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(54) APPARATUS FOR FORMING A NONWOVEN FIBROUS SHEET

VORRICHTUNG ZUM FORMEN EINER VLIESTOFFBAHN

APPAREIL POUR FORMER UNE FEUILLE NON-TISSE

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Description

Field of the Invention

The present invention relates to an apparatus for forming a nonwoven fibrous sheet.

Background of the Invention

In the preparation of fibrous nonwoven sheets, various methods and apparatus have been developed for dispersing the filaments from a bundle into a wide band and for directing a strand by oscillating means in a programmed manner to various locations across the width of a moving collection surface. For example, U.S. Patent 2,736,676 (Frickert) discloses several methods for directing glass fibers by the use of wobble plates or by deflection from the perimeter of a cylinder rotating about an axis at an angle a few degrees from the longitudinal axis of symmetry.

In U.S. Patent 3,169,899 (Steuber), an apparatus is described for spreading and directing a strand of flash spun polymer in a flowing stream of solvent gas by utilizing the combined action of the hot expanding solvent gas and a curved, oscillating baffle. The curved baffle serves to spread the strand into a wide web. The oscillating motion imparted by the baffle directs the web to various areas across the width of a moving collection belt. A randomly oriented fibrous nonwoven sheet is thereby obtained. The flash-spun strands, which are used in the sheet of Steuber, are prepared by flash-spinning from a solution of polymer in solvent under pressure and at a temperature far above the solution's atmospheric boiling point. When the solution passes from a spinning assembly to the surrounding atmosphere, the solvent evaporates almost instantly and forms a strand comprising a three-dimensional network of film-fibril elements. The strand has been termed a plexifilament and has been described in detail in U.S. Patent 3,081,519 (Blades et al.).

An apparatus for making a nonwoven fibrous sheet comprising a spinning assembly, a rotating baffle, electrostatic configurations for proper sheet dispersion, and a collection surface is described in U.S. Patents 3,497,918 (Pollock) and 4,666,395 (Shah). Commercial nonwoven polymer sheets (e.g., available from E. I. du Pont de Nemours and Company under the trademark "Tyvek®") are normally constructed of multiple swaths of trapezoidal basis weight profile shape that overlap across the width of the sheet. These types of sheets are disclosed and preferred by Pollock and Shah. However, along the edge of the sheet where there is less overlap (i.e., fewer swath layers at the sheet edges and thus lower mass), there is less usable sheet width due to thin spots left along the edge. This also results from the manner in which trapezoidal weight profile shapes stack at the edges of the sheet. This often results in a sheet having a maximum usable sheet width such that there is

significant edge trim waste. For obvious reasons, it is desirable to reduce this edge trim waste loss.

Summary of the Invention

The invention solves the problem of maximizing the usable sheet width by reducing the amount of edge trim waste.

That problem is solved by the apparatus set forth in claim 1.

Preferred embodiments of the invention are the subject matter of claims 2 to 7.

The apparatus of the invention can be used for forming the edge of flash spun webs by (1) changing the swath throw and lay down pattern of the outer edge spinning positions so that a higher percentage of the edge swath contributes to usable sheet product and (2) reducing the effective width of the moving collection surface used for collecting the web in a sheet structure.

The plurality of centrally located spinning packs and the plurality of edge spinning packs are each fitted with a baffle which lays down fibrous material on a moving collection surface. The edge spinning packs are fitted with baffles that lay down a relatively narrow swath of fibrous material having a triangular basis weight profile shape. Preferably, the edge spinning packs lay down fibrous material in cooperation with a product guide. The fibrous material in the outermost portion of the swath impinges upon and slides down the product guide and onto a moving collection surface. The centrally located spinning packs are fitted with baffles that lay down a relatively wide swath of fibrous material having a trapezoidal basis weight profile shape.

The baffles, as viewed with their axes of rotation in the horizontal position, comprise integral bodies composed of a circular boss portion on a disc portion with a fillet portion extending around the boss portion. The centrally located spinning packs have baffles having fillet portions that intersect with the disc portion to form a generally concave surface and are adapted to form a swath having a trapezoidal basis weight profile shape when the spread strands are deposited on a moving collection surface located below the centrally located spinning packs. The edge spinning packs have baffles having fillet portions that intersect with the disc portion to form a generally convex surface and are adapted to form a swath having a triangular basis weight profile shape when the spread strands are deposited on the moving collection surface located below the edge spinning packs. The axis of rotation of the baffles is perpendicular to, and coincident with the centers of the top, circular edges of both the boss portion and the disc portion.

The edge baffle improves yield by reducing edge losses due to low basis weight. The product guides reduce the effective width of the moving collection surface used for collecting the spread strand in a sheet structure, eliminate the feathered edge of formed sheet to prevent wraps, and make taking edge trim easier.

It will be understood that the edge baffles can be used alone or in combination with the product guides. However, the best results are obtained when both are used together.

Brief Description of the Drawings

Fig. 1 is a diagrammatic elevation view of an apparatus for depositing plexifilamentary material to a moving collection belt and forming a nonwoven sheet. The apparatus includes a spinning assembly, a rotatable baffle, means for rotating the baffle, and collection means located below the baffle.

Figs. 2, 3 and 4 respectively are front, vertical section and plan views of the preferred trilobal baffle used in the centrally located spinning packs.

Figs. 5a-5d illustrate a baffle of the type shown in Figs. 2-4, the baffle being shown in the operating position as viewed from the spinning assembly. The four views illustrate the effect of the baffle or direction of spread strand travel as it rotates 90 degrees.

Fig. 5e shows the trapezoidal basis weight profile shape produced by the baffle shown in Fig. 4.

Figs. 6, 7 and 8 respectively are front, vertical section and plan views of the modified trilobal baffle used in the edge spinning packs.

Figs. 9a-9d illustrate a modified baffle of the type shown in Figs. 6-8, the baffle being shown in the operating position as viewed from the spinning assembly. The four views illustrate the effect of the baffle or direction of spread strand travel as it rotates 90 degrees.

Fig. 9e shows the triangular basis weight profile shape produced by the edge baffle shown in Fig. 8.

Fig. 10 is a schematic top view of the moving collection means and the edge product guides used in the present invention.

Fig. 11 is an end view of the moving collection means and the edge product guides used in the present invention.

Fig. 12 shows how the edges of the sheet are built up using the baffle shown in Fig. 4.

Figs. 13, 14 and 15 show how the sheet edge waste is minimized and usable sheet width is increased by using the baffle shown in Fig. 8 and/or the product guides shown in Figs. 10 and 11.

Detailed Description of the Preferred Embodiments

A combination of apparatus is used in the present invention to create a nonwoven sheet with greater usable width than with similar apparatus used in the past. A modified baffle is used in the edge spinning packs instead of the previously used standard pack baffle that is contained in the centrally located spinning packs. The modified baffle is similar to the standard pack baffle shown in Figs. 2-4 and described in U.S. Patents 3,497,918 (Pollock) and 4,666,395 (Shah), except that the lobes and fillet portion are shaped differently to pro-

vide a narrower swath having a triangular basis weight profile shape rather than a trapezoidal basis weight profile shape.

