



(19)

Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 105 560 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

23.04.2003 Bulletin 2003/17

(21) Application number: **98940991.7**

(22) Date of filing: **19.08.1998**

(51) Int Cl.⁷: **D21D 1/30**

(86) International application number:
PCT/US98/17162

(87) International publication number:
WO 00/011264 (02.03.2000 Gazette 2000/09)

(54) REFINER PLATE WITH CHICANES

REFINERSCHEIBE MIT SCHIKANEN

PLAQUE DE RAFFINEUR A CHICANES

(84) Designated Contracting States:
AT DE FI FR GB SE

(43) Date of publication of application:
13.06.2001 Bulletin 2001/24

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Description

Background of the Invention

[0001] The present invention relates generally to disc refiners for lignocellulosic material. More particularly, the present invention relates to refiner plate segments for such an apparatus.

[0002] In high consistency mechanical pulp refiners, the wood fibers are worked between two relatively rotating discs on which refiner plates are mounted. The plates usually have radial bars and grooves. A large volume of steam is produced between the plates as a result of this refining work. For effective refining, the fibrous material must be retained between the plates on the bar surfaces despite the high velocity of the flowing steam, and the enormous centrifugal forces. Typically, the steam is exhausted via the grooves, and dams are provided in the grooves to interrupt material flow and thus improve the retention time of the material in the refining region.

[0003] In a typical refiner plate with radial bars and grooves, the bars provide impacts or pressure pulses which separate and fibrillate the fibers. The grooves enable radially directed feeding of the fibers and steam extraction. Near the perimeter of the plates, high radial steam flow and high centrifugal force both act to sweep the fibers outwardly from between the plates prematurely, thus reducing the refining effectiveness. The flow restrictions due to a small gap between opposed plates and fiber-filled grooves result in a steam pressure peak between the plates, located radially inward from the perimeter. This pressure peak is a major source of the refining thrust load, and can induce control instability at high motor loads. It is thus desirable that the steam generated during refining be discharged from the refining region as quickly as possible, while retaining the pulp within the region as long as possible.

[0004] International Application WO 88/06490 discloses a refiner segment for disc refiners having a pattern of alternating bars and grooves. Flow restrictions, or dams, in the grooves in the outer flow zone extend to the upper surface of the refiner bars to force fiber material flowing in the grooves to the refining surface for additional comminution. U-shaped apertures proximate to the dams extend through the bars provide a flow path for the steam flowing in the grooves.

Summary of the Invention

[0005] Briefly stated, the invention includes a refiner plate which is constituted from a plurality of refiner plate segments, each of the segments formed with a pattern including a refining zone having a plurality of radially disposed bar segments. Each of the bar segments has oppositely disposed radially inner and outer ends. A chicanes extends obliquely from the outer end of an inner bar segment to the inner end of an outer bar segment

to form a zig-zag shaped rib. Adjacent ribs define a plurality of zig-zag shaped grooves alternating with the ribs. The chicanes define at least one substantially arcuate line extending radially and laterally across at least the refining zone.

[0006] It is an object of the present invention to provide a refiner plate for the face of a refiner disc, which facilitates the removal of steam while retaining the pulp in the refiner region to achieve satisfactory pulp quality.

[0007] This object is achieved by, in a preferred form, by providing chicanes that form a zig-zag flow path for most of the steam generated during the refining operation. A sloping leading face on each chicane directs the flow of the lignocellulosic material into the gap between the refiner plates for comminution on the grinding surfaces of the bars. Although the upwelling of lignocellulosic material into the refining gap restricts flow of steam through the gap in the vicinity of the chicanes, the chicanes are positioned to form arcuate lines extending to the peripheral edge of the disc. Consequently, steam may flow in the gap to the edge of the disc in the arcuate corridors formed between the lines of chicanes.

[0008] Accordingly, the object of achieving good fiber quality with good steam management is accomplished by providing chicanes that direct the fiber into contact with the grinding surface while providing a plurality of flow paths for directing steam through the refining gap to the peripheral edge of the disc. To the inventor's knowledge, no one previously provided chicanes that are distributed in a manner that facilitates steam flow in the refining gap.

[0009] Other objects and advantages of the invention will become apparent from the drawings and specification.

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Brief Description of the Drawings

[0010] The present invention may be better understood and its numerous objects and advantages will become apparent to those skilled in the art by reference to the accompanying drawings in which:

Figure 1 is an elevation view of a refiner plate segment in accordance with the invention;
 45 Figure 2 is an enlarged section view along line 2-2 of Figure 1;
 Figure 3 is an enlarged elevation view of Area 3 of Figure 1;
 Figure 4 is an elevation view, partly broken away of a refiner plate including a plurality of the refiner plate segments in accordance with the invention;
 50 Figure 5 is an elevation view of an alternate embodiment of the refiner plate segment of Figure 1; and
 Figure 6 is an enlarged elevation view of Area 6 of Figure 5.

Detailed Description of the Preferred Embodiment

[0011] With reference to the drawings wherein like numerals represent like parts throughout the several figures, a refiner plate in accordance with the present invention comprises a plurality of refiner plate segments 10 which are securable to the front face 12 of a substantially circular refiner disc 14 (Figure 2). Although in the illustrated embodiment each segment 10 has two zones 16, 18 each having a differently oriented set of patterns, each segment 10 could alternatively have a single or three or more zones having respective sets of patterns (Figure 1).

