

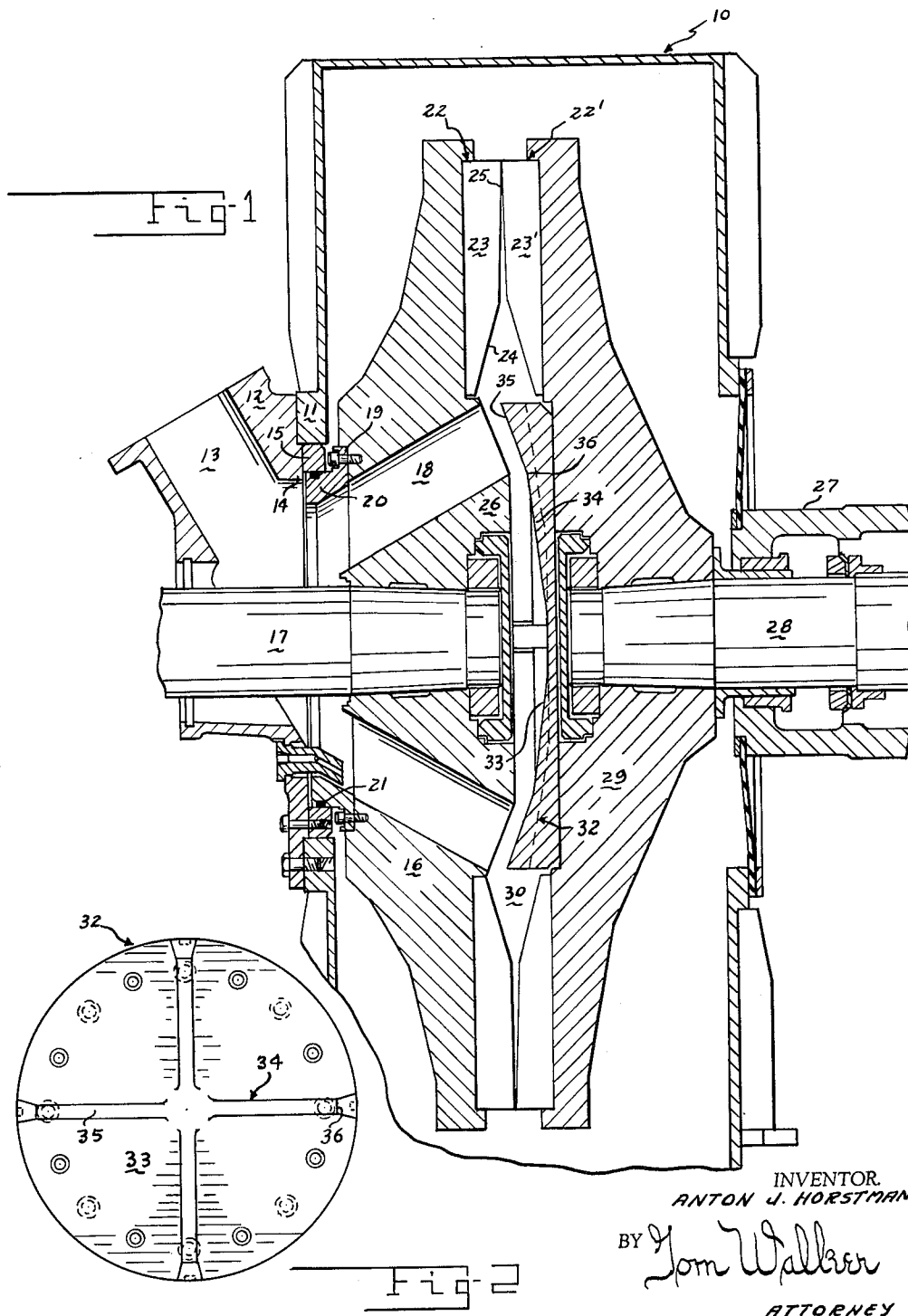
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REFINER DISC ASSEMBLY HAVING IMPROVED DISTRIBUTOR PLATE

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REFINER DISC ASSEMBLY HAVING IMPROVED DISTRIBUTOR PLATE

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This invention relates to disc type pulp refiners and, more particularly, to improvements in their disc assemblies which render them more efficient and satisfactory in use.