Referring now to Fig. 1, an apparatus of the present inventive combination is diagrammatically illustrated including a spinning assembly 11, a rotatable baffle 12, an electric motor 13 for rotating the baffle 12 through shaft 14, and a collection surface 15. As shown, collection surface 15 is preferably an endless belt set up to run around rolls 16 and 17. Strand 18, issuing from spinning assembly 11, is spread by baffle 12 and collected on belt (collection surface) 15 and combined with many other strands to form nonwoven sheet 20. Before the sheet 20 leaves belt 15, it is compacted by pressure exerted by roll 21, and the compacted sheet 22 is removed to storage or further processing. An electrostatic charging means 23 is provided to charge the spread web as it leaves baffle 12.

The standard trilobal rotary baffle used in the centrally located spinning packs is shown in Figs. 2-4. The baffle 12 is composed of a boss portion 30, a disc portion 31 and a fillet portion 32. In this embodiment, the boss portion 30 is a right cylinder standing on a planar disc portion 31. When the baffle is viewed with its axis of rotation 33 in the vertical position, as in Figs. 2 and 3, the axis is perpendicular to, and coincident with the centers of the top, circular edge 34 of the boss portion 30 and the top circular edge 35 of the disc portion 31.

Fillet portion 32 extends around boss portion 30, as shown in Fig. 4, and provides a sloped and contoured, generally concave, surface from the side 36 of boss portion 30 to the top flat surface 37 of disc portion 31. Fillet portion 32 includes preferably three radially disposed, equispaced lobes 38 which are the outermost part of the general contours of fillet portion 32. In practice, it has been determined that between one and twelve equispaced lobes 38 can be successfully used.

The upper surfaces 39 of the lobes 38 are slightly wedge-shaped, i.e., the surfaces are narrower near the boss portion 30 than they are near the disc portion 31. This can best be seen in Fig. 4. The edges of the wedges are indicated by lines 40; however, it should be understood that in actual construction all inflections in the surface of the fillet portion 32 are gradual. The reason for this will be apparent from the description hereinafter of the manner of using the baffle.

The intersection of the fillet portion 32 with the side 36 of boss portion 30 forms a series of lines, one for each lobe hereinafter referred to as the boss intersection line (B.I.L.) below the top 34 of boss portion 30. The B.I.L. is identified in Fig. 2 by the numeral 41; as shown, the B.I.L. 41 is generally an S-shaped curve for each fillet portion 32.

The intersection of fillet portions 32 with the top surface 37 of disc portion 31 forms a series of lines, one for each fillet portion 32, hereinafter referred to as the disc intersection line (D.I.L.), inside the top, circular edge of the disc portion 31. The D.I.L. is identified in Fig. 4 by

the numeral 42; as shown, the D.I.L. 42 is generally slightly concave between the individual lobes 38. The D.I.L. 42 can also form an equilateral triangle having rounded corners at the lobes 38.

Although the B.I.L. 41 and D.I.L. 42 are shown in the figures as distinct lines, it should be understood that in actual construction the fillet portion merges smoothly into the side 36 of boss portion 30 and the top surface 37 of disc portion 31. That is, there is no sharp inflection at either the B.I.L. or D.I.L.

Referring now to Fig 5a, it will be observed that when using the centrally located spinning baffle with this particular orientation, strand 18 impinges on the fillet portion at a point half-way between two lobes 38. The strand is spread and is deflected vertically downward, that is, the center line of the spread strand as it leaves the edge of the disc portion is vertical.

As the baffle rotates (clockwise in this case), the spread strand begins to be deflected to the left. For this particular embodiment, the center line of the spread strand as it leaves the disc is approximately perpendicular to the disc intersection line (D.I.L.) 42. Thus, one degree of rotation as the baffle turns from the position shown in Fig. 5a to that shown in Fig. 5b results in the center line being deflected about 1 degree from vertical. In general, the baffles must deflect the strand at a great enough angle such that a given minimum swath width and given basis weight profile shape result to meet the blendability needs of the product. At about 40 degrees rotation, strand 18 impinges on the point of maximum slope on the left slope of a lobe 38, as shown in Fig. 5b. At this degree of rotation, the center line of the spread strand is deflected approximately 35 degrees from the vertical, and this is the point of maximum deflection to the left for this particular embodiment.

As the baffle continues to turn, the strand 18 begins to impinge on the upper surface of a lobe 38 and the center line of the spread strand begins to shift back to vertical. When the baffle has rotated through about another 20 degrees (60 degrees from Fig. 5a), the strand 18 impinges upon the center of a lobe 38 and is again deflected vertically downward, as shown in Fig. 5c.

Upon further rotation of the baffle, the spread strand begins to impinge upon the right slope of the lobe 38, and the center line of the spread strand is diverted to the right. When the baffle has rotated about another 20 degrees (80 degrees from Fig. 5a) the spread strand center line is deflected approximately 35 degrees from the vertical, as shown in Fig. 5d, and this is the point of maximum deflection to the right for this particular embodiment.

As the baffle continues to turn through about another 40 degrees from the position shown in Fig. 5d (120 degrees from Fig. 5a) the spread strand center line moves gradually back to the vertical until it again assumes the position illustrated in Fig. 5a.

From the above description, it will be apparent that 360 degrees rotation of this trilobal baffle produces three

complete oscillation cycles of the spread strand. As noted above, the rotation of the baffle as shown in Figs. 5a-d results in a swath of trapezoidal basis weight profile shape (shown as 44 in Fig. 5e) when laid down on a moving collection surface. It is important to note that swath width as well as swath shape are important and both are influenced by the distance from the baffle to the collection surface. It will be understood that the contours of the baffle may vary greatly so long as a swath of trapezoidal basis weight profile shape is produced. Radically different geometries and contours of the fillet portion 32 can be used. Therefore it will be understood that the shapes and contours of the fillet portion 32 depicted in Figs. 2-4 are non-limiting and intended for purposes of illustration only.

Referring now to Figs. 6-8, a modified rotary baffle is shown as used in the edge spinning packs. The modified or edge baffle is similar in many respects to the centrally located spinning pack baffle except that certain contour changes have been made to produce a triangular basis weight profile shape rather than a trapezoidal basis weight profile shape when operated at the same distance to the collection surface as the centrally located spinning pack baffles. The major difference is that the intersection of the fillet portion 32 with the top surface 37 of the disc portion 31 (i.e., the D.I.L. 42') is generally convex between the individual lobes 38. In other words, the D.I.L. 42' bows out between each lobe 38 of the trilobal baffle. This is clearly seen in Fig. 8. It is the convex D.I.L. 42' that produces a narrower swath having a triangular basis weight profile shape.

Moreover, as noted above, although the B.I.L. 41 and D.I.L. 42' are shown in Figs. 6-8 as distinct lines, it should be understood that in actual construction the fillet portion merges smoothly into the side 36 of boss portion 30 and the top surface 37 of disc portion 31. That is, there is no sharp inflection at either the B.I.L. or D.I.L.

