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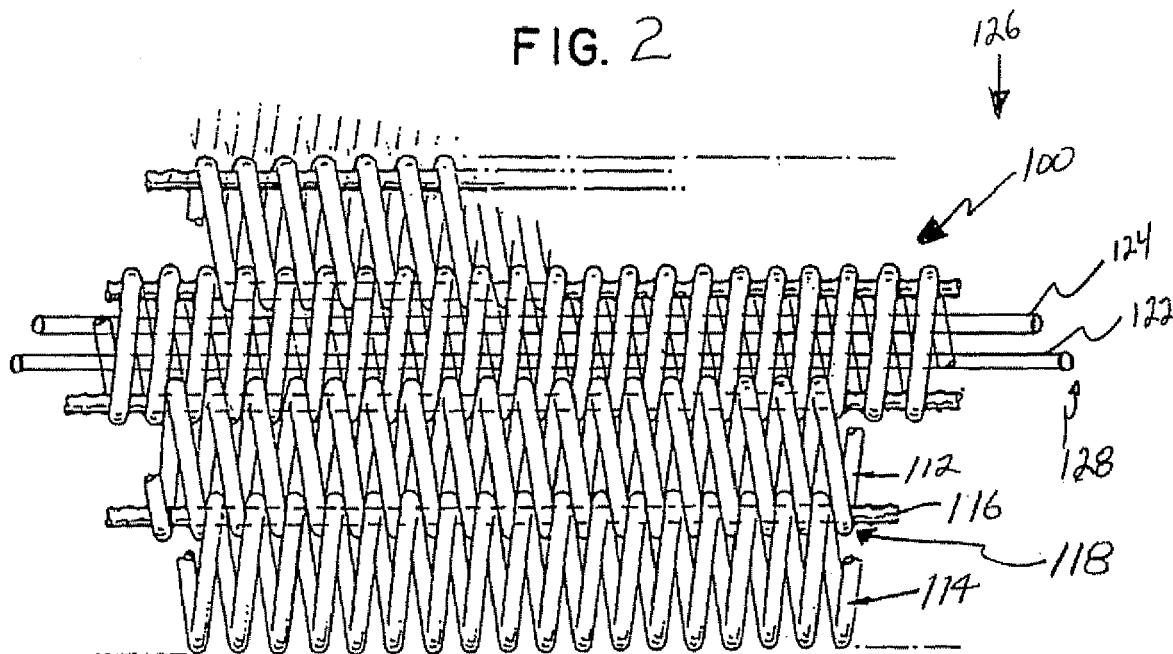
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(54) **Antistatic Spiral Fabric**

(57) In a spiral link fabric 100 having a plurality of helical coils 128 connected along a coiled perimeter to form a plurality of hinges, each hinge is formed using one of a plurality of connecting rods 116. The result is a spiral link fabric 100 having a plurality of open channels 120

between each of the plurality of hinges. At least one anti-static stuffer yarn 122 made of polyamide impregnated with carbon is placed in at least one of the plurality of open channels 120 to dissipate any electrostatic discharge.

FIG. 2



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a fabric having an antistatic stuffer used in the manufacture of non-woven textiles.

2. Description of Background

[0002] Non-woven textiles are broadly defined as sheet or web structures bonded together by entangling of the fibers mechanically, thermally or chemically. Non-woven textiles are not made by weaving or knitting. Thus, non-woven fabrics are engineered fabrics that may be a limited life, single-use fabric or a very durable fabric. These fabrics can imitate the appearance, texture and strength of a woven fabric.

[0003] During the fabrication of most nonwovens, static electricity can build-up. The result of static electricity build-up is the occasional spontaneous electrostatic discharge, or ESD. An ESD can not only damage the non-woven product in production, but it can also irreparably damage the fabric used in the fabrication of the non-woven product. This can lead to costly replacement of the fabric and down time for the manufacturing apparatus. In the worst case scenario, the machine fabricating the non-woven product can be damaged, or initiation of a fire could result.

[0004] One way to avoid ESD is to use an antistatic fabric made with carbon-filled polyamide antistatic yarns and conductive edging. These are generally endless or loop seamed. However, loop seams are weaker than the main body of the fabric, and they can place a seam mark on the finished product. Still further, endless fabrics are difficult and time-consuming to install, and cut warp ends at the seamed area become points of attachment for the non-woven fibers, resulting in "fibre picking."

