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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	10/07/2014	8852474	10859	1328

27752 7590 09/17/2014

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Steven Lee Barnholtz, West Chester, OH;
Paul Dennis Trokhan, Hamilton, OH;
Michael Donald Suer, Cincinnati, OH;
Douglas Jay Barkey, Hamilton Township, OH;
Jonathan Paul Brennan, Cincinnati, OH;
Ronald Thomas Gorley, Cincinnati, OH;

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 6 of 7

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	116	WO 2005/080497 A1	09-01-2005	Exxon-Mobil Chemical Patents, Inc.		
	117	WO 2005/118934 A1	12-15-2005	Dan-Web Holding A/S		
Change(s) applied	118	WO 2006/060813 A1	06-08-2006	Procter & Gamble Co.		
to document,	119	WO 2006/060815 A2	06-08-2006	Procter & Gamble Co.		
/G.R.P./	120	WO 2006/060816 A1	06-08-2006	Procter & Gamble Co.		
7/25/2014	121	WO 2006/069120 A2	06-29-2006	Procter & Gamble Co.		
	122	WO 2007/092303 A2	08-16-2007	SNS Nano Fiber Technology LLC		
	123	WO 2008/073101 A1	06-19-2008	Kimberly-ClarkWorldwide Inc.		
	124	WO 2009/010938 A1	01-22-2009	The Procter & Gamble Co.		
	125	WO 2009/010939 A2	01-2-2009	The Procter & Gamble Co.		
	126	WO 2009/105490 A1	08-27-2009	Sellars Absorbent Materials, Inc.		
	127	WO 2011/019908 A1	02-17-2011	The Procter & Gamble Co.		
	128	WO 2011/053677 A1	05-05-2011	The Procter & Gamble Co.		
EXAMINER				DATE CONSIDERED		

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IDS List of References.doc
Rev. 2/1909

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 4 of 7

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	79	EP 0 308 320 A2	03-22-1989	James River Corp.		
	80	EP 0 333 209 B1	09-1989	Kimberly-Clark Corp.		
	81	EP 0423 619 A1	04-24-1991	Fiberweb North America		
	82	EP 1 132 427 A1	09-12-2001	Humarto Corporation		
	83	EP 0 156 649 A2	10-02-1985	Minnesota Mining & Manufacturing Co.		
	84	EP 0 205 242 B2	12-04-1991	Kimberly Clark Corp.		
	85	EP 2 028 296 A1	02-25-2009	Reifenhäuser GmbH & Co. KG Maschinenfabrik	English Abstract	
	86	EP 0 357 496 B1	~~05-18-1194~~	Colgate-Palmolive Co.	05-1994	
Change(s) applied to document, /G.R.P./ 7/25/2014	87	EP 0 590 307 B1	12-16-1998	Kimberly-ClarkWorldwide Inc.		
	88	EP 0 865 755 A1	09-23-1998	Uni Charm Corp.		
	89	EP 0 992 338 A2	04-12-2000	Fort James Paper Corp.		
	90	EP 1 300 511 A2	04-09-2003	Armstrong World Ind. Inc.		
	91	EP 1 156 147 A1	11-21-2001	Kang Na Hsiung Enterprise Co. Ltd.		
	92	EP 1 156 160 A2	10-02-1985	Kimberly Clark Ltd.		
	93	EP 1 504 145 B1	11-05-2008	Kimberly-ClarkWorldwide Inc.		
	94	EP 1 589 137 A1	10-26-2005	Teijin Fibers, Ltd.		
	95	JP 2000/303335 A2	10-31-2000	Humatro Corp.	English Abstract	
	96	JP 2002/088660 A	03-27-2002	Crecia Corp.	English Abstract	
	97	JP 2005/218525 A2	08-18-2005	Kao Corp.	English Abstract	

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)	COMPLETE IF KNOWN	
	Application Number	12/170,575
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	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 2 of 7	Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	30	US-6,589,892 B1	07-08-2003	Smith, et al.	
	31	US-6,709,526	03-2004	Bailey, et al.	
	32	US-6,946,413 B2	09-20-2005	Lange, et al.	
	33	US-6,979,386	12-2005	Wallajapet, et al.	
	34	US-6,986,932	01-2006	Zink, et al.	
	35	US-7,000,000 B1	02-14-2006	O'Brien	
	36	US-~~7,028,429~~	04-2007	Vinson, et al.	7208429
Change(s) applied to document, /G.R.P./ 7/25/2014	37	US-7,029,620	04~~01~~-2006	Gordon, et al.	
	38	US-7,696,109	04-2010	Ouellette, et al.	
	39	US-7,176,150 B2	02-13-2007	Kopacz, et al.	
	40	US -7,425,517 B2	09-16-2008	Deka, et al.	
	41	US-7,879,172 B2	02-01-2011	Kopcz, et al.	
	42	US-7,902,096 B2	03-08-2011	Brandner, et al.	
	43	US-7,994,079 B2	08-09-2011	Chen, et al.	
	44	US-7,994,081 b2	08-09-2011	Farrell, et al.	
	45	US-7,998,889 B2	08-16-2011	Stralin, et al.	
	46	US-8,017,534 B2	09-13-2011	Harvey, et al.	
	47	US-7,972,986	7-5-2011	Barnholtz, et al.	
	48	US-2003/0200991 A1	10-30-2003	Keck, et al.	
	49	US-2004/0048542	03-2004	Thomaschefsy, et al.	
	50	US-2004/0087237 A1	05-06-2004	Garnier, et al.	
	51	US-2004/163781 A1	08-26-2004	Hernandez-Munoa, et al.	
	52	US-2005/0020170 A1	01-27-2005	Deka, et al.	
	53	US-2005/0090175	04-2005	Bergholm, et al.	
	54	US-2005/0130536 A1	06-16-2005	Siebers, et al.	
	55	US-2005/0136765	06-2005	Shannon	
	56	US-2005/0136772 A1	06-23-2005	Chen, et al.	
	57	US-2005/0136778 A1	06-23-2005	Thomaschefsky, et al.	
	58	US-2005/0245159 A1	11-03-2005	Chmielewski, et al.	
EXAMINER				DATE CONSIDERED	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 1 of 7	Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-3,521,638	07-1970	Parrish	
	2	US-4,139,699	02-1979	Hernandez, et al.	
	3	US-4,203,939	05-1980	Drachenberg, et al.	
	4	US-4,243,480	01-1981	Hernandez, et al.	
	5	US-4,355,066	10-19-1982	Newman	
	6	US-4,370,289	01-25-1983	Sorenson	
	7	US-4,436,780	03-13-1984	Hotchkiss, et al.	
	8	US-4,623,576	11-18-1986	Lloyd, et al.	
	9	US-4,675,226	06-23-1987	Ott	
	10	US-4,851,168	07-1989	Graiver, et al.	
	11	US-4,885,202	12-05-1989	Lloyd, et al.	
	12	US-5,094,717	03-10-1992	Manning, et al.	
	13	US-5,120,888	06-09-1992	Nohr, et al.	
	14	US-5,149,576	09-22-1992	Potts, et al.	
	15	US-5,204,165	04-20-1993	Schortmann	
	16	US-5,254,399	10-1993	Oku, et al.	
Change(s) applied to document, /G.R.P./ 7/25/2014	17	US-5,427,696	~~08-16-2006~~ 06-1995	Phan, et al.	
	18	US-5,436,066	07-1995	Chen	
	19	US-5,536,563	07-1996	Shah, et al.	
	20	US-5,629,080	05-13-1997	Gupta, et al.	
	21	US-5,853,867	12-29-1998	Harada, et al.	
	22	US-6,150,005	11-21-2000	Williams, et al.	
	23	US-6,177,370 B1	01-23-2001	Skoog, et al.	
	24	US-~~6,621,679~~	07-2001	Chen, et al.	6261679
	25	US-6,423,884	07-2002	Oehmen	
	26	US-6,488,801 B1	12-03-2002	Bodaghi, et al.	
	27	US-6,503,370	01-2003	Hollmark, et al.	
	28	US-6,506,873	01-2003	Ryan, et al.	
	29	US-6,550,115 B1	04-22-2003	Skoog, et al.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

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EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-2,008,031	07-1931	Miller	
	2	US-5,272,236	12-1993	Lai, et al.	
	3	US-5,375,306	12-1994	Roussin-Moynier	
	4	US-~~6,179,325~~ 6179235	01-2001	King	
Change(s) applied	5	US-2005/0170727	08-2005	Melik, et al.	
to document,	6	US-2007/0173162	07-2007	Ethiopia, et al.	
/G.R.P./	7	US-2008/0051471	02-2008	Kronberg, et al.	
7/25/2014					

EXAMINER	/Saeed Huda/	DATE CONSIDERED	06/12/2013

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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P.O. Box 1450
Alexandria, Virginia 22313-1450
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27752 7590 06/09/2014
THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

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Connie Baker	(Depositor's name)
/Connie Baker/	(Signature)
September 3, 2014	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

TITLE OF INVENTION: PROCESS FOR MAKING FIBROUS STRUCTURES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/09/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
TENTONI, LEO B	1742	264-131000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 C. Brant Cook
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: The Procter & Gamble Company
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Cincinnati, OH

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☒ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 16-2480 (enclose an extra copy of this form).

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☐ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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Authorized Signature /C. Brant Cook/ Date September 3, 2014
Typed or printed name C. Brant Cook Registration No. 39,151

FITESA/Exhibit 1013, Page 7 of 624

Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	20029974
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	03-SEP-2014
Filing Date:	10-JUL-2008
Time Stamp:	11:40:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$960
RAM confirmation Number	9295
Deposit Account	162480
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	10859_Issue_Fees.pdf	1097406 59c2587243ba01ebd419c96eefb5b978cd0eb8e5	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32034 54925dd510f9f747503836410b1ab9520cac3d74	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1129440		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

27752 7590 06/09/2014

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER
TENTONI, LEO B

ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 06/09/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

TITLE OF INVENTION: PROCESS FOR MAKING FIBROUS STRUCTURES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/09/2014

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27752 7590 06/09/2014
THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

TITLE OF INVENTION: PROCESS FOR MAKING FIBROUS STRUCTURES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/09/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
TENTONI, LEO B	1742	264-131000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

FITESA/Exhibit 1013, Page 13 of 624

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 06/09/2014

THE PROCTER & GAMBLE COMPANY
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Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
TENTONI, LEO B	
ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 06/09/2014

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 12/170,575	Applicant(s) BARNHOLTZ ET AL.	
	Examiner Leo B. Tentoni	Art Unit 1742	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amendment of 29 May 2014*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-5,9 and 12-23*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Leo B Tentoni/
Primary Examiner, Art Unit 1742

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	**Art Unit**
	LEO B TENTONI	1742

CPC						
Symbol					**Type**	**Version**
D01D		5	/	0985	I	2013-01-01
D04H		3	/	16	F	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	18	
/LEO B TENTONI/ Primary Examiner.Art Unit 1742	06/03/2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	11

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	**Art Unit**
	LEO B TENTONI	1742

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
264	131	D	0	1	D	5 / 08 (2006.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
264	171.1	518	555		

NONE	Total Claims Allowed:	
(Assistant Examiner) (Date)	18	
/LEO B TENTONI/ Primary Examiner.Art Unit 1742 06/03/2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner) (Date)	1	11

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	**Art Unit**
	LEO B TENTONI	1742

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	12	17												
2	2	13	18												
3	3	14	19												
4	4	15	20												
5	5	16	21												
	6	17	22												
	7	18	23												
	8														
6	9														
	10														
	11														
7	12														
8	13														
9	14														
10	15														
11	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 18	
/LEO B TENTONI/ Primary Examiner.Art Unit 1742 (Primary Examiner)	06/03/2018 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 11

EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L12	83	((air or fluid or gas or gases or gaseous or gasses) with (fiber or fibre or filament or filamentary or strand or thread or yarn) with (angle near3 (greater or higher or larger or less or lesser or lower))).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2014/06/03 08:03

6/3/2014 8:05:18 AM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Leo B. Tentoni
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

AMENDMENT AFTER FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.116

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of April 21, 2014, consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

OK TO ENTER: /LBT/

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	LEO B. TENTONI	1742

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
523	222	5/4/2009	Saeed M. Huda
264	210.8, 211.14	9/28/2009	Saeed M. Huda
425	72.2	9/28/2009	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	3/4/2010	Saeed M. Huda
425	66, 72.1, 224, 542, 461	3/4/2010	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	7/8/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	7/8/2013	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	11/12/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	11/12/2013	Saeed M. Huda
ABOVE	UPDATED	03/07/2014	LBT
264	112, 121, 131, 171.1, 510, 517, 518, 555	03/07/2014	LBT
ABOVE	UPDATED	04/16/2014	LBT
ABOVE	UPDATED	06/03/2014	LBT

SEARCH NOTES		
Search Notes	Date	Examiner
Searched Inventor and Assignee	5/4/2009	Saeed M. Huda
Reviewed Provisional Application	5/4/2009	Saeed M. Huda

/LEO B. TENTONI/ Examiner.Art Unit 1742	

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
INTERFERENCE	SEARCH HISTORY PRINTOUT	06/03/2014	LBT

/LEO B. TENTONI/ Examiner.Art Unit 1742	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	**Art Unit**
	LEO B TENTONI	1742

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/04/2009	09/25/2009	03/04/2010	07/08/2013	11/12/2013		06/03/2014		
1	1	✓	✓	✓	✓	✓		=		
2	2	✓	✓	✓	✓	✓		=		
3	3	✓	✓	✓	✓	✓		=		
4	4	✓	✓	✓	✓	✓		=		
5	5	✓	✓	✓	✓	✓		=		
	6	✓	✓	✓	✓	✓		-		
	7	✓	✓	✓	✓	✓		-		
	8	✓	✓	✓	✓	✓		-		
6	9	✓	✓	✓	✓	✓		=		
	10	✓	✓	✓	✓	✓		-		
	11	✓	✓	✓	✓	✓		-		
7	12	✓	✓	✓	✓	✓		=		
8	13	✓	✓	✓	✓	✓		=		
9	14	✓	✓	✓	✓	✓		=		
10	15	✓	✓	✓	✓	✓		=		
11	16	✓	✓	✓	✓	✓		=		
12	17	✓	✓	✓	✓	✓		=		
13	18	✓	✓	✓	✓	✓		=		
14	19	✓	✓	✓	✓	✓		=		
15	20	✓	✓	✓	✓	✓		=		
16	21	✓	✓	✓	✓	✓		=		
17	22	✓	✓	✓	✓	✓		=		
18	23	✓	✓	✓	✓	✓		=		

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 06/02/2014

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
TENTONI, LEO B	
ART UNIT	PAPER NUMBER
1742	

NOTIFICATION DATE	DELIVERY MODE
06/02/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

centraldocket.im@pg.com
mayer.jk@pg.com

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	12/170,575	BARNHOLTZ ET AL.	
	Examiner	Art Unit	
	Leo B. Tentoni	1742	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Leo B. Tentoni*.

(2) *C. Brant Cook Reg. No. 39,151*.

(3) *Steven L. Barnholtz (co-inventor)*.

(4) *Paul D. Trokhan (co-inventor)*.

Date of Interview: *28 May 2014*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☒102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1-5,9 and 12-23*.

Identification of prior art discussed: *Anderson et al (U.S. Patent 4,100,324 A), Schwarz (U.S. Patent 5,476,616 A)*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Discussed Anderson et al, particularly Figure 1, which shows fluid-releasing holes (12, 13) such that the fluid exiting from holes (12, 13) has a parallel component (note that the fluid stream 10 exiting the die 11 has a parallel component to the longitudinal axis of the die 11). Examiner stated that the parallel component of the fluid exiting from holes (12, 13) meets the limitation of "substantially parallel" set forth in instant claim 1, line 5. Pending further consideration of the originally-filed specification, there does not appear to be specific or general recitation of what constitutes "substantially parallel" with respect to the fluid exiting the fluid-releasing hole. Examiner will consider timely-filed amendments and/or remarks, and determine entry or non-entry of any proposed amendment-after-final.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Leo B Tentoni/ Primary Examiner, Art Unit 1742	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Leo B. Tentoni
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

AMENDMENT AFTER FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.116

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of April 21, 2014, consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended) A process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole contacts ~~is parallel or substantially parallel to~~ an exterior surface of a filament exiting the filament-forming hole at an angle of less than 30°;

b. supplying at least a first polymer comprising a polyolefin to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with solid additives to form a mixture; and

f. collecting the mixture on a collection device to produce a fibrous structure.

Claim 2 (Original) The process according to Claim 1 wherein the die comprises two or more rows of filament-forming holes.

Claim 3 (Original) The process according to Claim 2 wherein at least one row of filament-forming holes comprises two or more filament-forming holes.

Claim 4 (Original) The process according to Claim 1 wherein more than one fluid-releasing hole are associated with a filament-forming hole.

Claim 5 (Original) The process according to Claim 1 wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole.

Claims 6-8 (Cancelled)

Claim 9 (Previously presented) The process according to Claim 1 wherein the polyolefin comprises polypropylene.

Claims 10-11 (Cancelled)

Claim 12 (Original) The process according to Claim 1 wherein the solid additives comprise fibers.

Claim 13 (Original) The process according to Claim 12 wherein the fibers comprise wood pulp fibers.

Claim 14 (Original) The process according to Claim 1 wherein the solid additives are combined with the plurality of filaments by a solid additive spreader.

Claim 15 (Previously presented) The process according to Claim 1 wherein the process further comprises the step of:

g. contacting a surface of the fibrous structure with a plurality of filaments comprising a second polymer.

Claim 16 (Previously presented) The process according to Claim 15 wherein the plurality of filaments comprising the second polymer are in the form of a fibrous structure.

Claim 17 (Original) The process according to Claim 15 wherein the second polymer is the same as the first polymer.

Claim 18 (Original) The process according to Claim 1 wherein the fluid released by the fluid-releasing holes comprises air.

Claim 19 (Previously presented) The process according to Claim 1 wherein the fibrous structure exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121μm to about 200μm.

Claim 20 (Previously presented) The process according to Claim 1 wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation.

Claim 21 (Original) The process according to Claim 1 wherein the process is directly coupled to a post-processing operation.

Claim 22 (Original) The process according to Claim 1 wherein the process is closely coupled to a post-processing operation.

Claim 23 (Currently amended) A process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole contacts ~~is parallel or substantially parallel to~~ an exterior surface of a filament exiting the filament-forming hole at an angle of less than 30°;

b. supplying a polyolefin polymer to the die;

c. producing a plurality of filaments comprising the polyolefin polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with wood pulp fibers to form a mixture; and

f. collecting the mixture on a collection device to produce a fibrous structure.

REMARKS

Claim Status

Applicants' legal representative, C. Brant Cook, wishes to thank the Examiner for discussing the cited prior art references with the Applicants and himself during a telephone interview on May 28, 2014.

Claims 1 and 23, the independent claims, have been amended to define the claimed invention with greater specificity by reciting that the fluid exiting the fluid-releasing hole contacts an exterior surface of a filament exiting the filament-forming hole at an angle of less than 30°. Support for these amendments is found in the Specification, for example at Page 18, lines 2-4, and in the Drawings as originally filed.

These changes do not involve any introduction of new matter. Consequently, entry of these changes is believed to be in order and is respectfully requested.

Claims 1-5, 9, and 12-23 are pending in the present application. No additional claims fee is believed to be due.

Rejection Under 35 USC §102(b) (Pre-AIA) as being anticipated by U.S. Patent No. 4,100,324

Claims 1, 9, 12-14, 18, and 20-23 are rejected by the Examiner under 35 USC §102(b) as allegedly being anticipated by U.S. Patent No. 4,100,324 to Anderson et al. ("Anderson"). The Examiner asserts that Anderson teaches a process of making a fibrous structure including the steps of (a) providing a die including one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole; supplying at least a first polymer comprising a polyolefin to the die; producing a plurality of filaments comprising the first polymer from the die; supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments; combining the filaments

with solid additives to form a mixture; and collecting the mixture on a collection device to produce a fibrous structure.

Applicants respectfully submit that Anderson fails to teach each and every element of Claims 1 and 23, the independent claims, as amended, because Anderson fails to teach a die that includes one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid releasing hole fluid contacts an exterior surface of a filament exiting the filament-forming hole at an angle of less than 30°. Applicants respectfully submit that Anderson, which teaches a knife-edge die, fails to teach a die that includes a filament-forming hole that is associated with one or more fluid-releasing holes such that a fluid exiting the fluid releasing hole contacts an exterior surface of a filament exiting the filament-forming hole at an angle of less than 30°. Rather Anderson's knife-edge die teaches that its fluid exiting its fluid releasing hole contacts an exterior surface of a filament exiting its filament-forming hole at angle at of greater than 30°. See Anderson, Fig. 1. Accordingly, Applicants submit that Anderson, as clearly shown in Fig. 1 and described in Col. 2, lines 38-44 of Anderson, teaches a die having a die head 11 from which a molten polymeric material is extruded (filament-forming holes) into fine streams of polymer which are then broken into microfibers by converging flows of high velocity heated gas (usually air) supplied from nozzles 12 and 13 (fluid-releasing holes). Applicants submit that nowhere does Anderson teach or suggest that its die contains a filament-forming hole that is associated with one or more fluid-releasing holes such that a fluid exiting the fluid releasing hole contacts an exterior surface of a filament exiting the filament-forming hole at an angle of less than 30°. Therefore, Applicants respectfully submit that Claims 1 and 23, as amended, are not anticipated by Anderson. Further, Applicants respectfully submit that Claims 9, 12-14, 18, and 20-22, which ultimately depend from Claim 1, as amended, are not anticipated by Anderson.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 4,100,324 in view of U.S. Patent No. 5,476,616

Claims 2-5 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Anderson, discussed above, in view of U.S. Patent No. 5,476,616 to Schwarz ("Schwarz"). The Examiner recognizes that Anderson does not explicitly teach the recited details in Claim 2-5. To overcome Anderson's deficiency,

the Examiner attempts to combine the teachings of Schwarz with the teachings of Anderson.

Applicants respectfully submit that Anderson in view of Schwarz fails to teach each and every element of Claim 1, the independent claim, as amended, because Anderson in view of Scharwz fails to teach a die that includes one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid releasing hole contacts an exterior surface of a filament exiting the filament-forming hole at an angle of less than 30°.

Applicants respectfully submit that Schwarz cannot properly be combined with Anderson to render Claim 1, as amended, obvious because Schwarz teaches away from modifying Anderson's die as suggested by the Examiner. Applicants submit that Schwarz clearly teaches away its die using converging gas streams that converge onto a filament exiting a filament-forming hole as taught by Anderson because Schwarz's expressed purpose is to achieve uniform, high quality fiber formation by keeping its spinning nozzles and rows of spinning nozzles separated by a minimum distance so that the fiber attenuating gas stream of a nozzle did not interfere with its neighboring gas stream from another nozzle. Schwarz, Col. 2, lines 8-14. Applicants respectfully submit that if Anderson's die teachings were modified as suggested by the Examiner with Schwarz's teaching it would render Anderson's die inoperable for its intended purpose; namely to have converging gas streams converge upon polymer streams exiting its filament-forming holes to break the polymer streams into microfibers.

Therefore, Applicants respectfully submit that Claim 1, as amended, is not rendered obvious over Anderson, alone or in view of Schwarz. MPEP 2143.03. Further, Applicants respectfully submit that Claims 2-5, which ultimately depend from Claim 1, as amended, are not rendered obvious over Anderson alone or in view of Schwarz. MPEP 2143.03.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 4,100,324 in view of WO 2005/065932

Claims 15-17 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Anderson, discussed above, in view of WO 2005/065932 to Zhou et al. ("Zhou"). The Examiner recognizes that Anderson does not explicitly teach the step of contacting a surface of the fibrous structure with a plurality of filaments of a second polymer. To overcome Anderson's deficiency, the Examiner attempts to combine the teachings of Zhou with the teachings of Anderson.

Applicants respectfully submit that Claims 15-17, which ultimately depend from Claim 1, as amended, are not rendered obvious over Anderson in view of Zhou for the same reasons that Claim 1, as amended, is no rendered obvious over Anderson. MPEP 2143.03.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 4,100,324 in view of U.S. Patent Application Publication No. 2007/0202766

Claims 19 is rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Anderson, discussed above, in view of U.S. Patent Application Publication No. 2007/0202766 to Ouellette et al. ("Ouellette"). The Examiner recognizes that Anderson does not explicitly teach that its fibrous structure exhibits a pore volume distribution as claimed in Claim 19. To overcome Anderson's deficiency, the Examiner attempts to combine the teachings of Ouellette with the teachings of Anderson.

Applicants respectfully submit that Claim 19, which depends from Claim 1, as amended, is not rendered obvious over Anderson in view of Ouellette for the same reasons that Claim 1, as amended, is not rendered obvious over Anderson. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, Applicant(s) respectfully request(s) entry of the amendment(s) presented herein, reconsideration of this application, and allowance of the pending claim(s).

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: May 29, 2014
Customer No. 27752

Amendment_Response_to_Office_Action.doc
Revised 02/09/2009

Doc Code: A.NE.AFCP
Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
10859	12/170,575	July 10, 2008
First Named Inventor:	**Title:**	
Steven Lee Barnholtz	PROCESS FOR MAKING FIBROUS STRUCTURES	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:
    - Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
    - The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
        - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
        - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
            - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
            - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date
/C. Brant Cook/	May 29, 2014
Name (Print/Typed) C. Brant Cook	**Practitioner Registration No.** 39,151

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

[✓] * Total of 1 forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/229,812
Inventor(s)	:	Gregory Charles Gordon, et al.
Filed	:	September 12, 2011
Art Unit	:	1612
Examiner	:	Michael P. Cohen
Docket No.	:	11789MC
Confirmation No.	:	2740
Customer No.	:	27752
Title	:	FILAMENTS COMPRISING AN ACTIVE AGENT NONWOVEN WEBS AND METHODS FOR MAKING SAME

AMENDMENT AFTER FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.116

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of August 16, 2013, please amend the above-identified application as follows and consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 8 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended) A nonwoven web comprising ~~one or more~~a plurality of inter-entangled filaments at least one of the filaments comprising one or more filament-forming materials comprising a hydroxyl polymer and one or more active agents that are releasable from the filament when the filament's morphology changes, wherein the total level of the one or more filament-forming materials present in the filament is less than 65% by weight on a dry filament basis and the total level of the one or more active agents present in the filament is greater than 35% by weight on a dry filament basis.