Referring now to Fig. 9a, it will be observed that when using the edge spinning baffle with this particular orientation, strand 18 impinges on the fillet portion at a point half-way between two lobes 38. The strand is spread and deflected vertically downward, that is, the center line of the spread strand as it leaves the edge of the disc portion is vertical. The rotation sequence set forth for Figs. 5a-5d is the same for Figs. 9a-9d. The spread strand produced by the edge spinning baffles is deflected at a smaller angle left and right than the centrally located spinning baffles. This results in creating the narrower, triangular shaped basis weight profile 45 as shown in Fig. 9e. (Dimension 59 in Fig. 9e is less than dimension 58 in Fig. 5e).

The edge baffle described above is preferably used in conjunction with an edge product guide which is depicted in Figs. 10 and 11. Referring now to Fig. 10, the spread strand collection means is shown generally at 70, comprising machine frames 71, 72, product guides 73 and 74 and the face of belt guide 75. Referring now to Fig. 11, belt guide 75, supports moving belt 76 upon

which the spread strands are deposited. Product guides 73 and 74 are shown disposed at about a 30° angle from vertical. Product guides 73 and 74 are mounted on movable supports 77 and 78.

Besides the shape of the baffle in the edge spinning pack, the baffle speed and direction of rotation and the amounts by which the spread strands are electrostatically charged can be varied to optimize the production of greater sheet width for different basis weights of nonwoven sheet which the invention is designed to produce. The baffles of the centrally located spinning packs all operate at the same speed, and while the baffles of the edge spinning packs can often be operated at the same speed as the baffles of the centrally located spinning packs, it will be understood that they can also be operated at a different speed or rotation direction. Due to its narrower swath width and resultant higher charge density, the electrostatic charge level applied to the strands from the edge spinning packs is generally lower (e.g., 60% to 100%, preferably 70% to 80% lower) than that of the charge level being applied to the strands from the centrally located spinning packs.

Generally, there are from 1 to 4 edge spinning packs applying strands along each edge of the sheet. The space between the edge spinning packs can be varied to control the size and shape of the final sheet being produced. For example, the edge spinning packs can be closely spaced for special effects on the edge of the sheet. Depending upon the circumstances, the edge spinning packs can be spaced from one pack centerline to the next, or from one half the next pack centerline. However, this is largely governed by the number of packs used and the type of sheet desired.

When the sheet is laid down on a moving belt, a product guide is preferably used to direct the outward deflection of the spread strand to the laydown belt along both edges. The surfaces of the product guides must have surfaces which have low friction and high dielectric strength so that charged strands will easily slide off. Polycarbonate has been found to be a preferred material for forming the product guide using currently available commercial flash-spinning solvents. The surface placement of the product guide preferably ranges from vertical to 45 degrees from vertical. However, it should be noted that the product guide can be placed at an angle greater than 45 degrees from vertical, although it would not be as effective as the preferred range. Preferably, the product guides are long enough to allow the strands from one to four edge spinning packs being used to impinge on it and slide off onto the moving belt. The product guide is used to form a controlled straight edge of laid down strands thick enough so that fibrous material which is trimmed from the edge can be pneumatically conveyed as an unbroken tape. This minimizes the problems associated with handling strands having a feathered edge. The product guide's distance from the edge is adjustable in the cross machine direction over a distance of about 30 cm.

Figs. 12, 13, 14 and 15 show the improvement in usable sheet width and reduction in waste (edge trim) that result from use of the edge baffle and/or product guide. Fig. 12 (no edge baffle and no product guide) shows how the individual basis weight profile shapes from the centrally located spinning packs 44 stack up at the sheet edge, creating a given usable width 56 and an edge trim waste 52. Fig. 12 shows a composite representation of a five (5) layer sheet edge basis weight profile shape having a "usable width" significantly less than that of the full sheet width. Figs. 13 (no edge baffle but with a product guide) shows how the product guide modifies the full sheet profile, narrowing it by causing material 47 to be moved inward to create profile 48, and reducing edge trim waste 53 to less than 52 of Fig. 12. Usable sheet width in Fig. 13, 56, is approximately the same as that of Fig. 12. Fig. 14 (edge baffle but no product guide) shows the effect of the edge baffle to increase usable sheet width (57 > 56) and reduce waste trim 54 by greatly modifying and improving the sheet edge profile 49. Fig. 15 (edge baffle and product guide) shows the resultant edge profile improvement 51 when using both the product edge guide and the edge baffle. Note that usable width 57 is approximately the same as in Fig. 14, but edge trim waste 55 has been further reduced versus 54 of Fig. 14 and 53 of Fig. 13. In use, the inventive combination of edge baffles and product guides reduces edge losses by about 50% and increases usable sheet width by about 20 cm.

Claims

1. An apparatus for forming a nonwoven fibrous sheet (20) which comprises a plurality of centrally located spinning packs and a plurality of edge spinning packs, each of which comprises a spinning assembly (11) for spinning a fibrous strand (18) in a generally horizontal path, rotatable baffle (12) for receiving the strand (18) and deflecting it into a generally vertical plane downward while simultaneously spreading the strand (18) and causing the spread strand to oscillate in the generally vertical plane and means for rotating (13) the baffle (12), the baffles (12) as viewed with their axes of rotation in the vertical position, being integral bodies composed of a circular boss portion (30) on a disc portion (31) with a fillet portion (32) extending around the boss portion (30) with the axis of rotation of the baffles (12) being perpendicular to, and coincident with the centers of the top, circular edges of both the boss portion (30) and the disc portion (31), the centrally located spinning pack baffles (12) having fillet portions (32) that intersect with the disc portion (31) to form a generally concave surface (42) and adapted to form a swath having a trapezoidal basis weight profile shape (44) when the spread strands are deposited on a moving collection surface (15, 76) lo-

cated below the centrally located spinning packs, characterized by the edge spinning pack baffles having fillet portions (32) that intersect with the disc portion (31) to form a generally convex surface (42') and adapted to form a swath having a triangular basis weight profile shape (45) when the spread strands are deposited on the moving collection surface (15, 76) located below the edge spinning packs.

2. The apparatus of claim 1 wherein both the centrally located spinning packs and the edge spinning packs are adapted to electrostatically charge the spread strands and the charging strength of the edge spinning packs is from 60 to 100% of the charging strength of the centrally located spinning packs.
3. The apparatus of claim 1 wherein there are from 1 to 4 edge spinning packs located along each edge of the plurality of centrally located spinning packs.
4. The apparatus of any one of claims 1 to 3 comprising a plurality of product guides (73,74) paralleling each edge of the moving collection surface (15,76) and adapted to minimize the width of the spread strand by contacting a portion of the spread strand being deflected by the baffles of the edge spinning packs and depositing such spread strand portion on the moving collection surface (15,76).
5. The apparatus of claim 4 wherein the product guides are formed of a dielectric material.
6. The apparatus of claim 4 wherein the product guides are formed of polycarbonate.
7. The apparatus of claim 4 wherein the product guides (73,74) are disposed between vertical and 45° from vertical sloping inwardly toward the edge spinning packs.