BRIEF SUMMARY OF THE INVENTION

[0005] Accordingly, there is a need for an antistatic fabric that is easy to install, is non-marking, and is non-picking, yet has effective anti-static qualities. The present invention is for a fabric used in products manufactured in the non-woven industry. In the preferred embodiment, the fabric is a spiral stuffed with anti-static yarn. The fabric is preferably a spiral fabric having a plurality of spirals, and each spiral is stuffed with anti-static yarn. In the event of localized damage to the fabric, only removal of the damaged portion of the fabric is required. Additional fabric can be attached if desired or needed.

[0006] Additionally, the spiral fabric may contain up to approximately 25%, preferably approximately 15%, contaminant release properties, that is, not a coating. Accordingly, as the spiral wears, the contaminant release

properties remain. In this manner, "drips" of molten polymer can be removed easily with a cleaning system, for example, brushes, vacuum, and the like. If the fabric is damaged by the hot molten polymer drips, a section of the spiral can be removed and/or replaced. The contaminant release is part of the monofilament used to make the spiral, for example, the additive can be PTFE.

[0007] A fabric used on the formation of material produced for the non-woven industry has a spiral link fabric, the spiral link fabric having a plurality of helical coils connected along a coiled perimeter to form a plurality of hinges, each hinge formed using one of a plurality of connecting rods, resulting in a spiral link fabric having a plurality of open channels between each of the plurality of hinges; at least one antistatic stuffer yarn, the at least one antistatic stuffer yarn situated in one of the open channels.

[0008] Still further, the at least one antistatic stuffer yarn is removably attached to the spiral link fabric.

[0009] Additionally, the at least one antistatic stuffer yarn is at least one of a conductive monofilament, a conductive multifilament, a conductive metal, a conductive foam, and any other conductive stuffer that can be placed in one of the open channels. In the preferred embodiment, the antistatic stuffer yarn is a carbon impregnated polyamide.

[0010] Still further, at least one permeability control yarn is collocated with the at least one antistatic stuffer yarn in the open channel. In the preferred embodiment, the at least one permeability control yarn is polyester, and is either a monofilament or a multifilament.

[0011] Additionally, when the at least one antistatic stuffer yarn is a monofilament, it has a diameter between approximately 0.1 mm to approximately 1.0 mm. When the at least one antistatic stuffer yarn is a multifilament it has a range between approximately 22dTex and approximately 1500dTex. Still further, the cross section of the antistatic stuffer is either a round cross section or a profiled cross section.

[0012] Still further, a coating can be applied that connects a first longitudinal end of the at least one antistatic stuffer yarn and a first longitudinal end of the helical coils. The coating electrically connects the at least one antistatic stuffer yarn to form a conductive grid, thereby dissipating the ESD. The coating, in the preferred embodiment, is made from carbon particles suspended in latex.

[0013] Additionally, when a plurality of the antistatic stuffer yarns is used, these antistatic stuffer yarns are regularly spaced among the open channels in the spiral fabric. In this manner the electrostatic buildup can be collected and dissipated along a larger portion of the fabric. It is also conceived that a plurality of the at least one antistatic stuffer yarns are placed in every open channel, thereby maximizing the collection and dissipation of electrostatic charge buildup.

[0014] These and other features and advantages of this invention are described in or are apparent from the following detailed description of the preferred embodi-

ments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The preferred embodiments of the present inventions will be described in detail, with reference to the following figures, wherein:

- Fig. 1 depicts a plan view of a prior art link fabric;
 Fig. 2 depicts a plan view of a link fabric according to the present invention; and
 Fig. 3 depicts a partial cross-sectional view the link fabric according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0016] Fig. 1 depicts a plan view of a prior art link fabric 10. Generally, individual coils 12, 14 are connected by interdigitating adjacent turns of the coils and inserting a connecting rod, or pintel 16 into the interdigitated region 18. This prior art is disclosed, for example, in U.S. Patent No. 4,423,543.

[0017] Figure 2 depicts a plan view of a link fabric 100 according to the present invention. The individual link coils 112, 114 are connected in indigitating adjacent turns of the coils and inserting a connecting rod, or pintel 116 into the indigitated region 118. An open channel 120 is thereby created between the connecting rods 116.

[0018] The open channel, or region 120 located between the connecting rods 116 is stuffed with at least one antistatic stuffer yarn 122. This at least one antistatic stuffer yarn 122 is removably attached to the spiral link fabric 100. The at least one antistatic stuffer yarn 122 is at least one of a conductive monofilament, a conductive multifilament, a conductive metal, a conductive foam, and any other conductive stuffer that can be placed in one of the open channels. In the preferred embodiment, the antistatic stuffer yarn 122 is a carbon impregnated polyamide.

