United States Patent [19]

Frangquist

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[54] **SWING BACK WHIZZER BLADES FOR MECHANICAL AIR SEPARATOR**

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[22] Filed: **Dec. 21, 1971**

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[52] **U.S. Cl.** ..... **209/139 A,** 209/144

[51] **Int. Cl.** **B07b 7/083,** B07b 11/04

[58] **Field of Search** ..... 209/138, 139 R, 139 A, 209/144, 148, 132, 133; 55/400; 302/59, 62

[56] **References Cited**

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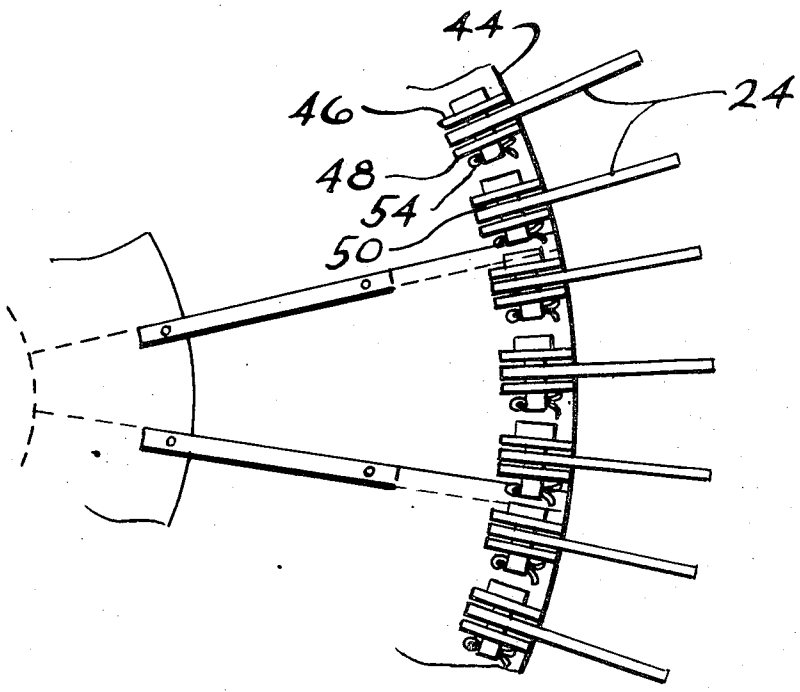
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[57] **ABSTRACT**

A mechanical separator, for selectively dividing an already finely divided solid into two products of different fineness, in which the whizzer blades are pivotally mounted, so that the separator setting for wide variations in fineness can be quickly and easily changed.