Claim 2 (Previously presented) The nonwoven web according to Claim 1 wherein the total level of the one or more active agents present in the filament is at least 40% by weight on a dry filament basis.

Claim 3 (Previously presented) The nonwoven web according to Claim 1 wherein the total level of the one or more active agents present in the filament is greater than 80% by weight on a dry filament basis.

Claim 4 (Previously presented) The nonwoven web according to Claim 1 wherein the one or more filament-forming materials and the one or more active agents are present in the filament at a weight ratio of filament-forming materials to active agents of 3.5 or less.

Claim 5 (Previously presented) The nonwoven web according to Claim 1 wherein the one or more filament-forming materials comprises a polar solvent-soluble material.

Claim 6 (Previously presented) The nonwoven web according to Claim 5 wherein the polar solvent-soluble material comprises a water-soluble material.

Claim 7 (Cancelled)

Claim 8 (Previously presented) The nonwoven web according to Claim 1 wherein the hydroxyl polymer is selected from the group consisting of: pullulan, hydroxypropylmethyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, polyvinyl pyrrolidone, carboxymethyl cellulose, sodium alginate, xanthan gum, tragacanth gum, guar gum, acacia gum, Arabic gum, polyacrylic acid, methylmethacrylate copolymer, carboxyvinyl polymer, dextrin, pectin, chitin, levan, elsinan, collagen, gelatin, zein, gluten, soy protein, casein, polyvinyl alcohol, starch, starch derivatives, hemicellulose, hemicellulose derivatives, proteins, chitosan, chitosan derivatives, polyethylene glycol, tetramethylene ether glycol, hydroxymethyl cellulose, and mixtures thereof.

Claim 9 (Withdrawn) The filament according to Claim 8 wherein the polymer comprises polyvinyl alcohol.

Claim 10 (Withdrawn) The filament according to Claim 8 wherein the polymer comprises starch or starch derivative.

Claim 11 (Previously presented) The nonwoven web according to Claim 1 wherein the hydroxyl polymer exhibits a weight average molecular weight of greater than about 10,000 g/mol.

Claim 12 (Previously presented) The nonwoven web according to Claim 1 wherein the filament further comprises a plasticizer.

Claim 13 (Previously presented) The nonwoven web according to Claim 12 wherein the plasticizer is selected from the group consisting of: glycerin, ethylene glycol, polyethylene glycol, propylene glycol, glycidol, urea, sorbitol, xylitol, maltitol, sugars, ethylene bisformamide, amino acids, and mixtures thereof.

Claim 14 (Previously presented) The nonwoven web according to Claim 1 wherein the one or more active agents comprises a surfactant.

Claim 15 (Previously presented) The nonwoven web according to Claim 14 wherein the surfactant is selected from the group consisting of: anionic surfactants, cationic surfactants, nonionic surfactants, zwitterionic surfactants, amphoteric surfactants, and mixtures thereof.

Claim 16 (Previously presented) The nonwoven web according to Claim 1 wherein one of the one or more active agents is selected from the group consisting of: skin benefit agents, medicinal agents, lotions, fabric care agents, dishwashing agents, carpet care agents, surface care agents, hair care agents, air care agents, and mixtures thereof.

Claim 17 (Previously presented) The nonwoven web according to Claim 1 wherein the filament exhibits a diameter of less than 50 μm as measured according to the Diameter Test Method.

Claim 18 (Previously presented) The nonwoven web according to Claim 1 wherein the filament comprises two or more different filament-forming materials.

Claim 19 (Previously presented) The nonwoven web according to Claim 1 wherein the filament comprises two or more different active agents.

Claim 20 (Previously presented) The nonwoven web according to Claim 1 wherein the filament further comprises a coating composition present on an external surface of the filament.

Claim 21 (Previously presented) The nonwoven web according to Claim 20 wherein the coating composition comprises one or more active agents.

Claim 22 (Previously presented) The nonwoven web according to Claim 21 wherein at least one of the one or more active agents present in the coating composition is different from at least one of the one or more active agents present in the filament.

Claim 23 (Previously presented) The nonwoven web according to Claim 1 wherein the filament further comprises a dissolution aid.

Claim 24 (Previously presented) The nonwoven web according to Claim 1 wherein the filament exhibits a water content of from 0% to about 20% as measured according to the Water Content Test Method described herein.

Claim 25 (Previously presented) The nonwoven web according to Claim 24 wherein the filament exhibits a water content of greater than 0% to less than 15% as measured according to the Water Content Test Method described herein.

Claims 26-30 (Cancelled)

Claim 31 (Previously presented) The nonwoven web according to Claim 1 wherein one or more active agents comprises a fabric care active agent.

Claim 32 (Cancelled)

Claim 33 (Previously presented) A fabric care composition comprising a nonwoven web according to Claim 1 wherein one or more active agents comprises a fabric care active agent.

Claim 34 (Withdrawn) A method for treating a fabric article in need of treatment, the method comprising the step of treating the fabric article with a nonwoven web according to Claim 30.

Claim 35 (Withdrawn) The method according to Claim 34 wherein the step of treating comprises one or more steps selected from the group consisting of:

a. pre-treating the fabric article before washing the fabric article;

b. contacting the fabric article with a wash liquor formed by nonwoven web with water;

c. contacting the fabric article with the nonwoven web in a dryer;

d. drying the fabric article in the presence of the nonwoven web in a dryer; and

e. combinations thereof.

Claim 36 (Withdrawn) A method for treating a fabric article in need of treatment, the method comprising the step of treating the fabric article with a film according to Claim 32.

Claim 37 (Withdrawn) The method according to Claim 36 wherein the step of treating comprises one or more steps selected from the group consisting of:

a. pre-treating the fabric article before washing the fabric article;

b. contacting the fabric article with a wash liquor formed by nonwoven web with water;

c. contacting the fabric article with the nonwoven web in a dryer;

d. drying the fabric article in the presence of the nonwoven web in a dryer; and

e. combinations thereof.

Claim 38 (Withdrawn) A method for treating a fabric article in need of treatment, the method comprising the step of treating the fabric article with a fabric care composition according to Claim 33.

Claim 39 (Withdrawn) The method according to Claim 38 wherein the step of treating comprises one or more steps selected from the group consisting of:

a. pre-treating the fabric article before washing the fabric article;

b. contacting the fabric article with a wash liquor formed by nonwoven web with water;

c. contacting the fabric article with the nonwoven web in a dryer;

d. drying the fabric article in the presence of the nonwoven web in a dryer; and

e. combinations thereof.

Claim 40 (Currently amended) A nonwoven web comprising a plurality of inter-entangled filaments at least one of the filaments comprising one or more filament-forming materials comprising a hydroxyl polymer and one or more active agents that are releasable and/or released from the filament when the filament's morphology changes, wherein the total level of the filament-forming materials present in the filament is less than 65% by weight on a dry filament basis and the total level of the active agents present in the filament is greater than 35% by weight on a dry filament basis, wherein the active agents comprise one or more surfactants, one or more enzymes, and one or more perfumes.

Claim 41 (Previously presented) The nonwoven web according to Claim 40 wherein the filament further comprises a suds suppressor.

Claims 42-43 (Cancelled)

REMARKS

Claim Status

Claims 1 and 40 have been amended to define the claimed invention with greater specificity by reciting a nonwoven web comprising a plurality of inter-entangled filaments at least one of the filaments comprising one or more filament-forming materials comprising a hydroxyl polymer and one or more active agents. Support for these amendments is found throughout the Specification for example at Page 15, line 26 to Page 16, line 3, the Drawings, and in the Claims as originally filed.

Claims 1-6, 8, 11-25, 31, 33, and 40-41 (Claims 9-10 and 34-39 stand withdrawn) are pending in the present application. No additional claims fee is believed to be due.

It is believed these changes do not involve any introduction of new matter. Consequently, entry of these changes is believed to be in order and is respectfully requested.

Rejection Under 35 USC §102(b) as being anticipated by U.S. Patent Publication No. 2003/0185872

Claims 1, 2, 4-6, 11, 18, 20, and 24 are rejected by the Examiner under 35 USC §102(b) as allegedly being anticipated by U.S. Patent Publication No. 2003/0185872 to Kochinke ("Kochinke"). The Examiner asserts that Kochinke discloses a filament comprising one or more filament-forming materials and one or more active agents. The Examiner asserts that Kochinke teaches an extruded filament comprising 70% active agent and 30% inactive polymer in Kochinke's Example 16.

Applicants respectfully submit that Kochinke fails to teach each and every element of Claim 1, the independent claim, as amended, because Kochinke fails to teach a nonwoven web, let alone a nonwoven web comprising a plurality of inter-entangled filaments at least one of the filaments comprising one or more filament-forming materials comprising a hydroxyl polymer and one or more active agents that are releasable from the filament when the filament's morphology changes, wherein the total level of the one or more filament-forming materials present in the filament is less than 65% by weight on a dry filament basis and the total level of the one or more active agents present in the

filament is greater than 35% by weight on a dry filament basis. The Examiner refers to Kochinke's Examples, in particular, Examples 16 and 17, which each teach an extruded filament that is cut into sub-units, not a nonwoven web formed of inter-entangled filaments, nor do they teach a filament comprising a hydroxyl polymer. Accordingly, Applicants submit that Claim 1, as amended, is not anticipated by Kochinke. Further, Applicants submit that Claims 2, 4-6, 11, 18, 20, and 24, which ultimately depend from Claim 1, as amended, are not anticipated by Kochinke.

Rejection Under 35 USC §103(a) Over U.S. Patent Publication No. 2003/0185872

Claims 3, 8, 12, 13, 17, 19, 23, and 25 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Kochinke, discussed above.

Applicants respectfully submit that Kochinke fails to teach each and every element of Claim 1, the independent claim, as amended, because Kochinke fails to teach a nonwoven web comprising a plurality of inter-entangled filaments at least one of the filaments comprising one or more filament-forming materials comprising a hydroxyl polymer and one or more active agents that are releasable from the filament when the filament's morphology changes, wherein the total level of the one or more filament-forming materials present in the filament is less than 65% by weight on a dry filament basis and the total level of the one or more active agents present in the filament is greater than 35% by weight on a dry filament basis. The Examiner refers to Kochinke's Examples, in particular, Examples 16 and 17, which each teach an extruded filament that is cut into sub-units, not a nonwoven web formed of inter-entangled filaments, let alone a filament comprising a hydroxyl polymer. Further, the Examiner asserts that Kochinke teaches that its depot can be a flexible sheet form. Applicants respectfully submit that Kochinke never teaches that its "sheet" is or can be a nonwoven web of inter-entangled filaments. In fact, Applicants submit that Kochinke teaches that its "sheet-like" form, as described in Example 14 of Kochinke, is produced by extruding its polymer composition through a flat orifice, not producing filaments that are inter-entangled. The only references to filaments in Kochinke are as an intermediary, which are cut into sub-units, not inter-entangled to produce a nonwoven web. Accordingly, Applicants submit that Claim 1, as amended, is not rendered obvious over Kochinke. MPEP 2143.03. Further, Applicants submit that Claims 3, 8, 12, 13, 17, 19, 23, and 25, which ultimately depend from Claim 1, as amended, are not rendered obvious over Kochinke. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over U.S. Patent Publication No. 2003/0166495, in view of U.S. Patent No. 7,226,899

Claims 1-6, 12-16, 18, 19, 23-25, 31, 33, 40 and 41 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over U.S. Patent Publication No. 2003/0166495 to Wang, et al. ("Wang"), in view of U.S. Patent No. 7,226,899 to Cole, et al. ("Cole"). The Examiner asserts that Wang teaches liquid and solid fabric care compositions comprising a dispersible polyolefin wax, a surfactant, and a builder. The Examiner asserts that Cole teaches a fibrous matrix of detergent comprising fibers formed of a synthetic wax, a primary surfactant and a secondary surfactant.

Applicants respectfully submit that Wang in view of Cole fails to teach each and every element of Claims 1 and 40, the independent claims, as amended, because Wang in view of Cole fails to teach a nonwoven web comprising a plurality of inter-entangled filaments at least one of the filaments comprising one or more filament-forming materials comprising a hydroxyl polymer and one or more active agents that are releasable from the filament when the filament's morphology changes, wherein the total level of the one or more filament-forming materials present in the filament is less than 65% by weight on a dry filament basis and the total level of the one or more active agents present in the filament is greater than 35% by weight on a dry filament basis. Applicants respectfully submit and the Examiner appears to recognize that Wang clearly fails to teach filaments comprising a hydroxyl polymer filament-forming material and a nonwoven web made therefrom. The Examiner's reference to Wang's disclosure of modified cellulose, such as cellulose ethers, does not teach that the cellulose ethers are filament-forming materials. In fact, the Applicants call out cellulose ethers within the present application as active agents, such as conditioning agents and dietary fiber. Further, Applicants respectfully submit that Cole fails to overcome the deficiencies of Wang because Cole fails to teach filaments comprising hydroxyl polymer filament-forming materials and nonwoven webs comprising a plurality of inter-entangled filaments comprising hydroxyl polymer filament-forming materials. Accordingly, Applicants submit that Claims 1 and 40, as amended, are not rendered obvious over Wang in view of Cole. MPEP 2143.03. Further, Applicants submit that Claims 2-6, 12-16, 18-19, 23-25, 31, 33, and 41 (Claims 7 and 42 have been cancelled), as amended, which ultimately depend from Claim 1 or 40, as amended, are not rendered obvious over Wang in view of Cole. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over U.S. Patent Publication No. 2003/0166495, in view of U.S. Patent No. 7,226,899, and further in view of U.S. Patent No. RE39,557 E

Claim 8 is rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Wang, in view of Cole, both discussed above, and further in view of U.S. Patent No. RE39,557 to Moe, et al. ("Moe"). The Examiner asserts that Moe teaches a detergent composition comprising hexyl ether carboxymethyl cellulose as an anti-pilling and fuzz reduction agent.

Applicants respectfully submit that Claim 8, as amended, which depends from Claim 1, as amended, is not rendered obvious over Wang in view of Cole and further in view of Moe for the same reasons that Claim 1, as amended, is not rendered obvious over Wang in view of Cole. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over U.S. Patent Publication No. 2003/0166495, in view of U.S. Patent No. 7,226,899, and further in view of U.S. Patent Publication No. 2005/008776

Claims 17, and 20-22 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Wang, in view Cole, both discussed above, and further in view of U.S. Patent Publication No. 2005/008776 to Chhabra, et al. ("Chhabra").

Applicants respectfully submit that Claims 17 and 20-22, as amended, which depend from Claim 1, as amended, are not rendered obvious over Wang in view of Cole and further in view of Chhabra for the same reasons that Claim 1, as amended, is not rendered obvious over Wang in view of Cole. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, entry of the amendment(s) presented herein, reconsideration of this application, and allowance of the pending claim(s) are respectfully requested.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
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Date: October 14, 2013
Customer No. 27752

Amendment_Response_to_Office_Action.doc
Revised 10/25/2010

Electronic Acknowledgement Receipt

EFS ID:	19155025
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	29-MAY-2014
Filing Date:	10-JUL-2008
Time Stamp:	10:32:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_Amend_AF_AFC_Pilot_Prgm_Req_to_OA_Mailed_4-21-14.pdf	387360 4afacc5af88764123e53668c0b2c53c479aaec15	yes	24

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	10
	After Final Consideration Program Request	11	24
Warnings:			
Information:			
	Total Files Size (in bytes):	387360	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/170,575	Filing Date 07/10/2008	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **05/29/2014**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 18	Minus	** 23	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/MAMYE WAGSTAFF/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 04/21/2014

THE PROCTER & GAMBLE COMPANY
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EXAMINER	
TENTONI, LEO B	
ART UNIT	PAPER NUMBER
1742	

NOTIFICATION DATE	DELIVERY MODE
04/21/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

centraldocket.im@pg.com
mayer.jk@pg.com

Office Action Summary	Application No. 12/170,575	Applicant(s) BARNHOLTZ ET AL.	
	Examiner Leo B. Tentoni	Art Unit 1742	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5, 9 and 12-23* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5, 9 and 12-23* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *03202014*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 9, 12-14, 18 and 20-23 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Anderson et al (U.S. Patent 4,100,324 A) for the reasons of record.

Claim Rejections - 35 USC § 103

3. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions

covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

5. Claims 2-5 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Anderson et al (U.S. Patent 4,100,324 A) as applied to claims 1, 9, 12-14, 18 and 20-23 above, and further in view of Schwarz (U.S. Patent 5,476,616 A) for the reasons of record.

6. Claims 15-17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Anderson et al (U.S. Patent 4,100,324 A) as applied to claims 1, 9, 12-14, 18 and 20-23 above, and further in view of Zhou et al (WO 2005/065932 A1) for the reasons of record.

7. Claim 19 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Anderson et al (U.S. Patent 4,100,324 A) as applied to claims 1, 9, 12-14, 18 and 20-23 above, and further in view of Ouellette et al (U.S. Patent Application Publication 2007/0202766 A1) for the reasons of record.

Response to Arguments

8. Applicant's arguments filed on 20 March 2014 have been fully considered but they are not persuasive.

9. Applicant argues (pages 2 and 3) that Anderson et al does not teach the step of providing a dies including one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole. Examiner responds that Anderson et al does teach the step of providing a dies including one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament forming hole. Anderson et al teaches (see especially Figure 1) providing a die (11) including one or more filament-forming holes (col. 2, line 45, “at least one straight row of extrusion apertures"), wherein one or more fluid-releasing holes (nozzles 12 (below the row of apertures) and 13 (above the row of apertures)) are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of

a filament exiting the filament-forming hole (the fluid stream (10) is parallel to a longitudinal axis of the die; note also that fluid stream 14 is perpendicular to fluid stream 10 (col. 4, lines 18-20)).

10. Applicant argues (page 4) that Schwarz cannot be properly combined with Anderson et al (citing col. 2, lines 8-14 of Schwarz, wherein the spinning nozzles and rows of spinning nozzles are separated by a minimum distance to prevent interference between gas streams). Examiner responds that this argument is not commensurate with the scope of the pending claims because none of the pending claims recite any distance (e.g., minimum, maximum, average) separating any of the nozzles. Furthermore, the proposed modification of Anderson et al with Schwarz concerns the details of the filament-forming holes and of the fluid-releasing holes.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened

statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leo B. Tentoni whose telephone number is (571)272-1209. The examiner can normally be reached on Monday - Friday (6:30 A.M. - 3:00 P.M.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina A. Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leo B Tentoni/
Primary Examiner, Art Unit 1742

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	LEO B. TENTONI	1742

CPC- SEARCHED

Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
523	222	5/4/2009	Saeed M. Huda
264	210.8, 211.14	9/28/2009	Saeed M. Huda
425	72.2	9/28/2009	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	3/4/2010	Saeed M. Huda
425	66, 72.1, 224, 542, 461	3/4/2010	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	7/8/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	7/8/2013	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	11/12/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	11/12/2013	Saeed M. Huda
ABOVE	UPDATED	03/07/2014	LBT
264	112, 121, 131, 171.1, 510, 517, 518, 555	03/07/2014	LBT
ABOVE	UPDATED	04/16/2014	LBT

SEARCH NOTES

Search Notes	Date	Examiner
Searched Inventor and Assignee	5/4/2009	Saeed M. Huda
Reviewed Provisional Application	5/4/2009	Saeed M. Huda

INTERFERENCE SEARCH

/LEO B. TENTONI/ Examiner.Art Unit 1742	

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/LEO B. TENTONI/ Examiner.Art Unit 1742	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-5,254,133 B1	10-19-1993	Seid	
	2	US-2003/0024662	02-2003	Besemer, et al.	
	3	US-2005/0130544	06-16-2005	Cheng, et al.	
	4				
EXAMINER /Leo B. Tentoni/				DATE CONSIDERED 04/16/2014	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /LBT/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Leo B. Tentoni
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

REPLY AFTER 3rd OFFICE ACTION UNDER 37 C.F.R. § 1.112

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of March 13, 2014, consider the following remarks and reconsider the application.

Remarks begin on page 2 of this paper.

REMARKS

Claim Status

Claims 1-5, 9, and 12-23 are pending in the present application.

Rejection Under 35 USC §102(b) (Pre-AIA) as being anticipated by U.S. Patent No. 4,100,324

Claims 1, 9, 12-14, 18, and 20-23 are rejected by the Examiner under 35 USC §102(b) as allegedly being anticipated by U.S. Patent No. 4,100,324 to Anderson et al. ("Anderson"). The Examiner asserts that Anderson teaches a process of making a fibrous structure including the steps of (a) providing a die including one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole; supplying at least a first polymer comprising a polyolefin to the die; producing a plurality of filaments comprising the first polymer from the die; supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments; combining the filaments with solid additives to form a mixture; and collecting the mixture on a collection device to produce a fibrous structure.

Applicants respectfully submit that Anderson fails to teach each and every element of Claims 1 and 23, the independent claims, because Anderson fails to teach a die that includes one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole. Applicants respectfully submit that Anderson fails to teach a die that includes a filament-forming hole that is associated with one or more fluid-releasing holes such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole. Applicants submit that Anderson, as clearly shown in Fig. 1 and described in Col. 2, lines 38-44 of Anderson, teaches a die having a die head 11 from which a molten polymeric material is extruded (filament-forming holes) into fine streams of polymer which are then broken

into microfibers by converging flows of high velocity heated gas (usually air) supplied from nozzles 12 and 13 (fluid-releasing holes). Applicants submit that nowhere does Anderson teach or suggest that its die contains a filament-forming hole that is associated with one or more fluid-releasing holes such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole. Therefore, Applicants respectfully submit that Claims 1 and 23 are not anticipated by Anderson. Further, Applicants respectfully submit that Claims 9, 12-14, 18, and 20-22, which ultimately depend from Claim 1, are not anticipated by Anderson.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 4,100,324 in view of U.S. Patent No. 5,476,616

Claims 2-5 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Anderson, discussed above, in view of U.S. Patent No. 5,476,616 to Schwarz ("Schwarz"). The Examiner recognizes that Anderson does not explicitly teach the recited details in Claim 2-5. To overcome Anderson's deficiency, the Examiner attempts to combine the teachings of Schwarz with the teachings of Anderson.

Applicants respectfully submit that Anderson in view of Schwarz fails to teach each and every element of Claim 1, the independent claim, because Anderson in view of Scharwz fails to teach a die that includes one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole. Applicants respectfully submit that Anderson fails to teach a die that includes a filament-forming hole that is associated with one or more fluid-releasing holes such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole. Applicants submit that Anderson, as clearly shown in Fig. 1 and described in Col. 2, lines 38-44 of Anderson, teaches a die having a die head 11 from which a molten polymeric material is extruded (filament-forming holes) into fine streams of polymer which are then broken into microfibers by converging flows of high velocity heated gas (usually air) supplied from nozzles 12 and 13 (fluid-releasing holes).

Applicants submit that nowhere does Anderson teach or suggest that its die contains a filament-forming hole that is associated with one or more fluid-releasing holes such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole.

Further, Applicants respectfully submit that Schwarz cannot properly be combined with Anderson to render Claim 1 obvious because Schwarz teaches away from modifying Anderson's die as suggested by the Examiner. Applicants submit that Schwarz clearly teaches away its die using converging gas streams that converge onto a filament exiting a filament-forming hole as taught by Anderson because Schwarz's expressed purpose is to achieve uniform, high quality fiber formation by keeping its spinning nozzles and rows of spinning nozzles separated by a minimum distance so that the fiber attenuating gas stream of a nozzle did not interfere with its neighboring gas stream from another nozzle. Schwarz, Col. 2, lines 8-14. Applicants respectfully submit that if Anderson's die teachings were modified as suggested by the Examiner with Schwarz's teaching it would render Anderson's die inoperable for its intended purpose; namely to have converging gas streams converge upon polymer streams exiting its filament-forming holes to break the polymer streams into microfibers.

Therefore, Applicants respectfully submit that Claim 1 is not rendered obvious over Anderson in view of Schwarz. MPEP 2143.03. Further, Applicants respectfully submit that Claims 2-5, which ultimately depend from Claim 1, are not rendered obvious over Anderson in view of Schwarz. MPEP 2143.03.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 4,100,324 in view of WO 2005/065932

Claims 15-17 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Anderson, discussed above, in view of WO 2005/065932 to Zhou et al. ("Zhou"). The Examiner recognizes that Anderson does not explicitly teach the step of contacting a surface of the fibrous structure with a plurality of filaments of a second polymer. To overcome Anderson's deficiency, the Examiner attempts to combine the teachings of Zhou with the teachings of Anderson.

Applicants respectfully submit that Anderson in view of Zhou fails to teach each and every element of Claim 1, the independent claim, because Anderson in view of Zhou fails to teach a die that includes one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole as described above. Accordingly, Applicants respectfully submit that Claim 1 is not rendered obvious over Anderson in view of Zhou. MPEP 2143.03. Further, Applicants respectfully submit that Claims 15-17, which ultimately depend from Claim 1, are not rendered obvious over Anderson in view of Zhou. MPEP 2143.03.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 4,100,324 in view of U.S. Patent Application Publication No. 2007/0202766

Claims 19 is rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Anderson, discussed above, in view of U.S. Patent Application Publication No. 2007/0202766 to Ouellette et al. ("Ouellette"). The Examiner recognizes that Anderson does not explicitly teach that its fibrous structure exhibits a pore volume distribution as claimed in Claim 19. To overcome Anderson's deficiency, the Examiner attempts to combine the teachings of Ouellette with the teachings of Anderson.

