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SEALING RING FOR GRINDERS

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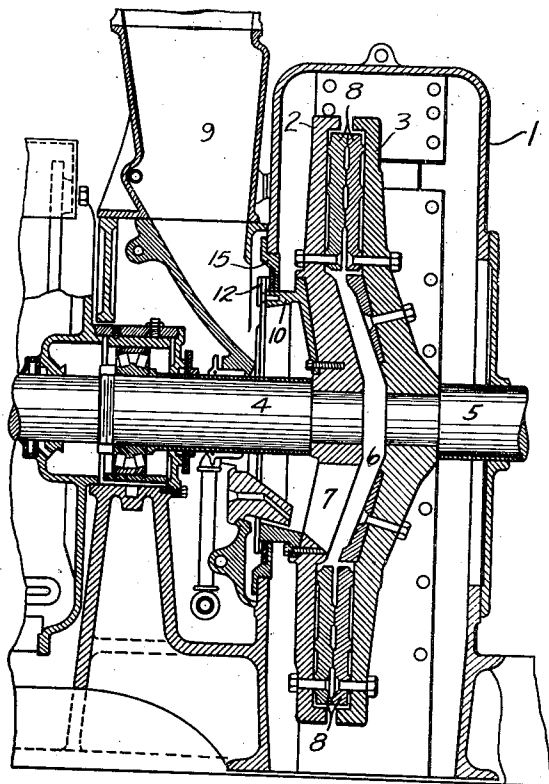


Fig-1

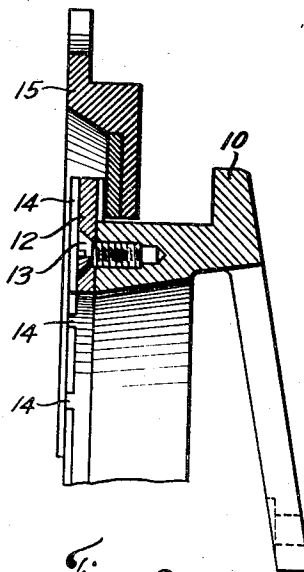


Fig.-2

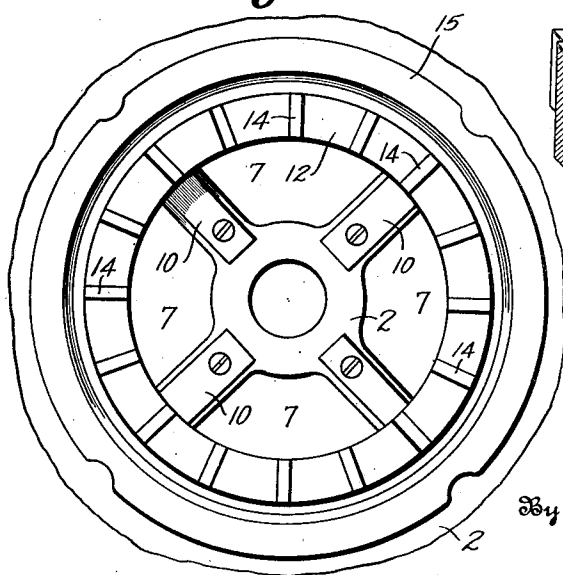


Fig-3

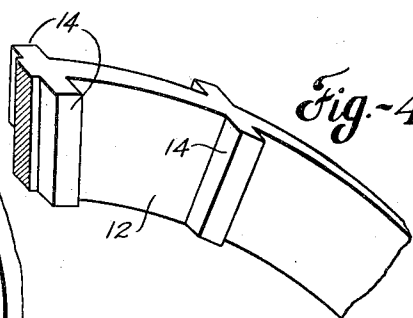


Fig-4

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SEALING RING FOR GRINDERS

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5 Claims. (Cl. 83—8)

This invention comprises flow stream control means for centering a stream of either liquid or dry material relative to a receiving opening or passage and for preventing leakage or by-passage of the material thereabout, by diverting stray portions of the material away from the periphery of the opening.

The invention consists more particularly in creating about the flowing stream of material an annular zone wherein countercurrents are induced by which stray eddies of material exteriorly of the main stream are discharged away from the opening or passage and in provision of centrifugal means for effecting such diversion of material without affecting nor retarding the flow of the main stream.