[0019] When the at least one antistatic stuffer yarn 122 is a monofilament, it has a diameter between approximately 0.1 mm to approximately 1.0 mm. When the at least one antistatic stuffer yarn 122 is a multifilament, it has a range between approximately 22dTex and approximately 1500dTex. Still further, the cross section of the antistatic stuffer yarn 122 is either a round cross section or a profiled cross section. A profiled cross section is any geometric shape that is not round or circular. For example, a profiled cross section can be oval, square, diamond, and polygonal.

[0020] When a plurality of the antistatic stuffer yarns 122 are used, these antistatic stuffer yarns 122 are regularly spaced among the open channels 120 in the spiral fabric 100.

[0021] Adjacent to the antistatic stuffing yarn 122 is optionally placed a stuffing, or permeability control yarn

124. Still further, the at least one permeability control yarn 124 is collocated with the at least one antistatic stuffer yarn 122 in the open channel 120. Stated differently, the at least one permeability control yarn 124 can be placed side-by-side with the antistatic stuffer yarn 122, as shown in the figure, or the two yarns 122, 124 can be twisted or otherwise attached to each other. In the preferred embodiment, the at least one permeability control yarn 124 is polyester, and is either a monofilament or a multifilament. The diameter of the permeability control yarn 124 is selected to determine the permeability of the fabric 100.

[0022] Still further, a coating or adhesive (not shown) can be applied that connects a first longitudinal end 126 of the at least one antistatic stuffer yarn 122 and a first longitudinal end of the helical coils 128. This coating or adhesive acts as a bus bar, electrically connecting the at least one antistatic stuffer yarn 122 to form a conductive grid, thereby dissipating the ESD. The coating or adhesive can be a heat seal adhesive that bonds the edges of the antistatic stuffer yarn 122 with the first longitudinal edge of the helical coils 128 of the fabric 100. This heat seal adhesive can be, for example, a carbon impregnated adhesive. The coating or adhesive, in the preferred embodiment, is made from carbon particles suspended in latex.

[0023] While the present invention has been particularly shown and described with reference to the foregoing preferred embodiments, those skilled in the art will understand that many variations may be made therein without departing from the spirit and scope of the invention as defined in the following claims. This description of the invention should be understood to include all novel and non-obvious combinations of elements described herein, and claims may be presented in this or a later application to any novel and non-obvious combination of these elements. The foregoing embodiments are illustrative, and no single feature or element is essential to all possible combinations that may be claimed in this or a later application. Where the claims recite "a" or "a first" element or the equivalent thereof, such claims should be understood to include incorporation of one or more such elements, neither requiring nor excluding two or more such elements.

