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GRINDING DEVICE IN A FLUIDIZED LAYER

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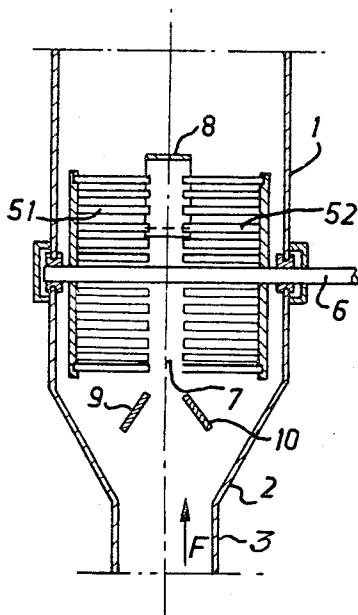


FIG. 1

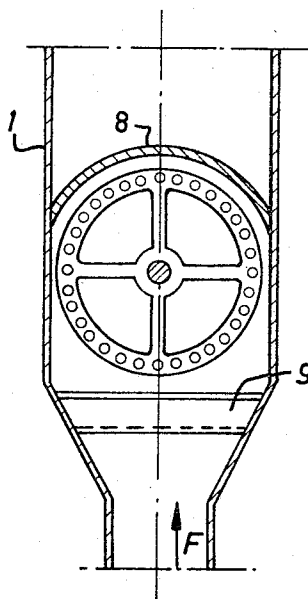


FIG. 2

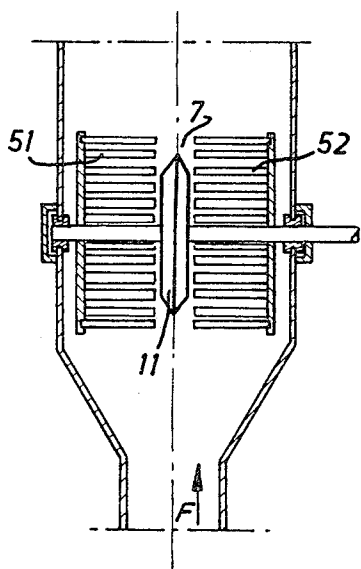


FIG. 3

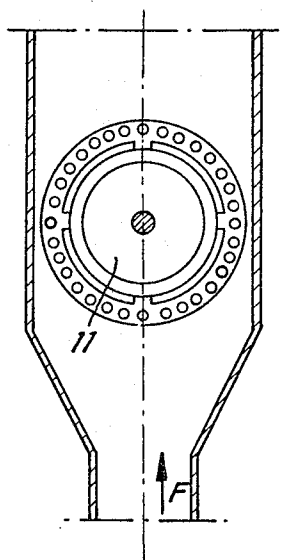


FIG. 4

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**GRINDING DEVICE IN A FLUIDIZED LAYER**  
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 18,592

4 Claims. (Cl. 241-44)

The present invention relates to an improved apparatus for the simultaneous grinding, sorting, and when so required drying, of granular, non-agglutinant materials.

It is known that the simultaneous operations of grinding, sorting, and when so required, drying of non-agglutinant materials can readily be carried out in a fluidization reactor, comprising a percussion grinder, for example of the squirrel cage disintegrator type, immersed partly or wholly in a fluidized layer of the material to be treated.

In one known form of construction, the supply of material to be treated to the fluidized bed is made by pneumatic conveyance of the said material by means of hot combustion gases passing into the fluidized layer under the moving system of the squirrel cage disintegrator. A device of this kind is described in the French Patent No. 1,357,803 of Feb. 28, 1963.

This device has the advantage of permitting the use of combustion or other gases at higher temperatures than in drying in a conventional fluidized bed, which makes it possible to reduce the contact time of the fine products with the gas or the combustion gases which convey them.

However, when the moving system of the grinder is made in the form of a single squirrel cage occupying almost the whole of the section of the fluidization chamber, it is found that a preferential wear takes place of the central external surface of the bars of the rotating cage.

This wear is due to the formation of a heap of material to be ground in the central zone of the layer, located immediately beneath the moving system of the grinder.

The present invention has for its object improvements in this kind of installation, the said improvements having the essential object of preventing preferential wear of the bars of the rotating system.

The improved device in accordance with the invention comprises essentially a fluidization chamber, at the base of which a closed conduit opens vertically, this conduit being traversed from the bottom to the top by the hot gases conveying the material to be treated, and percussion grinding means of the squirrel cage disintegrator type, and is essentially characterized in that the moving system of the grinder is constituted by a plurality of rotating cages with bars mounted side by side on the same driving shaft and separated from each other by a free space.

According to a characteristic feature, the cages are of the same diameter.

