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APPARATUS FOR TREATING SOLID PARTICLES IN A CONDITIONING FLUID

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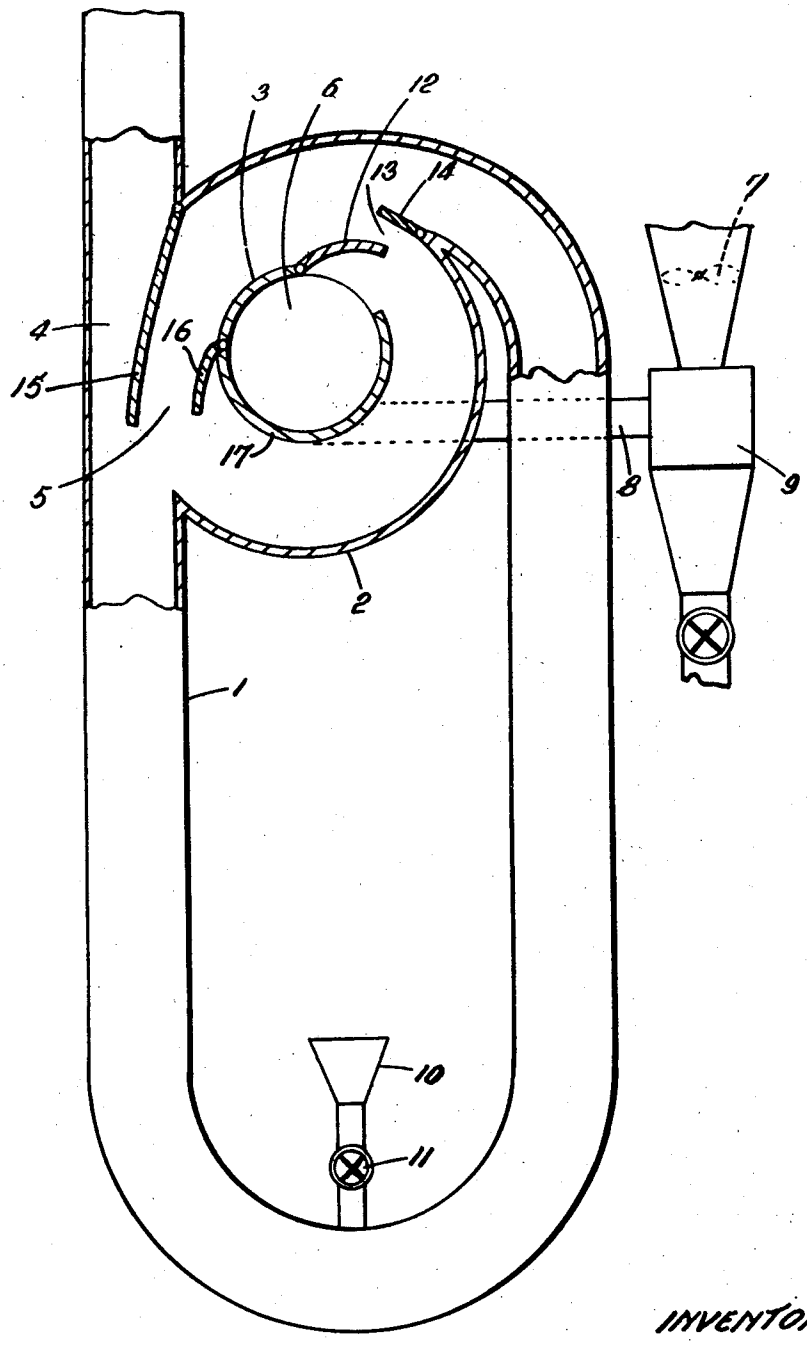

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APPARATUS FOR TREATING SOLID PARTICLES IN A CONDITIONING FLUID

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2 Claims. (Cl. 34—57)

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This invention relates to improvements in floating contact treatment of solid particles in a conditioning fluid. The object of the invention is to provide for improved facilities of control of such treatment.

It has already been proposed in Patent No. 2,351,091 to establish a closed circuit of airborne particles in an endless duct with an injector nozzle for introducing hot air or other carrying fluid into said duct and an outlet approximately opposite said nozzle, said outlet being the inlet into a drum shaped classifier.

It has further been proposed to provide a deflector in the outlet from said endless duct into the drum for the purpose of controlling release of solid particles from the endless duct. With this deflector, it is not only possible to control release of solid particles from the closed circuit in the endless duct but also to provide for return of some solid particles from the drum back into the endless duct.

According to the present invention, the duration of the floating contact treatment in the endless duct is more effectively controlled by providing the endless duct with an additional opening for the return of particles from the inner circuit back into the main circuit. The reasons why this provides considerably better control of the duration of the floating contact treatment will be described in greater detail with reference to the accompanying drawing, which shows an elevation partly in section of an apparatus according to the invention.