Patentansprüche

1. Vorrichtung zum Ausbilden einer Faservliesbahn (20), welche eine Mehrzahl von zentral angeordneten Spinnpacks und eine Mehrzahl von Kanten-Spinnpacks umfaßt, wobei jedes von diesen eine Spinnereinheit (11) zum Spinnen eines Faserstranges (18) in einem allgemein horizontalen Weg, einen drehbaren Ablenkkörper (12) zum Empfangen des Stranges (18) und Ablenken desselben in eine allgemein vertikale Ebene nach unten bei gleichzeitigem Ausbreiten des Stranges (18) und Veranlassen des ausgebreiteten Stranges, in der allgemein vertikalen Ebene zu oszillieren, und eine Einrichtung zum Drehen (13) des Ablenkkörpers (12) um-

faßt, wobei die Ablenkkörper (12), mit ihren Drehachsen in vertikaler Position betrachtet, einstückige Körper sind, die aus einem kreisförmigen Vorsprungsbereich (30) und einem Scheibenabschnitt (31) mit einem sich um den Vorsprungsbereich (30) herum erstreckenden Ausrundungsbereich (32) zusammengesetzt sind, wobei die Drehachsen der Ablenkkörper (12) rechtwinklig zu und übereinstimmend mit den Zentren der oberen kreisförmigen Kanten des Vorsprungsbereichs (30) und zugleich des Scheibenabschnitts (31) sind, wobei die zentral angeordneten Spinnpack-Ablenkkörper (12) Ausrundungsbereiche (32) haben, die mit dem Scheibenabschnitt (31) so schneiden, daß sie eine allgemein konkave Oberfläche (42) bilden, und so ausgebildet sind, daß sie einen Streifen mit einem trapezoidförmigen Flächenmassenprofil (44) bilden, wenn die ausgebreiteten Stränge auf einer unterhalb der zentral angeordneten Spinnpacks angeordneten, sich bewegenden Auffangfläche (15, 76) abgelegt sind, dadurch gekennzeichnet, daß die Ablenkkörper der Kanten-Spinnpacks Ausrundungsbereiche (32) haben, die mit dem Scheibenabschnitt (31) so schneiden, daß sie eine allgemein konvexe Oberfläche (42') bilden, und so ausgebildet sind, daß sie einen Streifen mit einem dreieckigen Flächenmassenprofil (45) bilden, wenn die ausgebreiteten Stränge auf der unterhalb der Kanten-Spinnpacks angeordneten, sich bewegenden Auffangfläche (15, 76) abgelegt werden.

2. Vorrichtung nach Anspruch 1, in welcher sowohl die zentral angeordneten Spinnpacks als auch die Kanten-Spinnpacks so ausgebildet sind, daß sie die ausgebreiteten Stränge elektrostatisch aufladen und die Ladungsstärke der Kanten-Spinnpacks 60 bis 100 % der Ladungsstärke der zentral angeordneten Spinnpacks beträgt.

3. Vorrichtung nach Anspruch 1, in welcher 1 bis 4 Kanten-Spinnpacks entlang jeder Kante der Mehrzahl von zentral angeordneten Spinnpacks angeordnet sind.

4. Vorrichtung nach einem der Ansprüche 1 bis 3 mit einer Mehrzahl von Produktführungseinrichtungen (73, 74), die parallel zu jeder Kante der sich bewegenden Auffangfläche (15, 76) verlaufen und so ausgebildet sind, daß sie die Breite des ausgebreiteten Stranges durch Berühren eines Teiles des durch die Ablenkkörper abgelenkten, ausgebreiteten Stranges und Ablegen eines solchen ausgebreiteten Strangteiles auf der sich bewegenden Auffangfläche (15, 76) minimieren.

5. Vorrichtung nach Anspruch 4, in welcher die Produktführungseinrichtungen aus einem dielektrischen Material ausgebildet sind.

6. Vorrichtung nach Anspruch 4, in welcher die Produktführungseinrichtungen aus Polycarbonat gebildet sind.
7. Vorrichtung nach Anspruch 4, in welcher die Produktführungseinrichtungen (73, 74) zwischen der Vertikalen und 45° von der Vertikalen nach innen auf die Kanten-Spinnpacks geneigt angeordnet sind.

Revendications

1. Un dispositif de fabrication d'une nappe fibreuse non tissée (20) qui comprend une pluralité de têtes de filage disposées au centre et une pluralité de têtes de filage en lisière, chacune d'entre elles comprenant un bloc de filage (11) pour filer une mèche fibreuse (18) suivant un trajet généralement horizontal, un déflecteur rotatif (12) pour recevoir la mèche (18) et la dévier vers le bas dans un plan sensiblement vertical tout en étalant simultanément la mèche (18) et en provoquant l'oscillation de la mèche étalée dans un plan généralement vertical, et des moyens (13) pour faire tourner le déflecteur (12), les déflecteurs (12), représentés avec leurs axes en position verticale, étant des corps monobloc composés d'un bossage circulaire (30) sur une partie en disque (31) avec une partie en congé (32) s'étendant autour du bossage (30), l'axe de rotation des déflecteurs (30) étant perpendiculaire et coïncidant avec les centres des bords circulaires supérieurs et du bossage (30) et de la partie en disque (31) et passant par leur centre, les déflecteurs de têtes de filage (12) disposés au centre comportant des parties de raccordement (32) dont l'intersection avec la partie en forme disque (31) pour former une surface (42) généralement concave et conçue pour former un empilement présentant une forme de profil (44) d'un poids à base trapézoïdale lorsque les mèches étalées sont déposées sur une surface de collecte (15, 76) et située en-dessous des têtes de filage centrales, caractérisé en ce que les déflecteurs de têtes de filage de lisière présentent des portions en congé (32) dont l'intersection avec la partie en forme disque (31) pour former une surface généralement convexe (42') et conçue pour former un empilement présentant une forme de profil (45) d'un poids à base triangulaire lorsque les mèches étalées sont déposées sur la surface de collection mobile (15, 76) disposées en-dessous des têtes de filage des lisières.
2. Le dispositif de la revendication 1 dans lequel à la fois les têtes de filage disposées au centre et les têtes de filage disposées en lisière sont adaptées pour conférer aux mèches étalées une charge électrostatique et l'importance des charges des têtes de

filage de lisière est comprise entre 60 et 100% de l'importance des charges des têtes de filage disposées au centre.

3. Le dispositif de la revendication 1 dans lequel de 1 à 4 têtes de filage en lisière sont disposées sur chaque lisière de la pluralité de têtes de filage disposées au centre.
4. Le dispositif selon l'une quelconque des revendications 1 à 3 comprenant une pluralité de guides de produits (73, 74) disposés en parallèle à chaque lisière de la surface de collecte mobile (15, 76) et conçus pour réduire la largeur des mèches étalées en venant au contact d'une partie de la mèche étalée déviée par les déflecteurs des têtes de filage de lisière et déposer ses portions de mèches étalées sur la surface de collecte mobile (15, 76).
5. Le dispositif de la revendication 4 dans lequel les guides des produits sont formés d'un matériau diélectrique.
6. Le dispositif de la revendication 4 dans lequel les guides des produits sont formés de polycarbonate.
7. Le dispositif de la revendication 4 dans lequel les guides des produits (73, 74) occupent une position comprise entre la verticale et une position inclinée à 45° depuis la verticale en pente vers l'intérieur vers les têtes de filage en lisière.