[0012] The plate segments 10 are attached to the disc face 12, in any convenient or conventional manner, such as by bolts (not shown) passing through bores 20. One end of the bolt engages the disc 14 and at the other end has head structure bearing against a countersunk surface. The disc 14, only a portion of which is shown, has a center about which the disc rotates, and a substantially circular periphery. The refiner plate segments 10 are arranged side-by-side on the face 12 of the disc 14, to form a substantially annular refiner face, shown generally at 22 (Figure 2). The face 22 forms a portion of a refiner region, when confronting another refiner plate (not shown) carried by another disc.

[0013] With reference to Figure 1, each refiner plate segment 10 has an inner edge 24 near the center of the disc, an outer edge 26 near the periphery of the disc, and leading and trailing side edges 28, 30 which abut the trailing and leading side edges 30, 28 of adjacent refiner plate segments 10', respectively (Figure 4). The remainder of this description will refer to a single plate segment 10, but it should be understood that all the segments which define the annular plate, are preferably substantially similar. The bars 32, 34 and grooves 36, 38 extend substantially radially, i.e., radially, or parallel to a radius of the disc, or obliquely at an acute angle to such a radius. The plate segment 10 has, on its face, at least one, and preferably two or three, distinct patterns of bars and grooves between the bars, whereby material to be refined can flow in the grooves in the general direction from the inner edge 24 to the outer edge 26 of the plate segment 10, 10'.

[0014] A first or inlet zone 16 has a multiplicity of bars 34 and grooves 38 between adjacent bars 34, all of which extend substantially in the radial direction. This pattern is especially adapted for receiving wood chips, wood pulp, or the like and performing an initial refining operation thereon to reduce the size of the material and funnel it radially outward into a second, refining zone 18. The refining zone 18 has a multiplicity of bars 32 and grooves 36 between adjacent bars 32, which also extend in parallel, substantially radially. A third, outer zone (not shown) may be provided between the refining zone 18 and the outer edge 26 of the plate. As shown in Figure 1, each zone 16, 18 may comprise a plurality of fields, where each field has a uniform pattern. In the embodi-

ment shown in Figure 1, the segment has two fields in each zone. The patterns promote the flow of steam radially outward to the outer edge 26 of the disc 14 and radially inward to the inner edge 24 of the disc 14 for evacuation while retarding the flow of material to ensure that the material is fully refined.

[0015] Since the disc 14 and plate rotate, the partially refined material is directed, as a result of centrifugal force, radially outward. Substantial quantities of steam are also generated in the refining zone 18 producing a steam flow with high radial velocity. Especially with relatively large discs, the centrifugal forces acting on the steam and partially refined chips increase dramatically as the material moves farther and farther radially outward. Although it is highly desirable that the steam be quickly exhausted from the refining region, it is essential that the partially refined fibers not be prematurely exhausted along with the steam. This condition is influenced by the radial pressure profile along the disc face 22 due to steam generated by the refining at high consistency. Since the pressure peak is between the inner and outer edges 24, 26 of the plate, the steam flows forward (radially outward) from the outer side of the pressure peak and backward (radially inward) inside the pressure peak, against the material feed.

[0016] In a first embodiment of the invention, the refining zone 18 of the refiner plate segment 10 includes a plurality of radially extending first rib segments 40. With reference to Figure 3, each first rib segment 40 is connected at its radially outer end 42 to the radially inner end 44 of the next outer first rib segment 40' by a chicane 46. Each chicane 46 comprises a second rib segment that extends obliquely in the direction of disc rotation 48 from the inner first rib segment 40 to the outer first rib segment 40' to form a radially extending zig-zag bar 32. With further reference to Figure 2, the inner side 50 of each chicane 46 slopes from the top 52 of the chicane 46 toward the adjacent chicane 46' to form a ramp face 54.

[0017] The grooves 36 formed between adjoining ribs 32 define a zig-zag path substantially across the refining zone 18 for the movement of fibers. The lignocellulosic material traveling in the groove 36 is drawn into the corner of the chicane 46 and up the ramp face 54 of the chicane 46 by centrifugal force. The lignocellulosic material is therefore directed into the space or gap between the opposing refiner plates for additional comminution. The zig-zag path therefore retards movement of the lignocellulosic material, preventing material from exiting the refiner without having been sufficiently refined. The majority of the steam, which is less affected by the centrifugal force, continues traveling in the groove 36 to the periphery of the plate where it exits the refiner.

[0018] With reference to Figure 1, the chicanes 46 define a series of substantially arcuate lines 56. In the embodiment shown in Figure 1, the radially innermost end 58 of the lines 56 define an arc segment 60 positioned intermediate the outer edge 26 of the plate and the junc-

tion of the inlet and refining zones 16, 18. Each of the lines 56 extends from the arc segment 60 in the direction opposite to the direction of rotation 48 of the disc to the outer edge 26 of the plate such that the arc formed by the line of chicanes 46 has a substantially uniform radius from a point P. The chicanes 46 of the present invention cause an upwelling of feed material that constricts the plate gap in the vicinity of the chicanes 46. However, steam generated during the refining operation may flow radially through the corridor 82 between the lines 56, 56' of chicanes 46. Alternatively, the inner most end of the lines of chicanes 46 may be positioned at the junction of the inlet and refining zones 16, 18 and the lines may not extend to the outer edge 26.

[0019] In the embodiment shown in Figures 5 and 6, interrupted bars 84 may be disposed intermediate pairs of zig-zag bars 86, 88. The interrupted bars 84 are formed by providing a gap 90 between the radially outer end 92 of an inner rib segment 94 and the radially inner end 96 of an outer rib segment 98. The gaps 90 are disposed intermediate the chicanes 100 of the zig-zag bar pair 86, 88 and therefore extend obliquely in the direction of disc rotation 48.