1 Claim, 4 Drawing Figures



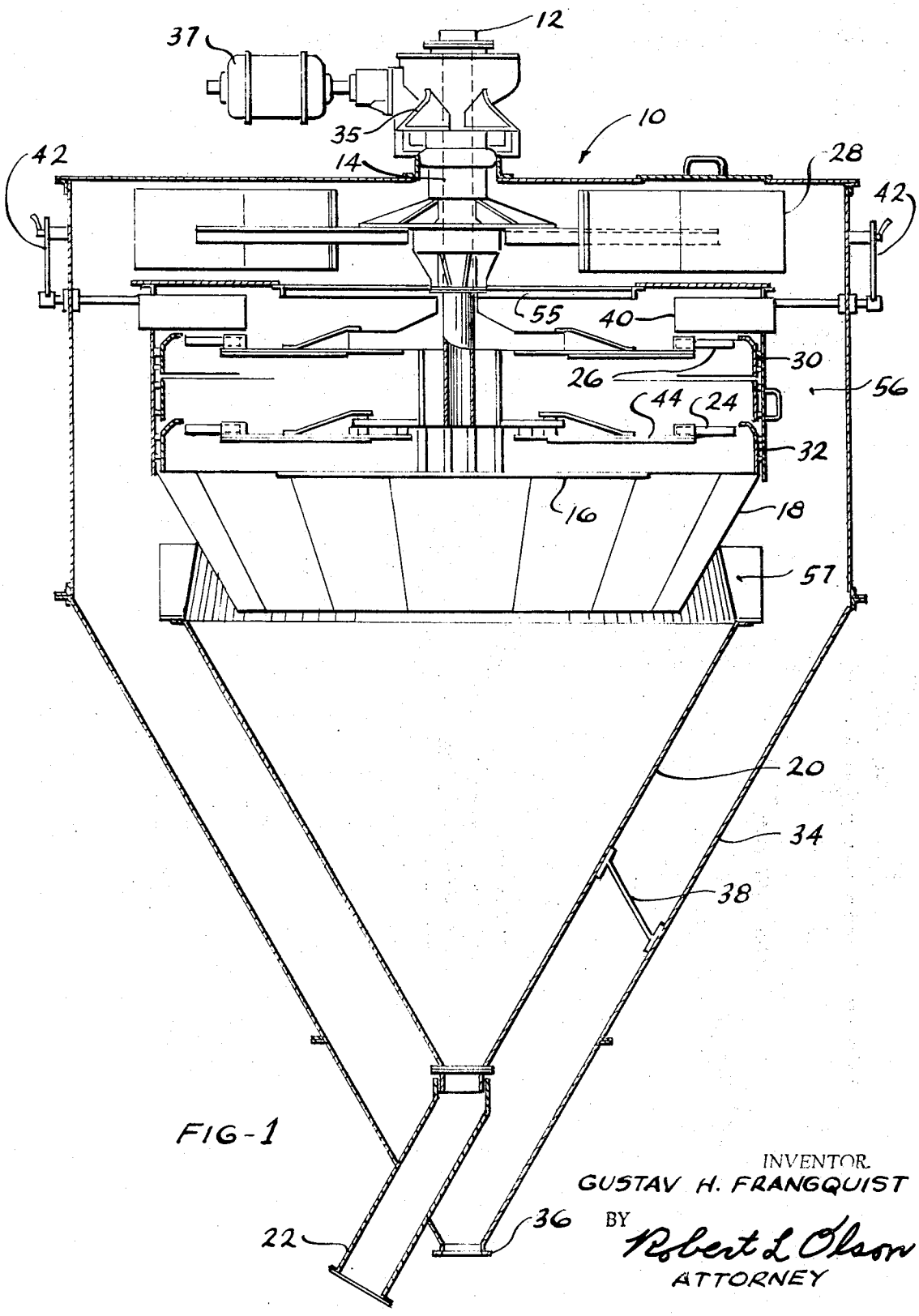


FIG-1

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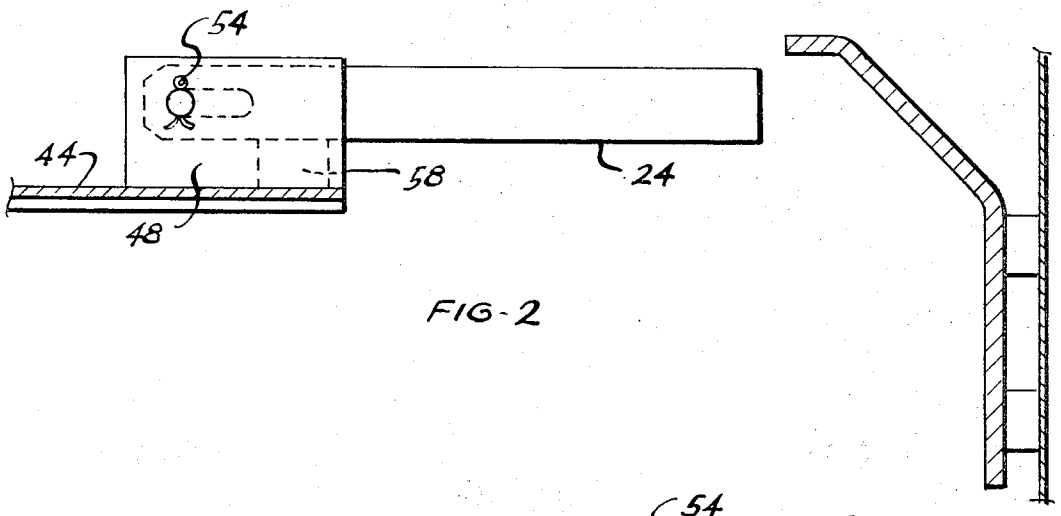