FIG. 1

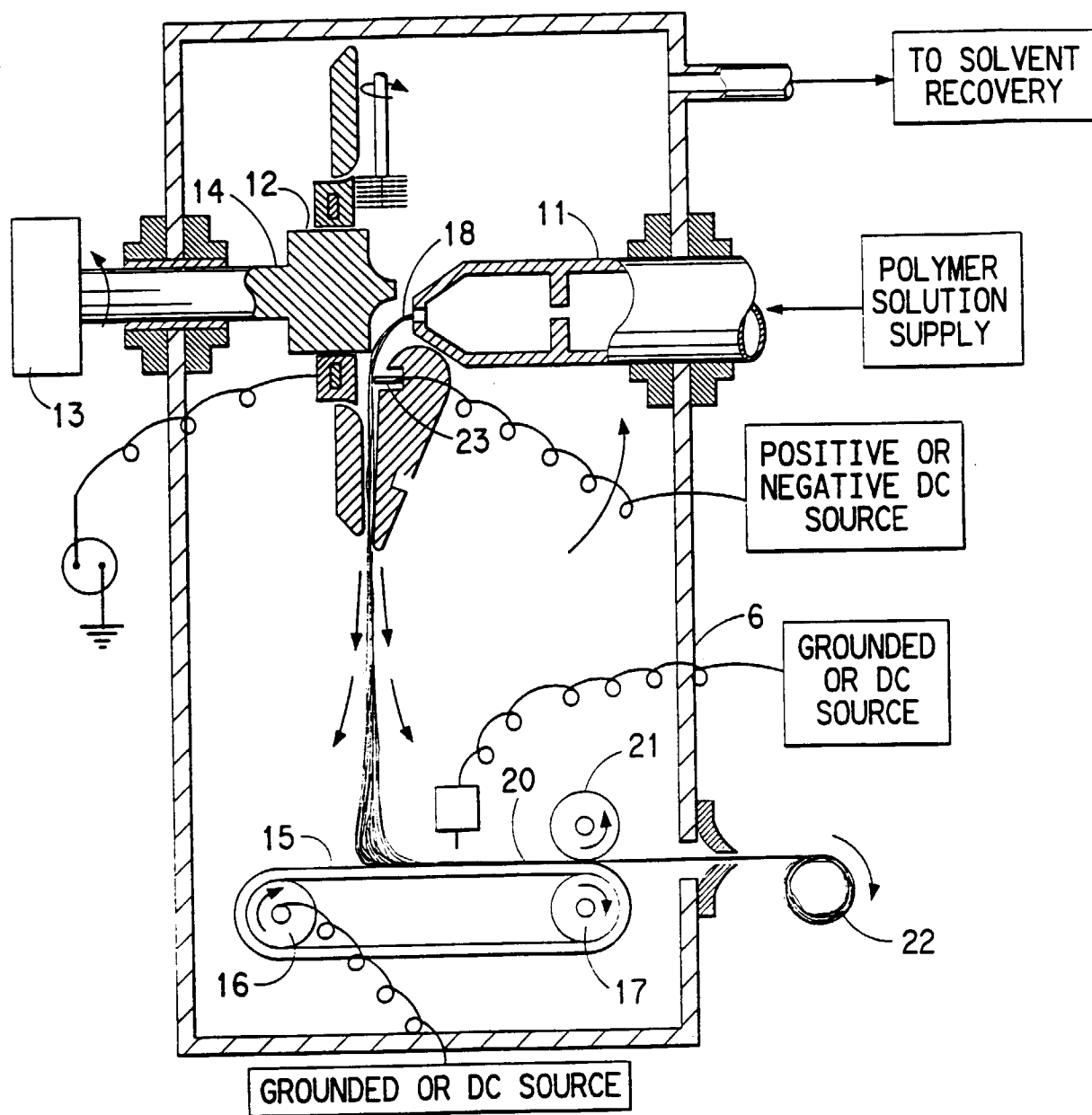


FIG. 4

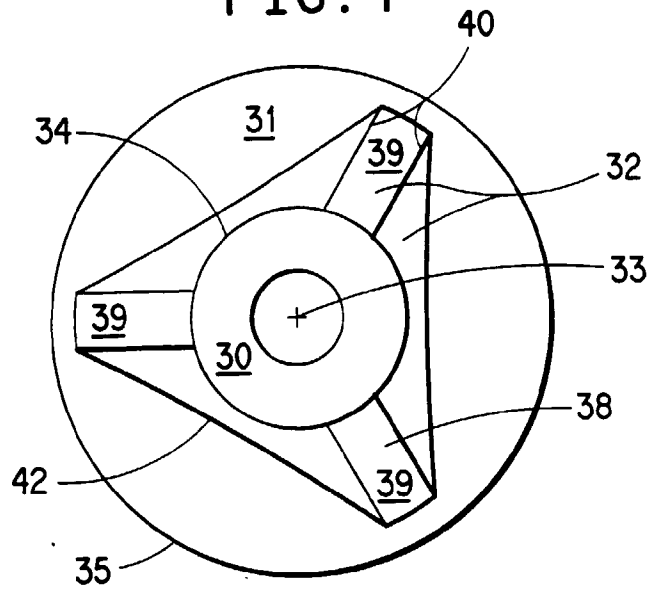


FIG. 2

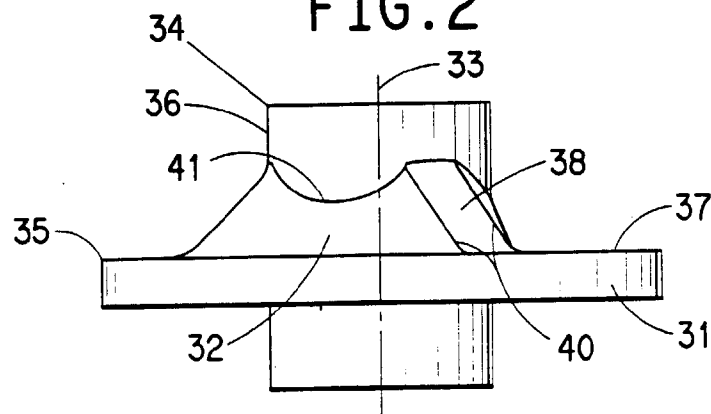


FIG. 3

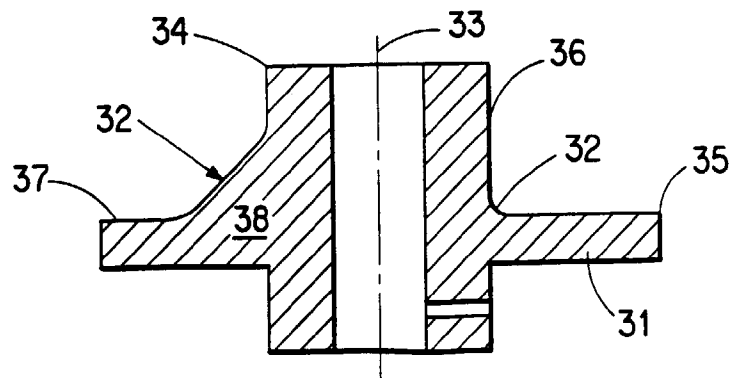


FIG. 5a

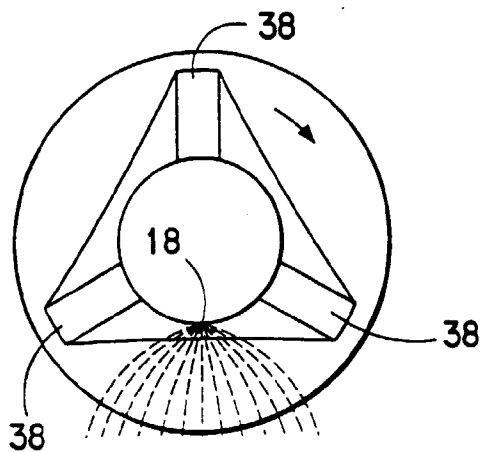


FIG. 5b