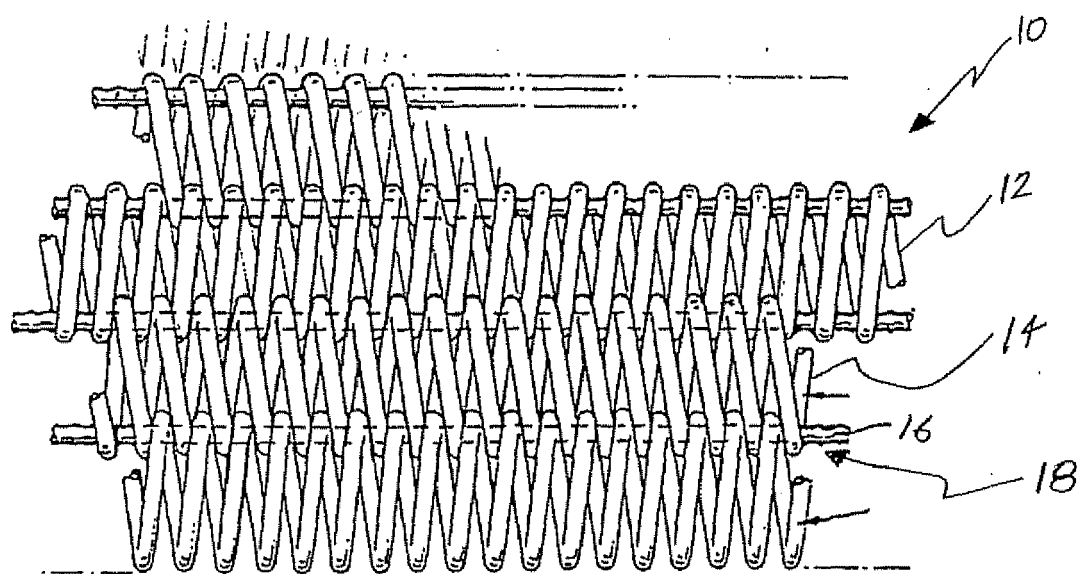
Claims

1. A fabric comprising:

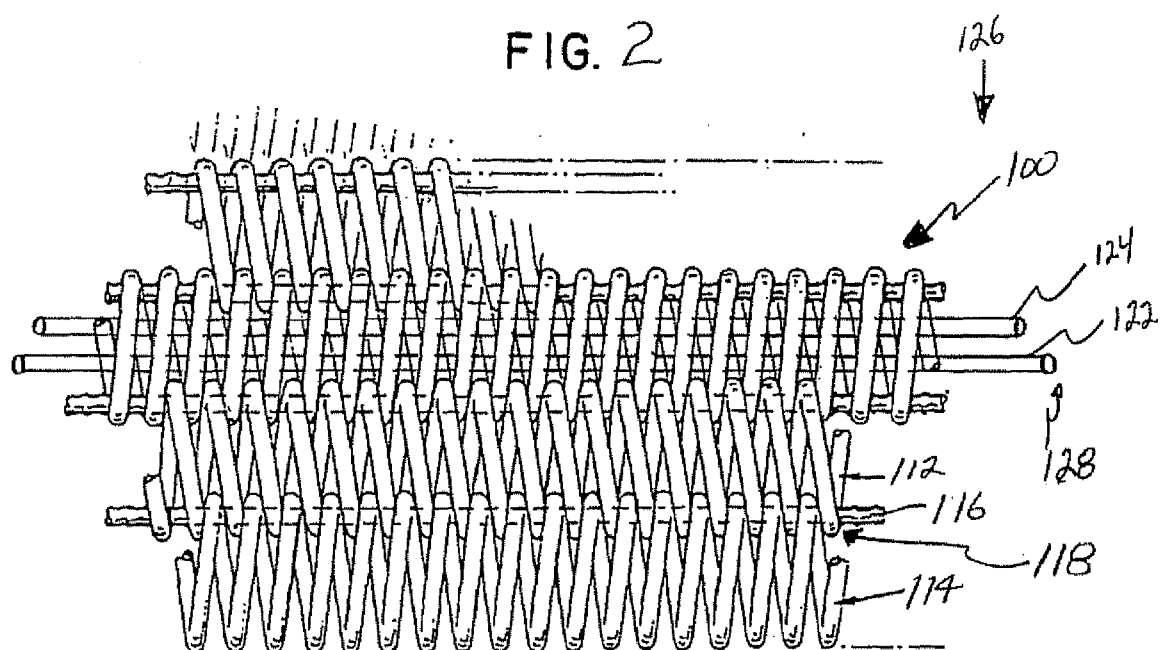
a spiral link fabric, the spiral link fabric comprising a plurality of helical coils connected along a coiled perimeter to form a plurality of hinges, each hinge formed using one of a plurality of connecting rods, resulting in a spiral link fabric having a plurality of open channels between each of the plurality of hinges;
 at least one antistatic stuffer yarn, the at least