[0020] With further reference to Figure 4, the radially outer end 62 of each line 56 of chicanes 46 that terminate on the trailing side edge 30 of a refiner plate segment 10 is positioned adjacent the radially inner end 63 of a line 56 of chicanes 46 on the leading side edge 28 of the adjacent refiner plate segment 10'. Consequently, the line of chicanes 56 may extend across two refiner plate segments 10, 10' to provide a continuous line from the arc segment to the outer edge 26 of the plate.

[0021] While preferred embodiments have been shown and described, various modifications and substitutions may be made thereto without departing from the scope of the invention as defined in the appended claims. For example, the present invention may also advantageously implemented on a three zone segment. Accordingly, it is to be understood that the present invention has been described by way of illustration and not limitation.

Claims

1. A refiner plate segment (10) adapted for mounting on a disc for a disc refiner for refining lignocellulosic material, said disc carrying a plurality of said refiner plate segments, the refiner plate segment comprising a refining zone (18) having radially inner and outer ends and a plurality of substantially radially disposed rib segments (40, 40'), each of said rib segments having oppositely disposed radially inner and outer ends (44, 42), **characterized by** the refining zone further having a plurality of chicanes (46), each of said chicanes extending obliquely from said radially outer end (42) of an inner rib segment (40) to said radially inner end (44) of an outer

rib segment (40') to form a zig-zag shaped bar (32), a plurality of zig-zag shaped grooves (36) being disposed intermediate adjacent said bars, said chicanes (46) defining at least one substantially arcuate line (56) extending radially and laterally across at least a portion of said refining zone.

2. The refiner segment (10) of claim 1 **characterized by** said segment being rotatable in a direction of rotation (48), wherein said chicanes (46) extend in the direction of rotation.
3. The refiner segment (10) of claim 2 **characterized by** said at least one line (56) extending in a direction opposite to said direction of rotation (48).
4. The refiner segment (10) of claims 1 to 3 **characterized by** each of said chicanes (46) comprising a top surface (52) and a leading side (50), said leading side sloping from said top surface toward an adjacent chicane to form a ramp face (54).
5. The refiner segment (10) of claim 1 **characterized by** said chicanes (46) defining a plurality of substantially arcuate lines (56) extending radially and laterally across said segment.
6. The refiner segment (10) of claim 1 **characterized by** said line (56) of chicanes (46) extending from a point intermediate said inner and outer ends of said refining zone (18) to said outer end of said refining zone.
7. The refiner segment (10) of claim 1 **characterized by** said refining zone (18) defining a plurality of gaps (90) extending obliquely from said radially outer end (92) of an inner rib segment (94) to said radially inner end (96) of an outer rib segment (98) to form at least one interrupted bar (84), said interrupted bar being disposed intermediate a pair zig-zag shaped bars (86, 88).
8. A refiner having relatively opposed discs (14), each of said discs (14) having an outer edge and carrying plates formed by a plurality of plate segments (10, 10'), **characterized in that** said plate segments (10, 10') mounted on said discs (14) are refiner plate segments according to claim 1 and that the refining zones (18) of said segments (10, 10') are combined to a refining zone of the refiner, whereby said chicanes (46) define a plurality of substantially arcuate lines (56) extending radially and laterally across said refining zone of the refiner.
9. The refiner of claim 8, **characterized in that** at least one of said discs (14) is rotatable in a direction of rotation and wherein said chicanes (46) of said segments (10) extend in said direction of rotation.

10. The refiner of claim 9, **characterized in that** said arcuate lines (56) of said segments (10) extend in a direction opposite to said direction of rotation.

11. The refiner of claim 8 **characterized by** said plurality of plate segments comprising first and second plate segments (10, 10'), each of said plate segments having a leading edge (28) and a trailing edge (30), said trailing edge (30) of said first plate segment (10) being adjacent said leading edge (28) of said second plate segment (10'), at least one of said lines (56) including a first portion having an outer end (62) terminating at said trailing edge (30) of said first plate segment (10) and a second portion having an inner end (63) beginning at said leading edge (28) of said second plate segment (10').

12. The refiner of claim 11 **characterized by** said outer end (62) of said first portion being disposed adjacent said inner end (63) of said second portion to form a continuous line (56).

13. The refiner of claim 8 **characterized by** said disc (14) further comprising a radially inner inlet zone (16) for receiving the lignocellulosic material and a radially outer refining zone (18) for refining the lignocellulosic material, said rib segments (40, 40') and said chicanes (46) being disposed in said refining zone.

14. The refiner of claim 13 **characterized by** each of said lines (56) having a radially inner end (58) positioned intermediate said outer edge (26) of said disc (14) and said inlet zone (16) and each of said lines extending to said outer edge of said disc.

15. The refiner of claim 8 **characterized by** said opposed discs (14) defining a refining gap and said lines (56) of said chicanes (46) defining a plurality of flow corridors in said refining gap.

16. A method for directing the flow of feed material and steam, generated between a pair of relatively rotating opposed refining discs (14) defining a refining gap, during refining of a lignocellulosic material in a refiner, each of the discs having radially inner and outer edges (24, 26) and a face pattern including a refining zone (18) having a plurality of substantially radially disposed rib segments (40, 40'), each of the rib segments having oppositely disposed radially inner and outer ends (44, 42), a plurality of chicanes (46), each of the chicanes extending obliquely from the radially outer end (42) of an inner rib segment (40) to the radially inner end (44) of an outer rib segment (40') to form a zig-zag shaped bar (32) having an upper grinding surface, the chicanes having a sloped leading face (50) and defining a plurality of substantially arcuate lines (56) extending radially

and laterally across the refining zone to the outer edge (26) of the disc, and a plurality of zig-zag shaped grooves (36) alternating with the bars, the method comprising the steps of

- 5 1) directing the feed material up the sloped leading face (50) of the chicane (46) to the refining gap with a centrifugal force generated by rotating at least one of the refining discs for comminution on the grinding surface of the bar (32);
- 10 2) directing a first portion of the steam through the grooves (36) to the outer edge (26) of the discs with the centrifugal force and thereby removing the first portion of the steam from between the discs; and
- 15 3) directing a second portion of the steam through the refining gap intermediate adjacent lines (56) of chicanes (46) to the outer edge (26) of the discs with the centrifugal force and thereby removing the second portion of the steam from between the discs.