FIG-2

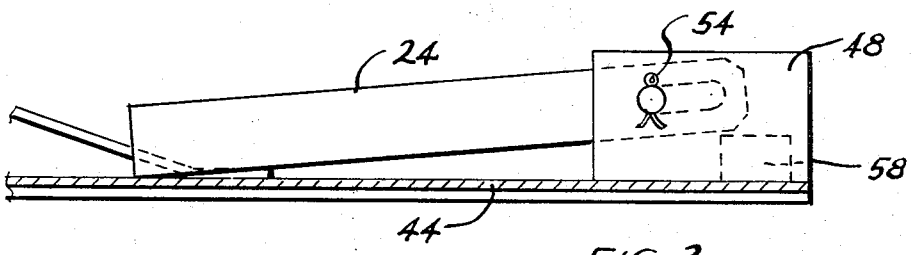


FIG-3

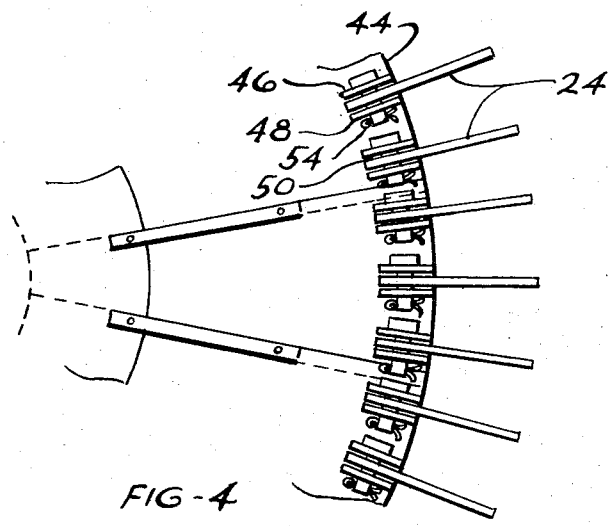


FIG-4

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SWING BACK WHIZZER BLADES FOR MECHANICAL AIR SEPARATOR

BACKGROUND OF THE INVENTION

The invention relates to a mechanical separator for selectively dividing an already finely divided solid into two products. In grinding mills, for example for grinding cement, it is desirable to be able to change the setting of the associated separator so that it is possible to get a wide range of fineness in the finished product. One means of getting normal variations of fineness in the finished product is by varying the setting of dampers in the separating zone above the whizzers of the separator. However, when large changes in fineness are required in present day whizzer separators, it is necessary to shut the unit down, so that whizzer blades can be added or removed. Since the blades are generally secured by means of nut and bolt assemblies, this is a costly and time consuming process.

SUMMARY OF THE INVENTION

The whizzer separator of my invention utilizes whizzer blades which are pivotally connected to the inner whizzer plate. The fineness of the finished product can be quickly changed by pivoting more or less of the blades out of the annular space through which the solids bearing gas stream flows.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of a whizzer separator incorporating the invention;

FIG. 2 is an enlarged view of the whizzer blades shown in FIG. 1;

FIG. 3 is a view similar to FIG. 2 showing the whizzer blades pivoted to a different position; and

FIG. 4 is a view taken on lines 4—4 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Looking now to FIG. 1 of the drawings, 10 designates a whizzer separator constructed in accordance with the invention. The pulverized material is introduced into the separator through an upper central inlet 12. This material flows from a pulverizing or grinding mill, not shown. The solids pass downwardly through a hollow shaft 14, and encounters the distributor plate 16. The distributor plate 16 is rotatable, and thus the solids are flung outwardly therefrom. Some of the heavier particles contact the cone liner 18, and fall by gravity into the inner cone 20, and are removed through the duct 22.

The majority of the solids coming off distributor plate 16 are picked up by the circulating gases in the separator and are carried in an upward direction, the flow being induced by means of the fan blades 28. The solids in passing through the whizzer blades 24 and 26 have centrifugal force imparted to it, causing the heavier particles to separate out of the gas stream onto the walls of the drums 30 and 32. Gravity causes these separated heavier particles to move downwardly through cone liner 18, inner cone 20, and out through duct 22. These solids can be recycled to the grinding mill for further grinding. The distributor plate 16, whizzer blades 24, 26, and the fan are rotated by motor 37 by way of gear 35.