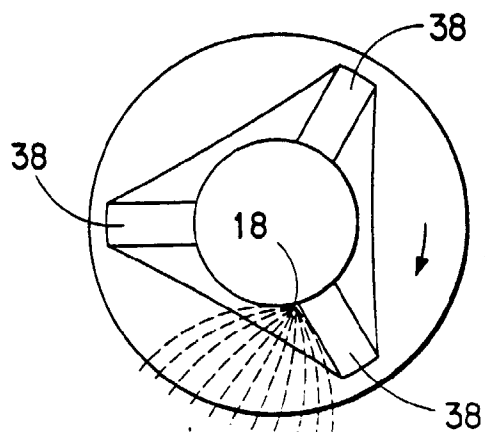


FIG. 5c

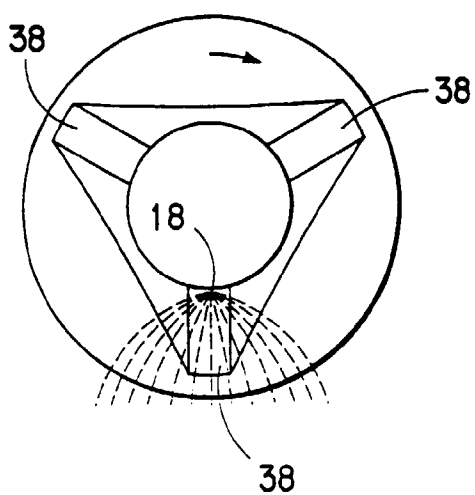


FIG. 5d

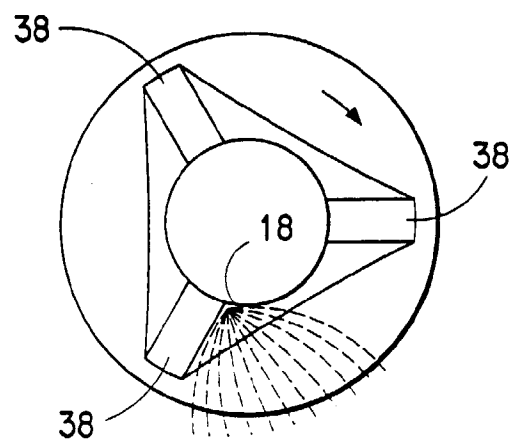


FIG. 5e

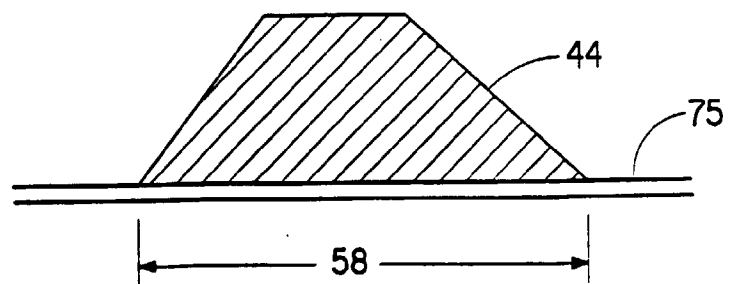


FIG.8

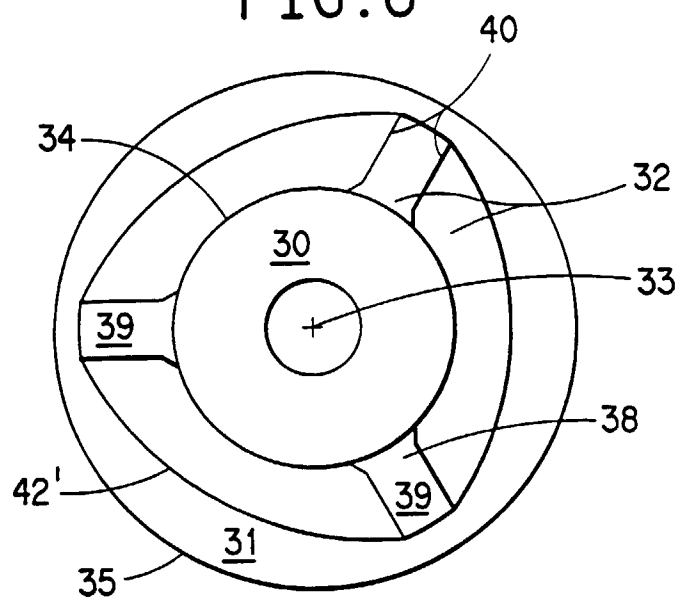


FIG.6

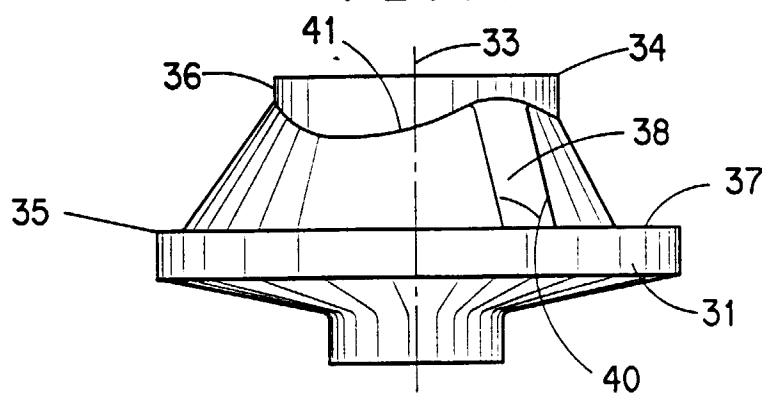


FIG.7