Applicants respectfully submit that Anderson in view of Ouellette fails to teach each and every element of Claim 1, the independent claim, because Anderson in view of Ouellette fails to teach a die that includes one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole as described above. Accordingly, Applicants respectfully submit that Claim 1 is not rendered obvious over Anderson in view of Ouellette. MPEP 2143.03. Further, Applicants respectfully submit that Claim 19, which ultimately depends from Claim 1, is not rendered obvious over Anderson in view of Ouellette. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, Applicant(s) respectfully request(s) reconsideration of this application, and allowance of the pending claim(s).

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: March 20, 2014
Customer No. 27752

Amendment_Response_to_Office_Action.doc
Revised 02/09/2009

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, it is respectfully requested that the document(s) cited in this submission be carefully considered by the Examiner and made of record in this case. As provided in §1.97(g), no representation is made or intended that a thorough art search was made. As provided in 37 C.F.R. §1.97(h), this Information Disclosure Statement does not constitute an admission of any kind, and specifically is not an admission that the document(s) cited in this submission is (are), or is (are) considered to be, material to the patentability of the above-identified patent application, as defined in 37 C.F.R. §1.56(b).

This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(c). A final action under 37 C.F.R. §1.113, a notice of allowance under 37 C.F.R. §1.311, or an action that otherwise closes prosecution in the application (e.g., *Ex parte Quayle)* has not been received as of the date of this submission. I hereby elect to pay the fee set forth in 37 C.F.R. §1.17(p). Authorization is hereby given to charge the fee set forth in 37 C.F.R. §1.17(p) to Deposit Account Number 16-2480 in the name of The Procter & Gamble Company.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: March 20, 2014
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-5,254,133 B1	10-19-1993	Seid	
	2	US-2003/0024662	02-2003	Besemer, et al.	
	3	US-2005/0130544	06-16-2005	Cheng, et al.	
	4				
EXAMINER				**DATE CONSIDERED**	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	18532286
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	20-MAR-2014
Filing Date:	10-JUL-2008
Time Stamp:	11:15:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	10986
Deposit Account	162480
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_Amendment_Response_to_OA_Mailed_3-13-14_IDS_Supp_3-20-14.pdf	184734 27023e8395f59c59295c7bff4402bc09142f3f7f	yes	9

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment/Req. Reconsideration-After Non-Final Reject	1	6
Transmittal Letter	7	8
Information Disclosure Statement (IDS) Form (SB08)	9	9

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30510 4e03a49a586b091ea498d3834ded048e3c9fdf22	no	2

Warnings:

Information:

Total Files Size (in bytes):	215244

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 03/13/2014

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
TENTONI, LEO B	
ART UNIT	PAPER NUMBER
1742	

NOTIFICATION DATE	DELIVERY MODE
03/13/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

centraldocket.im@pg.com
mayer.jk@pg.com

Office Action Summary	Application No. 12/170,575	Applicant(s) BARNHOLTZ ET AL.	
	Examiner Leo B. Tentoni	Art Unit 1742	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 January 2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-5,9 and 12-23* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-5, 9 and 12-23* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The finality of the last Office action is withdrawn.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 9, 12-14, 18 and 20-23 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Anderson et al (U.S. Patent 4,100,324 A).

Anderson et al (see the entire document, in particular, col. 2, line 28 to col. 8, line 43; Figure 1) teaches a process (e.g., a melt-blowing process) of making a fibrous structure including the steps of (a) providing a die including one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with the one or more filament-forming holes such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole; (b) supplying at least a first polymer (e.g., a polyolefin, polyethylene or polypropylene) to the die; (c) producing a plurality of filaments of the first polymer from the die; (d) supplying a fluid (e.g., air) to the die such that the fluid exits the one or more fluid-releasing

holes parallel or substantially parallel to the exterior surface of the at least one of the filaments; (e) combining the filaments with solid additives (e.g., wood pulp fibers) to form a mixture; and (f) collecting the mixture on a collection device to produce a fibrous structure.

Claim Rejections - 35 USC § 103

4. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

6. Claims 2-5 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Anderson et al (U.S. Patent 4,100,324 A)

as applied to claims 1, 9, 12-14, 18 and 20-23 above, and further in view of Schwarz (U.S. Patent 5,476,616 A).

Anderson et al teaches a melt-blowing process for making a fibrous structure, but Anderson et al does not explicitly teach the recited details of the filament-forming holes or of the fluid-releasing holes. Schwarz (see the entire document, in particular, col. 2, lines 15-52; Figures a, 2A and 2B) teaches a melt-blowing process (for making a fibrous structure) including the recited details of the filament-forming holes or of the fluid-releasing holes, and it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the details of the filament-forming holes and of the fluid-releasing holes of Schwarz in the process of Anderson et al in order to manufacture a desired fibrous structure by a melt-blowing process.

7. Claims 15-17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Anderson et al (U.S. Patent 4,100,324 A) as applied to claims 1, 9, 12-14, 18 and 20-23 above, and further in view of Zhou et al (WO 2005/065932 A1).

Anderson et al teaches a melt-blowing process for making a fibrous structure, but Anderson et al does not explicitly teach the step of contacting a surface of the fibrous structure with a plurality of filaments of a second polymer. Zhou et al (see the entire document, in particular, paragraphs [0006], [0043] and [0089]) teaches a melt-blowing process for making a fibrous structure including the step of contacting a surface of a fibrous

structure with a plurality of filaments of a second polymer, and it would have been obvious to one of ordinary skill in the art at the time the invention was made to contact a surface of a fibrous structure with a plurality of filaments of a second polymer in the process of Anderson et al in view of Zhou et al in order to manufacture a desired fibrous structure.

8. Claim 19 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Anderson et al (U.S. Patent 4,100,324 A) as applied to claims 1, 9, 12-14, 18 and 20-23 above, and further in view of Ouellette et al (U.S. Patent Application Publication 2007/0202766 A1).

Anderson et al teaches a melt-blowing process for making a fibrous structure, but Anderson et al does not explicitly teach that the fibrous structure exhibits a pore volume distribution such that greater than 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 µm to about 200 µm. Ouellette et al (see the entire document, in particular, the abstract; paragraph [0088]; Figures 4-6) teaches a melt-blowing process for making a fibrous structure wherein the fibrous structure exhibits a pore volume distribution such that at least 50% of the total pore volume present in the fibrous structure exists in pores of radii of from 110 µm to 250 µm, and it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a porous structure exhibiting a pore volume distribution such that greater than 40%

of the total pore volume present in the fibrous structure exists in pores of radii of from about 121 µm to about 200 µm in the process of Anderson et al in view of Ouellette et al in order to manufacture a desired fibrous structure.

Response to Arguments

9. Applicant's arguments with respect to claims 1-5, 9 and 12-23 have been considered but are moot because the arguments do not apply to the Anderson et al (U.S. Patent 4,100,324 A) or Ouellette et al (U.S. Patent Application Publication 2007/0202766 A1) references being used in the current rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leo B. Tentoni whose telephone number is (571)272-1209. The examiner can normally be reached on Monday - Friday (6:30 A.M. - 3:00 P.M.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina A. Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leo B Tentoni/
Primary Examiner, Art Unit 1742

Notice of References Cited	Application/Control No. 12/170,575	Applicant(s)/Patent Under Reexamination BARNHOLTZ ET AL.	
	Examiner Leo B. Tentoni	Art Unit 1742	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2007/0202766 A1	08-2007	Ouellette et al.	442/327
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Huda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

AMENDMENT AFTER FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.116

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of November 21, 2013, please amend the above-identified application as follows and consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

OK TO ENTER: /LBT/

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	LEO B. TENTONI	1742

CPC- SEARCHED

Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED

Symbol	Date	Examiner

US CLASSIFICATION SEARCHED

Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
523	222	5/4/2009	Saeed M. Huda
264	210.8, 211.14	9/28/2009	Saeed M. Huda
425	72.2	9/28/2009	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	3/4/2010	Saeed M. Huda
425	66, 72.1, 224, 542, 461	3/4/2010	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	7/8/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	7/8/2013	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	11/12/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	11/12/2013	Saeed M. Huda
ABOVE	UPDATED	03/07/2014	LBT
264	112, 121, 131, 171.1, 510, 517, 518, 555	03/07/2014	LBT

SEARCH NOTES

Search Notes	Date	Examiner
Searched Inventor and Assignee	5/4/2009	Saeed M. Huda
Reviewed Provisional Application	5/4/2009	Saeed M. Huda

INTERFERENCE SEARCH

/LEO B. TENTONI/ Examiner.Art Unit 1742	

US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/LEO B. TENTONI/ Examiner.Art Unit 1742	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
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AMENDMENT AFTER FINAL OFFICE ACTION UNDER 37 C.F.R. § 1.116

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of November 21, 2013, please amend the above-identified application as follows and consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended) A process for making a fibrous structure~~sanitary tissue product useful as a wiping implement~~, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying at least a first polymer comprising a polyolefin to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with solid additives to form a mixture; and

f. collecting the mixture on a collection device to produce a fibrous structure~~sanitary tissue product useful as a wiping implement~~.

Claim 2 (Original) The process according to Claim 1 wherein the die comprises two or more rows of filament-forming holes.

Claim 3 (Original) The process according to Claim 2 wherein at least one row of filament-forming holes comprises two or more filament-forming holes.

Claim 4 (Original) The process according to Claim 1 wherein more than one fluid-releasing hole are associated with a filament-forming hole.

Claim 5 (Original) The process according to Claim 1 wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole.

Claims 6-8 (Cancelled)

Claim 9 (Currently amended) The process according to Claim 1~~8~~ wherein the polyolefin comprises polypropylene.

Claims 10-11 (Cancelled)

Claim 12 (Original) The process according to Claim 1 wherein the solid additives comprise fibers.

Claim 13 (Original) The process according to Claim 12 wherein the fibers comprise wood pulp fibers.

Claim 14 (Original) The process according to Claim 1 wherein the solid additives are combined with the plurality of filaments by a solid additive spreader.

Claim 15 (Currently amended) The process according to Claim 1 wherein the process further comprises the step of:

g. contacting a surface of the fibrous structure~~sanitary tissue product~~ with a plurality of filaments comprising a second polymer.

Claim 16 (Previously presented) The process according to Claim 15 wherein the plurality of filaments comprising the second polymer are in the form of a fibrous structure.

Claim 17 (Original) The process according to Claim 15 wherein the second polymer is the same as the first polymer.

Claim 18 (Original) The process according to Claim 1 wherein the fluid released by the fluid-releasing holes comprises air.

Claim 19 (Currently amended) The process according to Claim 1 wherein the fibrous structure~~sanitary tissue product~~ exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure~~sanitary tissue product~~ exists in pores of radii of from about 121μm to about 200μm.

Claim 20 (Currently amended) The process according to Claim 1 wherein the process further comprises the step of subjecting the fibrous structure~~sanitary tissue product~~ to a thermal bonding operation.

Claim 21 (Original) The process according to Claim 1 wherein the process is directly coupled to a post-processing operation.

Claim 22 (Original) The process according to Claim 1 wherein the process is closely coupled to a post-processing operation.

Claim 23 (Currently amended) A process for making a fibrous structure~~sanitary tissue product useful as a wiping implement~~, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying a polyolefin polymer to the die;

c. producing a plurality of filaments comprising the polyolefin polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with wood pulp fibers to form a mixture; and

f. collecting the mixture on a collection device to produce a fibrous structure~~sanitary tissue product useful as a wiping implement~~.

REMARKS

Claim Status

Claims 1 and 23 have been amended to define the claimed invention with greater specificity by reciting that a fibrous structure is made from a first polymer comprising a polyolefin. Support for this amendment is found within the Specification, for example at page 5, lines 6-15.

Claims 9, 15, 19, and 20 have been amended to be consistent with Claim 1, as amended.

Claims 6-8 and 10-11 have been canceled without prejudice.

Claims 1-5, 9, and 12-23 are pending in the present application. No additional claims fee is believed to be due.

It is believed these changes do not involve any introduction of new matter. Consequently, entry of these changes is believed to be in order and is respectfully requested.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209

Claims 1-9, 12-14, 18-19, and 21-23 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over U.S. Patent No. 5,476,616 to Schwarz ("Schwarz") in view of EP 0 333 209 to Radwanski, et al. ("Radwanski"). The Examiner asserts that Schwarz teaches a process for making a fibrous structure comprising the steps of providing a die comprising spinning nozzles and fluid releasing holes associated with the spinning nozzles such that a fluid exiting the fluid releasing holes is parallel or substantially parallel to an exterior surface of a filament exiting the spinning nozzles and that the filaments are collected on a collection device to form a fibrous structure. The Examiner recognizes that Schwarz fails to teach that its process comprises the step of combining the filaments with solid additives to form a mixture. The Examiner attempts to overcome the deficiencies of Schwarz by combining the teachings of Radwanski with the teachings of Schwarz. The Examiner asserts that Radwanski

teaches a method of forming a nonwoven fibrous elastomeric web material useful in absorbent materials such as diapers, feminine napkins, and incontinent articles. The Examiner asserts that Radwanski teaches a process that comprises merging a secondary gas stream containing solid additives with a primary gas stream of elastic meltblown fibers. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to use the secondary gas stream containing solid additives of Radwanski in Schwarz's process to form a highly absorbent structure.

Applicants respectfully submit that Schwarz in view of Radwanski fails to teach each and every element of Claims 1 and 23, the independent claims, as amended, because Schwarz in view of Radwanski fails to teach a process for making a fibrous structure from a polyolefin as claimed in Claims 1 and 23, as amended. Applicants respectfully submit that Radwanski teaches a process for making elastomeric absorbents using elastomeric polymers, for example polyolefin rubbers, for example polypropylene rubber, which is not a polyolefin as claimed and described in the present invention. Schwarz teaches making nonwoven fiber mats out of polypropylene, a polyolefin. Applicants respectfully submit that there is no teaching, suggestion, or motivation to combine Radwanski's teachings with Schwarz's teachings since the materials they are spinning are totally different. Applicants further submit that even if Radwanski and Schwarz could properly be combined based on materials, the fact that Radwanski's secondary gas stream, which contains pulp fibers, mixes with its primary gas stream, which contains its broken fibers, it does so under turbulent conditions as evidenced by Radwanski's reference to U.S. Patent No. 4,100,324. Radwanski, Page 2, lines 25-30, and Page 10, lines 7-11.

Applicants submit that Schwarz clearly teaches a process for making a nonwoven mat of fibers. Further, Applicants submit that Schwarz teaches making a nonwoven mat of uniform and high quality fiber formation. Nowhere does Schwarz even suggest adding another stream of gas least alone a stream of gas that contains pulp fibers, to its stream of fibers. Therefore, Applicants submit that clearly Schwarz does not suggest adding Radwanski's secondary gas stream comprising pulp fibers to Schwarz's polypropylene fibers because to do so under turbulent conditions as described in Radwanski would interfere with Schwarz's expressed intended function of making a uniform and high quality fiber formation. Applicants submit that Schwarz clearly teaches away from

merging a gas stream containing solid additives with its stream of filaments since Schwarz's expressed purpose is to achieve uniform, high quality fiber formation by keeping its spinning nozzles and rows of spinning nozzles separated by a minimum distance so that the fiber attenuating gas stream of a nozzle did not interfere with its neighboring gas stream from another nozzle. Schwarz, Col. 2, lines 8-14. Applicants submit that if Radwanski's step of merging a secondary gas stream containing solid additives was added to Schwarz's process, it would render Schwarz's teaching inoperable for its intended purpose. Accordingly, Applicants respectfully submit that the teachings of Schwarz and Radwanski cannot properly be combined to render the claimed invention as claimed in Claims 1 and 23, as amended, obvious.

In light of the foregoing, Applicants submit that Claims 1 and 23, as amended, are not rendered obvious over Schwarz in view of Radwanski. MPEP 2143.03. Further, Applicants submit that Claims 2-5, 9, 12-14, 18-19, and 21-22 (Claims 6-8 have been cancelled), as amended, which ultimately depend from Claim 1, as amended, are not rendered obvious over Schwarz in view of Radwanski. MPEP 2143.03.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209 and further in view of U.S. Patent No. 6,506,873

Claims 10-11 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Schwarz in view of Radwanski, both discussed above, and further in view of U.S. Patent No. 6,506,873 to Ryan, et al. ("Ryan").

Applicants respectfully submit that this rejection in moot in light of the cancellation Claims 10-11.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209 and further in view of WO 2005/065932

Claims 15-17 and 20 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Schwarz in view of Radwanski, both discussed above, and further in view of WO 2005/065932 to Zhou, et al. ("Zhou").

Applicants respectfully submit that Claims 15-17 and 20, as amended, which ultimately depend from Claim 1, as amended, are not rendered obvious over Schwarz in view of Radwanski and further in view of Zhou. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, Applicant(s) respectfully request(s) entry of the amendment(s) presented herein, reconsideration of this application, and allowance of the pending claim(s).

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: January 21, 2014
Customer No. 27752

Amendment_Response_to_Office_Action.doc
Revised 02/09/2009

Electronic Acknowledgement Receipt

EFS ID:	17974914
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	21-JAN-2014
Filing Date:	10-JUL-2008
Time Stamp:	16:14:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response After Final Action	10859_Amendment_Response_to_OA_Final_Mailed_11-21-13.pdf	93058 bac5864b37ee9a4cccf930c0463590445174 8c37	no	9

Warnings:	
Information:	

Total Files Size (in bytes):	93058

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/170,575	Filing Date 07/10/2008	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☒ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	**310**
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	**310**

APPLICATION AS AMENDED – PART II

AMENDMENT	01/21/2014	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 18	Minus	** 23	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/TER JACKSON WOODRUFF/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 11/21/2013

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
HUDA, SAEED M	
ART UNIT	**PAPER NUMBER**
1742	

NOTIFICATION DATE	DELIVERY MODE
11/21/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

centraldocket.im@pg.com
mayer.jk@pg.com

Office Action Summary	Application No. 12/170,575	Applicant(s) BARNHOLTZ ET AL.	
	Examiner SAEED HUDA	Art Unit 1742	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/05/2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-23* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☐ Claim(s) _____ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/09/2013, 09/30/2013, 10/04/2013*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The response filed on 11/05/2013 has been fully considered and entered into the record. Claims 1 and 23 have been amended.

Support for Claim Amendments

2. Support for the amendments to claims 1 and 23 can be found on page 6, lines 1-4.

Claim Interpretation

3. Applicant has amended claim 1 to state that the product made is "useful as a wiping implement". The Examiner notes that such language is merely intended use.

A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See In re Casey, 152 USPQ 235 (CCPA 1967) and In re Otto, 136 USPQ 458, 459 (CCPA 1963).

Since the prior art combination is capable of performing the intended use, it meets the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-9, 12-14, 18-19, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz (US 5476616) in view of Radwanski et al. (EP 0333209) and further in view of Fare (US 2001/0019931).

a. Regarding claims 1 and 23, Schwarz teaches a process for making a fibrous structure (abstract, claim 5), the process comprising the steps of:

- a. providing a die body 1 (die) comprising spinning nozzles 3 (filament-forming holes), wherein gas cavity 5 (fluid-releasing holes) are associated with spinning nozzles 3 (filament-forming holes) such that a fluid exiting the gas cavity 5 (fluid-releasing holes) is parallel or substantially parallel to an exterior surface of a filament exiting the spinning nozzles 3 (filament-forming holes) (column 2, lines 15-52, claim 5, figure 1, figure 2A, figure 2B);
- b. supplying polypropylene (first polymer) to the die body 1 (die) (column 2, lines 63-66)
- c. producing a plurality of filaments comprising the polypropylene (first polymer) from the die body 1 (die) (column 2, lines 53-67, claim 5, figure 1, figure 2A, figure 2B);
- d. supplying air (a fluid) to the die body 1 (die) such that the air (fluid) exits the gas cavity 5 (fluid-releasing holes) parallel or substantially parallel to the exterior surface of at least one of the

filaments (column 2, lines 15-52, claim 5, figure 1, figure 2A, figure 2B);

- f. collecting the mixture on a receiver (collection device) to produce a fibrous structure (claim 5)

Schwarz fails to teach

- e. combining the filaments with solid additives to form a mixture; and

Radwanski et al. teach a method of forming a nonwoven fibrous elastomeric web material (page 2, lines 3-5). Radwanski et al. disclose that the method of formation involve extruding a molten polymeric material through a die head into fine streams. The die head preferably includes at least one straight row of extrusion apertures (page 9, lines 34-43).

Radwanski et al. teach gas streams are used in the process and a primary gas stream 2 of elastic meltblown fibers is merged with a secondary gas stream 12 containing at least one of pulp fiber, staple fibers, meltblown fibers, and continuous filaments, with or without particulate material (solid additives) (page 9, lines 43-48, figure 1). Radwanski et al. teach the use of polypropylene material to make fibers (page 8, lines 54-55), which is the same material used in the invention of Schwarz (column 2, lines 53-67).

Radwanski et al. teach the formed product is used as feminine napkins and incontinence articles (page 2, lines 7-10) where it is

commonly known that polypropylene-based feminine napkins and incontinence articles are sanitary (Fare – [0007], [0026], claim 7)

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the secondary gas stream 12 containing solid additives, of Radwanski et al., in the invention of Schwarz as the solid additives combined with the fibrous structure will form a highly absorbent structure (page 12, lines 34-39).

b. Regarding claim 2, Schwarz in view of Radwanski et al. teach wherein the die body 1 (die) comprises two or more rows of filament-forming holes (Schwarz - figure 1, figure 2A, figure 2B)

c. Regarding claim 3, Schwarz in view of Radwanski et al. teach wherein at least one row of filament-forming holes comprises two or more filament-forming holes (Schwarz - figure 1, figure 2A, figu e 2B)

d. Regarding claim 4, Schwarz in view of Radwanski et al. teach wherein more than one fluid-releasing hole 19 and 20 are associated with a filament-forming hole (Schwarz – column 2, lines 44-46, figure 1).

e. Regarding claim 5, Schwarz in view of Radwanski et al. teach wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole (Schwarz - figure 1, figure 2A, figure 2B)

f. Regarding claims 6-9, Schwarz in view of Radwanski et al. teach wherein the first polymer comprises a polypropylene (a synthetic polyolefin polymer) (claim 5, figure 1, figure 2A, figure 2B);

g. Regarding claims 12-13, Schwarz in view of Radwanski et al. teach wherein the solid additives comprise pulp fibers such as Southern Pines (cellulosic material) (Radwanski et al. – page 8, lines 35-36, page 9, lines 43-48)

h. Regarding claim 14, Schwarz in view of Radwanski et al. teach wherein the solid additives are combined with the plurality of filaments by a nozzle or duct 20 (solid additive spreader) (Radwanski et al. - page 9, lines 48-56).

i. Regarding claim 18, Schwarz in view of Radwanski et al. teach wherein the fluid released by the gas cavity 5 (fluid-releasing holes) comprises air (Schwarz – column 2, lines 21-24).

j. Regarding claim 19, Schwarz in view of Radwanski et al. teach fail explicitly teach the pore volume distribution percentage or the pore radii.

The pore volume distribution related to the pore radii directly determines the fluid distribution, wetness control, absorbency, printability, and filtration of the fibrous structure (Radwanski et al. – page 11, lines 3-7).

Therefore this is a result effective variable. Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to determine the optimum pore volume distribution related to the pore radii to obtain the

desired fluid distribution, wetness control, absorbency, printability, and filtration of the fibrous structure.

k. Regarding claims 21-22, Schwarz in view of Radwanski et al. teach wherein the process is directly coupled to a bonding station (post-processing operation) (Radwanski et al. – page 10, lines 32-35).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the bonding station of Radwanski et al. in the invention of Schwarz as this will enhance the strength of the formed product (Radwanski et al. – page 10, lines 32-35).

6. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz (US 5476616) in view of Radwanski et al. (EP 0333209) and Fare (US 2001/0019931) as applied to claim 1 above, and further in view of Ryan et al. (US 6506873 B1).

Schwarz in view of Radwanski et al. and Fare fail to teach

- wherein the first polymer comprises a natural polymer

Ryan et al. teach a method to form a fibrous material (abstract) where the air stream (fluid) passage is positioned concentrically around the fibrous material 106 (figure 3).

Ryan et al. teach the use of polylactic acid to form the fibers (column 3, lines 55-60) where polylactic acid is made from corn starch or sugarcane.

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the polylactic acid fibers of Ryan et al. in the invention of Schwarz

in view of Radwanski et al. and Fare as polylactic acid fibers made from corn starch or sugarcane bases are biodegradable (Ryan et al. - column 5, lines 22-30).

7. Claims 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz (US 5476616) in view of Radwanski et al. (EP 0333209) as applied to claim 1 above, and further in view of Zhou et al. (WO 2005/065932).

a. Regarding claims 15-17, Schwarz in view of Radwanski et al. fail to teach that the surface of the fibrous structure is contacted with plurality of filaments of a second polymer.

Zhou et al. teach the production of a laminate (abstract) where an apparatus 20 extrudes filaments 13 directly onto a conveyor system and a melt blown layer, also of an elastomeric material is extruded from an adjacent bank 35 or 45, such that the meltblown fibers 36 or 46 are placed on top of the continuous filament 31. In one embodiment, the styrenic block copolymer or elastic polyolefin-based polymer composition is the same in both the filament and meltblown materials ([0089]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the second polymer of Zhou et al. in the invention of Schwarz in view of Radwanski et al. as this will form laminates that can used be used in consumer products and that will retain comfort for said materials (Zhou et al. – [0006]).

b. Regarding claim 20, Schwarz in view of Radwanski et al. and Zhou et al. teach wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation (Zhou et al. – [0043])

Response to Arguments

8. Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209

- Applicant states that Schwarz in view of Radwanski fails to teach each and every element of claims 1 and 23. Specifically, Applicant states that Schwarz in view of Radwanski fails to teach a process for making a sanitary tissue product useful as a wiping implement as claimed in claims 1 and 23, as amended.