Referring to the drawing, the apparatus comprises an endless duct 1 and an injector nozzle 4 for introducing fluid into the endless duct. The opening 5 between the deflectors 15 and 16 is the outlet of the endless duct and, at the same time, the inlet into the curved duct 2, which leads back to the opening 13 of the endless duct, some distance upstream from the outlet 5. The drum 6 with a tangential inlet near the opening 13 and an axial outlet is so located between duct 1 and duct 2 that the drum has a common wall 3 with the endless duct 1 and a common wall 17 with the curved duct 2. The fan 7 serves for passing fluid through the whole apparatus and from drum 6 through duct 8 into a separator 9, where finished product is separated from spent fluid. Fresh solid particles can be introduced into the duct 1 from hopper 10 through valve 11.

With this apparatus it is possible to establish two closed circuits of airborne solid particles. The main circuit will pass through the entire length of the endless duct 1. When the material

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reaches the outlet of the duct at 5, where a major part of fluid is withdrawn, the majority of solid particles are prevented from leaving the main ring duct by centrifugal force and also by the suction effect of the nozzle 4.

A certain proportion of solid particles will, however, be entrained through the opening 5 into the outlet 2. Owing to the curvature of the wall of the outlet, the majority of the solid particles in the outlet will travel near the outer wall of the outlet. Whereas most of the fluid is withdrawn through drum 6, a stream of airborne solid particles is, by centrifugal force, passed round the outside of a deflector 12 and returned into the main duct 1 through opening 13. The arrangement of the tangential inlet of the drum 6 near the opening 13 with the controlling deflectors 12 and 14 serves for further restriction of the release of solid particles from the apparatus, and thus prolongs the floating contact treatment in the conditioning fluid.

With this arrangement, a second closed circuit of airborne particles is set up within the main circuit, the inner circuit branching off from the main circuit at 5 and returning into the main circuit at 13. It is an object of the invention to provide separate means of control for release of solid particles from the main circuit to the inner circuit and for return from the inner circuit back to the main circuit.

In other words, the invention provides for separate control for the two stages of a double centrifugal separation of finished product. The untreated solid particles are first introduced into the endless duct 1. Their release from the endless duct 1 into the duct 2 is controlled by deflectors 15 and 16, whereas their final release from the duct 2 into drum 6 is controlled by deflectors 12 and 14.

The effect of the deflector 12 can also be described as peeling or shaving off the inner layer of dust or other airborne particles for discharge into drum 6. Equally, just as well as describing the path of the solid particles as two closed circuits, this could be described as a double spiral, coil or loop. At the two points 5 and 13 of said spiral, coil or loop, a stream of airborne solid particles is peeled or shaved off and returned to a point up-stream in said spiral, coil or loop. The definition of the process as treatment in two closed circuits is, however, preferably because the rate of circulation of solids in both circuits is higher than the rate of feed or discharge. The rate of transfer from the outer to the inner circle is, obviously, again higher than the rate of

feed or discharge, because the rate of transfer from the main circuit to the inner circuit equals the sum of the rate of discharge plus the rate of return from the inner circuit to the main circuit.

I claim:

1. An apparatus for treating solid particles in a conditioning fluid comprising an endless duct, means for introducing a stream of fluid into said duct, means for maintaining continuous circulation of said fluid within said duct, means for introducing solid particles into said duct, an outlet opening on the inner periphery of said duct, a second opening in said inner wall of said duct up-stream from said outlet opening, a curved wall connecting said outlet opening and said second opening, and a drum member within said endless duct forming a space with said curved wall, said drum member having an axial outlet opening and a tangential inlet opening communicating with said space, and deflectors for guiding the inner layer of fluid and solids into said drum member, and returning the outer layer of said fluid and solids into the endless duct through said second opening, one of the deflectors being hinged at the down-stream end of the inlet opening of the said drum member, the other being hinged at the up-stream end of said second opening.

2. An apparatus for treating solid particles in a conditioning fluid comprising an endless duct, means for introducing a stream of fluid into said duct, means for maintaining continuous circulation of said fluid within said duct, means for introducing solid particles into said duct, an outlet

opening on the inner periphery of said duct, a second opening in said inner wall of said duct up-stream from said outlet opening, a curved wall connecting said outlet opening and said second opening, a drum member within said endless duct forming a space with said curved wall, said drum member having an axial outlet opening and a tangential inlet opening communicating with said space, the inlet of the drum member being located adjacent to the second opening in the wall of the endless duct, and deflectors for guiding the inner layer of fluid and solids into said drum member, and returning the outer layer of said fluid and solids into the endless duct through said second opening, one of the deflectors being hinged at the down-stream end of the inlet opening of the said drum member, the other being hinged at the up-stream end of said second opening.

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