25 Patentansprüche

1. Refinermahlplattensegment (10), angepasst zwecks Befestigung an einer Scheibe für einen Scheibenrefiner zum Mahlen von holzzellulosehaltigem Material, wobei die Scheibe mehrere dieser Refinermahlplattensegmente trägt, dieses Refinermahlplattensegment mit einer Mahlzone (18) mit radialen inneren und äußeren Enden sowie einer Vielzahl von im Wesentlichen radial angeordneten Stegsegmenten (40, 40') versehen ist und jedes dieser Stegsegmente gegenüberliegende radiale innere und äußere Enden (44, 42) hat, **dadurch gekennzeichnet, dass** die Mahlzone weiters eine Vielzahl von Schikanen (46) hat, wobei jede dieser Schikanen vom radialen äußeren Ende (42) eines inneren Stegsegments (40) zum radialen inneren Ende (44) eines äußeren Stegsegments (40') in schräger Linie verläuft und damit einen zickzackförmigen Steg (32) bildet, wobei eine Vielzahl von zickzackförmigen Rillen (36) zwischen den nebeneinanderliegenden Stegen angeordnet ist und die Schikanen (46) zum mindest eine, im Wesentlichen bogenförmige, sich radial und seitlich über mindestens einen Teil der Mahlzone erstreckende Linie (56), beschreiben.
2. Refinersegment (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** das Segment in einer Drehrichtung (48) drehbar ist, und die Schikanen (46) in Drehrichtung verlaufen.
3. Refinersegment (10) nach Anspruch 2, **dadurch gekennzeichnet, dass** zum mindest eine Linie (56)

- in einer der Drehrichtung (48) entgegengesetzten Richtung verläuft.
4. Refinersegment (10) nach Anspruch 1 bis 3, **dadurch gekennzeichnet, dass** jede der Schikanen (46) eine obere Fläche (52) und eine führende Seite (50) hat, wobei die führende Seite von der oberen Fläche in Richtung einer nebenliegenden Schikane schräg abfällt und damit eine Rampenfläche (54) bildet. 5
5. Refinersegment (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Schikanen (46) eine Vielzahl von im Wesentlichen bogenförmigen Linien (56) beschreiben, welche radial und seitlich über das Segment verlaufen. 10
6. Refinersegment (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Linie (56) von Schikanen (46) von einem Punkt zwischen dem inneren und dem äußeren Ende der Mahlzone (18) zum äußeren Ende der Mahlzone verläuft. 15
7. Refinersegment (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Mahlzone (18) eine Vielzahl von vom radialen äußeren Ende (92) eines inneren Stegsegments (94) zum radialen inneren Ende (96) eines äußeren Stegsegments (98) in schräger Linie verlaufende Spalten (90) begrenzt, sodass zumindest ein unterbrochener Steg (84) gebildet wird, wobei dieser unterbrochene Steg zwischen einem Paar zickzackförmiger Stege (86, 88) angeordnet ist. 20
8. Refiner mit einander gegenüberliegenden Scheiben (14), wobei jede Scheibe (14) eine Außenkante hat und aus einer Vielzahl von Segmenten (10, 10') gebildete Mahlplatten trägt, **dadurch gekennzeichnet, dass** die auf den Scheiben (14) montierten Mahlplattensegmente (10, 10') Refinermahlplattensegmente entsprechend Anspruch 1 sind und dass die Mahlzonen (18) der Segmente (10, 10') zu einer Refiner-Mahlzone zusammengefasst sind, wobei die Schikanen (46) eine Vielzahl von im Wesentlichen bogenförmigen, radial und seitlich über die Mahlzone verlaufenden Linien (56) beschreiben. 25
9. Refiner nach Anspruch 8, **dadurch gekennzeichnet, dass** zumindest eine der Scheiben (14) in einer Drehrichtung drehbar ist und wobei die Schikanen (46) der Segmente (10) in der Drehrichtung verlaufen. 30
10. Refiner nach Anspruch 9, **dadurch gekennzeichnet, dass** die bogenförmigen Linien (56) der Segmente (10) in einer der Drehrichtung entgegengesetzten Richtung verlaufen. 35
11. Refiner nach Anspruch 8, **dadurch gekennzeichnet, dass** die Vielzahl von Mahlplattensegmenten erste und zweite Mahlplattensegmente (10, 10') aufweist, wobei jedes Mahlplattensegment eine vordere Kante (28) und eine rückwärtige Kante (30) aufweist und die rückwärtige Kante (30) des ersten Mahlplattensegments (10) an die vordere Kante (28) des zweiten Mahlplattensegments (10') angrenzt und zumindest eine der Linien (56) einen ersten Teil mit einem äußeren, bis zur rückwärtigen Kante (30) des ersten Mahlplattensegments (10) führenden Ende (62), sowie einen zweiten Teil mit einem inneren, an der vorderen Kante (28) des zweiten Mahlplattensegments (10') beginnenden Ende (63) beinhaltet. 40
12. Refiner nach Anspruch 11, **dadurch gekennzeichnet, dass** das äußere Ende (62) des ersten Teils anschließend an das innere Ende (63) des zweiten Teils angeordnet ist, sodass eine kontinuierliche Linie (56) entsteht. 45
13. Refiner nach Anspruch 8, **dadurch gekennzeichnet, dass** die Scheibe (14) weiters eine radiale innere Einlaufzone (16) zur Aufnahme des holzzellulosehaltigen Materials sowie eine radiale äußere Mahlzone (18) zum Mahlen des holzzellulosehaltigen Materials enthält, wobei die Stegsegmente (40, 40') und Schikanen (46) in der Mahlzone angeordnet sind. 50
14. Refiner nach Anspruch 13, **dadurch gekennzeichnet, dass** jede der Linien (56) ein zwischen der äußeren Kante (26) der Scheibe (14) und der Einlaufzone (16) liegendes radiales inneres Ende (58) aufweist und dass jede der Linien bis zur äußeren Kante der Scheibe verläuft. 55
15. Refiner nach Anspruch 8, **dadurch gekennzeichnet, dass** die einander gegenüberliegenden Scheiben (14) einen Mahlspalt begrenzen und die Linien (56) der Schikanen (46) eine Vielzahl von Durchgängen in diesem Mahlspalt vorgeben. 60
16. Verfahren zum Lenken des Zufuhrmaterial- und Dampfusses, hervorgerufen durch ein Paar sich gegeneinander drehender Mahlscheiben (14), die während des Mahlvorgangs von holzzellulosehaltigem Material in einem Refiner einen Mahlspalt begrenzen, wobei jede der Scheiben radiale innere und äußere Kanten (24, 26) sowie ein Oberflächenmuster einschließlich einer Mahlzone (18) mit einer Vielzahl von im Wesentlichen radial angeordneten Stegsegmenten (40, 40'), von denen jedes entgegengesetzt angeordnete, radiale innere und äußere Enden (44, 42) hat, aufweist, ferner eine Vielzahl von Schikanen (46), wobei jede der Schikanen vom radialen äußeren Ende (42) eines inneren Stegseg-