The Examiner disagrees. As stated in the response, Radwanski teach making feminine napkins and incontinence articles, which are sanitary products (the Examiner has provided a supporting reference, Fare (US 2001/0019931), to demonstrate this fact).

- Applicant states that Schwarz teaches away from adding Radwanski's step of merging a secondary gas stream of solid additives to its stream of filaments since Schwarz's expressed purpose is to achieve a uniform, high quality fiber formation by keeping its spinning nozzles and rows of spinning nozzles separated by a minimum distance so that the fiber gas stream of a nozzle did not interfere with its neighboring gas stream (Schwarz – column 2, lines 8-14).

The Examiner disagrees. As noted in Radwanski, the primary stream is conveyed downwardly (page 9, lines 50-53) and the primary and secondary streams 2

and 12 are merging with each other, the velocity of the secondary stream 12 preferably being lower than that of the primary stream 2 so that the integrated stream 28 flows in the same direction as primary stream 2 (page 10, lines 7-9). Schwarz teaches supplying air (a fluid) to the die body 1 (die) such that the air (fluid) exits the gas cavity 5 (fluid-releasing holes) parallel or substantially parallel to the exterior surface of at least one of the filaments (column 2, lines 15-52, claim 5, figure 1, figure 2A, figure 2B). Thus, if the primary stream is conveyed downwardly in the invention of Radwanski, the multitude of streams in the invention of Schwarz would all be conveyed downwardly in such a manner that each stream would interfere with its neighboring gas stream.

- Applicant states even if the Examiner continues to assert that Radwanski's teachings can be properly combined with Schwarz's teachings to render the claimed invention obvious, Applicants respectfully submit that both Schwarz and Radwanski's teachings have been publicly available for a relatively long time and no one has combined their teachings as suggested by the Examiner.

The statement, in and of itself, is not sufficient to overcome or rebut the combination of Schwarz and Radwanski.

9. Rejection Under 35 USC § 103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209 and further in view of U.S. Patent No. 6,506,873

- Applicant states that claims 10-11, which ultimately depend from claim 1, as amended, are not rendered obvious over Schwarz in view of Radwanski and further in view of Ryan.

Applicant is asked to review the response to claim 1 above.

10. Rejection Under 35 USC § 103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209 and further in view of WO 2005/065932

- Applicants respectfully submit that claims 15-17 and 20, as amended, which ultimately depend from claim 1, as amended, are not rendered obvious over Schwarz in view of Radwanski and further in view of Zhou.

Applicant is asked to review the response to claim 1 above.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAEED HUDA whose telephone number is (571)270-5514. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571.272.1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SAEED M. HUDA/
Examiner, Art Unit 1742

/Matthew J. Daniels/
Primary Examiner, Art Unit 1742

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	SAEED M HUDA	1742

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
523	222	5/4/2009	Saeed M. Huda
264	210.8, 211.14	9/28/2009	Saeed M. Huda
425	72.2	9/28/2009	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	3/4/2010	Saeed M. Huda
425	66, 72.1, 224, 542, 461	3/4/2010	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	7/8/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	7/8/2013	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	11/12/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	11/12/2013	Saeed M. Huda

SEARCH NOTES		
Search Notes	Date	Examiner
Searched Inventor and Assignee	5/4/2009	Saeed M. Huda
Reviewed Provisional Application	5/4/2009	Saeed M. Huda

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/SAEED HUDA/ Examiner.Art Unit 1742	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
/SMH/	1	US-3,838,692	10-1974	Levesque	
/SMH/	2	US-5,087,506	02-1992	Palumbo	
/SMH/	3	US-5,509,915	04-1996	Hanson, et al.	
/SMH/	4	US-5,587,225	12-1996	Griesbach, et al.	
/SMH/	5	US-5,597,873	01-1997	Chambers, et al.	
/SMH/	6	US-2003/0135172	07-2003	Whitmore, et al.	
/SMH/	7	US-2004/0096656	05-2004	Bond	
EXAMINER	/Saeed M. Huda/			**DATE CONSIDERED** 11/12/2013	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	**Art Unit**
	SAEED M HUDA	1742

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/04/2009	09/25/2009	03/04/2010	07/08/2013	11/12/2013				
	1	✓	✓	✓	✓	✓				
	2	✓	✓	✓	✓	✓				
	3	✓	✓	✓	✓	✓				
	4	✓	✓	✓	✓	✓				
	5	✓	✓	✓	✓	✓				
	6	✓	✓	✓	✓	✓				
	7	✓	✓	✓	✓	✓				
	8	✓	✓	✓	✓	✓				
	9	✓	✓	✓	✓	✓				
	10	✓	✓	✓	✓	✓				
	11	✓	✓	✓	✓	✓				
	12	✓	✓	✓	✓	✓				
	13	✓	✓	✓	✓	✓				
	14	✓	✓	✓	✓	✓				
	15	✓	✓	✓	✓	✓				
	16	✓	✓	✓	✓	✓				
	17	✓	✓	✓	✓	✓				
	18	✓	✓	✓	✓	✓				
	19	✓	✓	✓	✓	✓				
	20	✓	✓	✓	✓	✓				
	21	✓	✓	✓	✓	✓				
	22	✓	✓	✓	✓	✓				
	23	✓	✓	✓	✓	✓				

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
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U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
/SMH/	1	US-2006/0088697	04-2006	Manifold, et al.	
EXAMINER	/Saeed M. Huda/			**DATE CONSIDERED** 11/12/2013	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
/SMH/	1	US-6,348,253 B1	02-19-2002	Daley, et al.	
/SMH/	2	US-7,410,683 B2	08-12-2008	Curro, et al.	
/SMH/	3	US-2004/0065422 A1	04-08-2004	Hu, et al.	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
/SMH/	4	EP 0 080 382 A1	11-24-1982	Kimberly-Clark Limited		
/SMH/	5	JP 08-174735 A	07-09-1996	Oji Paper	English Abstract	
/SMH/	6	JP 59-211667 A	11-30-1984	PGI	English Abstract	
/SMH/	7	JP 2004-141255 A	05-20-2004	Asahi Kasei Fibers	English Abstract	

EXAMINER	/Saeed M. Huda/	DATE CONSIDERED	11/12/2013

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Rev. 2/1909

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Huda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

AMENDMENT AFTER 1ST OFFICE ACTION UNDER 37 C.F.R. § 1.111(c)

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of August 7, 2013, please amend the above-identified application as follows and consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended) A process for making a ~~fibrous structure~~sanitary tissue product useful as a wiping implement, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying at least a first polymer to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with solid additives to form a mixture; and

f.~~.~~ collecting the mixture on a collection device to produce a ~~fibrous structure~~sanitary tissue product useful as a wiping implement.

Claim 2 (Original) The process according to Claim 1 wherein the die comprises two or more rows of filament-forming holes.

Claim 3 (Original) The process according to Claim 2 wherein at least one row of filament-forming holes comprises two or more filament-forming holes.

Claim 4 (Original) The process according to Claim 1 wherein more than one fluid-releasing hole are associated with a filament-forming hole.

Claim 5 (Original) The process according to Claim 1 wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole.

Claim 6 (Original)he process according to Claim 1 wherein the first polymer comprises a synthetic polymer.

Claim 7 (Original) The process according to Claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates, polycaprolactones and mixtures thereof.

Claim 8 (Original) The process according to Claim 7 wherein the synthetic polymer comprises a polyolefin.

Claim 9 (Original) The process according to Claim 8 wherein the polyolefin comprises polypropylene.

Claim 10 (Original) The process according to Claim 1 wherein the first polymer comprises a natural polymer.

Claim 11 (Original) The process according to Claim 10 wherein the natural polymer is selected from the group consisting of: starch, starch derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives and mixtures thereof.

Claim 12 (Original) The process according to Claim 1 wherein the solid additives comprise fibers.

Claim 13 (Original) The process according to Claim 12 wherein the fibers comprise wood pulp fibers.

Claim 14 (Original) The process according to Claim 1 wherein the solid additives are combined with the plurality of filaments by a solid additive spreader.

Claim 15 (Currently amended) The process according to Claim 1 wherein the process further comprises the step of:

g. contacting a surface of the ~~fibrous structure~~sanitary tissue product with a plurality of filaments comprising a second polymer.

Claim 16 (Currently amended) The process according to Claim 15 wherein the plurality of filaments comprising the second polymer are in the form of a ~~second~~ fibrous structure.

Claim 17 (Original) The process according to Claim 15 wherein the second polymer is the same as the first polymer.

Claim 18 (Original) The process according to Claim 1 wherein the fluid released by the fluid-releasing holes comprises air.

Claim 19 (Currently amended) The process according to Claim 1 wherein the ~~fibrous structure~~sanitary tissue product exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the ~~fibrous structure~~sanitary tissue product exists in pores of radii of from about 121μm to about 200μm.

Claim 20 (Currently amended) The process according to Claim 1 wherein the process further comprises the step of subjecting the ~~fibrous structure~~sanitary tissue product to a thermal bonding operation.

Claim 21 (Original) The process according to Claim 1 wherein the process is directly coupled to a post-processing operation.

Claim 22 (Original) The process according to Claim 1 wherein the process is closely coupled to a post-processing operation.

Claim 23 (Currently amended) A process for making a ~~fibrous structure~~sanitary tissue product useful as a wiping implement, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying a polyolefin polymer to the die;

c. producing a plurality of filaments comprising the polyolefin polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with wood pulp fibers to form a mixture; and

f. collecting the mixture on a collection device to produce a ~~fibrous structure~~sanitary tissue product useful as a wiping implement.

REMARKS

Claim Status

Claims 1 and 23 have been amended to define the claimed invention with greater specificity by reciting a process for making a sanitary tissue product useful as a wiping implement. Support for this amendment is found within the Specification, for example at page 6, lines 1-4.

Claims 15, 19, and 20 have been amended to be consistent with Claim 1, as amended.

Claim 16 has been amended to be consistent with Claim 15, as amended.

Claims 1-23 are pending in the present application. No additional claims fee is believed to be due.

It is believed these changes do not involve any introduction of new matter. Consequently, entry of these changes is believed to be in order and is respectfully requested.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209

Claims 1-9, 12-14, 18-19, and 21-23 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over U.S. Patent No. 5,476,616 to Schwarz ("Schwarz") in view of EP 0 333 209 to Radwanski, et al. ("Radwanski"). The Examiner asserts that Schwarz teaches a process for making a fibrous structure comprising the steps of providing a die comprising spinning nozzles and fluid releasing holes associated with the spinning nozzles such that a fluid exiting the fluid releasing holes is parallel or substantially parallel to an exterior surface of a filament exiting the spinning nozzles and that the filaments are collected on a collection device to form a fibrous structure. The Examiner recognizes that Schwarz fails to teach that its process comprises the step of combining the filaments with solid additives to form a mixture. The Examiner attempts to overcome the deficiencies of Schwarz by combining the teachings

of Radwanski with the teachings of Schwarz. The Examiner asserts that Radwanski teaches a method of forming a nonwoven fibrous elastomeric web material useful in absorbent materials such as diapers, feminine napkins, and incontinent articles. The Examiner asserts that Radwanski teaches a process that comprises merging a secondary gas stream containing solid additives with a primary gas stream of elastic meltblown fibers. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to use the secondary gas stream containing solid additives of Radwanski in Schwarz's process to form a highly absorbent structure.

Applicants respectfully submit that Schwarz in view of Radwanski fails to teach each and every element of Claims 1 and 23, the independent claims, as amended, because Schwarz in view of Radwanski fails to teach a process for making a sanitary tissue product useful as a wiping implement as claimed in Claims 1 and 23, as amended. Applicants respectfully submit that Radwanski teaches a process for making elastic absorbents for use as absorbent materials in diapers, feminine napkins, and incontinent articles, not sanitary tissue products useful as wiping implements. Further, Applicants respectfully submit that Schwarz teaches away from adding Radwanski's step of merging a secondary gas stream of solid additives to its stream of filaments. Applicants submit that Schwarz clearly teaches away from merging a gas stream containing solid additives with its stream of filaments since Schwarz's expressed purpose is to achieve uniform, high quality fiber formation by keeping its spinning nozzles and rows of spinning nozzles separated by a minimum distance so that the fiber attenuating gas stream of a nozzle did not interfere with its neighboring gas stream from another nozzle. Schwarz, Col. 2, lines 8-14. Applicants submit that if Radwanski's step of merging a secondary gas stream containing solid additives was added to Schwarz's process, it would render Schwarz's teaching inoperable for its intended purpose.

Further, even if the Examiner continues to assert that Radwanski's teachings can be properly combined with Schwarz's teachings to render the claimed invention obvious, Applicants respectfully submit that both Schwarz and Radwanski's teachings have been publicly available for a relatively long time and no one has combined their teachings as suggested by the Examiner. Accordingly, Applicants respectfully submit that the teachings of Schwarz and Radwanski cannot properly be combined to render the claimed invention as claimed in Claims 1 and 23, as amended, obvious.

In light of the foregoing, Applicants submit that Claims 1 and 23, as amended, are not rendered obvious over Schwarz in view of Radwanski. MPEP 2143.03. Further, Applicants submit that Claims 2-9, 12-14, 18-19, and 21-22, as amended, which ultimately depend from Claim 1, as amended, are not rendered obvious over Schwarz in view of Radwanski. MPEP 2143.03.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209 and further in view of U.S. Patent No. 6,506,873

Claims 10-11 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Schwarz in view of Radwanski, both discussed above, and further in view of U.S. Patent No. 6,506,873 to Ryan, et al. ("Ryan").

Applicants respectfully submit that Claims 10-11, which ultimately depend from Claim 1, as amended, are not rendered obvious over Schwarz in view of Radwanski and further in view of Ryan. MPEP 2143.03.

Rejection Under 35 USC §103(a) (Pre-AIA) Over U.S. Patent No. 5,476,616 in view of EP 333 209 and further in view of WO 2005/065932

Claims 15-17 and 20 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Schwarz in view of Radwanski, both discussed above, and further in view of WO 2005/065932 to Zhou, et al. ("Zhou").

Applicants respectfully submit that Claims 15-17 and 20, as amended, which ultimately depend from Claim 1, as amended, are not rendered obvious over Schwarz in view of Radwanski and further in view of Zhou. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, Applicant(s) respectfully request(s) entry of the amendment(s) presented herein, reconsideration of this application, and allowance of the pending claim(s).

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: November 5, 2013
Customer No. 27752

Amendment_Response_to_Office_Action.doc
Revised 02/09/2009

Electronic Acknowledgement Receipt

EFS ID:	17313150
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	05-NOV-2013
Filing Date:	10-JUL-2008
Time Stamp:	10:00:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	10859_Amendment_Response_to_OA_Mailed_8-7-13.pdf	105057 2a746c5e2142f0a08792e56dd016b4213ed98434	no	9

Warnings:	
Information:	

Total Files Size (in bytes):	105057

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/170,575	Filing Date 07/10/2008	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **11/05/2013**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 23	Minus	** 23	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/BURNELL L. ROSS/

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-3,838,692	10-1974	Levesque	
	2	US-5,087,506	02-1992	Palumbo	
	3	US-5,509,915	04-1996	Hanson, et al.	
	4	US-5,587,225	12-1996	Griesbach, et al.	
	5	US-5,597,873	01-1997	Chambers, et al.	
	6	US-2003/0135172	07-2003	Whitmore, et al.	
	7	US-2004/0096656	05-2004	Bond	
EXAMINER				**DATE CONSIDERED**	

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[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	17043270
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	04-OCT-2013
Filing Date:	10-JUL-2008
Time Stamp:	14:42:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	1065
Deposit Account	162480
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS_Supp_10-4-13.pdf	159505 e989931f6d86f066f0d0bf6c02f77e6ea0f0c51b	yes	3

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal Letter	1	2
Information Disclosure Statement (IDS) Form (SB08)	3	3

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30510 4f5b4bbd6232243417c754fbd825dfd6bf696fc2	no	2

Warnings:

Information:

Total Files Size (in bytes):	190015

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New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, it is respectfully requested that the document(s) cited in this submission be carefully considered by the Examiner and made of record in this case. As provided in §1.97(g), no representation is made or intended that a thorough art search was made. As provided in 37 C.F.R. §1.97(h), this Information Disclosure Statement does not constitute an admission of any kind, and specifically is not an admission that the document(s) cited in this submission is (are), or is (are) considered to be, material to the patentability of the above-identified patent application, as defined in 37 C.F.R. §1.56(b).

This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(c). A final action under 37 C.F.R. §1.113, a notice of allowance under 37 C.F.R. §1.311, or an action that otherwise closes prosecution in the application (e.g., *Ex parte Quayle)* has not been received as of the date of this submission. I hereby elect to pay the fee set forth in 37 C.F.R. §1.17(p). Authorization is hereby given to charge the fee set forth in 37 C.F.R. §1.17(p) to Deposit Account Number 16-2480 in the name of The Procter & Gamble Company.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: October 4, 2013
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-6,348,253 B1	02-19-2002	Daley, et al.	
	2	US-7,410,683 B2	08-12-2008	Curro, et al.	
	3	US-2004/0065422 A1	04-08-2004	Hu, et al.	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	4	EP 0 080 382 A1	11-24-1982	Kimberly-Clark Limited		
	5	JP 08-174735 A	07-09-1996	Oji Paper	English Abstract	
	6	JP 59-211667 A	11-30-1984	PGI	English Abstract	
	7	JP 2004-141255 A	05-20-2004	Asahi Kasei Fibers	English Abstract	

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	16993725
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	30-SEP-2013
Filing Date:	10-JUL-2008
Time Stamp:	15:13:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	5245
Deposit Account	162480
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS_Supp_9-30-13.pdf	163199 7d9685907d56d4a5e11b34510de7b3ecb6a079b8	yes	3
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Form (SB08)		3	3	
Warnings:					
Information:					
2	Foreign Reference	EP80382A2.pdf	1738681 1eb74342fdafe2f51dfd7b7e4aaa4c1c73ec4d80	no	40
Warnings:					
Information:					
3	Foreign Reference	JP08017435A_Eng_Abs.pdf	63239 72f48c417674652c1aad3f0466854d7f9762cc1b	no	1
Warnings:					
Information:					
4	Foreign Reference	JP59211667A_Eng_Abs.pdf	40716 a58fdc1db9405bc63788e30f619054d2d770b756	no	1
Warnings:					
Information:					
5	Foreign Reference	JP2004141255A_Eng_Abs.pdf	48418 3cba467f92f8723f7e072dbe459a4525b9bc6330	no	1
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	30510 bbb4ace776da04da00b3d9e16791df952da9cf23	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2084763		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

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Additional Items to be Noted by the Examiner

In accordance with 37 C.F.R. §1.98(a)(2), a foreign patent document and/or non-patent literature is provided.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: September 30, 2013
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-2006/0088697	04-2006	Manifold, et al.	
EXAMINER				**DATE CONSIDERED**	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	16545077
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	09-AUG-2013
Filing Date:	10-JUL-2008
Time Stamp:	09:54:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	7886
Deposit Account	162480
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS_Supp_8-9-13.pdf	141994 7b8afbec68a0eb174317148d5469b033c4286699	yes	3

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Transmittal Letter	1	2
Information Disclosure Statement (IDS) Form (SB08)	3	3

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30509 b21dd1c19ac820d1f01c21aca48b91c38d1c16ce	no	2

Warnings:

Information:

Total Files Size (in bytes):	172503

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

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New International Application Filed with the USPTO as a Receiving Office

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(c). A final action under 37 C.F.R. §1.113, a notice of allowance under 37 C.F.R. §1.311, or an action that otherwise closes prosecution in the application (e.g., *Ex parte Quayle)* has not been received as of the date of this submission. I hereby elect to pay the fee set forth in 37 C.F.R. §1.17(p). Authorization is hereby given to charge the fee set forth in 37 C.F.R. §1.17(p) to Deposit Account Number 16-2480 in the name of The Procter & Gamble Company.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: August 9, 2013
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 08/07/2013

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
HUDA, SAEED M	
ART UNIT	**PAPER NUMBER**
1742	

NOTIFICATION DATE	DELIVERY MODE
08/07/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

centraldocket.im@pg.com
mayer.jk@pg.com

Office Action Summary	Application No. 12/170,575	Applicant(s) BARNHOLTZ ET AL.	
	Examiner SAEED HUDA	Art Unit 1742	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 June 2010*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-23* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-23* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Interim copies:

a)☐ All b)☐ Some c)☐ None of the: Interim copies of the priority documents have been received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01/31/2012, 05/31/2012, 06/11/2013*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/10/2010 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-9, 12-14, 18-19, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz (US 5476616) in view of Radwanski et al. (EP 0333209).

a. Regarding claims 1 and 23, Schwarz teaches a process for making a fibrous structure (abstract, claim 5), the process comprising the steps of:

- a. providing a die body 1 (die) comprising spinning nozzles 3 (filament-forming holes), wherein gas cavity 5 (fluid-releasing holes) are associated with spinning nozzles 3 (filament-forming holes) such that a fluid exiting the gas cavity 5 (fluid-releasing holes) is

parallel or substantially parallel to an exterior surface of a filament exiting the spinning nozzles 3 (filament-forming holes) (column 2, lines 15-52, claim 5, figure 1, figure 2A, figure 2B);

- b. supplying polypropylene (first polymer) to the die body 1 (die) (column 2, lines 63-66)
- c. producing a plurality of filaments comprising the polypropylene (first polymer) from the die body 1 (die) (claim 5, figure 1, figure 2A, figure 2B);
- d. supplying air (a fluid) to the die body 1 (die) such that the air (fluid) exits the gas cavity 5 (fluid-releasing holes) parallel or substantially parallel to the exterior surface of at least one of the filaments (column 2, lines 15-52, claim 5, figure 1, figure 2A, figure 2B);
- f. collecting the mixture on a receiver (collection device) to produce a fibrous structure (claim 5)

Schwarz fails to teach

- e. combining the filaments with solid additives to form a mixture; and

Radwanski et al. teach a method of forming a nonwoven fibrous elastomeric web material (page 2, lines 3-5). Radwanski et al. disclose that the method of formation involve extruding a molten polymeric material

through a die head into fine streams. The die head preferably includes at least one straight row of extrusion apertures (page 9, lines 34-43).

Radwanski et al. teach gas streams are used in the process and a primary gas stream 2 of elastic meltblown fibers is merged with a secondary gas stream 12 containing at least one of pulp fiber, staple fibers, meltblown fibers, and continuous filaments, with or without particulate material (solid additives) (page 9, lines 43-48, figure 1).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the secondary gas stream 12 containing solid additives, of Radwanski et al., in the invention of Schwarz as the solid additives combined with the fibrous structure will form a highly absorbent structure (page 12, lines 34-39).

b. Regarding claim 2, Schwarz in view of Radwanski et al. teach wherein the die body 1 (die) comprises two or more rows of filament-forming holes (Schwarz - figure 1, figure 2A, figure 2B)

c. Regarding claim 3, Schwarz in view of Radwanski et al. teach wherein at least one row of filament-forming holes comprises two or more filament-forming holes (Schwarz - figure 1, figure 2A, figu e 2B)

d. Regarding claim 4, Schwarz in view of Radwanski et al. teach wherein more than one fluid-releasing hole 19 and 20 are associated with a filament-forming hole (Schwarz – column 2, lines 44-46, figure 1).

e. Regarding claim 5, Schwarz in view of Radwanski et al. teach wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole (Schwarz - figure 1, figure 2A, figure 2B)

f. Regarding claims 6-9, Schwarz in view of Radwanski et al. teach wherein the first polymer comprises a polypropylene (a synthetic polyolefin polymer) (claim 5, figure 1, figure 2A, figure 2B);

g. Regarding claims 12-13, Schwarz in view of Radwanski et al. teach wherein the solid additives comprise pulp fibers such as Southern Pines (cellulosic material) (Radwanski et al. – page 8, lines 35-36, page 9, lines 43-48)

h. Regarding claim 14, Schwarz in view of Radwanski et al. teach wherein the solid additives are combined with the plurality of filaments by a nozzle or duct 20 (solid additive spreader) (Radwanski et al. - page 9, lines 48-56).

i. Regarding claim 18, Schwarz in view of Radwanski et al. teach wherein the fluid released by the gas cavity 5 (fluid-releasing holes) comprises air (Schwarz – column 2, lines 21-24).

j. Regarding claim 19, Schwarz in view of Radwanski et al. teach fail explicitly teach the pore volume distribution percentage or the pore radii.

The pore volume distribution related to the pore radii directly determines the fluid distribution, wetness control, absorbency, printability,

and filtration of the fibrous structure (Radwanski et al. – page 11, lines 3-7).

Therefore this is a result effective variable. Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to determine the optimum pore volume distribution related to the pore radii to obtain the desired fluid distribution, wetness control, absorbency, printability, and filtration of the fibrous structure.

k. Regarding claims 21-22, Schwarz in view of Radwanski et al. teach wherein the process is directly coupled to a bonding station (post-processing operation) (Radwanski et al. – page 10, lines 32-35).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the bonding station of Radwanski et al. in the invention of Schwarz as this will enhance the strength of the formed product (Radwanski et al. – page 10, lines 32-35).

4. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz (US 5476616) in view of Radwanski et al. (EP 0333209) as applied to claim 1 above, and further in view of Ryan et al. (US 6506873 B1).