While for illustrative purposes the invention is herein illustrated and will be described in its application to a double disc attrition type mill suitable for reducing fibrous material for pulp making purposes as well as for grinding cereals and granular dry material, it is to be understood that the invention is not limited to such use, but may be applied to various other flow stream control purposes.

Heretofore much difficulty has been experienced in effectively sealing the annular space about the opening from a supply hopper or compartment to the throat or receiving space between the relatively revoluble discs of mills or grinders of the type herein illustrated. Various forms of seal rings have been unsuccessfully devised and attempts have been made to exclude stray material by accurately fitting the contiguous parts within a few thousandths of an inch, but without avail. Such close fitting necessitates extreme accuracy of machining operation which materially increases cost of production and causes friction and incident wear, both of which are increased by collection of material in the space. Nevertheless the material has heretofore continued to leak through such space and by pass the disc, entering the treated material therebeyond in a comparatively coarse and untreated condition.

In the present construction this tendency is counteracted by provision of a rapidly rotating impeller about the opening or passage by which the material which might otherwise leak through the space between the hopper outlet and relatively rotating disc is centrifugally discharged away from such space back into the hopper supply compartment where it may again enter the stream flowing into the opening.

The object of the invention is to provide an

effective means and a method for diverting away from the periphery of an opening or passage stray eddies of material which may otherwise leak about or by-pass the opening or passage without interfering or retarding the flow of the main stream of material therethrough.

A further object of the invention is to provide flow stream control means of the character described which may not only be economically manufactured, but will be more efficient in use, of compact form, automatic in action, uniform in operation, and unlikely to get out of repair.

A further object of the invention is to provide a counter-current zone about an opening or passage within which undesired material will be diverted away from the opening.

A further object of the invention is to provide positive means for excluding material from the space about the opening or passage and preventing leakage therethrough.

A further object of the invention is to provide a centrifugal impeller device for control of eddy currents of material.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents, as hereinafter described and set forth in the claims.

Referring to the accompanying drawing wherein is shown the preferred, but obviously not necessarily the only form of embodiment of the invention:

Fig. 1 is a vertical sectional view of a double disc mill to which the present invention has been applied.

Fig. 2 is an enlarged detail sectional view of a portion of the assembly illustrated in Fig. 1 embodying the present invention.

Fig. 3 is a front elevation of the impeller ring and contiguous portions of the apparatus.

Fig. 4 is a detail perspective view of a portion of the impeller ring.

Like parts are indicated by similar characters of reference throughout the several views.

Referring to the drawing, Fig. 1 illustrates a typical double disc attrition mill of which 1 is the housing enclosing a pair of relatively revoluble discs 2 and 3, mounted on separate shafts 4 and 5 for unison rotation in opposite directions. However, for certain conditions of use one disc may be stationary and the other revoluble relative thereto. The discs 2 and 3 are centrally concave to afford a throat into which material to be oper-

ated upon enters through a central opening or eye 7 in the disc 2. The material is carried, by centrifugal influence and the rubbing action of the discs, outwardly between opposing surface plates 8 adjacent to the peripheries of the discs and discharged therefrom into the housing 1. Such mill is used for dry grinding of cereals and other granular material, and when of suitable size, and equipped with plates 8 of a character to afford the requisite rolling and crushing action, it is quite effectively used in the manufacture of wood pulp and analogous fibrous products from wet material intermixed with a considerable quantity of water, in which event the mill is known as a "Bauer".