ments (40) zum radialen inneren Ende (44) eines äußeren Stegsegments (40') schräg verläuft, so dass sich ein zickzackförmiger Steg (32) mit einer oberen Mahlfläche bildet, wobei die Schikanen eine schräge vordere Fläche (50) und eine Vielzahl von im Wesentlichen bogenförmigen, radial und seitlich über die Mahlzone zum äußeren Ende (26) der Scheibe verlaufenden Linien (56) sowie eine Vielzahl von mit den Stegen abwechselnden zickzackförmigen Rillen (36) haben, wobei das Verfahren aus den folgenden Schritten besteht:

1. Führen des Zulaufmaterials aufwärts entlang der schrägen vorderen Fläche (50) der Schikane (46) zum Mahlspalt, wobei die durch die Drehung von zumindest einer der Mahlscheiben entstehende Zentrifugalkraft zur Zerkleinerung auf der Schleiffläche des Stegs (32) erzeugt wird;
2. Führen eines ersten Teils des Dampfes durch die Rillen (36) zum äußeren Ende (26) der Scheiben durch die Zentrifugalkraft und dadurch Entfernen des ersten Teils des Dampfes aus dem Scheibenzwischenraum; sowie
3. Führen eines zweiten Teils des Dampfes durch den Mahlspalt zwischen nebeneinanderliegenden Linien (56) von Schikanen (46) zur äußeren Kante (26) der Scheiben durch die Zentrifugalkraft und dadurch Entfernen des zweiten Teils des Dampfes aus dem Scheibenzwischenraum.

Revendications

1. Segment d'une plaque à raffineur (10), adapté pour être fixé à un disque d'un raffineur à disques pour le raffinement de matières lignocellulosiques, ce disque portant une pluralité de ces segments de plaque à raffineur, ce segment de plaque à raffineur ayant une zone de raffinement (18) avec bouts radiaux intérieurs et extérieurs ainsi qu'une pluralité de segments à barrette (40, 40') disposés essentiellement radialement et que chacun de ces segments à barrette a des bouts radiaux intérieurs et extérieurs opposés (44, 42), **caractérisé en ce que** la zone de raffinement a en outre une pluralité de chicanes (46), chacune de ces chicanes s'étendant en biais du bout extérieur radial (42) d'un segment à barrette intérieur (40) au bout radial intérieur (44) d'un segment à barrette extérieur (40') pour ainsi former une barrette zigzagée (32), une pluralité de rainures zigzagées (36) étant disposées entre barrettes adjacentes, les chicanes (46) définissant au moins une ligne essentiellement arquée (56).
2. Segment de raffineur (10) selon la revendication 1, **caractérisé en ce que** le segment est rotatif à un

sens de rotation (48), et les chicanes (46) s'étendent au sens de rotation.