Schwarz in view of Radwanski et al. fail to teach

- wherein the first polymer comprises a natural polymer

Ryan et al. teach a method to form a fibrous material (abstract) where the air stream (fluid) passage is positioned concentrically around the fibrous material 106 (figure 3).

Ryan et al. teach the use of polylactic acid to form the fibers (column 3, lines 55-60) where polylactic acid is made from corn starch or sugarcane.

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the polylactic acid fibers of Ryan et al. in the invention of Schwarz in view of Radwanski et al. as polylactic acid fibers made from corn starch or sugarcane bases are biodegradable (Ryan et al. - column 5, lines 22-30).

5. Claims 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwarz (US 5476616) in view of Radwanski et al. (EP 0333209) as applied to claim 1 above, and further in view of Zhou et al. (WO 2005/065932).

a. Regarding claims 15-17, Schwarz in view of Radwanski et al. fail to teach that the surface of the fibrous structure is contacted with plurality of filaments of a second polymer.

Zhou et al. teach the production of a laminate (abstract) where an apparatus 20 extrudes filaments 13 directly onto a conveyor system and a melt blown layer, also of an elastomeric material is extruded from an adjacent bank 35 or 45, such that the meltblown fibers 36 or 46 are placed on top of the continuous filament 31. In one embodiment, the styrenic block copolymer or elastic polyolefin-based polymer composition is the same in both the filament and meltblown materials ([0089]).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use the second polymer of Zhou et al. in the invention of Schwarz in view of Radwanski et al. as this will form laminates that can used be used in consumer products and that will retain comfort for said materials (Zhou et al. – [0006]).

b. Regarding claim 20, Schwarz in view of Radwanski et al. and Zhou et al. teach wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation (Zhou et al. – [0043])

Support for Claim Amendment

6. Claims 1 and 23 have been amended to state: "supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments"

Support for the above claim language can be found in page 2, lines 12-15 and page 17, lines 15-22 – page 18, lines 1-2 of the specification.

Response to Arguments

7. Rejection Under 35 USC § 103(a) Over EP 333 209 in view of US 5476616

- Applicant states Radwanski in view of Schwarz fails to teach its air streams exits is nozzles 8 and 10 parallel or substantially parallel to the exterior surface of its filament and that the high velocity air streams delivered by nozzles 8 and 10 of Radwanski's figure 1 exit nozzle 8 and 10 at an angle, not parallel or substantially parallel to the exterior surface of its filament that is product by its filament-forming hole. Specifically, Applicant states that Radwanski teach that heated gas (usually air) supplied from

nozzles 8 and 10 break the polymer streams into fibers of relatively small diameter (page 9, lines 40-42) and that modifying the converging flow of Radwanski with the parallel flows taught by Schawrz would render Radwanski inoperable, namely, "to break the polymer streams into fibers."

The Examiner has provided a newly formulated rejection. Thus, the above arguments are moot.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAEED HUDA whose telephone number is (571)270-5514. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571.272.1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SAEED M. HUDA/
Examiner, Art Unit 1742
/Christina Johnson/
Supervisory Patent Examiner, Art Unit 1742

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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SHEET 1 of 2

COMPLETE IF KNOWN	
Application Number	12/170,575
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First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

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EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
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	Group Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 2 of 2	Docket Number	10859

NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Provide relevant information to identify the Non-Patent Literature being submitted (e.g., name of the author (in CAPITAL LETTERS), title of the article, title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published, related application serial number, filing date and brief description of the papers being submitted).	T[2]
	18	All Office Actions in U.S. Patent Application Serial Nos. 13/106,302, 12/170,578, 12/170,575, 12/170,557, 12/917,535, 12/917,547, 12/917,558, 12/917,574, 12/917,585, and 13/076,492 are available on Private Pair. (P&G Cases 10857C, 10858, 10859, 11002, 11476, 11477, 11478, 11479, 11480, and 11672M, respectively)	

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	SAEED M HUDA	1791

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
523	222	5/4/2009	Saeed M. Huda
264	210.8, 211.14	9/28/2009	Saeed M. Huda
425	72.2	9/28/2009	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	3/4/2010	Saeed M. Huda
425	66, 72.1, 224, 542, 461	3/4/2010	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	7/8/2013	Saeed M. Huda
425	66, 72.1, 224, 542, 461	7/8/2013	Saeed M. Huda

SEARCH NOTES		
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Searched Inventor and Assignee	5/4/2009	Saeed M. Huda
Reviewed Provisional Application	5/4/2009	Saeed M. Huda

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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EXAMINER				**DATE CONSIDERED**	

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[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Rev. 2/1909

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 4 of 7	Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	79	EP 0 308 320 A2	03-22-1989	James River Corp.		
	80	EP 0 333 209 B1	09-1989	Kimberly-Clark Corp.		
	81	EP 0423 619 A1	04-24-1991	Fiberweb North America		
	82	EP 1 132 427 A1	09-12-2001	Humarto Corporation		
	83	EP 0 156 649 A2	10-02-1985	Minnesota Mining & Manufacturing Co.		
	84	EP 0 205 242 B2	12-04-1991	Kimberly Clark Corp.		
	85	EP 2 028 296 A1	02-25-2009	Reifenhäuser GmbH & Co. KG Maschinenfabrik	English Abstract	
	86	EP 0 357 496 B1	05-18-1194	Colgate-Palmolive Co.		
	87	EP 0 590 307 B1	12-16-1998	Kimberly-ClarkWorldwide Inc.		
	88	EP 0 865 755 A1	09-23-1998	Uni Charm Corp.		
	89	EP 0 992 338 A2	04-12-2000	Fort James Paper Corp.		
	90	EP 1 300 511 A2	04-09-2003	Armstrong World Ind. Inc.		
	91	EP 1 156 147 A1	11-21-2001	Kang Na Hsiung Enterprise Co. Ltd.		
	92	EP 1 156 160 A2	10-02-1985	Kimberly Clark Ltd.		
	93	EP 1 504 145 B1	11-05-2008	Kimberly-ClarkWorldwide Inc.		
	94	EP 1 589 137 A1	10-26-2005	Teijin Fibers, Ltd.		
	95	JP 2000/303335 A2	10-31-2000	Humatro Corp.	English Abstract	
	96	JP 2002/088660 A	03-27-2002	Crecia Corp.	English Abstract	
	97	JP 2005/218525 A2	08-18-2005	Kao Corp.	English Abstract	

EXAMINER	DATE CONSIDERED

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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SHEET 5 of 7

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	98	WO 92/07985 A1	05-14-1992	Weyerhaeuser Company		
	99	WO 94/19179 A1	09-01-1994	The University of Tennessee Research Corporation		
	100	WO 97/37757 A1	10-16-1997	Kimberly-ClarkWorldwide Inc.		
	101	WO 98/03713 A1	01-29-1998	Kimberly Clark Co.		
	102	WO 98/27257 A2	06-25-1998	Kimberly-ClarkWorldwide Inc.		
	103	WO 98/36117 A1	08-20-1998	Kimberly-ClarkWorldwide Inc.		
	104	WO 98/55295 A1	12-10-1998	International Paper Co.		
	105	WO 00/21476	04-2000	Weyhaueser Co.		
	106	WO 00/29655 A1	05-25-2000	Kimberly-ClarkWorldwide Inc.		
	107	WO 00/38565 A1	07-06-2000	Kimberly Clark Co.		
	108	WO 01/66345 A1	09-13-2001	The Procter & Gamble Co.		
	109	WO 02/50357 A1	06-27-2002	M & J Fibretech A/S		
	110	WO 02/053003 A2	07-11-2002	Kimberly-ClarkWorldwide Inc.		
	111	WO 02/053365 A2	07-11-2002	Kimberly-ClarkWorldwide Inc.		
	112	WO2004/092474 A2	10-28-2004	Polymer Group, Inc.		
	113	WO 2005/065516 A2	07-21-2005	Kimberly-ClarkWorldwide Inc.		
	114	WO 2005/065932	07-2005	Kimberly-Clark Worldwide Inc.		
	115	WO 2005/073446 A1	08-11-2005	The Procter & Gamble Company		

EXAMINER	DATE CONSIDERED

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	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 6 of 7	Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	116	WO 2005/080497 A1	09-01-2005	Exxon-Mobil Chemical Patents, Inc.		
	117	WO 2005/118934 A1	12-15-2005	Dan-Web Holding A/S		
	118	WO 2006/060813 A1	06-08-2009	Procter & Gamble Co.		
	119	WO 2006/060815 A2	06-08-2009	Procter & Gamble Co.		
	120	WO 2006/060816 A1	06-08-2006	Procter & Gamble Co.		
	121	WO 2006/069120 A2	06-29-2006	Procter & Gamble Co.		
	122	WO 2007/092303 A2	08-16-2007	SNS Nano Fiber Technology LLC		
	123	WO 2008/073101 A1	06-19-2008	Kimberly-ClarkWorldwide Inc.		
	124	WO 2009/010938 A1	01-22-2009	The Procter & Gamble Co.		
	125	WO 2009/010939 A2	01-2-2009	The Procter & Gamble Co.		
	126	WO 2009/105490 A1	08-27-2009	Sellars Absorbent Materials, Inc.		
	127	WO 2011/019908 A1	02-17-2011	The Procter & Gamble Co.		
	128	WO 2011/053677 A1	05-05-2011	The Procter & Gamble Co.		
EXAMINER				DATE CONSIDERED		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Group Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 7 of 7	Docket Number	10859

NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Provide relevant information to identify the Non-Patent Literature being submitted (e.g., name of the author (in CAPITAL LETTERS), title of the article, title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published, related application serial number, filing date and brief description of the papers being submitted).	T[2]
	129	Anonymous, "NanoDispense® Contact Angle Measurements", *First Ten Angstroms*, (October 3, 2004). Retrieved from the Internet: URL: http://www.firsttenangstroms.com/pdfdocs/NanoDispenseExamples.pdf, (retrieved February 15, 2011) Entire document.	
	130	Meyer, et al., "Comparison between different presentations of pore size distribution in porous materials." Fresenius J. Anal Chem. 1999. 363: pp. 174-178	
	131	All Office Actions in U.S. Patent Application Serial Nos. 13/106,302, 12/170,578, 12/170,575, 12/170,557, 12/917,535, 12/917,547, 12/917,558, 12/917,574, 12/917,585, and 13/076,492 are available on Private Pair. (P&G Cases 10857C, 10858, 10859, 11002, 11476, 11477, 11478, 11479, 11480, and 11672M, respectively)	
EXAMINER /Saeed Huda/		DATE CONSIDERED 06/12/2013	

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Rev. 8/17/09

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.H./

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	**Art Unit**
	SAEED M HUDA	1742

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/04/2009	09/25/2009	03/04/2010	07/08/2013					
	1	✓	✓	✓	✓					
	2	✓	✓	✓	✓					
	3	✓	✓	✓	✓					
	4	✓	✓	✓	✓					
	5	✓	✓	✓	✓					
	6	✓	✓	✓	✓					
	7	✓	✓	✓	✓					
	8	✓	✓	✓	✓					
	9	✓	✓	✓	✓					
	10	✓	✓	✓	✓					
	11	✓	✓	✓	✓					
	12	✓	✓	✓	✓					
	13	✓	✓	✓	✓					
	14	✓	✓	✓	✓					
	15	✓	✓	✓	✓					
	16	✓	✓	✓	✓					
	17	✓	✓	✓	✓					
	18	✓	✓	✓	✓					
	19	✓	✓	✓	✓					
	20	✓	✓	✓	✓					
	21	✓	✓	✓	✓					
	22	✓	✓	✓	✓					
	23	✓	✓	✓	✓					

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

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	1	US-2,008,031	07-1931	Miller	
	2	US-5,272,236	12-1993	Lai, et al.	
	3	US-5,375,306	12-1994	Roussin-Moynier	
	4	US-6,179,325	01-2001	King	
	5	US-2005/0170727	08-2005	Melik, et al.	
	6	US-2007/0173162	07-2007	Ethiopia, et al.	
	7	US-2008/0051471	02-2008	Kronberg, et al.	

EXAMINER	DATE CONSIDERED

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Rev. 2/1909

Electronic Acknowledgement Receipt

EFS ID:	16005673
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	11-JUN-2013
Filing Date:	10-JUL-2008
Time Stamp:	14:29:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS_Supp_6-11-13.pdf	157411 bbc9c0393f01ecdf4d7ca518d8309bfd29f9edfe	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	2
	Information Disclosure Statement (IDS) Form (SB08)	3	3
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Information:			
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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, it is respectfully requested that the document(s) cited in this submission be carefully considered by the Examiner and made of record in this case. As provided in §1.97(g), no representation is made or intended that a thorough art search was made. As provided in 37 C.F.R. §1.97(h), this Information Disclosure Statement does not constitute an admission of any kind, and specifically is not an admission that the document(s) cited in this submission is (are), or is (are) considered to be, material to the patentability of the above-identified patent application, as defined in 37 C.F.R. §1.56(b).

This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(b)(4) together with a Request For Continued Examination and/or before a first Office Action after filing a Request For Continued Examination (RCE) has been received. Therefore, no fee is believed to be due. However, in the event that this paper is crossing in the mail with a first Office Action, authorization is hereby given to charge the required fee pursuant to 37 C.F.R. §1.97(c) and 37 C.F.R. §1.17(p) to Deposit Account No. 16-2480 in the name of The Procter & Gamble Company.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: June 11, 2013
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

STATUS INQUIRY

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

This application was originally filed on July 10, 2008 and an RCE was filed June 10, 2012. To date, no communication has been received from the Patent Office since May 19, 2010. Inquiry is hereby made again as to the status of this application.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: June 1, 2012
Customer No. 27752

Status_Inquiry.doc
Rev. 04/25/2006

Electronic Acknowledgement Receipt

EFS ID:	12913495
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
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Time Stamp:	14:04:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for status of Application	10859_Status_Inquiry_6-1-12.pdf	63729 4175c423ffa689e011e0bd18226ddc388d67d012	no	1

Warnings:	
Information:	

Total Files Size (in bytes):	63729

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New Applications Under 35 U.S.C. 111

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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SHEET 1 of 2

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	1	US-5,611,890	03-1997	Vinson, et al.	
	2	US-5,814,570	09-1998	Cohen	
	3	US-6,383,336	05-2002	Shannon	
	4	US-2005/0103455	05-2005	Edwards, et al.	
	5	US-2007/0232180 A1	10-2007	Polat, et al.	
	6	US-2007/0272381 A1	11-2007	Elony, et al.	
	7	US-2008/0008853 A1	01-2008	Hupp, et al.	
	8	US-2008/0041543 A1	02-2008	Dyer, et al.	
	9	US-2009/0220741 A1	09-2009	Manifold, et al.	
	10	US-2010/0239825 A1	09-2010	Sheehan, et al.	
	11	US-2010/0326612 A1	12-2010	Hupp, et al.	
	12	US-2011/0220310 A1	09-2011	Polat, et al.	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	13	EP 1 887 036 A2	02-2008	The Procter & Gamble Co.		
	14	WO 2008/005500 A2	01-2008	The Procter & Gamble Co.		
	15	WO 2008/050311 A2	05-2008	The Procter & Gamble Co.		
	16	WO 2009/010940 A2	01-2009	The Procter & Gamble Co.		
	17	WO 2009/010942 A2	01-2009	The Procter & Gamble Co.		
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NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Provide relevant information to identify the Non-Patent Literature being submitted (e.g., name of the author (in CAPITAL LETTERS), title of the article, title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published, related application serial number, filing date and brief description of the papers being submitted).	T[2]
	18	All Office Actions in U.S. Patent Application Serial Nos. 13/106,302, 12/170,578, 12/170,575, 12/170,557, 12/917,535, 12/917,547, 12/917,558, 12/917,574, 12/917,585, and 13/076,492 are available on Private Pair. (P&G Cases 10857C, 10858, 10859, 11002, 11476, 11477, 11478, 11479, 11480, and 11672M, respectively)	

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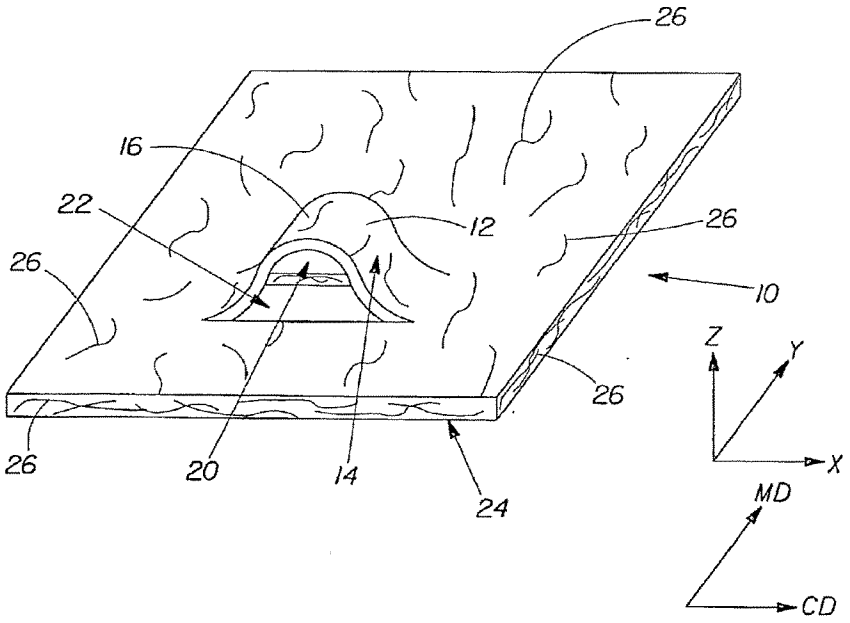
(54) Title: A WEB COMPRISING A TUFT



(57) Abstract: Webs, such as fibrous structures, having a tuft, sanitary tissue products employing same and methods for making same are provided. More particularly, webs, such as fibrous structures, having a tuft employing a non-extensible material, such as non-extensible fibers, sanitary tissue products employing same and methods for making same are provided.

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A WEB COMPRISING A TUFT

FIELD OF THE INVENTION

The present invention relates to webs, such as fibrous structures, comprising a tuft, sanitary tissue products comprising same and methods for making same. More particularly, the present invention relates to webs, such as fibrous structures, comprising a tuft comprising a non-extensible material, such as non-extensible fibers, sanitary tissue products comprising same and methods for making same.

BACKGROUND OF THE INVENTION

Webs, especially fibrous structures, comprising tufts are known in the art. Such fibrous structures utilize extensible fibers and/or films to form tufts within the fibrous structures. For example, in one prior art execution, polypropylene fibers are meltblown onto a cellulosic pulp fibrous structure and then subjected to a tuft generating process which pushes the polypropylene fibers through the cellulosic pulp fibers thereby creating a polypropylene fiber tuft (an extensible fiber tuft).

Formulators of such webs and/or fibrous structures apparently never believed that tufts could be formed out of a non-extensible material, especially non-extensible fibers. Some of their concerns included the non-extensible fibers breaking during the tuft generating process before a tuft could be formed. As a result, a web comprising a tuft comprising a non-extensible material, especially non-extensible fibers, has never before been achieved.

Since extensible fiber and/or film materials are typically thermoplastic polymers, the cost of such materials is significant for use in fibrous structures that are incorporated into sanitary tissue products, such as bath tissue, facial tissue and paper towels, in particular, thus making it difficult for sanitary tissue product manufacturers to utilize such thermoplastic polymers.

Accordingly, there has been a need for webs, especially fibrous structures, comprising a non-extensible material, especially non-extensible fibers, wherein the fibrous structure comprises a tuft comprising a non-extensible material, especially non-extensible fibers, sanitary tissue products comprising same and methods for making same.

SUMMARY OF THE INVENTION

The present invention fulfills the needs described above by providing a web, such as a fibrous structure, comprising a tuft comprising a non-extensible material, especially non-extensible fibers.

In one example of the present invention, a web, such as a fibrous structure, comprising a tuft comprising a non-extensible material, such as non-extensible fibers, is provided.

In another example of the present invention, a method for making a web according to the present invention, wherein the method comprises the steps of:

a. forming a web comprising a non-extensible material, such as non-extensible fibers;
b. imparting extensibility into the web, or at least a portion of the web, to form an extensible web or portion of the web, for example such that the web exhibits a stretch of less than 800% as measured by the Short Span Tensile Test Method; and
c. subjecting the extensible web or portion of the web to a tuft generating operation such that a tuft comprising a non-extensible material (for example non-extensible fibers) is formed in the web, is provided.

In yet another example of the present invention, a single- or multi-ply sanitary tissue product comprising a web according to the present invention is provided.

Accordingly, the present invention provides a web comprising a tuft comprising a non-extensible material, especially non-extensible fibers, a sanitary tissue product comprising such a web and a method for making such a web.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic representation of a fibrous structure in accordance with the present invention;

Fig. 2 is a perspective view of an apparatus for forming a fibrous structure according to the present invention;

Fig. 3 is a cross-sectional depiction of the apparatus shown in Fig. 2;

Fig. 4 is a perspective view of a portion of the apparatus of Fig. 2 for forming a fibrous structure of the present invention;

Fig. 5 is an enlarged perspective view of a portion of the apparatus of Fig. 4;

Fig. 6 is a schematic representation of a portion of a multi-ply fibrous structure according to the present invention;

Fig. 7 is a schematic representation of a portion of a multi-ply fibrous structure according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

"Web" as used herein means a substantially planar structure, for example a film and/or a fibrous structure. The web may comprise a surface comprising undulations. Such undulations may be formed by creping of the web and/or rush transferring of the web during the web-making process.

"Tuft," for purposes of this present invention only, means a region, in the form of a continuous loop, of the fibrous structure and/or sanitary tissue product that is extended from the fibrous structure and/or sanitary tissue product along or substantially along the z-axis ("z-axis" as used herein is commonly understood in the art to indicate an "out-of-plane" direction generally orthogonal to the x-y plane as shown in Fig. 1, for example). In one example, a tuft according to the present invention is a continuous loop that extends along the z-axis from the x-y plane of the fibrous structure and/or sanitary tissue product, wherein the tuft comprises a non-extensible material, such as non-extensible fibers. In another example, a tuft according to the present invention is a continuous loop that extends along the z-axis from the x-y plane of the fibrous structure and/or sanitary tissue product, wherein the tuft comprises at least 10% and/or at least 20% and/or at least 30% and/or at least 50% and/or 100% or less and/or 90% or less and/or 70% or less by weight of the total fibers present in the tuft of non-extensible fibers. In another example, the tuft comprises 100% by weight of total fibers present in the tuft of non-extensible fibers, in other words in this example, the tuft is made up entirely of non-extensible fibers.

The tuft may define an interior open or substantially open void area that is generally free of fibers. In other words, the tufts of the present invention may exhibit a "tunnel-like" structure, instead of a "tent-like" rib-like element that exhibits continuous side walls as is taught in the prior art. In one example, the tunnel is oriented in the MD of the fibrous structure. If the web comprises a surface having undulations that are oriented in the CD direction, then the tuft may be oriented perpendicular to such undulations. In another example, as a result of the tuft, a discontinuity is formed in the fibrous structure and/or sanitary tissue product in its x-y plane. A

"discontinuity" as used herein is an interruption along the side/surface of the fibrous structure and/or sanitary tissue product opposite the tuft. In other words, a discontinuity is a hole and/or recess and/or void on a side/surface of the fibrous structure that is created as a result of the formation of the tuft on the opposite side/surface of the fibrous structure and/or sanitary tissue product. In one example, a deformation in a surface of fibrous structure and/or sanitary tissue product such as a bulge, bump, loop or other protruding structure that extends from a surface of the fibrous structure and/or sanitary tissue product of the present invention.

In one example, the tufts of the fibrous structure of the present invention may increase the caliper (wet and/or dry) and/or bulk (wet and/or dry) of the fibrous structure and/or sanitary tissue product. For example, the tufts of the fibrous structure of the present invention may increase the caliper by at least about 10% and/or at least about 20% relative to the fibrous structure and/or sanitary tissue product prior to formation of the tufts.

In another example, the tufts may be oriented inward in a multi-ply fibrous product, they may be oriented outward on a multi-ply sanitary tissue product, and they may be oriented such that one ply has the tufts oriented inward and another ply has the tufts oriented outward in/on the multi-ply sanitary tissue product.

In yet another example, the tufted fibrous structure and/or sanitary tissue product of the present invention may be convolutedly wound to form a roll of the fibrous structure and/or sanitary tissue product. Such a roll may exhibit an effective caliper that is greater than the combined caliper of the untufted fibrous structure and/or sanitary tissue product.

In still another example, the tufts of the fibrous structure and/or sanitary tissue product may be phased to embossing, printing and/or perforations on and/or within the fibrous structure and/or sanitary tissue product.

In yet another example, the tufts of the fibrous structure and/or sanitary tissue product may generate enhanced aesthetics through creating differential height/elevation and/or differential texture regions, differential opacity regions, differential color (when tufts have colors (same or varied)), phasing with ink or emboss or other indicia within the fibrous structure and/or sanitary tissue product.

"Non-extensible material" as used herein means a material that is present within a portion of a web, such as a fibrous structure, wherein the web exhibits a stretch of less than 800% and/or less than 700% and/or less than 600% and/or less than 500% and/or less than 400% and/or less than

300% as measured according to the Short Span Tensile Test Method described herein. In one example, a surface of a web according to the present invention comprises a non-extensible material. In addition to a non-extensible material, such as non-extensible fibers, a surface of a web according to the present invention may comprise extensible fibers, such as thermoplastic polymer fibers. Such thermoplastic polymer fibers may comprise a thermoplastic polymer thermoplastic polymers selected from the group consisting of: polypropylene, copolymers of polypropylene, polyethylene, copolymers of polyethylene, polyethylene terephthalate, copolymers of polyethylene terephthalate and mixtures thereof.