The fines still carried by the gas stream after passing through whizzer blades 24 and 26 pass inwardly

through the fan inlet 55 and outwardly through the fan blades 28 and flow downwardly into passage 56 formed by inner and outer drum. Cyclonic action in chamber 56 separates the fine solid from the transporting gas stream. The gases flow inwardly through vanes 57 for recycle through the separator. The solids flow downwardly through outer cone 34 and are removed from the separator through outlet 36.

The inner cone 20 is positioned and supported by means of a plurality of circumferentially spaced brackets 38. Vertical dampers 40 can be adjusted to vary the fineness of the solids that are carried over to the fan blades 28 with the gas stream. The setting of these dampers can be adjusted to vary the fineness of the solids that are carried over. The setting of these dampers can be adjusted from outside of the separator housing by means of mechanism 42. When a large change in the fineness of the solids which are discharged through the outer cone outlet 36 is desired, it is necessary to add or omit whizzer blades.

Looking now to FIGS. 2–4, the construction of the lower set of whizzer blades 24 is shown in greater detail. The upper blades 26 are constructed in a similar manner. Each of the blades 24 is pivotally connected to an imperforate whizzer plate 44 by means of a pair of upstanding members 46, 48, and a pivot pin 50. The pin 50 has a head 52 on one end thereof, and after insertion of the pin through holes in the members 46, 48, and the blade 24, it is secured in place in any suitable manner, for example by a cotter pin 54.

When a high degree of fineness of the solid particles discharged through outlet 36 is desired, all of the blades 24, along with blades 26, are manually pivoted to their outward position shown in FIG. 2. Thus a great amount of centrifugal force is imparted to the gas stream and entrained solids passing through the whizzer blades as they are rotated, causing centrifugal separation of all but the very fine particles. When it is desired to have more coarse particles carried over to the discharge 36, the unit is shut down, and an operator enters the housing and pivots either some or all of the blades 24 and 26 to their inner position, shown in Figure 3. When the unit is thereafter put back into operation, less centrifugal force is imparted to the solids carried by the gas stream, causing solids of coarser particle size to be carried into chamber 56 and discharged through opening 36.

It should be noted that the pivot point of the blades 24 is above the center of mass of the blade, which will cause centrifugal force to hold the blade down firmly against the upper surface of the whizzer plate 44. For added insurance against the blade coming out of the inward position shown in FIG. 3, the pivot holes in whizzer blades 24 have been slotted. Centrifugal force holds the whizzer blade against the inner limits of the slotted hole, thus locking the outer end of the whizzer blade 24 over the support block 58. When the blades are initially placed in their outer position, they rest on the support block 58. As soon as rotation begins, centrifugal force holds the whizzer blades in the extended position against the end of the slotted hole.

From the above, it can be seen that a whizzer separator has been provided wherein the whizzer blades can be quickly and easily removed by an operator by pivoting them to an inward or outward position. In previous installations, where the blades were secured by nuts and bolts to the whizzer plate, it would take an operator

up to eight hours to remove the whizzer blades. This requires the separator to be shut down for that length of time. With use of the pivotally connected whizzer blades of the invention, it is estimated that removal of the whizzer blades will take less than an hour.

What is claimed is:

1. In a mechanical separator comprising an upright casing, means for causing a forward axial flow through the casing of gas entraining solids to be separated therefrom, an assembly mounted centrally within the casing including an inner imperforate member having an outer circular periphery, said imperforate member having a vertical axis corresponding to that of the casing, means for rotating the imperforate member, a plurality of upright means secured to the upper surface of the imperforate member, a plurality of radially extending blades, each blade being pivotally connected to one of the upright means so as to be pivotable, vertically about its pivot point, each blade having a major portion on one side of its pivot point, and a minor portion on the other side of its pivot point, each blade being pivotally connected to its respective upright means high enough above the upper surface of the imperforate member so it can be pivoted through at least a 180° arc, the length of the major portion of each blade being such that the end of the major portion rests on the upper surface of the imperforate member when it is positioned inwardly of its pivot point, each blade also being pivotally connected high enough above the upper surface of the imperforate member so that the center of gravity of the major portion of the blade is below its pivot point while the end of the major portion is in contact with the upper surface of the imperforate means, so that centrifugal force tends to hold it in a stationary position once it is initially positioned with the major portion extending inwardly, and centrifugal force will also tend to hold the blades in a stationary horizontal position if they are initially positioned with the major portion extending outwardly of the pivot points.

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