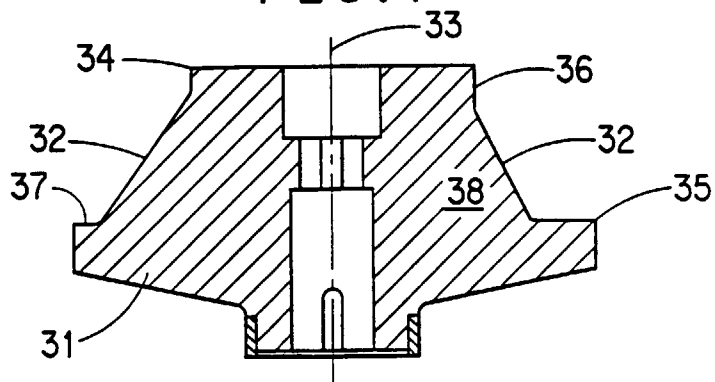


FIG. 9a

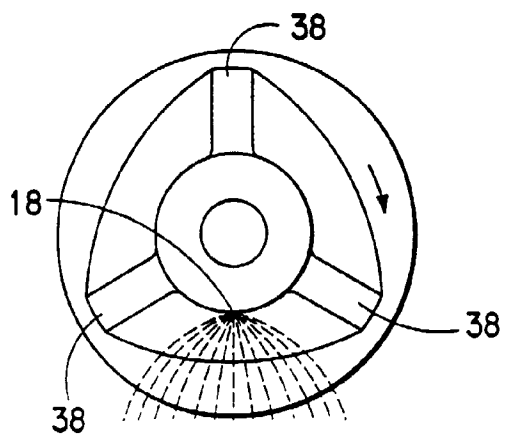


FIG. 9b

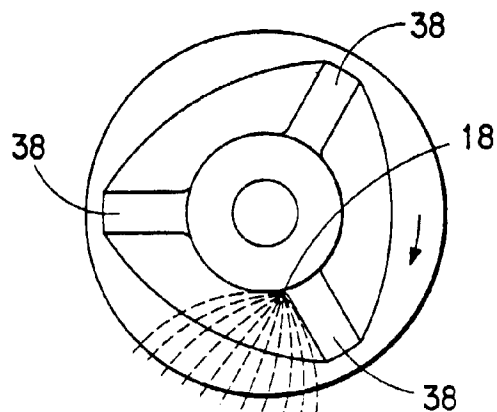


FIG. 9c

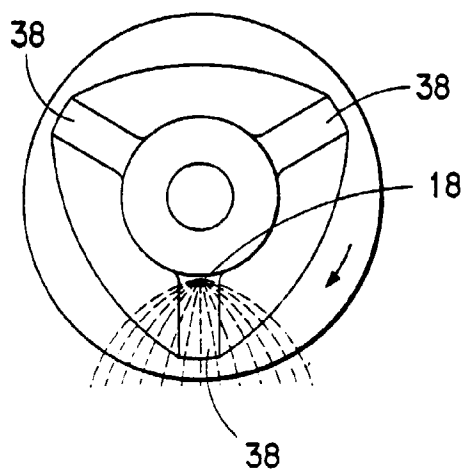


FIG. 9d

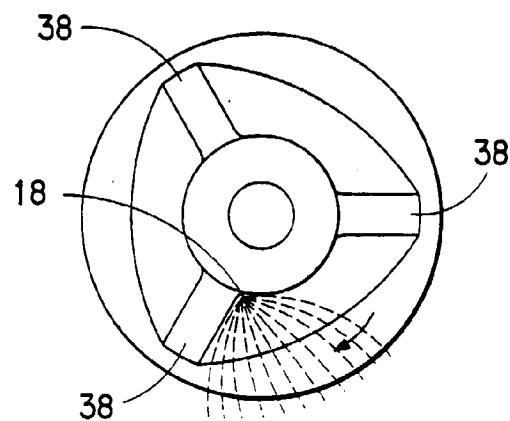


FIG. 9e

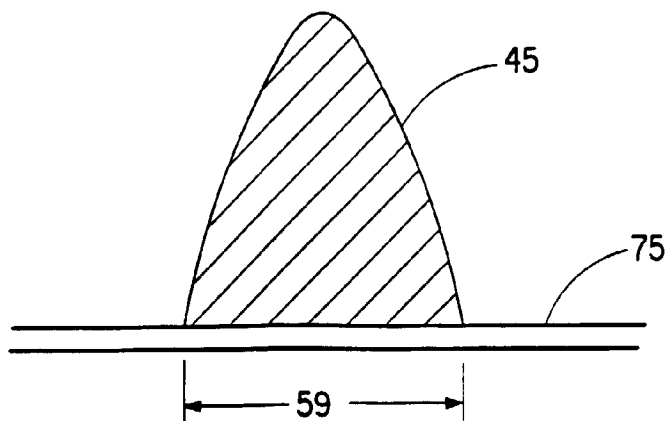