"Non-extensible fibers" as used herein means fibers that are present within a portion of a web, such as a fibrous structure, wherein the web exhibits a stretch of less than 800% and/or less than 700% and/or less than 500% and/or less than 400% and/or less than 300% as measured according to the Short Span Tensile Test Method described herein. In one example, one or more of the non-extensible fibers exhibits a length of less than about 7 mm and/or less than about 6.5 mm and/or less than about 6 mm and/or less than about 5 mm and/or less than about 3 mm and/or less than about 2.5 mm and/or from about 0.4 mm to about 7 mm and/or from about 0.5 mm to about 6.5 mm and/or from about 0.5 mm to about 6 mm and/or from about 0.6 mm to about 5 mm.

In one example, one or more of the non-extensible fibers comprises a naturally occurring fiber.

"Fiber" as used herein means an elongate physical structure having an apparent length greatly exceeding its apparent diameter, i.e. a length to diameter ratio of at least about 10. Fibers having a non-circular cross-section and/or tubular shape are common; the "diameter" in this case may be considered to be the diameter of a circle having cross-sectional area equal to the cross-sectional area of the fiber. More specifically, as used herein, "fiber" refers to fibrous structure-making fibers. The present invention contemplates the use of a variety of fibrous structure-making fibers, such as, for example, natural fibers or synthetic fibers, or any other suitable fibers, and any combination thereof.

Natural fibrous structure-making fibers ("naturally occurring fibers") useful in the present invention include animal fibers, mineral fibers, other plant fibers (such as trichomes and/or seed hairs) and mixtures thereof. Animal fibers may, for example, be selected from the group consisting of: wool, silk and other naturally occurring protein fibers and mixtures thereof. The

other plant fibers may, for example, be derived from a plant selected from the group consisting of: wood, cotton, cotton linters, flax, sisal, abaca, hemp, hesperaloe, jute, bamboo, bagasse, kudzu, corn, sorghum, gourd, agave, loofah and mixtures thereof.

Wood fibers; often referred to as wood pulps include chemical pulps, such as kraft (sulfate) and sulfite pulps, as well as mechanical and semi-chemical pulps including, for example, groundwood, thermomechanical pulp, chemi-mechanical pulp (CMP), chemi-thermomechanical pulp (CTMP), neutral semi-chemical sulfite pulp (NSCS). Chemical pulps, however, may be preferred since they impart a superior tactile sense of softness to tissue sheets made therefrom. Pulps derived from both deciduous trees (hereinafter, also referred to as "hardwood") and coniferous trees (hereinafter, also referred to as "softwood") may be utilized. The hardwood and softwood fibers can be blended, or alternatively, can be deposited in layers to provide a stratified and/or layered web. U.S. Pat. Nos. 4,300,981 and U.S. Pat. No. 3,994,771 are incorporated herein by reference for the purpose of disclosing layering of hardwood and softwood fibers. Also applicable to the present invention are fibers derived from recycled paper, which may contain any or all of the above categories as well as other non-fibrous materials such as fillers and adhesives used to facilitate the original papermaking.

The wood pulp fibers may be short (typical of hardwood fibers) or long (typical of softwood fibers). Nonlimiting examples of short fibers include fibers derived from a fiber source selected from the group consisting of Acacia, Eucalyptus, Maple, Oak, Aspen, Birch, Cottonwood, Alder, Ash, Cherry, Elm, Hickory, Poplar, Gum, Walnut, Locust, Sycamore, Beech, Catalpa, Sassafras, Gmelina, Albizia, Anthocephalus, and Magnolia. Nonlimiting examples of long fibers include fibers derived from Pine, Spruce, Fir, Tamarack, Hemlock, Cypress, and Cedar. Softwood fibers derived from the kraft process and originating from more-northern climates may be preferred.

In addition to the various wood pulp fibers, other cellulosic fibers such as cotton linters, rayon, and bagasse can be used in this invention. Synthetic fibers ("non-naturally occurring fibers"), such as polymeric fibers, can also be used. Elastomeric polymers, polypropylene, polyethylene, polyester, polyolefin, polyvinyl alcohol and nylon, can be used. The polymeric fibers may comprise natural polymers from sources such as starch sources, protein sources and/or cellulose sources. The polymeric fibers can be produced by suitable methods known in the art.

An embryonic fibrous web can be typically prepared from an aqueous dispersion of papermaking fibers, though dispersions in liquids other than water can be used. The fibers are dispersed in the carrier liquid to have a consistency of from about 0.1 to about 0.3 percent. It is believed that the present invention can also be applicable to moist forming operations where the fibers are dispersed in a carrier liquid to have a consistency of less than about 50% and/or less than about 10%.

"Fibrous structure" as used herein means a structure that comprises one or more fibers. In one example, a fibrous structure according to the present invention means an orderly arrangement of fibers within a structure in order to perform a function. Nonlimiting examples of fibrous structures of the present invention include composite materials (including reinforced plastics and reinforced cement), paper, fabrics (including woven, knitted, and non-woven), and absorbent pads (for example for diapers or feminine hygiene products). A bag of loose fibers is not a fibrous structure in accordance with the present invention.

Nonlimiting examples of processes for making fibrous structures include known wet-laid papermaking processes and air-laid papermaking processes. Such processes typically include steps of preparing a fiber composition in the form of a suspension in a medium, either wet, more specifically aqueous medium, or dry, more specifically gaseous, i.e. with air as medium. The aqueous medium used for wet-laid processes is oftentimes referred to as a fiber slurry. The fibrous suspension is then used to deposit a plurality of fibers onto a forming wire or belt such that an embryonic fibrous structure is formed, after which drying and/or bonding the fibers together results in a fibrous structure. Further processing the fibrous structure may be carried out such that a finished fibrous structure is formed. For example, in typical papermaking processes, the finished fibrous structure is the fibrous structure that is wound on the reel at the end of papermaking, and may subsequently be converted into a finished product, e.g. a sanitary tissue product.

The fibrous structures of the present invention may be homogeneous or may be layered. If layered, the fibrous structures may comprise at least two and/or at least three and/or at least four and/or at least five layers.

"Sanitary tissue product" as used herein means a soft, low density (i.e. < about 0.15 g/cm3) web useful as a wiping implement for post-urinary and post-bowel movement cleaning (toilet tissue), for otorhinolaryngological discharges (facial tissue), and multi-functional

absorbent and cleaning uses (absorbent towels). The sanitary tissue product may be convolutedly wound upon itself about a core or without a core to form a roll of sanitary tissue product.

"Basis Weight" as used herein is the weight per unit area of a sample reported in lbs/3000 ft^2 or g/m^2. Basis weight is measured by preparing one or more samples of a certain area (m^2) and weighing the sample(s) of a fibrous structure according to the present invention and/or a paper product comprising such fibrous structure on a top loading balance with a minimum resolution of 0.01 g. The balance is protected from air drafts and other disturbances using a draft shield. Weights are recorded when the readings on the balance become constant. The average weight (g) is calculated and the average area of the samples (m^2). The basis weight (g/m^2 or gsm) is calculated by dividing the average weight (g) by the average area of the samples (m^2).

"Caliper" or "Sheet Caliper" as used herein means the macroscopic thickness of a single-ply fibrous structure, web product or film according to the present invention. Caliper of a fibrous structure, web product or film according to the present invention is determined by cutting a sample of the fibrous structure, web product or film such that it is larger in size than a load foot loading surface where the load foot loading surface has a circular surface area of about 3.14 in^2. The sample is confined between a horizontal flat surface and the load foot loading surface. The load foot loading surface applies a confining pressure to the sample of 15.5 g/cm^2 (about 0.21 psi). The caliper is the resulting gap between the flat surface and the load foot loading surface. Such measurements can be obtained on a VIR Electronic Thickness Tester Model II available from Thwing-Albert Instrument Company, Philadelphia, PA. The caliper measurement is repeated and recorded at least five (5) times so that an average caliper can be calculated. The result is reported in millimeters.

In one example, the single-ply fibrous structure and/or sanitary tissue product according to the present invention exhibits a sheet caliper of at least about 0.508 mm (20 mils) and/or at least about 0.762 mm (30 mils) and/or at least about 1.524 mm (60 mils).

"Effective Caliper" as used herein means the radial thickness a layer of fibrous structure and/or sanitary tissue product occupies within a convolutely wound roll of such fibrous structure and/or sanitary tissue product. In order to facilitate the determination of effective caliper, an Effective Caliper Test Method is described herein. The effective caliper of a fibrous structure and/or sanitary tissue product can differ from the sheet caliper of the fibrous structure and/or sanitary tissue product due to winding tension, nesting of deformations, etc.

"Density" or "Apparent density" as used herein means the mass per unit volume of a material. For fibrous structures, the density or apparent density can be calculated by dividing the basis weight of a fibrous structure sample by the caliper of the fibrous structure sample with appropriate conversions incorporated therein. Density and/or apparent density used herein has the units g/cm^3.

"Dry Tensile Strength" (or simply "Tensile Strength" as used herein) of a fibrous structure and/or sanitary tissue product is measured as follows. One (1) inch by five (5) inch (2.5 cm X 12.7 cm) strips of fibrous structure and/or sanitary tissue product are provided. The strip is placed on an electronic tensile tester Model 1122 commercially available from Instron Corp., Canton, Massachusetts in a conditioned room at a temperature of 73°F ± 4°F (about 28°C ± 2.2°C) and a relative humidity of 50% ± 10%. The crosshead speed of the tensile tester is 4.0 inches per minute (about 10.2 cm/minute) and the gauge length is 4.0 inches (about 10.2 cm). The Dry Tensile Strength can be measured in any direction by this method. The "Total Dry Tensile Strength" or "TDT" is the special case determined by the arithmetic total of MD and CD tensile strengths of the strips.

"Absorbent" and "absorbency" as used herein means the characteristic of the fibrous structure which allows it to take up and retain fluids, particularly water and aqueous solutions and suspensions. In evaluating the absorbency of paper, not only is the absolute quantity of fluid a given amount of paper will hold significant, but the rate at which the paper will absorb the fluid is also. Absorbency is measured here in by the Horizontal Full Sheet (HFS) test method described in the Test Methods section herein. In one example, the fibrous structures and/or sanitary tissue products according to the present invention exhibit an HFS absorbency of greater than about 5 g/g and/or greater than about 8 g/g and/or greater than about 10 g/g up to about 100 g/g. In another nonlimiting example, the fibrous structures and/or sanitary tissue products according to the present invention exhibit an HFS absorbency of from about 12 g/g to about 30 g/g.

"Machine Direction" or "MD" as used herein means the direction parallel to the flow of the fibrous structure through the papermaking machine and/or product manufacturing equipment.

"Cross Machine Direction" or "CD" as used herein means the direction perpendicular to the machine direction in the same plane of the fibrous structure and/or paper product comprising the fibrous structure.

"Ply" or "Plies" as used herein means an individual fibrous structure optionally to be disposed in a substantially contiguous, face-to-face relationship with other plies, forming a multiple ply fibrous structure. It is also contemplated that a single fibrous structure can effectively form two "plies" or multiple "plies", for example, by being folded on itself.

As used herein, the articles "a" and "an" when used herein, for example, "an anionic surfactant" or "a fiber" is understood to mean one or more of the material that is claimed or described.

All percentages and ratios are calculated by weight unless otherwise indicated. All percentages and ratios are calculated based on the total composition unless otherwise indicated.

Unless otherwise noted, all component or composition levels are in reference to the active level of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources.

Fibrous Structure

The fibrous structure and/or sanitary tissue product of the present invention may be made from any suitable precursor fibrous structure (a fibrous structure that has not be subjected to a tuft generating operation) known to those skilled in the art. In one example, the precursor fibrous structure may be made by an air-laid process. In another example, the precursor fibrous structure may be made by a wet-laid process.

The precursor fibrous structure may be made with a fibrous furnish that produces a single layer embryonic fibrous web or a fibrous furnish that produces a multi-layer embryonic fibrous web.

In one example, the precursor fibrous structures in accordance with the present invention may be selected from the group consisting of: through-air-dried fibrous structures, differential density fibrous structures, differential basis weight fibrous structures, wet laid fibrous structures, air laid fibrous structures, conventional dried fibrous structures, creped or uncreped fibrous structures, patterned-densified or non-patterned-densified fibrous structures, compacted or uncompacted, especially high bulk uncompacted, fibrous structures, other nonwoven fibrous structures comprising synthetic or multicomponent fibers, homogeneous or multilayered fibrous structures, double re-creped fibrous structures, uncreped fibrous structures, co-form fibrous structures and mixtures thereof.

In one example, the air laid fibrous structure is selected from the group consisting of thermal bonded air laid (TBAL) fibrous structures, latex bonded air laid (LBAL) fibrous structures and mixed bonded air laid (MBAL) fibrous structures.

The precursor fibrous structures may exhibit a substantially uniform density or may exhibit differential density regions, in other words regions of high density compared to other regions within the patterned fibrous structure. Typically, when a fibrous structure is not pressed against a cylindrical dryer, such as a Yankee dryer, while the fibrous structure is still wet and supported by a through-air-drying fabric or by another fabric or when an air laid fibrous structure is not spot bonded, the fibrous structure typically exhibits a substantially uniform density.

In one example, the precursor fibrous structure of the present invention comprises 100% or about 100% by weight, on a dry precursor fibrous structure basis of wood pulp fibers.

In another example, the precursor fibrous structure of the present invention comprises from about 100% to about 10% and/or from about 100% to about 30% and/or from about 100% to about 50% and/or from about 100% to about 75% by weight, on a dry precursor fibrous structure basis of wood pulp fibers. The other fibers, if any, in this type of precursor fibrous structure may be synthetic fibers, continuous, substantially continuous or staple synthetic fibers.

Extensibility sufficient to form a tuft comprising otherwise non-extensible material may be imparted to a precursor web (fibrous structure) by any suitable means such as by forming the web on a structured through-air-drying fabric, foreshortening, creping, wet microcontracting, and/or rush transferring. Alternatively, the precursor web (e.g., fibrous structure) may not be foreshortened.

The precursor fibrous structure may be pattern densified. A pattern densified fibrous structure is characterized by having a relatively high-bulk field of relatively low fiber density and an array of densified zones of relatively high fiber density. The high-bulk field is alternatively characterized as a field of pillow regions. The densified zones are alternatively referred to as knuckle regions. The densified zones may be discretely spaced within the high-bulk field or may be interconnected, either fully or partially, within the high-bulk field.

The precursor fibrous structure may be uncompacted, non pattern-densified. The precursor fibrous structure may be of a homogenous or multilayered construction. The precursor fibrous structure may be made with a fibrous furnish that produces a single layer embryonic fibrous web or a fibrous furnish that produces a multi-layer embryonic fibrous web.

The precursor fibrous structures of the present invention may comprise any suitable ingredients known in the art. Nonlimiting examples of suitable ingredients that may be included in the precursor fibrous structures include permanent and/or temporary wet strength resins, dry strength resins, softening agents, wetting agents, lint resisting agents, absorbency-enhancing agents, immobilizing agents, especially in combination with emollient lotion compositions, antiviral agents including organic acids, antibacterial agents, polyol polyesters, antimigration agents, polyhydroxy plasticizers, opacifying agents, bonding agents, debonding agents, colorants, soil release polymers (polymeric hydrophilizing agents), wetting agents and mixtures thereof. Such ingredients, when present in the fibrous structure of the present invention, may be present at any level based on the dry weight of the fibrous structure. Typically, such ingredients, when present, may be present at a level of from about 0.001 to about 50% and/or from about 0.001 to about 20% and/or from about 0.01 to about 5% and/or from about 0.03 to about 3% and/or from about 0.1 to about 1.0% by weight, on a dry precursor fibrous structure basis.

The fibrous structures of the present invention and/or sanitary tissue products comprising such fibrous structures may have a basis weight of between about 10 g/m^2 to about 120 g/m^2 and/or from about 14 g/m^2 to about 80 g/m^2 and/or from about 20 g/m^2 to about 60 g/m^2.

The fibrous structures of the present invention and/or sanitary tissue products comprising such fibrous structures may have a total dry tensile strength of greater than about 59 g/cm (150 g/in) and/or from about 78 g/cm (200 g/in) to about 394 g/cm (1000 g/in) and/or from about 98 g/cm (250 g/in) to about 335 g/cm (850 g/in).

The fibrous structures of the present invention and/or sanitary tissue products comprising such fibrous structures may have a density of about 0.60 g/cc or less and/or about 0.30 g/cc or less and/or from about 0.04 g/cc to about 0.20 g/cc.

The fibrous structures of the present invention and/or sanitary tissue products comprising such fibrous structures may have a lint of about 2 or more and/or about 4 or more and/or from about 6 or more to about 12 or less and/or about 10 or less and/or about 8 or less.

As shown in Fig. 1, a fibrous structure and/or sanitary tissue product 10 comprising a tuft 12 is provided. The tuft 12 comprises a non-extensible material 14, such as non-extensible fibers 16. As a result of the creation of the tuft 12, an open void area 20 is formed within the tuft 12 and a discontinuity 22 is formed on the non-tufted surface 24 of the fibrous structure and/or sanitary tissue product 10. Even though the schematic example doesn't show it, the discontinuity

22 may be smaller in width in the x-plane than the maximum x-plane width of the tuft 12. The fibrous structure and/or sanitary tissue product 10 may be made of fibers 26, which may be extensible or non-extensible.

The fibrous structure of the present invention may be combined with an additional fibrous structure the same or different from the fibrous structure of the present invention. Tufts present in the fibrous structure of the present invention may protrude at least into the additional fibrous structure. In addition, the tufts present in the fibrous structure of the present invention may protrude through the additional fibrous structure as a result of the additional fibrous structure breaking at the point of the tuft.

When combined with one or more additional fibrous structures, the same or different from the fibrous structures of the present invention to form a multi-ply sanitary tissue product, the tufts may be oriented either inwardly such that the tufts do not form part of an external surface of the sanitary tissue product or outwardly such that the tufts do form part of an external surface of the sanitary tissue product. In one example, tufts of two different fibrous structures of the present invention of a multi-ply sanitary tissue product may contact one another by being oriented inwardly such that the tufts do not form part of an external surface of the sanitary tissue product. However, the tufts of the fibrous structures may be separated from one another by one or more additional fibrous structures the same or different from the fibrous structures of the present invention. Alternatively, tufts of two different fibrous structures of the present invention of a multi-ply sanitary tissue product may be oriented differently, one fibrous structure having the tufts oriented outwardly such that the tufts form part of an external surface of the sanitary tissue product and one fibrous structure having tufts oriented inwardly such that the tufts do not form part of an external surface of the sanitary tissue product. In another example, tufts of two different fibrous structures of the present invention of a multi-ply sanitary tissue product may both be oriented outwardly such that the tufts form a part of the external surfaces of the sanitary tissue product.

The additional fibrous structure may be combined with the fibrous structure of the present invention by any suitable means. The fibrous structure may be combined before or after tufts are present in the fibrous structure of the present invention.

The fibrous structure of the present invention and the additional fibrous structure may exhibit different stretch properties at peak load. For example the fibrous structure of the present

invention may exhibit a stretch at peak load that is less than the stretch at peak load of the additional fibrous structure.

In another example, a fibrous structure of the present invention or portions thereof may exhibit a pre-tuft stretch at peak load that is less than the stretch at peak load of the additional web or portions of the additional web. The pre-tuft stretch at peak load of the fibrous structure of the present invention or portions thereof may be influenced, especially immediately before and/or during being subjected to a tuft generating process, such that the stretch at peak load of the fibrous structure of the present invention or portions thereof is greater than (at the time of being subjected to the tuft generating process) the stretch at peak load of the additional fibrous structure thus allowing the fibrous structure of the present invention or portions thereof to be imparted tufts.

In other examples, the fibrous structure of the present invention or portions thereof may exhibit a greater stretch at peak load than the additional fibrous structure or portions thereof.

In one example, the fibrous structure and/or sanitary tissue product of the present invention may comprise 100% by weight of fibers of wood pulp fibers. In another example, the fibrous structure and/or sanitary tissue product of the present invention may comprise 100% by weight of fibers of a mixture of wood pulp fibers and staple synthetic fibers.

The fibrous structure of the present invention may be formed by any suitable process known in the art.

Tuft Generating Process

Referring to Fig. 2, there is shown a nonlimiting example of an apparatus and method for making a fibrous structure of the present invention. The apparatus 100 comprises a pair of intermeshing rolls 102 and 104, each rotating about an axis A, the axes A being parallel in the same plane. Roll 102 comprises a plurality of ridges 106 and corresponding grooves 108 which extend unbroken about the entire circumference of roll 102. Roll 104 is similar to roll 102, but rather than having ridges that extend unbroken about the entire circumference, roll 104 comprises a plurality of rows of circumferentially-extending ridges that have been modified to be rows of circumferentially-spaced teeth 110 that extend in spaced relationship about at least a portion of roll 104. The individual rows of teeth 110 of roll 104 are separated by corresponding grooves 112. In operation, rolls 102 and 104 intermesh such that the ridges 106 of roll 102 extend into the grooves 112 of roll 104 and the teeth 110 of roll 104 extend into the grooves 108 of roll 102.

The intermeshing is shown in greater detail in the cross sectional representation of Fig. 3, discussed below.

In Fig. 2, the apparatus 100 is shown having one patterned roll, e.g., roll 104, and one non-patterned grooved roll 102. However, in certain examples it may be desirable to use two patterned rolls 104 having either the same or differing patterns, in the same or different corresponding regions of the respective rolls. Such an apparatus can produce fibrous structures with tufts protruding from both sides of the fibrous structure.

The process of the present invention is similar in many respects to a process as described in U.S. Pat. No. 5,518,801 entitled "Web Materials Exhibiting Elastic-Like Behavior" and referred to in subsequent patent literature as "SELF" webs, which stands for "Structural Elastic-like Film". However, there are significant differences between the apparatus of the present invention and the apparatus disclosed in the above-identified '801 patent. These differences account for the novel features of the web of the present invention. As described below, the teeth 110 of roll 104 have a specific geometry associated with the leading and trailing edges that permit the teeth, e.g., teeth 110, to essentially "punch" through the precursor fibrous structure 28 as opposed to, in essence, emboss the web. The difference in the apparatus 100 of the present invention results in a fundamentally different fibrous structure.

Precursor fibrous structure 28 is provided either directly from a web making process or indirectly from a supply roll (neither shown) and moved in the machine direction to the nip 116 of counter-rotating intermeshing rolls 102 and 104. Precursor fibrous structure 28 can be any suitable fibrous structure that exhibits or is capable of exhibiting sufficient stretch at peak load to permit formation of tufts in the fibrous structure. Precursor fibrous structure 28 can be plasticized by any means known in the art, such as by subjecting the precursor web to a humid environment. As precursor fibrous structure 28 goes through the nip 116 the teeth 110 of roll 104 enter grooves 108 of roll 102 and simultaneously urge fibers out of the plane of plane of precursor fibrous structure 28 to form tufts 12 and discontinuities 22, not shown in Fig. 2. In effect, teeth 110 "push" or "punch" through precursor fibrous structure 28. As the tip of teeth 110 push through precursor fibrous structure 28 the portions of fibers that are oriented predominantly in the CD and across teeth 110 are urged by the teeth 110 out of the plane of precursor fibrous structure 28 and are stretched, pulled, and/or plastically deformed in the z-axis,

resulting in formation of the tuft 12. Fibers that are predominantly oriented generally parallel in the machine direction of precursor fibrous structure 28 as shown in Fig. 2, are simply spread apart by teeth 110 and remain substantially in the non-tufted region of the fibrous structure 10. The number, spacing, and size of tufts can be varied by changing the number, spacing, and size of teeth 110 and making corresponding dimensional changes as necessary to roll 104 and/or roll 102. This variation, together with the variation possible in precursor fibrous structures 28 and line speeds, permits many varied fibrous structures to be made for many purposes. For example, a fibrous structure made from a high basis weight textile fabric having MD and CD woven extensible threads could be made into a soft, porous ground covering, such as a cow carpet useful for reducing udder and teat problems in cows. A fibrous structure made from a relatively low basis weight nonwoven web of extensible spunbond polymer fibers could be used as a terry cloth-like fabric for semi-durable or durable clothing.

Fig. 3 shows in cross section a portion of the intermeshing rolls 102 and 104 including ridges 106 and teeth 110. As shown teeth 110 have a tooth height TH (note that TH can also be applied to ridge 106 height; in a preferred example tooth height and ridge height are equal), and a tooth-to-tooth spacing (or ridge-to-ridge spacing) referred to as the pitch P. As shown, depth of engagement E is a measure of the level of intermeshing of rolls 102 and 104 and is measured from tip of ridge 106 to tip of tooth 110. The depth of engagement E, tooth height TH, and pitch P can be varied as desired depending on the properties of the precursor web and the desired characteristics of fibrous structure. Also, the greater the density of the tufted regions desired (tufted regions per unit area of fibrous structure), the smaller the pitch should be, and the smaller the tooth length TL and tooth distance TD should be, as described below.

Fig. 4 shows one example of a roll 104 having a plurality of teeth 110 useful for making a fibrous structure of the present invention having a basis weight of between about 15 gsm and 100 gsm and/or from about 25 gsm to about 90 gsm and/or from about 30 gsm to about 90 gsm. In one example, the resulting fibrous structure exhibits a basis weight of from about 15 gsm to about 50 gsm and/or from about 15 gsm to about 40 gsm. An enlarged view of teeth 110 shown in Fig. 4 is shown in Fig. 5. In this example of roll 104 teeth 110 have a uniform circumferential length dimension TL of about 1.25 mm measured generally from the leading edge LE to the trailing edge TE at the tooth tip 111, and are uniformly spaced from one another circumferentially by a

distance TD of about 1.5 mm. For making a fibrous structure from a precursor web having a basis weight in the range of about 15 gsm to 100 gsm, teeth 110 of roll 104 can have a length TL ranging from about 0.5 mm to about 3 mm and a spacing TD from about 0.5 mm to about 3 mm, a tooth height TH ranging from about 0.5 mm to about 10 mm, and a pitch P between about 1 mm (0.040 inches) and 2.54 mm (0.100 inches). Depth of engagement E can be from about 0.5 mm to about 5 mm (up to a maximum approaching the tooth height TH). Of course, E, P, TH, TD and TL can each be varied independently of each other to achieve a desired size, spacing, and area density of tufts (number of tufts per unit area of fibrous structure).