In accordance with other characteristic features, taken separately or in all their combinations:

A fixed deflector system placed under each free space channels the products to be treated towards the said space;

A deflector system carried by the driving shaft of the moving system inside each free space channels the products to be treated towards the interior of the cages adjacent the said space;

A fixed impact plate extending over all or part of the width of the fluidization chamber is placed above each free space.

In accordance with one form of construction, the deflector system placed inside each free space is rigidly fixed on the driving shaft of the moving system of the grinder.

In accordance with an alternative form of construc-

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tion, the deflector system placed inside each free space is freely mounted on the driving shaft.

Other characteristic features and advantages of the present invention will be brought out in the description which follows below, this description being given with reference to the accompanying drawings, in which:

FIGS. 1 and 2 are two diagrammatic sections of one form of embodiment of the device according to the invention, comprising a fixed deflector and an impact plate;

FIGS. 3 and 4 are two diagrammatic sections of another form of embodiment of the device according to the invention, comprising a deflector rigidly fixed to the driving shaft of the moving system of the grinder.

The apparatus shown by way of example in FIGS. 1 and 2 is essentially composed of a fluidization chamber 1 with a rectangular section at the base 2 of which opens the vertical conduit 3, through which pass, in the direction of the arrow F, the hot combustion or other gases which convey the materials to be ground, already partly dried during the course of their pneumatic conveyance. As the speed of the drying gases becomes lower, the material forms a fluidized layer of low density.

At the lower portion of the vertical chamber 1 is provided a grinding device of the squirrel cage disintegrator type.

For the sake of clearness, only the rotatably-driven moving system of this grinder has been shown, the rotational drive being effected at a controlled speed by a driving set (not shown).

According to the invention, the moving system of the grinder is constituted by two cages 51 and 52, fixed for rotation on the driving shaft 6, and separated from the other by a free space 7.

This particular arrangement facilitates the introduction into the two cages of the products which have a tendency to be concentrated in the central portion of the moving system.

In order to prevent some grains which pass through the space provided between the cages from being carried away out of the cages without coming into contact with the bars, there may be provided above each space an impact plate fixed to the wall of the chamber 1 and constituted for example by a strip of sheet steel 8 having a width substantially equal to that of the space and extending over the whole width of the fluidization chamber.

Two plates 9 and 10 converging towards the top are placed under each space and may constitute fixed deflector system intended to channel towards the space 7 those products which have a tendency to accumulate in the central part of the moving system of the grinder.

The form of construction shown in FIGS. 3 and 4 is an alternative form of easier construction and assembly.

The deflector system intended to channel the products into the central zone of the moving system is constituted by a wheel 11 mounted on the driving shaft 6 and the space 7 which separates two adjacent cages.

The shape of this wheel is such that the products are channelled towards the interior of each cage.

As it is mounted between the two cages, it can be seen that this wheel furthermore prevents the passage of grains which have a tendency to pass through the moving system without passing into the cages.

The said wheel can be fixed for rotation with the shaft 6, as shown, or mounted freely rotatable on the said shaft.

It will of course be understood that the foregoing description has only been given by way of indication and not in any limitative sense and that any useful modification may be made thereto without departing from the scope of the invention.

Thus, in particular, the invention may be applied to grinding operations combined with operations of thermal

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treatment of granular or powdered solids other than drying.

In addition, the moving system of the grinder may be composed of more than two cages, and also each rotating cage may be constituted by a number of concentric cages independent for rotation or not.

I claim:

1. In a grinding apparatus working in a fluidized layer, of the type comprising a fluidization chamber at the base of which opens vertically a closed conduit traversed from the bottom to the top by hot combustion gases conveying the material to be treated and percussion grinding means of the squirrel cage disintegrator type, arranged in the fluidization chamber, a moving grinding system constituted:

by a plurality of rotating cages with bars, mounted side by side on the same driving shaft;

by free spaces separating said cages from each other; and by as many deflector systems as there are free spaces;

each of said reflector systems co-operating with a free space and being adapted to channel the products to be treated towards the interior of the cages adjacent to said space.

2. A moving grinding system as claimed in claim 1, in which each deflector system is constituted on the one hand by fixed deflector plates arranged under the free space and

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converging towards this latter, and on the other hand by a fixed impact plate arranged above the free space and extending substantially over the width of said fluidization chamber.

3. A moving grinding system as claimed in claim 1, in which each deflector system is constituted by deflector plates arranged in the interior of the free space between the cages adjacent to said space and diverging towards said cages, said deflector plates being driven in rotation by the driving shaft of said cages.

4. A moving grinding system as claimed in claim 1, in which each deflector system is constituted by deflector plates arranged in the interior of the free space between the cages adjacent to said space and diverging towards said cages, said deflector plates being mounted freely on the driving shaft of said cages.

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