FIG. 10

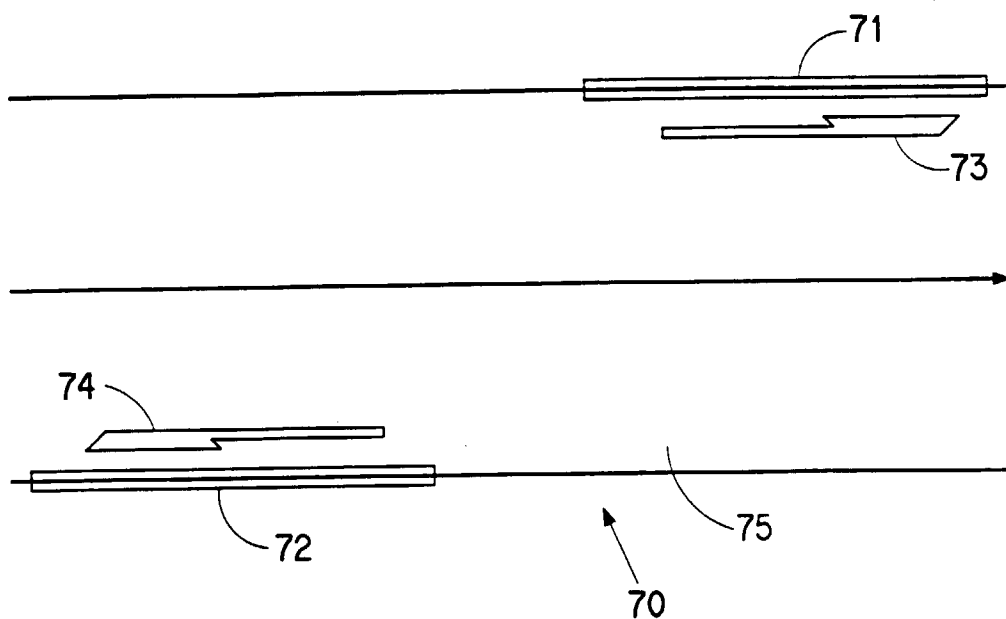


FIG. 11

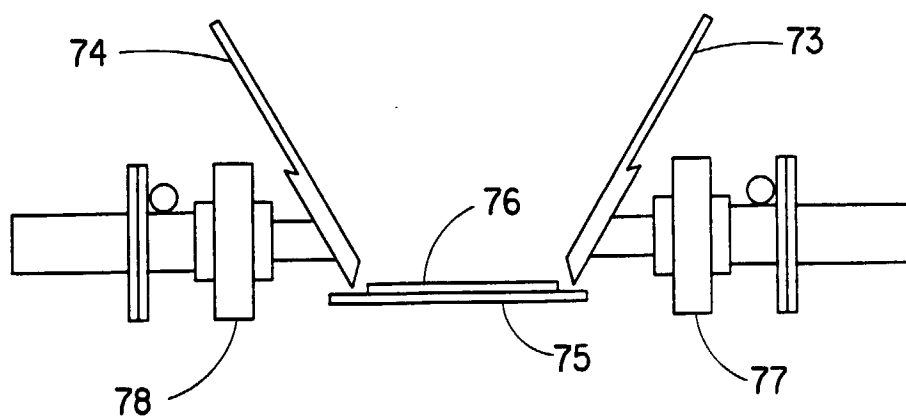


FIG. 13

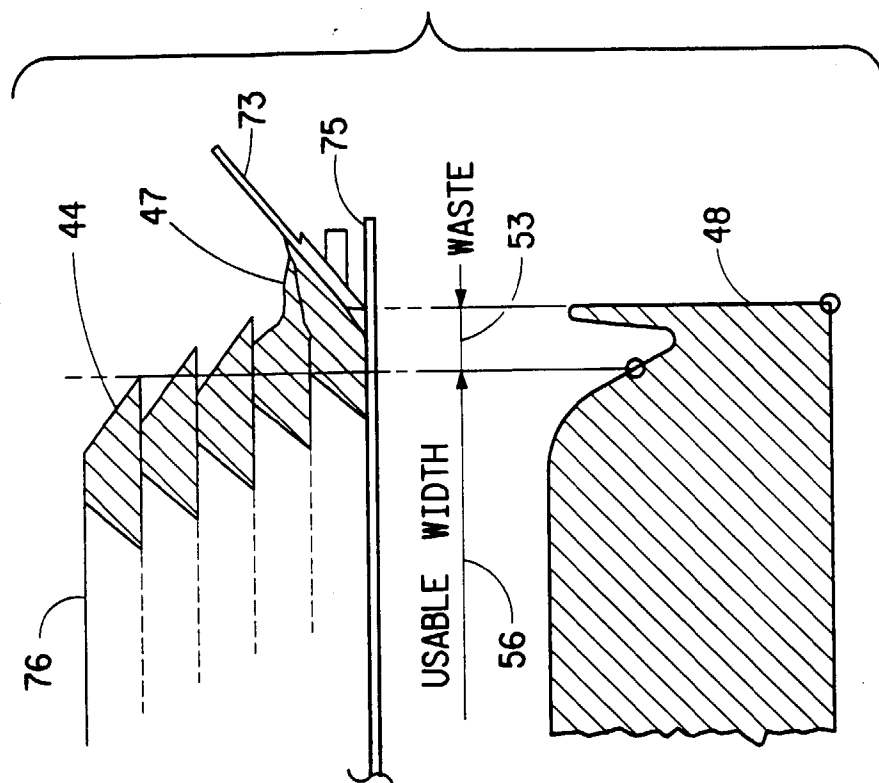


FIG. 12

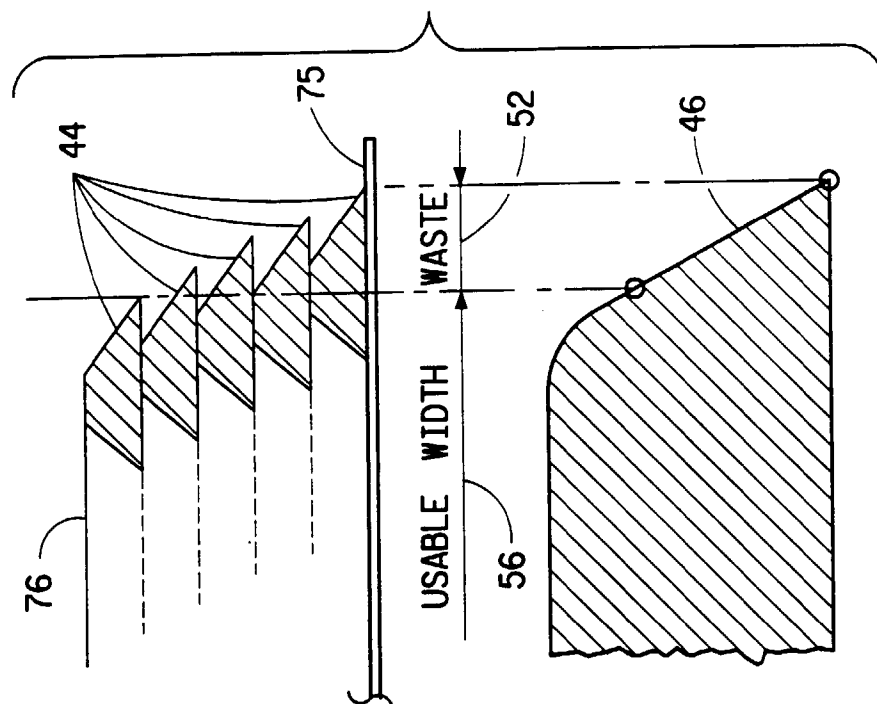


FIG. 14

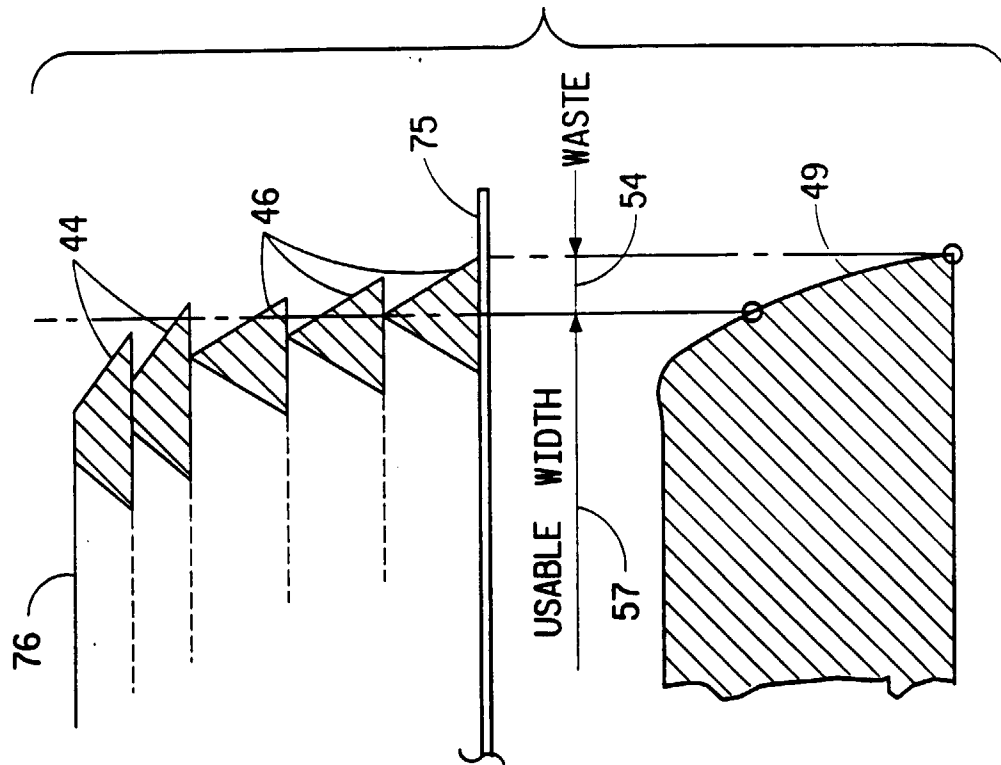


FIG. 15