A primary object of the invention is to provide improvements in disc type refiner units rendering them economical to fabricate, more efficient and satisfactory in use, adaptable to a wide variety of applications and unlikely to malfunction.

Another object of the invention is to provide means which facilitate the distribution and flow of stock in a disc type refiner unit.

A further object of the invention is to provide a novel wear plate the use of which improves the stock flow in a double disc refiner.

An additional object of the invention is to provide a double disc refiner the disc assemblies of which are so formed to inhibit a stagnant collection of material therebetween at their centers.

A further object of the invention is to provide a double disc refiner including one disc having extended flow passages so formed for delivery of stock to a position immediately adjacent the disc refining surfaces and means in connection with the other disc to afford a positive dispersal of stock between the disc refining surfaces on exit from said flow passages.

A further object of the invention is to provide a disc refiner possessing the advantageous structural features, the inherent meritorious characteristics and the means and mode of operation herein described.

With the above and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

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

FIG. 1 is a fragmentary cross-sectional view of a double disc refiner in accordance with the invention; and FIG. 2 is a plan view of a replaceable wear plate which is incorporated in the device of FIG. 1.

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

The disc refiner shown in the drawings is detailed only to the extent necessary for a full disclosure of the present invention. As illustrated, it includes a housing 10 having an opening to one side defined by a tubular projection 11. Bolted to the outer face of the projection 11 is a feed spout 12 including a flow passage 13 which communicates with the opening in the housing 10. The discharge end of the spout 12 is defined by a short tubular extension 14 which nests in and in contact with the tubular projection 11.

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Fixed within the projection 11, in end abutting relation to the extension 14, is a ring element 15. Positioned in the housing 10 in adjacent relation to the opening defined by the projection 11 is an open disc 16. The disc 16 mounts on one end of a drive shaft 17 which extends through the projection 11 and an opening in one side of the spout 12 which leads thereto.

The disc 16 includes flow passages 18 which relatively diverge from their entrance ends which are adjacent and spaced from the ring 15. Fixed to the rear face of the disc 16 through the medium of an external flange 19 is a ring element 20. The ring 20 rims the entrance ends of the flow passages 18 and projects to concentrically nest in and bear on the inner peripheral surface of the ring 15. A ring seal 21 nests in the outer peripheral wall of the ring 20 to relatively project and contact the inner periphery of the ring 15 thereabout and form a seal therebetween.

As thus related, the rings 15 and 20 form a bridging flow passage which interconnects the flow passage 13 in the spout 12 and the divergent flow passages 18 in the disc 16.

At the operating face of the disc 16, which is innermost with reference to housing 10, the hub portion of the disc, which includes the flow passages 18, is rimmed by an annular recess 22 the outer limit of which lies immediately within the outer periphery of the disc. Nested in and relatively projected from the recess 22 is a series of identically formed refiner plates 23. The refiner plates 23 mount in adjacent end abutting relation to form a ring which encircles the hub portion of the disc 16. Plates 23 provide a projected refining surface having a profile the inner peripheral portion 24 of which inclines outwardly of the disc in a long gradual slope from its hub portion. The outer peripheral portion 25 of this profile forms a continuation of the slope of the portion 24, but at a much lesser angle so as to approach a flat.

At the operating face of the disc 16 its hub portion which is peripherally bounded by the refiner plates 23 includes a portion 26 which relatively projects in the form of a conical section. The projected extremity of the section 26 lies in a plane adjacent but spaced beyond that achieved by the refining surfaces of plates 23.

