wall 17 surrounds the central opening extending longitudinally through the casing, and that a large portion of the air delivered by the fan 11 will pass lengthwise of the casing

through this opening, but the heavier particles carried by the air will be thrown outwardly by centrifugal force out of the direct path of the air and into the protected spaces between the spirals.

It is important to prevent the fine materials from escaping through the slot 16 with the heavier particles, and to this end nozzles 18 are mounted adjacent the slot 16 to direct blasts of air against the materials that approach the slot to deflect the lighter materials away from the slot. In the present case nozzles are provided for directing a blast of air inwardly between each pair of coils of the spiral wall 17, and the mouth of each nozzle is flattened out to give the blast of air it delivers a width substantially equal to the space between the adjacent coils of the spiral wall. The nozzles preferably are supported for adjustment relative to the slot 16, and to this end each nozzle 16 may be mounted in a bracket 19 adjustably secured to ears 20 extending outwardly from a wall of the casing 10. The brackets 19 preferably are slotted as shown and are secured to the ears 20 for swinging and sliding adjustment by bolts 21. Air is supplied to the nozzles by pipes 22 and the volume of air may be controlled by valves 23.

Below the casing 10 are provided a series of receptacles 24 preferably having partitions 25 arranged so that the materials that escape between different coils of the spiral wall 17 will enter different receptacles, and each receptacle may discharge into a hopper 26.

Considerable air may enter the receptacles 24 from the casing 10 and in the present case this air is returned to the fan 11 and is again delivered to the casing 10. To this end in the construction shown, each receptacle has an upwardly extending portion 27 at the upper end of which is a pipe 28. The pipes 28 communicate with a transversely extending pipe 29 that leads to the main pipe 15. The heavier materials that enter the receptacles 24 will move downward therein into the hopper 26, and the air within these receptacles with the lighter particles that may remain therein is returned through the pipes 28, 29 and 15 to the casing 10 for further treatment. Gates 30 within the pipes 28 may be adjusted to control the flow of air from the receptacles 24.

In the embodiment of the invention shown, the spiral wall 17 does not extend through the entire length of the casing but is replaced at the left hand portion of the casing by spaced baffle walls 31 having large central openings through which the air at the center of the casing passes and escapes through the discharge conduit 32 leading from the delivery end of the container 10. The baffle walls 31 serve to retard movement of the air longitudinally of the casing 10, and this gives the heavier particles which still remain in the air an opportunity to settle between the baffle walls 33 and escape through the slot 16 into the aligned receptacles 24.

What is claimed is:

1. A concentrator comprising in combination, a substantially cylindrical casing having a relatively wide discharge slot extending longitudinally of a side wall thereof, a fan at one end of said casing for forcing air bearing the materials to be treated centrally through the casing with a longitudinal whirling movement that throws the heavier particles outwardly by centrifugal force through said slot, and an air nozzle for directing a jet of air inwardly through said slot and in a direction to deflect the lighter materials approaching the slot inwardly away from the slot.

2. A concentrator comprising in combination, a substantially cylindrical casing having a relatively wide discharge slot extending longitudinally of a side wall thereof, means for forcing air bearing the materials to be treated lengthwise of the casing with a longitudinal whirling movement that throws the heavier particles outwardly by centrifugal force through the slot, an air nozzle for directing a jet of air inwardly throug said slot and in a direction to deflect the lighter materials approaching the slot inwardly away from the slot, and means for supporting the air nozzle in different positions of adjustment.

3. A concentrator comprising in combination, a substantially centrifugal casing having a relatively wide discharge slot extending longitudinally of a side wall thereof, means for forcing air bearing the materials to be treated lengthwise of the casing with a longitudinal whirling movement that throws the heavier particles outwardly by centrifugal force through the slot, and means for directing a jet of air inwardly through said slot at one edge thereof to deflect the lighter materials approaching the slot inwardly away from the slot.

4. A concentrator comprising in combination, a substantially cylindrical casing having a discharge slot extending longitudinally of a side wall thereof, means for delivering air bearing the materials to be treated into the casing through an end thereof to travel centrally through the casing with a whirling movement that throws the heavier particles outwardly by centrifugal force, a spiral wall within the casing encircling the air passage therethrough and adapted to arrest the heavier particles thrown outwardly by centrifugal force and to direct them to said slot, and means for directing a jet of air inwardly adjacent the slot and in a direction to deflect from the slot the lighter materials approaching the same.

5. A concentrator, comprising in combination, a substantially cylindrical casing having a discharge slot extending longitudinally of a side wall thereof, a fan at one end of said casing for forcing air bearing the materials to be treated centrally through the casing with a longitudinal whirling movement that throws the heavier particles outwardly by centrifugal force, and a spiral wall extending inwardly from the wall of the casing to form a guide for directing the heavier materials that enter between the spirals toward the discharge slot.

6. A concentrator comprising, in combination, a substantially cylindrical casing having a discharge slot extending longitudinally of a wall thereof, a spiral wall extending inwardly from the wall of the casing and surrounding a core forming an air passage centrally through the casing, and means for delivering air carrying the materials to be treated lengthwise through the casing with a spiral whirling movement to cause the heavier particles to be thrown outwardly by centrifugal force between the spirals to escape through said slot.

7. A concentrator comprising, in combination, a casing having a discharge slot extending longitudinally thereof, a fan for delivering air bearing the materials to be treated into the casing to travel centrally longitudinally thereof with a whirling movement so that the heavier particles are thrown outwardly by centrifugal force to pass through the slot, a spiral wall within the casing for promoting whirling movement of the material bearing air and adapted to receive between the spirals the heavier materials thrown outwardly by the whirling movement, and a series of receptacles for receiving the materials discharged through different portions of said slot.

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

ALBERT H. STEBBINS.