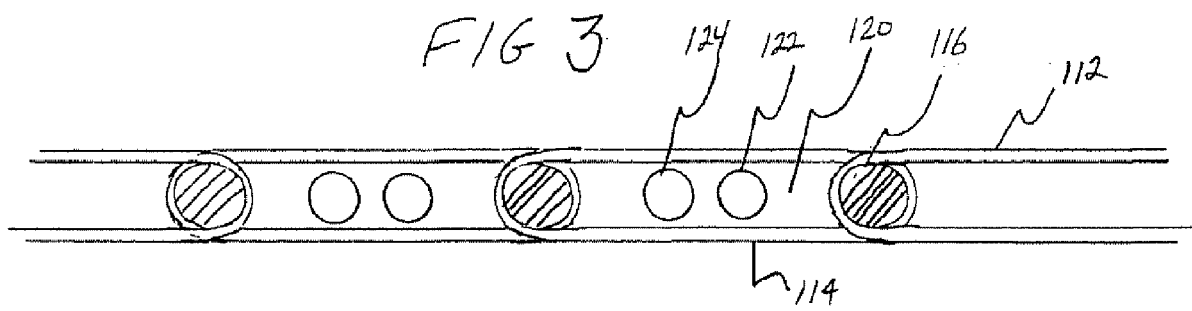
- one antistatic stuffer yarn situated in one of the plurality of open channels.
2. The fabric according to claim 1, wherein the at least one antistatic stuffer yarn is removably attached to the spiral link fabric. 5
 3. The fabric according to claim 1 or 2, wherein the at least one antistatic stuffer yarn is at least one of a conductive monofilament, a conductive multifilament, a conductive metal, a conductive foam, and any other conductive stuffer that can be placed in one of the plurality of open channels. 10
 4. The fabric according to one of the claims 1 to 3, wherein the antistatic stuffer yarn is a carbon impregnated polyamide. 15
 5. The fabric according to one of the preceding claims, further comprising at least one permeability control yarn collocated with the at least one antistatic stuffer yarn in the one of the plurality of open channels. 20
 6. The fabric according to claim 5, wherein the at least one permeability control yarn is polyester. 25
 7. The fabric according to claim 5 or 6, wherein the at least one permeability control yarn is one of a monofilament and a multifilament. 30
 8. The fabric according to any of the preceding claims, wherein the at least one antistatic stuffer yarn is a monofilament having a diameter between approximately 0.1 mm to approximately 1.0 mm. 35
 9. The fabric according to any of the preceding claims, wherein the at least one antistatic stuffer yarn is a multifilament have a range between approximately 22dTex and approximately 1500dTex. 40
 10. The fabric according to any of the preceding claims, wherein the at least one antistatic stuffer has at least one of a round cross section and a profiled cross section. 45
 11. A fabric according to any of the preceding claims, further comprising a coating connecting a first longitudinal end of the at least one antistatic stuffer yarn and a first longitudinal end of the helical coils. 50
 12. The fabric according to claim 11, wherein the coating electrically connects the at least one antistatic stuffer yarn to form a conductive grid.
 13. The fabric according to claim 11 or 12, wherein the coating comprises carbon particles suspended in latex. 55
 14. The fabric according to any of the preceding claims, wherein a plurality of the at least one antistatic stuffer yarns are regularly spaced among the open channels.
 15. The fabric according to any of the preceding claims, wherein a plurality of the at least one antistatic stuffer yarns are places in every open channel.
 16. The fabric according to any of the preceding claims, wherein the fabric is for use in non-woven industry for the formation of a product.
 17. The fabric according to any of the preceding claims, wherein the fabric is for use in the dryer section in the papermaking industry.

FIG. 1



PRIOR ART







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 11 4212

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 534 333 A (KELLER ROBERT A [US] ET AL) 9 July 1996 (1996-07-09) * column 1, line 5 - line 10 * * column 2, line 23 - column 3, line 9 * -----	1,3,10, 14-17	INV. D21F1/00
A	WO 2005/059243 A (ALBANY INT CORP [US]; BREUER HANS-PETER [DE]; PEREZ JESUS [MX]; LUCIAN) 30 June 2005 (2005-06-30) * page 4, line 19 - page 5, line 14; figures 2,3 * -----	1	
A	GB 2 346 387 A (SCAPA GROUP PLC [GB]; VOITH APPLETON MILLS INC [US]; VOITH FABRICS HEI) 9 August 2000 (2000-08-09) * abstract; figure 2 * -----	1	
D,A	US 4 423 543 A (LEUVELINK GERRIT W E [NL]) 3 January 1984 (1984-01-03) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			D21F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 November 2006	Examiner Helpiö, Tomi
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 11 4212

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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17-11-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5534333	A	09-07-1996	NONE	

WO 2005059243	A	30-06-2005	AU 2004299788 A1	30-06-2005
			CA 2548396 A1	30-06-2005
			EP 1699976 A1	13-09-2006

GB 2346387	A	09-08-2000	NONE	

US 4423543	A	03-01-1984	AU 535180 B2	08-03-1984
			AU 5826980 A	04-12-1980
			BE 883459 A1	15-09-1980
			BR 8008695 A	09-06-1981
			CA 1129234 A1	10-08-1982
			CH 648878 A5	15-04-1985
			DE 2921491 A1	04-12-1980
			WO 8002703 A1	11-12-1980
			EP 0028630 A1	20-05-1981
			ES 253401 Y	01-06-1981
			ES 8200586 A1	01-02-1982
			FI 801672 A	27-11-1980
			GB 2051154 A	14-01-1981
			IT 1130664 B	18-06-1986
			JP 1980925 C	17-10-1995
			JP 4005797 B	03-02-1992
			JP 61028096 A	07-02-1986
			JP 1507084 C	13-07-1989
			JP 56014641 A	12-02-1981
			JP 63039717 B	08-08-1988
			NO 810220 A	22-01-1981
			NZ 193559 A	15-07-1983
			US 4345730 A	24-08-1982
			ZA 8002542 A	24-06-1981

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 4423543 A [0016]