At its side opposite the projection 11 and coaxial therewith, the housing 10 has a further opening defined in its wall structure by a bearing unit 27. The unit 27 rotatably accommodates a drive shaft 28 one end of which terminates in the housing 10 in adjacent spaced relation to and coaxial with the shaft 17. The end of the shaft 28 in the housing 10 mounts a closed disc 29 positioned directly opposite and in adjacent spaced relation to the disc 16. The face of the disc 29 adjacent the disc 16 includes a recess 22' to seat a ring of refiner plates 23' identical with, directly opposite and adjacent the refiner plates 23 on the disc 16.

Thus, the respective series of plates 23 and 23' on the discs 16 and 29 provide directly opposed and immediately adjacent annular refining surfaces. The inner peripheral portions 24 of these refining surfaces cooperate to define a convergent entrance throat 30 which facilitates the entrance and flow of stock therebetween in a manner to be described.

The central portion of the operating face of the disc 29 positioned immediately opposite the conically projecting section 26 on the disc 16 is recessed to seat a

disc shaped wear plate 32. The wear plate 32 is a replaceable distributor device which is releasably connected to the plate 29.

The outer face 33 of the plate 32 is dished to its center. Its sides have a uniform slope to afford a direct flow path from its center to the entrance throat 30 defined by the refiner plates 23 and 23' which are positioned immediately thereabout. Radially coextensive with the face 33 are relatively projected ribs 34, spaced 90 degrees apart. The projected surfaces 35 of the ribs 34 have a uniform gradual outward slope from the center of the dished surface 33 to a point 36 adjacent a circle which rims the interior surfaces of the discharge ends of the flow passages 18 in the disc 16. From this point the ribs 34 have their outermost surfaces inclined to lie in a plane adjacent and generally parallel to the conical surface of the projection 26 on the disc 16 which includes the discharge ends of the flow passages 18. Thus the outer peripheral portions of the ribs 34 lie adjacent and opposite the discharge ends of the flow passages 18 and are angled in the direction of an intermediate point on the surfaces 24 of the refiner plates 23 on the disc 16.

It is to be noted that the protruding hub portion 26 on the disc 16 affords an extension of the divergent flow paths defined by the passages 18 to an area immediately adjacent the refiner plates 23' on the disc 29 and thereby to the immediate vicinity of the entrance to the throat 30. Also, material which exits from the flow passages 18 discharges in the direct path of the adjacent radially projected extremities of the ribs 34 of the plate 32.

Suitable means conventionally connect to the shafts 17 and 28 to enable their relative rotation in opposite directions and the relative rotation therewith of the refining surfaces formed on the discs 16 and 29. As these drive means are energized, stock may be delivered through the passage 13 of the spout 12 to flow through the bridging flow passage defined by the ring elements 15 and 20 and then through the rotating disc 16 through the medium of the divergent flow passages 18. As the stock exits from the flow passages 18 at the entrance to the throat 30, it discharges on the outer peripheral portion of the face 33 of the relatively rotating plate 32. This discharge is in the direct path of the radially projected extremities of ribs 34, the surfaces 35 of which swing past the discharge ends of the passages 18 in a plane immediately adjacent thereto. Therefore, the radially projected extremities of ribs 34 intercept and almost instantaneously sling the discharged stock into the immediately adjacent entrance to the throat 30. The force and nature of this of this interception and the appropriate orientation of the stock on discharge due to the extension of the flow passages 18 is such to provide a uniform dispersion of the stock as it is caused thereby to move to and between the opposed refining surfaces on the relatively adjacent discs.

Thus, the configuration of the protruding portion 26 of the hub of the disc 16 in conjunction with the character of the ribs on the wear plate 32 enables a most uniform and continuous dispersion of the stock discharged from the flow passages 18. This insures a generally uniform load on the operating components of the disc assembly above described.