3. Segment de raffineur (10) selon la revendication 2, **caractérisé en ce qu'au moins une ligne (56)** s'étend à un sens opposé au sens de rotation (48).
4. Segment de raffineur (10) selon la revendication 1 à 3, **caractérisé en ce que** chacune des chicanes (46) a une face supérieure (52) et un côté avant (50), ce côté avant s'inclinant de la surface supérieure vers une chicane adjacente pour former une rampe (54).
5. Segment de raffineur (10) selon la revendication 1, **caractérisé en ce que** les chicanes (46) définissent une pluralité de lignes (56) essentiellement arquées s'étendant radialement et latéralement à travers le segment.
6. Segment de raffineur (10) selon la revendication 1, **caractérisé en ce que** la ligne (56) de chicanes (46) s'étend à partir d'un point entre les bouts intérieur et extérieur de la zone de raffinement (18) vers le bout extérieur de la zone de raffinement.
7. Segment de raffineur (10) selon la revendication 1, **caractérisé en ce que** la zone de raffinement (18) définit une pluralité de fentes (90) s'étendant en biais à partir du bout radial extérieur (92) d'un segment à barrette (94) au bout radial intérieur (96) d'un segment à barrette (98) extérieur, pour former au moins une barrette interrompue (84), cette barrette interrompue étant disposée entre une paire de barrettes zigzagées (86, 88).
8. Raffineur avec disques relativement opposés (14), chacun de ces disques (14) ayant une arête extérieure et une pluralité de segments (10, 10') de plaque de raffinement, **caractérisé en ce que** les plaques de raffinement (10, 10') montées sur les disques (14) sont conformes à la revendication 1 et que les zones de raffinement (18) des segments (10, 10') sont combinés à former une zone de raffinement du raffineur, les chicanes (46) ayant une pluralité de lignes arquées (56) s'étendant radialement et latéralement à travers la zone de raffinement.
9. Raffineur selon la revendication 8, **caractérisé en ce qu'au moins un des disques (14) est rotatif à un sens de rotation (48) et les chicanes (46) des segments (10) s'étendent au sens de rotation.**
10. Raffineur selon la revendication 9, **caractérisé en ce que** les lignes arquées (56) des segments (10) s'étendent en direction opposée au sens de rotation.

11. Raffineur selon la revendication 8, **caractérisé en ce que** cette pluralité de segments de plaque a des premiers et deuxièmes segments de plaque (10, 10'), chacun de ces segments de plaque ayant une arête avant (28) et une arête arrière (30) et l'arête arrière (30) du premier segment de plaque (10) étant adjacente à l'arête avant (28) du deuxième segment de plaque (10'), au moins une des lignes (56) comportant une première partie avec bout extérieur (62) terminant à l'arête arrière (30) du premier segment de plaque (10) et une deuxième partie ayant un bout intérieur (63) naissant à l'arête avant (28) du deuxième segment de plaque (10').
12. Raffineur selon la revendication 11, **caractérisé en ce que** le bout extérieur (62) de la première partie est disposée adjacent au bout intérieur (63) de la deuxième partie pour former une ligne continue (56).
13. Raffineur selon la revendication 8, **caractérisé en ce que** le disque (14) a en outre une zone d'entrée intérieure (16) pour la matière lignocellulosique, ainsi qu'une zone de raffinage radiale extérieure (18) pour raffiner la matière lignocellulosique, ces segments à barrettes (40, 40') et ces chicanes (46) étant disposés dans la zone de raffinage.
14. Raffineur selon la revendication 13, **caractérisé en ce que** chacune de ces lignes (56) a un bout radial intérieur (58) positionné entre l'arête extérieure (26) du disque (14) et la zone d'entrée (16) et que chacune de ces lignes s'étend vers l'arête extérieure du disque.
15. Raffineur selon la revendication 8, **caractérisé en ce que** ces disques opposés (14) définissent une fente de raffinage et les lignes (56) de ces chicanes (46) définissent une pluralité de passages dans cette fente de raffinage.
16. Procédé pour conduire le flux de matière d'alimentation et de vapeur, généré entre une paire de disques de raffinage (14) opposés relativement rotatifs définissant une fente de raffinage, pendant le raffinage d'une matière lignocellulosique dans un raffineur, chacun des disques ayant des arêtes intérieure et extérieure (24, 26) ainsi qu'un dessin de surface avec zone de raffinage (18) ayant une pluralité de segments à barrette (40, 40') disposés essentiellement radialement, chacun de ces segments ayant des bouts radiaux intérieurs et extérieurs disposés opposés (44, 42), une pluralité de chicanes (46), chacune de ces chicanes s'étendant en biais à partir du bout radial extérieur (42) d'un segment à barrette intérieur (40) au bout radial intérieur (44) d'un segment de barrette extérieur (40') pour former une barrette zigzagée (32) ayant une face d'attaque supérieure, les chicanes ayant une face avant inclinée (50) et définissant une pluralité de lignes (56) essentiellement arquées s'étendant radialement et latéralement à travers la zone de raffinage vers le bout extérieur (26) du disque ainsi qu'une pluralité de rainures zigzagées (36) alternant avec les barrettes, ce procédé se composant des étapes suivantes :
1. conduite de la matière d'alimentation vers le haut le long de la face avant inclinée (50) de la chicane (46) vers la fente de raffinage, une force centrifuge étant générée par la rotation d'au moins un des disques de raffinage pour le broyage sur la surface d'attaque de la barrette (32);
 2. conduite de la première partie de la vapeur à travers les rainures (36) vers l'arête extérieure (26) des disques par la force centrifuge, et de par là, élimination de la première partie de la vapeur d'entre les disques ; ainsi que
 3. conduite de la deuxième partie de la vapeur à travers la fente de raffinage entre lignes adjacentes (56) de chicanes (46) vers l'arête extérieure (26) des disques par la force centrifuge, et de par là, élimination de la deuxième partie de vapeur d'entre les disques.