Located at one side of the housing 1 is a hopper compartment 9 having at its lower portion an opening communicating with the eye 7 of the disc through which a stream of material flows into the throat space 6 between the discs. Surrounding the receiving opening or eye 7 of the disc and carried thereby is a flange 10 projecting within the discharge opening of the hopper compartment and forming a short passage or conduit for the flowing stream of material from the hopper compartment. Although the flange 10 fits fairly closely within the discharge opening in the wall between the hopper compartment 9 and the housing 1, unless effectively sealed, leakage of material through the slight annular space between the periphery of the flange and the margin of the hopper discharge opening will occur. Such material by-passes the discs and mixes with the finished product being discharged from the peripheries thereof into the housing. Collection of material in such space not only increases the frictional resistance but it accelerates the rate of wear. Because of such rapid wear, the flange 10 has heretofore been made as a replaceable ring detachably secured to the disc 2. However, by use of the present means for diverting material away from the annular space exteriorly of the flange and preventing its entrance thereto, such wearing of the parts is obviated and the flange 10 may now be made an integral part of the disc. To so protect the annular space exteriorly of the flange 10 against entrance of stray material, there is provided within the hopper compartment 9 and concentric with the discharge opening an impeller ring 12 which is attached for unison rotation to the edge of the flange 10 by a series of screws 13. The impeller ring 12 is provided with a series of spaced radial ribs or vanes 14, preferably, although not necessarily, formed on both sides of the ring 12 which intercept stray eddies of material which might otherwise leak through the annular space exteriorly of the flange 10 and discharge such material by centrifugal influence in directions outwardly away from the opening and flowing main stream of material. Such impeller ring entirely surrounds and defines the discharge opening therethrough from the hopper compartment. Rotating with the disc the impeller ring creates a countercurrent zone wherein the material is automatically diverted away from the annular space and forced back into the hopper compartment where it may enter the main stream of material flowing through the interior of the impeller ring 12 and flange 10 into the throat space between the discs.

The margin of the opening from the hopper compartment is preferably reinforced by a facing ring 15 secured to the wall between the housing 1 and hopper compartment 9 and which is over-

lapped by the impeller ring. Such material as may enter in the spaces between succeeding vanes or ribs is forcibly expelled radially therefrom and the vanes or ribs at the inner side of the ring adjacent to the facing plate 15 tend to create a suction effect at the point of meeting of the flange 10 and the inner periphery of the ring 15 and an expelling force outwardly toward the outer periphery of the impeller ring 12 by which the annular space is kept clear of accumulation of material.

The rotation of the impeller device and creation of countercurrents by centrifugal discharge of stray material does not in the least interfere with the flow of the main stream of material from the hopper compartment through the proper course into the space between the discs, but it does effectively prevent leakage of material and by-passing of the material outside the discs.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. In a mill of the character described, the combination with relatively rotatable discs one of which has a central opening for reception of material to be operated upon, and a hopper compartment including a wall having therein a discharge opening communicating with the disc opening for directing material thereto, of a rotary impeller ring within the hopper compartment closely adjacent to the wall thereof and surrounding the discharge opening, radiating vanes thereon constructed and arranged to centrifugally divert stray portions of material away from discharge opening and means for rotating said impeller ring.

2. In a mill of the character described, the combination with relatively rotatable discs, one of which has a central opening for reception of material to be operated upon, and a hopper compartment including a wall having therein a discharge opening communicating with the disc opening for directing material thereto, and centrifugal deflector means within the hopper compartment adjacent to the wall thereof, so constructed and arranged as to create about the discharge opening a zone of countercurrents within which stray material is diverted within the hopper in directions away from the opening.

3. In a mill of the character described, the combination with relatively rotatable discs, one of which has a central opening for reception of material to be operated upon, and a hopper compartment including a wall having a discharge opening therein communicating with the disc opening for directing material thereto, a flange upon the disc extending within and radially over-

lapping the hopper opening, and a series of impeller vanes carried by said flange within the hopper compartment constructed and arranged to centrifugally divert stray eddies of material away from the opening.

5 4. The combination with a mill, including a rotary disc and a hopper compartment including a wall having a discharge opening through which material is discharged from the hopper compartment to the disc, of a flange on the rotary disc
10 projecting within the discharge opening and an impeller ring located within the hopper compartment and carried by the flange of the disc in radially overlapping relation with the margins of the opening for imparting centrifugal

influence to contiguous portions of material within the hopper compartment.

5. A structure having an opening through which a stream of material flows, characterized by a rotary impeller ring surrounding the opening in intimate relation with the flowing material and subjecting material exteriorly of the opening to centrifugal influence so constructed and arranged as to divert stray material away from the opening and return such material to the stream in spaced relation with the opening for return flow therethrough, and means for rotating the impeller ring.

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