As shown in Fig. 5, each tooth 110 has a tip 111, a leading edge LE and a trailing edge TE. The tooth tip 111 is elongated and has a generally longitudinal orientation, corresponding to the longitudinal axes L of tufted regions. It is believed that to get the tufts of the fibrous structure that can be described as being terry cloth-like, the LE and TE should be very nearly orthogonal to the local peripheral surface 120 of roll 104. As well, the transition from the tip 111 and the LE or TE should be a sharp angle, such as a right angle, having a sufficiently small radius of curvature such that, in use the teeth 110 push through precursor web at the LE and TE. Without being bound by theory, it is believed that having relatively sharply angled tip transitions between the tip of tooth 110 and the LE and TE permits the teeth 110 to punch through precursor web "cleanly", that is, locally and distinctly, so that the resulting fibrous structure can be described as "tufted" in tufted regions rather than "embossed" for example. When so processed, the fibrous structure is not imparted with any particular elasticity, beyond what the precursor web may have possessed originally.

Although the fibrous structure of the present invention is disclosed in preferred examples as a single ply fibrous structure made from a single ply precursor web, it is not necessary that it be so. For example, a laminate or composite precursor web having two or more plies can be used so long as one of the plies is a fibrous structure according to the present invention. In general, the above description for the fibrous structure holds, recognizing that tufted, aligned fibers, for example, formed from a laminate precursor web would be comprised of fibers from both (or all) plies of the laminate. In such a fibrous structure, it is important, therefore, that all the fibers of all the plies have sufficient diameter, elongation characteristics, and fiber mobility, so as not to break prior to extension and tufting. In this manner, fibers from all the plies of the laminate may

contribute to the tufts. In a multi-ply fibrous structure, the fibers of the different plies may be mixed or intermingled in the tuft and/or tufted regions. The fibers may not protrude through but combine with the fibers in an adjacent ply.

Multi-ply fibrous structures can have significant advantages over single ply fibrous structures. For example, a tuft from a multi-ply fibrous structure made of two or more precursor plies is shown schematically in Figs. 6-7. As shown in Fig. 6, the multi-ply fibrous structure 10' comprises ply 28' and ply 28". Ply 28" is a precursor ply in accordance with the present invention. Ply 28" comprises a tuft 12 comprising a non-extensible material. The tuft 12 protrudes through precursor web 28'.

As shown in Fig. 7, the multi-ply fibrous structure 10' comprises three plies, 28', 28", 28'". One or both plies 28' and 28'" may be a precursor ply in accordance with the present invention. Plies 28' and 28'" contribute material, such as fibers, to form tuft 12, which comprises a non-extensible material, in a "nested" relationship that "locks" the two precursor plies together, forming a laminate fibrous structure without the use or need of adhesives or thermal bonding or ultrasonic bonding or hydroentangling between the plies. However, if desired an adhesive, chemical bonding, resin or powder bonding, or thermal bonding or ultrasonic bonding or hydroentangling and combinations thereof between the plies can be selectively utilized to certain regions or all of the precursor plies. In addition, the multiple plies may be bonded during processing by any suitable bonding method by applying an adhesive or by thermal bonding without the addition of a separate adhesive. Also, bonding may be achieved by physically subjecting the two plies to the tuft generating process such that tufts, especially tufts from at least one ply protrude through the other ply. In one example, the tuft 12 retains the ply relationship of he laminate precursor web, as shown in Fig. 7, wherein the upper ply (specifically ply 28' in Fig. 7, remains substantially intact. As shown, the tuft 12 protrudes through precursor web 28'' and only into the precursor web 28' (not through precursor web 28').

In a multi-ply fibrous structure, for example 10' in Figs. 6-7, each precursor ply can have different properties. For example, as shown in Figs. 6-7, multi-ply fibrous structures 10' can comprise two (or more) precursor fibrous structures (at least one of the precursor fibrous structures is a fibrous structure according to the present invention), e.g., first and second precursor webs 28' and 28".

In the multi-ply fibrous structures examples illustrated in Figs. 6-7, the formation of the tufts 12 results in a discontinuity 22 on the non-tufted surface 24 and an open void area 20.

The fibrous structures of the present invention, addition to being used as web products, may also be used for a wide variety of other applications. Nonlimiting examples of such other applications include various filter sheets such as air filter, bag filter, liquid filter, vacuum filter, water drain filter, and bacterial shielding filter; sheets for various electric appliances such as capacitor separator paper, and floppy disk packaging material; beach mat; various industrial sheets such as tacky adhesive tape base cloth, oil absorbing material, and paper felt; various wiper sheets such as wipers for homes, services and medical treatment, printing roll wiper, wiper for cleaning copying machine, and wiper for optical systems; hygiene or personal cleansing wiper such as baby wipes, feminine wipes, facial wipes, or body wipes, various medicinal and sanitary sheets, such as surgical gown, gown, covering cloth, cap, mask, sheet, towel, gauze, base cloth for cataplasm, diaper, diaper core, diaper acquisition layer, diaper liner, diaper cover, base cloth for adhesive plaster, wet towel, and tissue; various sheets for clothes, such as padding cloth, pad, jumper liner, and disposable underwear; various life material sheets such as base cloth for artificial leather and synthetic leather, table top, wall paper, shoji-gami (paper for paper screen), blind, calendar, wrapping, and packages for drying agents, shopping bag, suit cover, and pillow cover; various agricultural sheets, such as cow carpets, cooling and sun light-shielding cloth, lining curtain, sheet for overall covering, light-shielding sheet and grass preventing sheet, wrapping materials of pesticides, underlining paper of pots for seeding growth; various protection sheets such as fume prevention mask and dust prevention mask, laboratory gown, and dust preventive clothes; various sheets for civil engineering building, such as house wrap, drain material, filtering medium, separation material, overlay, roofing, tuft and carpet base cloth, wall interior material, soundproof or vibration reducing sheet, and curing sheet; and various automobile interior sheets, such as floor mat and trunk mat, molded ceiling material, head rest, and lining cloth, in addition to a separator sheet in alkaline batteries.

Another advantage of the process described to produce the fibrous structures of the present invention is that the fibrous structures can be produced in-line with other fibrous structure production equipment. Additionally, there may be other solid state formation processes that can be used either prior to or after the process of the present invention. Nonlimiting examples of

suitable solid state formation processes include printing, embossing, laminating, slitting, perforating, cutting edges, stacking, folding, mechanical softening, and the like.

As can be understood from the above description of the fibrous structures and methods for making such fibrous structure of the present invention, many various fibrous structures can be made without departing from the scope of the present invention as claimed in the appended claims. For example, fibrous structures can be coated or treated with lotions, medicaments, cleaning fluids, anti-bacterial solutions, emulsions, fragrances, surfactants.

Examples

Example 1 – A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 70% NSK fibers, 20% Eucalyptus fibers and 10% Co-PET/PET (sheath/core) staple fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 3% wet microcontraction (i.e., a papermaking belt that transfers the web to a through-air-dried fabric is running faster than the through-air-dried fabric) and 20% crepe off a Yankee dryer. The fibrous structure is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.042". Two plies of the fibrous structures comprising tufts are combined using an embossing process. The resulting fibrous structure is a non-extensible tufted fibrous structure wherein the tuft comprises a non-extensible material. The stretch of the fibrous structure according to the Short Span Tensile Test Method is 227%.

Example 2 – A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 75% NSK fibers and 25% SSK fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 3% wet microcontraction and 20% crepe off a Yankee dryer. The fibrous structure is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.032". The resulting fibrous structure is a non-extensible tufted fibrous structure wherein the tuft comprises a non-extensible material. The stretch of the fibrous structure according to the Short Span Tensile Test Method is 230%.

Example 3 - A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 70% NSK fibers and 30% SSK fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 3% wet microcontraction and 10% crepe off a Yankee dryer. The fibrous structure is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.052". The resulting fibrous structure is a non-extensible tufted fibrous structure wherein the tuft comprises a non-extensible material. The stretch of the fibrous structure according to the Short Span Tensile Test Method is 230%.

Comparative Example 4 – A multi-ply sanitary tissue product comprising a tuft consisting of extensible material is formed by sandwiching between two existing wood pulp fiber fibrous structures a 12 gsm meltblown synthetic bicomponent (80% PET core/20% CoPET sheath) fiber layer. Prior to thermally bonding the multi-ply sanitary tissue product, the multi-ply sanitary tissue product is passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.060". The resulting multi-ply sanitary tissue product is a tufted multi-ply sanitary tissue product wherein the tufts consist of extensible material. The stretch of the multi-ply sanitary tissue product according to the Short Span Tensile Test Method is 1026%.

Comparative Example 5 - A multi-ply sanitary tissue product is formed by sandwiching between two existing wood pulp fiber fibrous structures a 6 gsm meltblown synthetic bicomponent (80% PET core/20% CoPET sheath) fiber layer. Prior to thermally bonding the multi-ply sanitary tissue product, the multi-ply sanitary tissue product is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.060". The resulting multi-ply sanitary tissue product is a tufted multi-ply sanitary tissue product wherein the tufts consist of extensible material. The stretch of the multi-ply sanitary tissue product according to the Short Span Tensile Test Method is 828%.

TEST METHODS

Unless otherwise indicated, all tests described herein including those described under the Definitions section and the following test methods are conducted on samples that have been conditioned in a conditioned room at a temperature of 73°F ± 4°F (about 23°C ± 2.2°C) and a relative humidity of 50% ± 10% for 2 hours prior to the test. Further, all tests are conducted in

such conditioned room. Tested samples should be subjected to 73°F ± 4°F (about 23°C ± 2.2°C) and a relative humidity of 50% ± 10% for 24 hours prior to testing.

Short Span Tensile Test Method

Suitable equipment for this test could include a Thwing Albert EJA or Instron tensile tester. The tester must have modified grips, with rubber pieces added both grips on the edge closest to the corresponding grip. Secondly, the grip must be level to each other and any equipment to load the grips must not interact with the opposing grip. The zero height between the grips is set by bringing the grips together until the first substantial force is measured, the cross hairs are zeroed. The sample gauge length is set by increasing the gap between the grips to the desired distance (0.100 cm). The cross hairs are re-zeroed.

In this test, modified grips are used to pull one inch strips of fibrous structures and/or sanitary tissue products comprising one or more tufts apart at a speed of 2.54 cm/min. The load is captured as the grips are separating until the peak load is reached and then continued until only 2% of the peak load is remaining. The grips were then returned to the initial position or gauge length describe above. Strain at break was determined as the strain at 2% of the peak load after the peak load had been achieved. Four repeats were performed on separate sample pieces and the four results were averaged. The samples tested were 1 inch strips in the machine direction. The samples tested were after the tufting process. If a sample exhibits a stretch according to this test method of less than 800% and/or less than 700% and/or less than 600% and/or less than 500% and/or less than 400% and/or less than 300% to 0%, then the sample is deemed to contain a tuft that comprises a non-extensible material, such as non-extensible fibers.

Effective Caliper Test

Effective caliper of a fibrous structure and/or sanitary tissue product in roll form is determined by the following equation:

$$EC = (RD^2\text{-}CD^2) / (0.00127 \times SC \times SL)$$

wherein EC is effective caliper in mils of a single sheet in a wound roll of fibrous structure and/or sanitary tissue product; RD is roll diameter in inches; CD is core diameter in inches; SC is sheet count; and SL is sheet length in inches.

Horizontal Full Sheet (HFS) Absorbency Test:

The Horizontal Full Sheet (HFS) test method determines the amount of distilled water absorbed and retained by the paper of the present invention. This method is performed by first

weighing a sample of the paper to be tested (referred to herein as the "Dry Weight of the paper"), then thoroughly wetting the paper, draining the wetted paper in a horizontal position and then reweighing (referred to herein as "Wet Weight of the paper"). The absorptive capacity of the paper is then computed as the amount of water retained in units of grams of water absorbed by the paper. When evaluating different paper samples, the same size of paper is used for all samples tested.

The apparatus for determining the HFS capacity of paper comprises the following: An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the paper tested (i.e.; a paper sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

A sample support rack and sample support cover is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid of 0.5 inch squares (1.27 cm^2). The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The HFS test is performed in an environment maintained at 23 ± 1° C and 50 ± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23 ± 1° C to a depth of 3 inches (7.6 cm).

The paper to be tested is carefully weighed on the balance to the nearest 0.01 grams. The dry weight of the sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). The sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched between the rack and cover) is submerged in the water reservoir. After the sample has been submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain horizontally for 120±5 seconds, taking care not to excessively shake or vibrate the sample. Next, the rack cover is carefully removed and the wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The gram per paper sample absorptive capacity of the sample is defined as (Wet Weight of the paper - Dry Weight of the paper).

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm".

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention. To the extent that any meaning or definition of a term in this written document conflicts with any meaning or definition of the term in a document incorporated by reference, the meaning or definition assigned to the term in this written document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

CLAIMS

What is claimed is:

1. A web comprising a tuft comprising a non-extensible material.

2. The web according to Claim 1 wherein the web exhibits a stretch of less than 800% as determined by the Short Span Tensile Test Method.

3. The web according to any of the preceding claims wherein the web further comprises a surface comprising a non-extensible material.

4. The web according to any of the preceding claims wherein the non-extensible material comprises non-extensible fibers.

5. The web according to any of the preceding claims wherein the web comprises a surface that comprises undulations, preferably wherein the tuft is oriented perpendicular to the undulations.

6. The web according to any of the preceding claims wherein the web comprises a plurality of tufts.

7. The web according to any of the preceding claims wherein the non-extensible fibers exhibits lengths of 6.0 mm or less.

8. The web according to any of the preceding claims wherein the non-extensible fibers comprise naturally occurring fibers.

9. The web according to any of the preceding claims wherein the naturally occurring fibers are selected from the group consisting of: animal fibers, mineral fibers, plant fibers, protein fibers and mixtures thereof, preferably wherein the animal fibers are selected from the group consisting of: wool fibers, silk fibers and mixtures thereof, preferably wherein the plant fibers

are derived from a plant selected from the group consisting of: wood, cotton, cotton linters, flax, sisal, abaca, hemp, hesperaloe, jute, bamboo, bagasse, kudzu, corn, sorghum, gourd, agave, loofah and mixtures thereof.

10. The web according to any of the preceding claims wherein the web comprises a surface comprising extensible fibers, preferably wherein the extensible fibers comprise thermoplastic polymers, more preferably wherein the thermoplastic polymers are selected from the group consisting of: polypropylene, copolymers of polypropylene, polyethylene, copolymers of polyethylene, polyethylene terephthalate, copolymers of polyethylene terephthalate and mixtures thereof.

11. A single- or multi-ply sanitary tissue product comprising a web according to any of the preceding claims, preferably wherein the tuft is oriented inwardly and/or outwardly in the multi-sanitary tissue product, .

12. A process for making a web according to any of Claims 1 to 10, the process comprising the steps of:

a. forming a web comprising a non-extensible material, preferably wherein the non-extensible material comprises non-extensible fibers;

b. imparting extensibility into the web; and

c. subjecting the extensible web to a tuft generating operation such that a web comprising a tuft comprising the non-extensible material is formed.