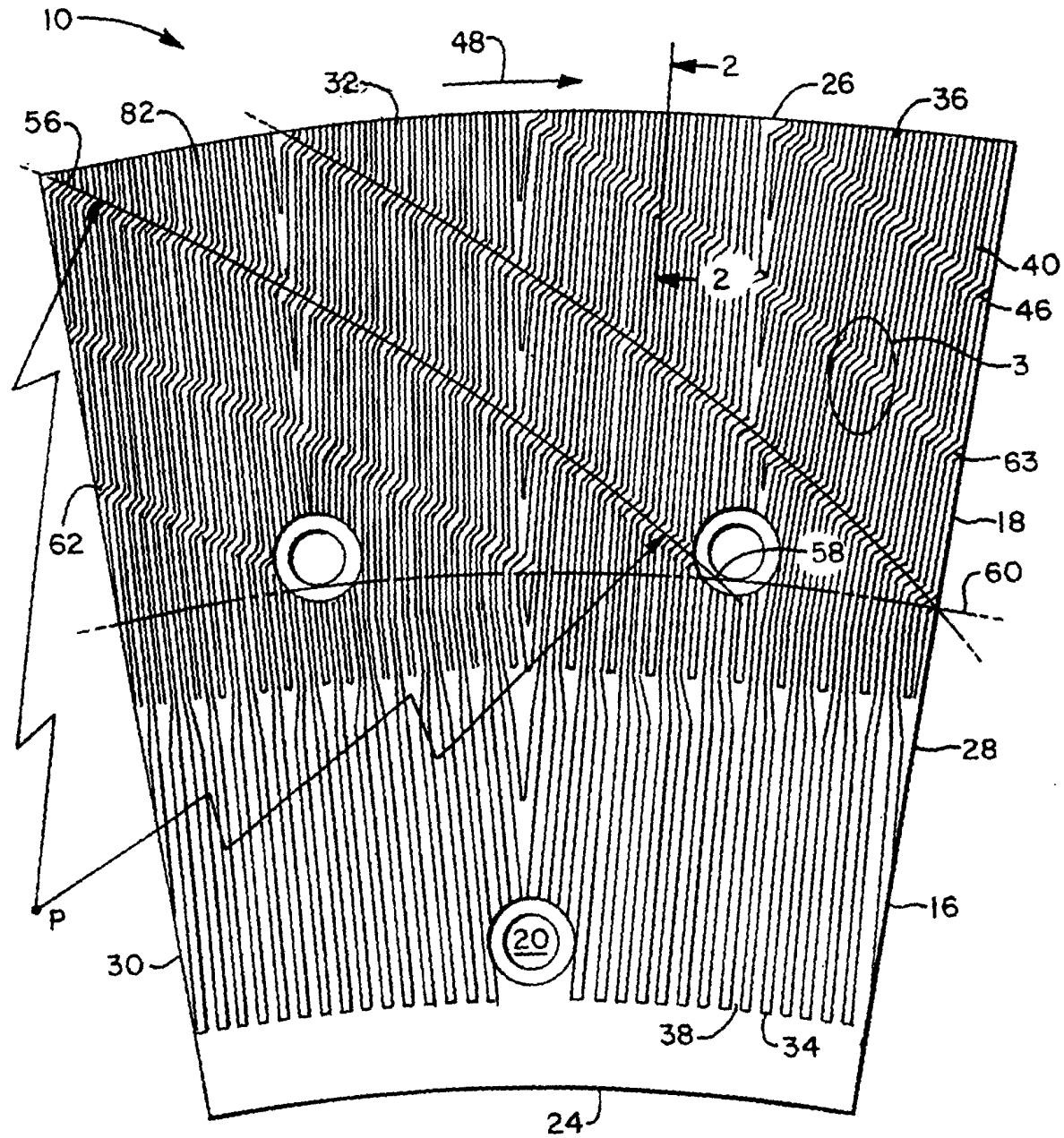


FIG. 1

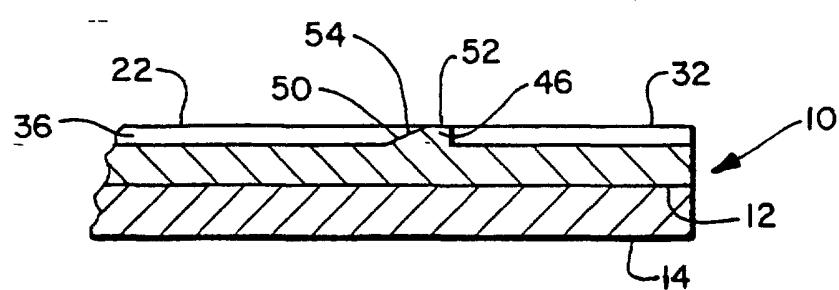


FIG. 2

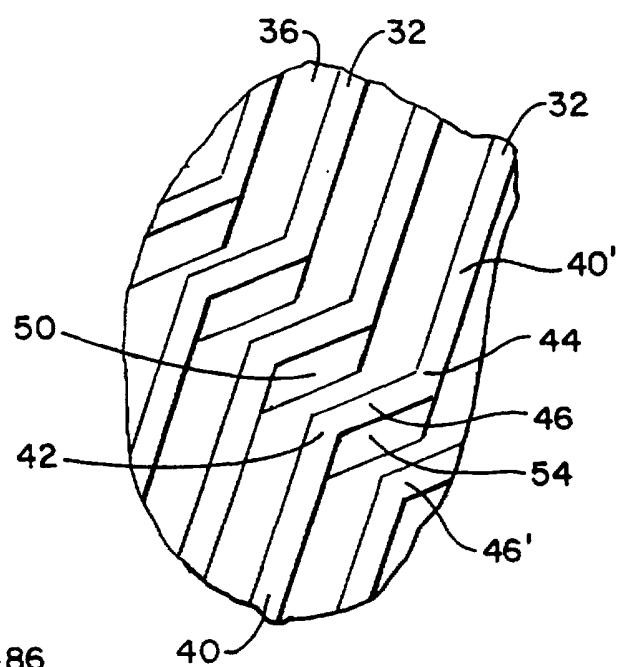