In the event portions of the stock discharged from the passages 18 should move inwardly between the disc assemblies to the vicinity of the center of the wear plate 32 and the relatively adjacent protruding surface of the projection 26, the fact that the ribs 34 are radially coextensive with the wear plate in conjunction with the fact the wear plate is dished, enables the ribs 34 to pick up the stock which flows inwardly thereof and fling it outwardly into the refining throat 30 in a manner believed obvious. Accordingly, not only is there a generally uniform dispersion of stock in accordance with the features of the invention, but there are means which positively inhibit an accumulation of stock between the centers

of the disc assemblies which might ordinarily interfere with the facility of their operation.

Thus, the present invention provides means which facilitate the delivery and dispersal of stock in a disc refiner. The movement of stock is positive in all aspects of its flow. Moreover, the use of a dished wear plate including radially co-extensive ribs to insure a proper dispersal of stock, which plate is readily replaceable, enables maintenance costs for a disc refiner to be held to a minimum.

Therefore, the invention provides a more economical and effective flow of stock in a disc refiner which enables a more efficient and economical refiner operation. As is evident, with the uniform and smooth flow of stock occasioned by the improvements of the invention, there is less load imposed on the attendant structure and operating components and power demand is held to a minimum.

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 but one 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. A pulp refiner unit wherein first and second opposed spaced discs are secured at their hub to respective oppositely projecting relatively rotatable shafts, with said first disc having at least one material passing through opening located in a circumferential area near its hub to admit material for refining to the space between said discs, said discs having opposing inner faces defining said space; characterized by a wear plate seated to the inner face of said second disc in aligned superposed relation to the end of the shaft to which said second disc is secured, said plate having radial ribs each having a first portion of relatively long and gradual slope from the mid area of the plate outward and a second portion of shorter relatively steeper slope from the outer end of said first portion to the periphery of the plate, said second portion being disposed to move in response to rotation of said second disc in a path in concentric aligned relation to the said circumferential area of said first disc in which said material passing opening appears, said first portion terminating adjacent to the inner periphery of said area.

2. A pulp refiner according to claim 1, further characterized in that said inner face of said second disc is formed with a flat planar surface seating said wear plate, said plate having on one side thereof a complementary surface and on the other side a concave surface, said ribs being on said concave surface, the said first portions of said ribs approximately paralleling said concave surface and said second portions of said ribs diverging therefrom.

3. A pulp refiner according to claim 1, further characterized in that said second portion of each rib is sufficiently long to extend transversely across more than half of said circumferential area.

4. A pulp refiner unit wherein first and second relatively opposed spaced discs are secured at their hubs to respective oppositely projecting relatively rotatable shafts, with said first disc having at least one material passing opening located in a circumferential area near its hub to admit material for refining to the space between said discs, said discs having opposing inner faces defining

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said space; characterized by a wear plate mounted to the inner face of said second disc centrally thereof, said plate being continuous across the axis of the said shaft to which said second disc is secured and extending at its periphery substantially to a location aligned with the outer peripheral edge of said circumferential area, said plate having ribs exposed to said first disc extending transversely across said plate, each rib having a first portion extending from mid area of the plate to a location aligned with the inner peripheral edge of said circumferential area and a second portion inclined relatively to the first portion extending from the outer terminus of said first portion to the periphery of said plate.

5. A pulp refiner unit according to claim 4, further characterized in that said second portions of said ribs extend in respective longitudinal planes perpendicular to the axis of said material passing opening in said first

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disc, said opening being in a divergent relation to the axis of said shaft to which said first disc is secured.

References Cited by the Examiner

UNITED STATES PATENTS

386,339	7/88	Miller	275—15
727,156	5/03	Lacey	241—298
1,123,217	1/15	Bailey	241—247
1,758,539	5/30	Schuchardt	241—251
2,184,903	12/39	Baehr	241—246
2,239,497	4/41	Byers	241—247
2,314,109	3/43	Smith	275—15
3,040,996	6/62	Ginaven	241—251
3,055,598	9/62	Ginaven	241—251 X

J. SPENCER OVERHOLSER, *Primary Examiner*.