FIG. 3

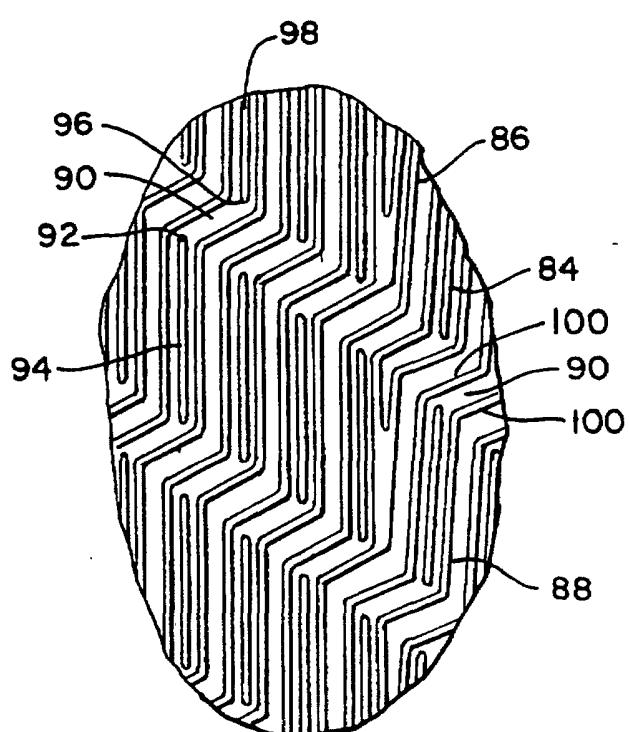


FIG. 6

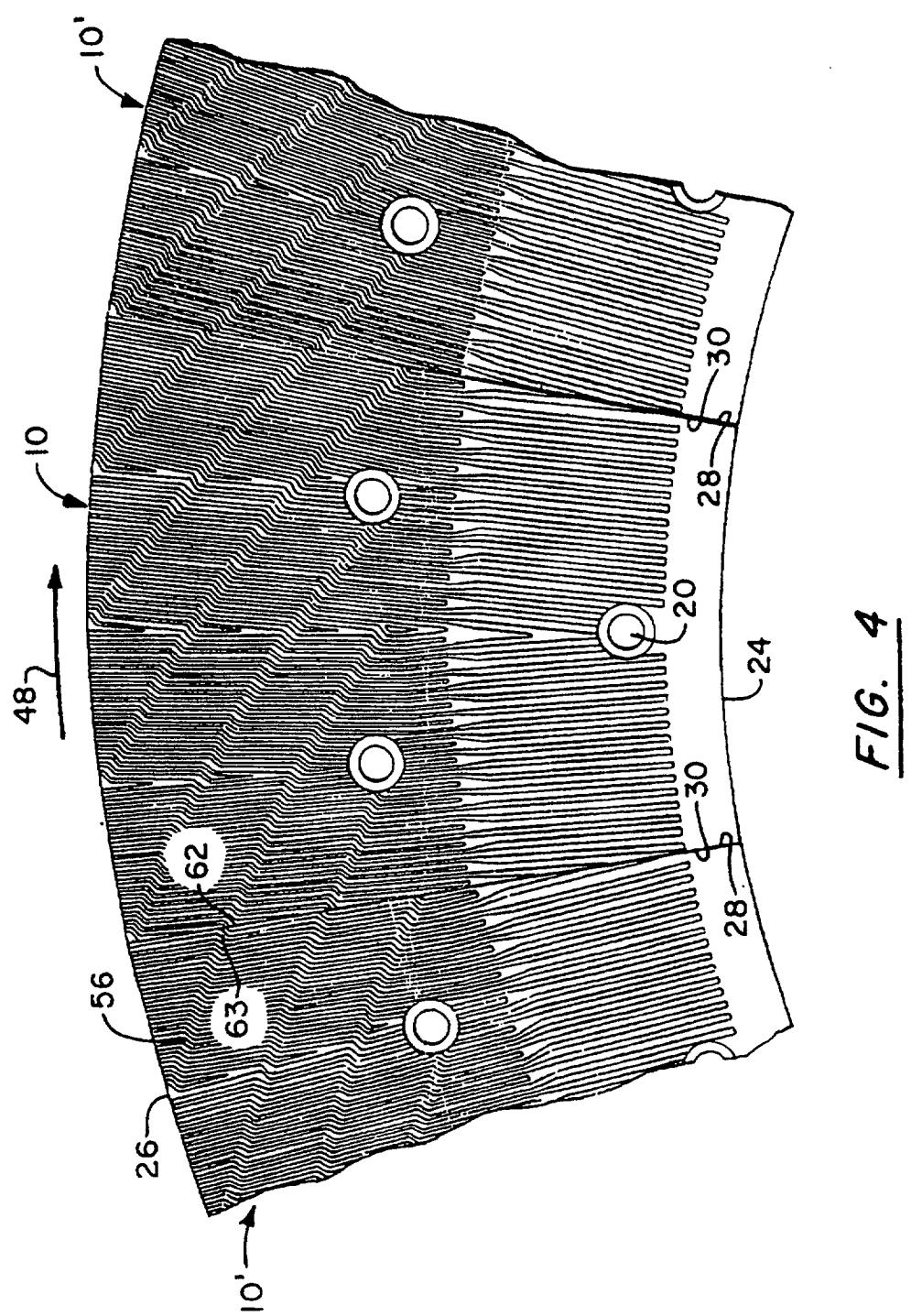


FIG. 5