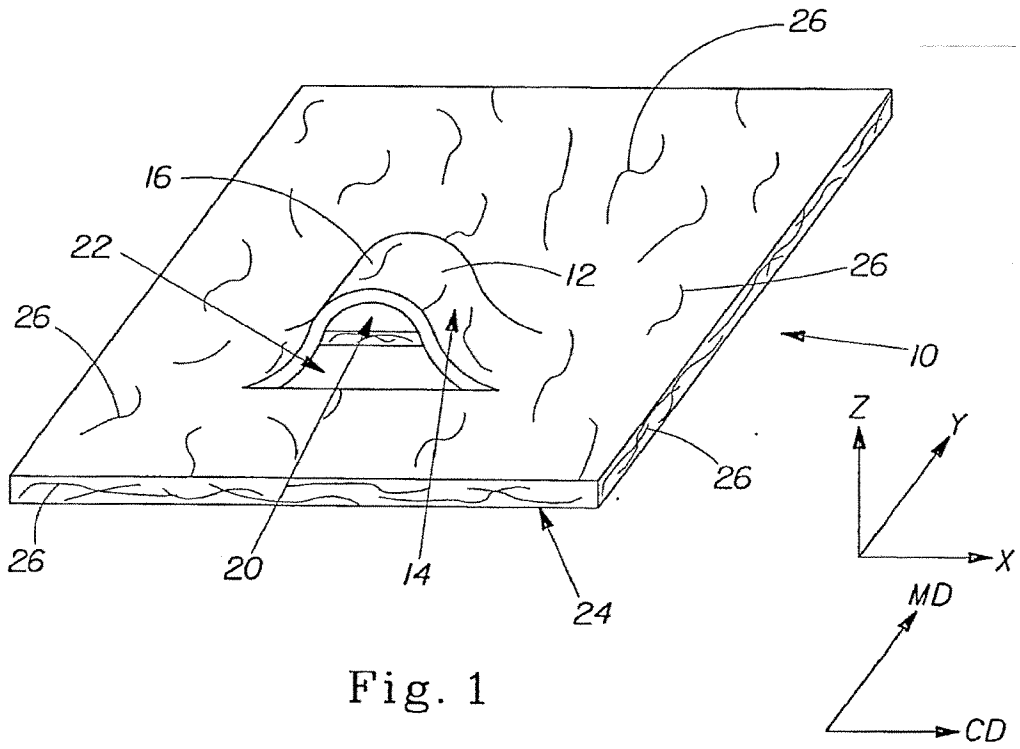

Fig. 1

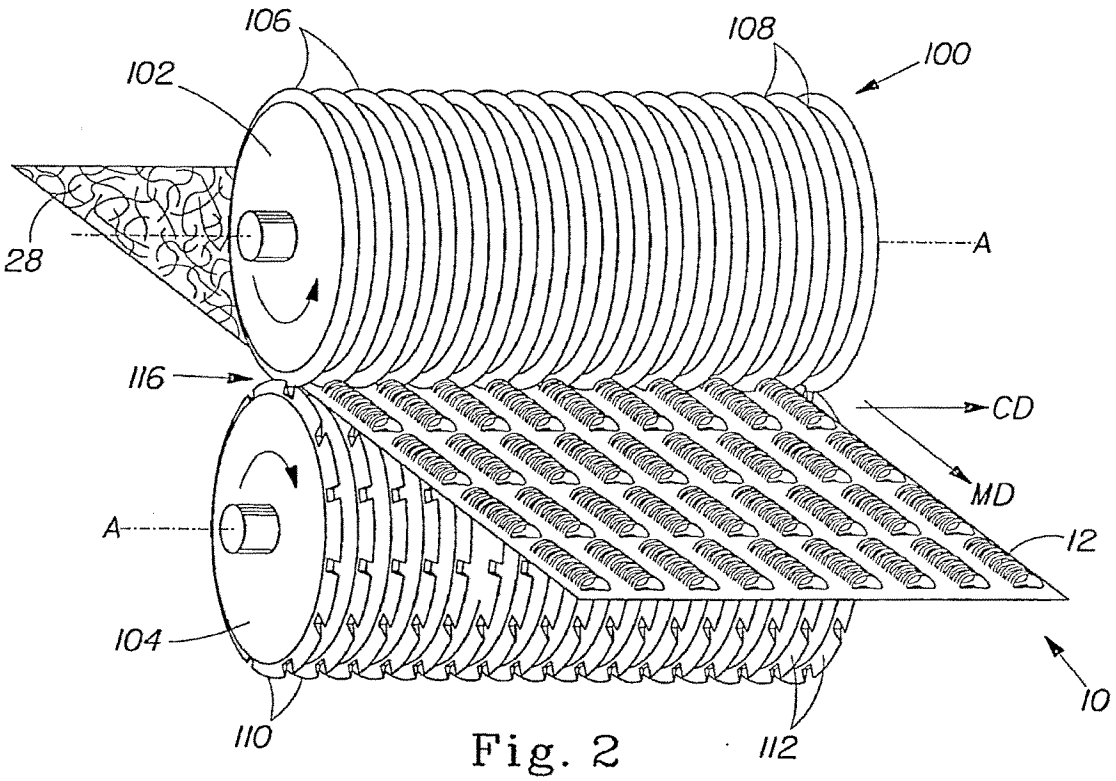

Fig. 2

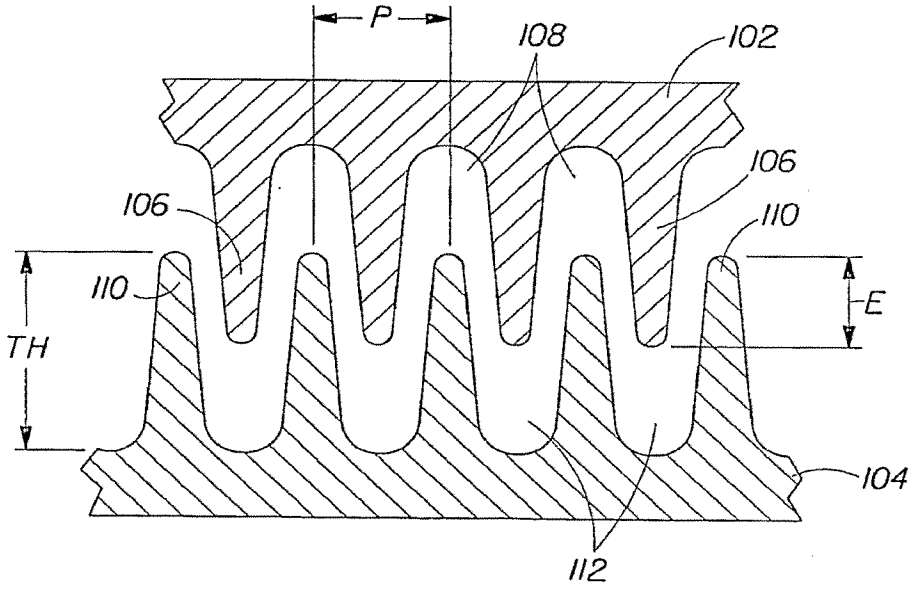

Fig. 3

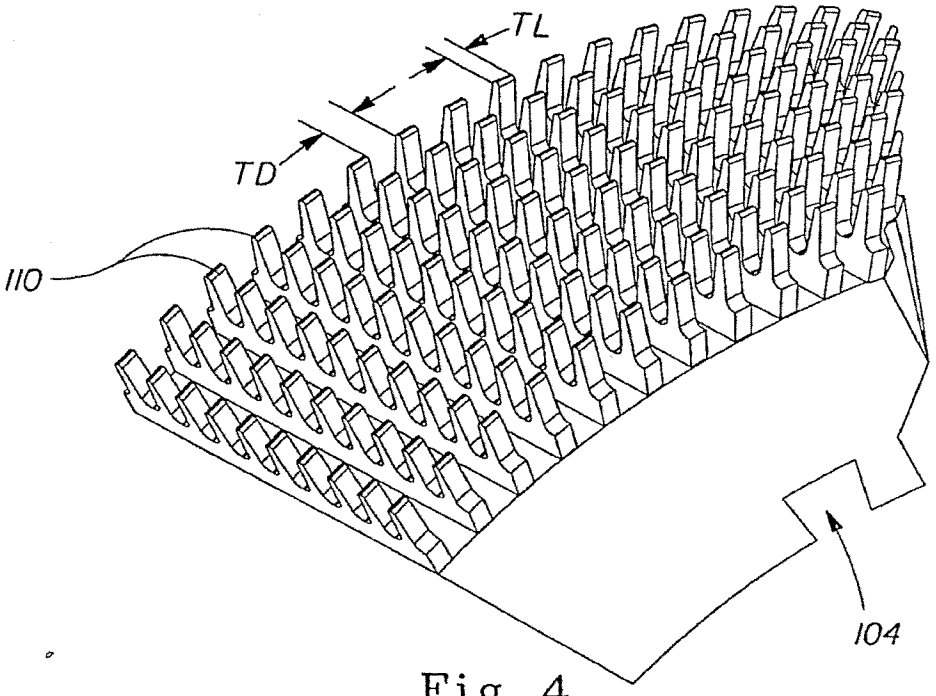

Fig. 4

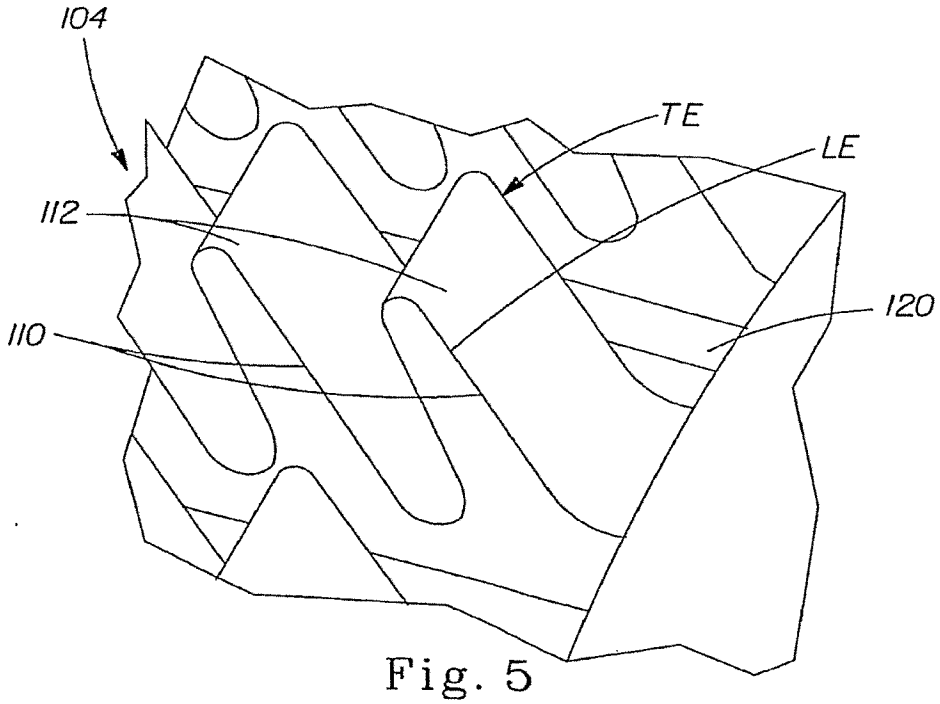

Fig. 5

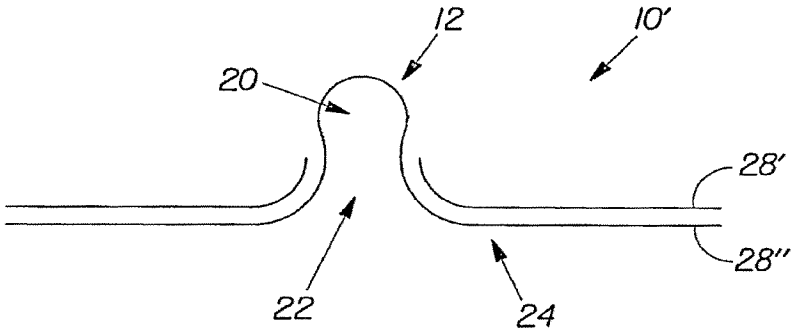

Fig. 6

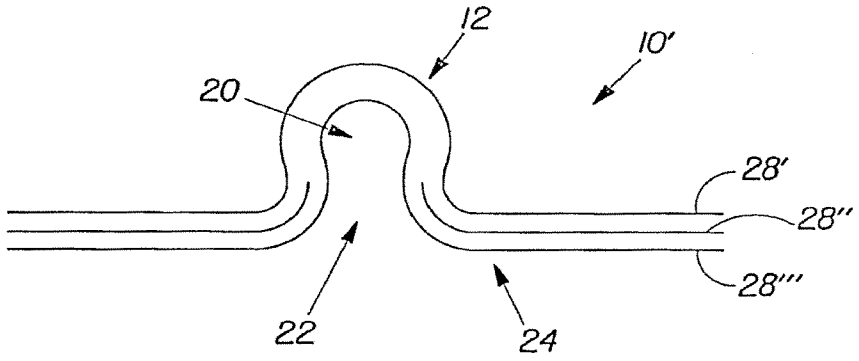

Fig. 7

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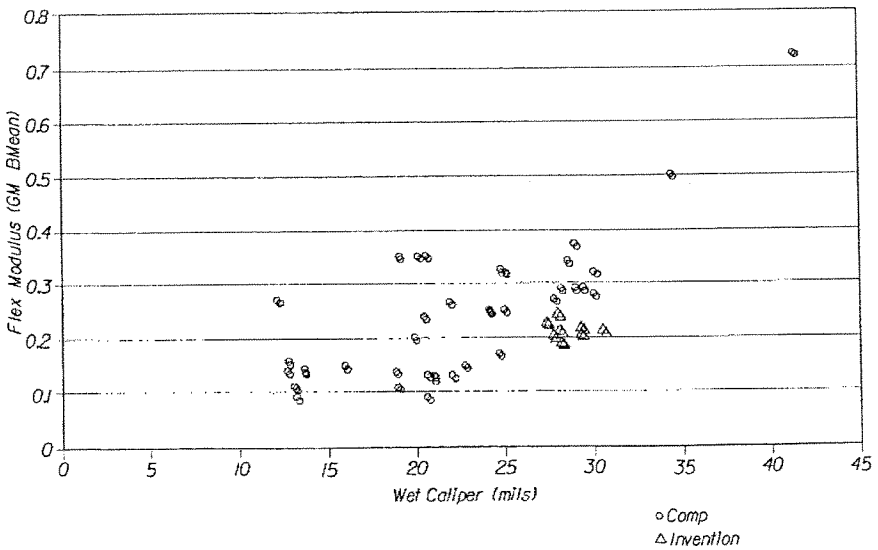

(57) Abstract: Fibrous structures, more particularly non-woven fibrous structures that exhibit properties that consumers associate with cloths, sanitary tissue products incorporating such fibrous structures and processes for making such fibrous structures are provided.

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CLOTHLIKE NON-WOVEN FIBROUS STRUCTURES AND PROCESSES FOR MAKING SAME

FIELD OF THE INVENTION

The present invention relates to fibrous structures, more particularly to non-woven fibrous structures that exhibit properties that consumers associate with cloths, sanitary tissue products comprising such fibrous structures and processes for making such fibrous structures.

BACKGROUND OF THE INVENTION

Woven fabrics, such as cloths, exhibit properties that consumers, at least some consumers, would like to see in their non-woven fibrous structures and/or sanitary tissue products comprising such fibrous structures.

Numerous attempts have been made by formulators to achieve clothlike properties in non-woven fibrous structures, especially fibrous structures comprising pulp fibers. Such attempts have made progress, but consumers continue to have a need for non-woven fibrous structures that exhibit even more clothlike properties.

Accordingly, there exists a need for non-woven fibrous structures, especially pulp fiber-containing fibrous structures that exhibit clothlike properties, sanitary tissue products comprising such fibrous structures and processes for making such fibrous structures.

SUMMARY OF THE INVENTION

The present invention fulfills the needs described above by providing non-woven fibrous structures that exhibit clothlike properties and/or visual aspects that consumers associate with cloths, sanitary tissue products comprising such fibrous structures and processes for making such fibrous structures.

It has been unexpectedly found that non-woven fibrous structures that exhibit specific values for a combination of specific properties exhibit clothlike properties.

In one example of the present invention, a non-woven fibrous structure comprising a plurality of fibers, wherein the fibrous structure exhibits a wet caliper of greater than 25 mils and a flex modulus of less than 0.25 GM Bmean, is provided.

In another example of the present invention, a non-woven fibrous structure comprising a plurality of fibers, wherein the fibrous structure exhibits a wet caliper of greater than 25 mils and a VFS of greater than 10.2 g/g, is provided.

In even another example of the present invention, a non-woven fibrous structure comprising a plurality of fibers, wherein the fibrous structure exhibits a dry caliper of greater than 37 mils and a VFS of greater than 10.2 g/g, is provided.

In still another example of the present invention, a single- or multi-ply sanitary tissue product comprising a non-woven fibrous structure according to the present invention is provided.

In yet another example of the present invention, a process for making a non-woven fibrous structure according to the present invention is provided.

Accordingly, the present invention provides non-woven fibrous structures that exhibit certain properties that consumers of the non-woven fibrous structures associate with cloths, sanitary tissue products comprising such non-woven fibrous structures and processes for making such non-woven fibrous structures.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a plot of Flex Modulus vs. Wet Caliper for fibrous structures made in accordance with the present invention ("Invention") and prior art fibrous structures ("Comp"), illustrating the low flex modulus and high wet caliper exhibited by the fibrous structures of the present invention;

Fig. 2 is a plot of VFS vs. Wet Caliper for fibrous structures made in accordance with the present invention ("Invention") and prior art fibrous structures ("Comp"), illustrating the high VFS and wet caliper exhibited by the fibrous structures of the present invention;

Fig. 3 is a plot of VFS vs. Dry Caliper for fibrous structures made in accordance with the present invention ("Invention") and prior art fibrous structures ("Comp"), illustrating the high VFS and dry caliper exhibited by the fibrous structures of the present invention;

Fig. 4 is a perspective view of an apparatus for forming a fibrous structure according to the present invention;

Fig. 5 is a cross-sectional depiction of the apparatus shown in Fig. 4;

Fig. 6 is a perspective view of a portion of the apparatus of Fig. 4 for forming a fibrous structure of the present invention; and

Fig. 7 is an enlarged perspective view of a portion of the apparatus of Fig. 6.

DETAILED DESCRIPTION OF THE INVENTION

"Clothlike" as used herein relates to the feel of the non-woven fibrous structure to a consumer, the appearance of the non-woven fibrous structure to a consumer and/or the performance (absorbency, strength, durability, etc.) of the non-woven fibrous structure during use by a consumer.

"Fibrous structure" as used herein means a structure that comprises one or more fibers. In one example, a fibrous structure according to the present invention means an orderly arrangement of fibers within a structure in order to perform a function. A bag of loose fibers is not a fibrous structure in accordance with the present invention.

"Non-woven fibrous structure" as used herein means a fibrous structure wherein fibers forming the fibrous structure are not orderly arranged by weaving and/or knitting the fibers together. In other words, non-woven fibrous structures do not include textiles and/or garments and/or apparel. The non-woven fibrous structures of the present invention are disposable (i.e., typically thrown away after one or two uses – unlike clothes, rags, cloths, etc.).

"Fiber" as used herein means an elongate physical structure having an apparent length greatly exceeding its apparent diameter, i.e. a length to diameter ratio of at least about 10. Fibers having a non-circular cross-section and/or tubular shape are common; the "diameter" in this case may be considered to be the diameter of a circle having cross-sectional area equal to the cross-sectional area of the fiber. More specifically, as used herein, "fiber" refers to fibrous structure-making fibers. The present invention contemplates the use of a variety of fibrous structure-making fibers, such as, for example, naturally-occurring fibers or synthetic (human-made) fibers, or any other suitable fibers, and any combination thereof.

"Naturally-occurring fibers" as used herein means animal fibers, mineral fibers, plant fibers (such as wood fibers, trichomes and/or seed hairs) and mixtures thereof. Animal fibers may, for example, be selected from the group consisting of: wool, silk and other naturally-occurring protein fibers and mixtures thereof. The plant fibers may, for example, be obtained directly from a plant. Nonlimiting examples of suitable plants include wood, cotton, cotton

linters, flax, sisal, abaca, hemp, hesperaloe, jute, bamboo, bagasse, kudzu, corn, sorghum, gourd, agave, loofah and mixtures thereof.

Wood fibers; often referred to as wood pulps include chemical pulps, such as kraft (sulfate) and sulfite pulps, as well as mechanical and semi-chemical pulps including, for example, groundwood, thermomechanical pulp, chemi-mechanical pulp (CMP), chemi-thermomechanical pulp (CTMP), neutral semi-chemical sulfite pulp (NSCS). Chemical pulps, however, may be preferred since they impart a superior tactile sense of softness to tissue sheets made therefrom. Pulps derived from both deciduous trees (hereinafter, also referred to as "hardwood") and coniferous trees (hereinafter, also referred to as "softwood") may be utilized. The hardwood and softwood fibers can be blended, or alternatively, can be deposited in layers to provide a stratified and/or layered web. U.S. Pat. Nos. 4,300,981 and U.S. Pat. No. 3,994,771 are incorporated herein by reference for the purpose of disclosing layering of hardwood and softwood fibers. Also applicable to the present invention are fibers derived from recycled paper, which may contain any or all of the above categories as well as other non-fibrous materials such as fillers and adhesives used to facilitate the original papermaking.

The wood fibers may be short (typical of hardwood fibers) or long (typical of softwood fibers). Nonlimiting examples of short fibers include fibers derived from a fiber source selected from the group consisting of Acacia, Eucalyptus, Maple, Oak, Aspen, Birch, Cottonwood, Alder, Ash, Cherry, Elm, Hickory, Poplar, Gum, Walnut, Locust, Sycamore, Beech, Catalpa, Sassafras, Gmelina, Albizia, Anthocephalus, and Magnolia. Nonlimiting examples of long fibers include fibers derived from Pine, Spruce, Fir, Tamarack, Hemlock, Cypress, and Cedar. Softwood fibers derived from the kraft process and originating from more-northern climates may be preferred.

In addition to the various wood fibers, other cellulosic fibers such as cotton linters, cotton and bagasse can be used in the fibrous structures of the present invention.

Synthetic (human-made) fibers ("non-naturally occurring fibers"), such as polymeric fibers, can also be used in the fibrous structures of the present invention. Elastomeric polymers, polypropylene, polyethylene, polyester, polyolefin, polyvinyl alcohol and nylon, which are obtained from petroleum sources, can be used. In addition, polymeric fibers comprising natural polymers, which are obtained from natural sources, such as starch sources, protein sources

and/or cellulose sources may be used in the fibrous structures of the present invention. The synthetic fibers may be produced by any suitable methods known in the art.

"Sanitary tissue product" as used herein means a soft, low density (i.e. < about 0.15 g/cm3) web useful as a wiping implement for post-urinary and post-bowel movement cleaning (toilet tissue), for otorhinolaryngological discharges (facial tissue), and multi-functional absorbent and cleaning uses (absorbent towels). The sanitary tissue product may be convolutedly wound upon itself about a core or without a core to form a roll of sanitary tissue product.

"Basis Weight" as used herein is the weight per unit area of a sample reported in lbs/3000 ft^2 or g/m^2. Basis weight is measured by preparing one or more samples of a certain area (m^2) and weighing the sample(s) of a fibrous structure according to the present invention and/or a paper product comprising such fibrous structure on a top loading balance with a minimum resolution of 0.01 g. The balance is protected from air drafts and other disturbances using a draft shield. Weights are recorded when the readings on the balance become constant. The average weight (g) is calculated and the average area of the samples (m^2). The basis weight (g/m^2) is calculated by dividing the average weight (g) by the average area of the samples (m^2).

"Caliper" or "Sheet Caliper" as used herein means the macroscopic thickness of a single-ply fibrous structure, web product or film according to the present invention. Caliper of a fibrous structure, web product or film according to the present invention is determined by cutting a sample of the fibrous structure, web product or film such that it is larger in size than a load foot loading surface where the load foot loading surface has a circular surface area of about 3.14 in^2. The sample is confined between a horizontal flat surface and the load foot loading surface. The load foot loading surface applies a confining pressure to the sample of 15.5 g/cm^2 (about 0.21 psi). The caliper is the resulting gap between the flat surface and the load foot loading surface. Such measurements can be obtained on a VIR Electronic Thickness Tester Model II available from Thwing-Albert Instrument Company, Philadelphia, PA. The caliper measurement is repeated and recorded at least five (5) times so that an average caliper can be calculated. The result is reported in millimeters.

In one example, a non-woven fibrous structure and/or sanitary tissue product comprising such fibrous structure may exhibit a sheet caliper of at least about 0.508 mm (20 mils) and/or at least about 0.762 mm (30 mils) and/or at least about 1.524 mm (60 mils).

The fibrous structures of the present invention and/or sanitary tissue products of the present invention may exhibit a wet caliper as measured by the Wet Caliper Test Method described herein of greater than 23 mils. In one example, the fibrous structure of the present invention and/or sanitary tissue product of the present invention exhibits a wet caliper of greater than about 24 mils and/or greater than about 25 mils and/or greater than about 26 mils and/or greater than about 27 mils up to about 45 mils and/or up to about 40 mils and/or up to about 35 mils and/or up to about 33 mils.

The fibrous structures of the present invention and/or sanitary tissue products of the present invention may exhibit a dry caliper as measured by the Dry Caliper Test Method described herein of greater than 31 mils. In one example, the fibrous structure of the present invention and/or sanitary tissue product of the present invention exhibits a dry caliper of greater than about 32 mils and/or greater than about 34 mils and/or greater than about 35 mils and/or greater than about 37 mils and/or greater than about 38 mils up to about 60 mils and/or up to about 50 mils and/or up to about 45 mils and/or up to about 43 mils.

"Density" or "Apparent density" as used herein means the mass per unit volume of a material. For fibrous structures, the density or apparent density can be calculated by dividing the basis weight of a fibrous structure sample by the caliper of the fibrous structure sample with appropriate conversions incorporated therein. Density and/or apparent density used herein has the units g/cm^3.

"Dry Tensile Strength" (or simply "Tensile Strength" as used herein) of a fibrous structure and/or sanitary tissue product is measured as follows. One (1) inch by five (5) inch (2.5 cm X 12.7 cm) strips of fibrous structure and/or sanitary tissue product are provided. The strip is placed on an electronic tensile tester Model 1122 commercially available from Instron Corp., Canton, Massachusetts in a conditioned room at a temperature of 73°F ± 4°F (about 28°C ± 2.2°C) and a relative humidity of 50% ± 10%. The crosshead speed of the tensile tester is 4.0 inches per minute (about 10.2 cm/minute) and the gauge length is 4.0 inches (about 10.2 cm). The Dry Tensile Strength can be measured in any direction by this method. The "Total Dry Tensile Strength" or "TDT" is the special case determined by the arithmetic total of MD and CD tensile strengths of the strips.

"Absorbent" and "absorbency" as used herein means the characteristic of the fibrous structure which allows it to take up and retain fluids, particularly water and aqueous solutions

and suspensions. In evaluating the absorbency of paper, not only is the absolute quantity of fluid a given amount of paper will hold significant, but the rate at which the paper will absorb the fluid is also. Absorbency is measured here in by the Horizontal Full Sheet (HFS) test method described in the Test Methods section herein. In one example, the fibrous structures and/or sanitary tissue products according to the present invention exhibit an HFS absorbency of greater than about 5 g/g and/or greater than about 8 g/g and/or greater than about 10 g/g up to about 100 g/g. In another nonlimiting example, the fibrous structures and/or sanitary tissue products according to the present invention exhibit an HFS absorbency of from about 12 g/g to about 30 g/g.

In one example, the fibrous structures of the present invention and/or sanitary tissue products of the present invention exhibit a VFS of greater than about 5 g/g and/or greater than about 8 g/g and/or greater than about 9.5 g/g and/or greater than about 9.6 g/g and/or greater than about 9.8 g/g and/or greater than about 10 g/g and/or greater than about 10.2 g/g and/or greater than about 10.4 g/g and/or greater than about 10.5 g/g up to about 20 g/g and/or up to about 14 g/g and/or up to about 12 g/g.

"Machine Direction" or "MD" as used herein means the direction parallel to the flow of the fibrous structure through the papermaking machine and/or product manufacturing equipment.

"Cross Machine Direction" or "CD" as used herein means the direction perpendicular to the machine direction in the same plane of the fibrous structure and/or paper product comprising the fibrous structure.

"Ply" or "Plies" as used herein means an individual fibrous structure optionally to be disposed in a substantially contiguous, face-to-face relationship with other plies, forming a multiple ply fibrous structure. It is also contemplated that a single fibrous structure can effectively form two "plies" or multiple "plies", for example, by being folded on itself.

As used herein, the articles "a" and "an" when used herein, for example, "an anionic surfactant" or "a fiber" is understood to mean one or more of the material that is claimed or described.

All percentages and ratios are calculated by weight unless otherwise indicated. All percentages and ratios are calculated based on the total composition unless otherwise indicated.

Unless otherwise noted, all component or composition levels are in reference to the active level of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources.

Non-woven Fibrous Structure

The fibrous structures of the present invention may be homogeneous or may be layered. If layered, the fibrous structures may comprise at least two and/or at least three and/or at least four and/or at least five layers.

In one example, the fibrous structure in accordance with the present invention may be selected from the group consisting of: through-air-dried fibrous structures, differential density fibrous structures, differential basis weight fibrous structures, wet laid fibrous structures, air laid fibrous structures, conventional dried fibrous structures, creped or uncreped fibrous structures, patterned-densified or non-patterned-densified fibrous structures, compacted or uncompacted, especially high bulk uncompacted, fibrous structures, other nonwoven fibrous structures comprising synthetic or multicomponent fibers, homogeneous or multilayered fibrous structures, double re-creped fibrous structures, uncreped fibrous structures, co-form fibrous structures and mixtures thereof.

The fibrous structures of the present invention and/or sanitary tissue products of the present invention may comprise a surface that comprises undulations.

The fibrous structures of the present invention and/or sanitary tissue products of the present invention may comprise an embossment.

In one example, an air laid fibrous structure of the present invention may be selected from the group consisting of thermal bonded air laid (TBAL) fibrous structures, latex bonded air laid (LBAL) fibrous structures and mixed bonded air laid (MBAL) fibrous structures.

The fibrous structures may exhibit a substantially uniform density or may exhibit differential density regions, in other words regions of high density compared to other regions within the patterned fibrous structure. Typically, when a fibrous structure is not pressed against a cylindrical dryer, such as a Yankee dryer, while the fibrous structure is still wet and supported by a through-air-drying fabric or by another fabric or when an air laid fibrous structure is not spot bonded, the fibrous structure typically exhibits a substantially uniform density.

The fibrous structure may be pattern densified. A pattern densified fibrous structure is characterized by having a relatively high-bulk field of relatively low fiber density and an array of

densified zones of relatively high fiber density. The high-bulk field is alternatively characterized as a field of pillow regions. The densified zones are alternatively referred to as knuckle regions. The densified zones may be discretely spaced within the high-bulk field or may be interconnected, either fully or partially, within the high-bulk field.

The fibrous structure may be uncompacted, non pattern-densified. The fibrous structure may be of a homogenous or multilayered construction. The fibrous structure may be made with a fibrous furnish that produces a single layer embryonic fibrous web or a fibrous furnish that produces a multi-layer embryonic fibrous web.

In one example, the fibrous structure of the present invention comprises 100% or about 100% by weight, on a dry fibrous structure basis of naturally occurring fibers, for example wood pulp fibers.

In another example, the fibrous structure of the present invention comprises from about 100% to about 10% and/or from about 100% to about 30% and/or from about 100% to about 50% and/or from about 100% to about 75% by weight, on a dry fibrous structure basis of naturally occurring fibers, for example wood pulp fibers. The other fibers, if any, in this type of fibrous structure may be non-naturally occurring fibers such as synthetic fibers, continuous, substantially continuous or staple synthetic fibers.

The fibrous structures of the present invention may comprise any suitable ingredients known in the art. Nonlimiting examples of suitable ingredients that may be included in the fibrous structures include permanent and/or temporary wet strength resins, dry strength resins, softening agents, wetting agents, lint resisting agents, absorbency-enhancing agents, immobilizing agents, especially in combination with emollient lotion compositions, antiviral agents including organic acids, antibacterial agents, polyol polyesters, antimigration agents, polyhydroxy plasticizers, opacifying agents, bonding agents, debonding agents, colorants, and mixtures thereof. Such ingredients, when present in the fibrous structure of the present invention, may be present at any level based on the dry weight of the fibrous structure. Typically, such ingredients, when present, may be present at a level of from about 0.001 to about 50% and/or from about 0.001 to about 20% and/or from about 0.01 to about 5% and/or from about 0.03 to about 3% and/or from about 0.1 to about 1.0% by weight, on a dry fibrous structure basis.

The fibrous structures of the present invention and/or sanitary tissue products of the present invention may exhibit a flex modulus of less than about 0.30 GM Bmean as measured by the Flex Modulus Test Method described herein. In one example, the fibrous structure of the present invention and/or sanitary tissues product of the present invention may exhibit a flex modulus of less than about 0.25 GM Bmean and/or less than about 0.24 GM Bmean and/or less than about 0.23 GM Bmean and/or to about 0.10 GM Bmean and/or to about 0.12 GM Bmean and/or to about 0.14 GM Bmean and/or to about 0.16 GM Bmean and/or to about 0.19 GM Bmean.

The fibrous structures of the present invention and/or sanitary tissue products comprising such fibrous structures may have a basis weight of less than about 120 g/m^2 and/or from about 10 g/m^2 to about 120 g/m^2 and/or from about 14 g/m^2 to about 80 g/m^2 and/or from about 20 g/m^2 to about 60 g/m^2.

The fibrous structures of the present invention and/or sanitary tissue products comprising such fibrous structures may have a total dry tensile strength of greater than about 59 g/cm (150 g/in) and/or from about 78 g/cm (200 g/in) to about 394 g/cm (1000 g/in) and/or from about 98 g/cm (250 g/in) to about 335 g/cm (850 g/in).

The fibrous structures of the present invention and/or sanitary tissue products comprising such fibrous structures may have a density of about 0.60 g/cc or less and/or about 0.30 g/cc or less and/or from about 0.04 g/cc to about 0.20 g/cc.

The fibrous structure of the present invention may be combined with one or more additional fibrous structures the same or different from the fibrous structure of the present invention to form a multi-ply sanitary tissue product. The additional fibrous structure may be combined with the fibrous structure of the present invention by any suitable means.

When combined with one or more additional fibrous structures, the same or different from the fibrous structures of the present invention to form a multi-ply sanitary tissue product, the tufts, if any, present in/on the fibrous structures may be oriented either inwardly such that the tufts do not form part of an external surface of the sanitary tissue product or outwardly such that the tufts do form part of an external surface of the sanitary tissue product. In one example, tufts of two different fibrous structures of the present invention of a multi-ply sanitary tissue product may contact one another by being oriented inwardly such that the tufts do not form part of an external surface of the sanitary tissue product. However, the tufts of the fibrous structures may

be separated from one another by one or more additional fibrous structures the same or different from the fibrous structures of the present invention. Alternatively, tufts of two different fibrous structures of the present invention of a multi-ply sanitary tissue product may be oriented differently, one fibrous structure having the tufts oriented outwardly such that the tufts form part of an external surface of the sanitary tissue product and one fibrous structure having tufts oriented inwardly such that the tufts do not form part of an external surface of the sanitary tissue product. In another example, tufts of two different fibrous structures of the present invention of a multi-ply sanitary tissue product may both be oriented outwardly such that the tufts form a part of the external surfaces of the sanitary tissue product.

The fibrous structure of the present invention and the additional fibrous structure may exhibit different stretch properties at peak load. For example the fibrous structure of the present invention may exhibit a stretch at peak load that is less than the stretch at peak load of the additional fibrous structure.

In other examples, the fibrous structure of the present invention or portions thereof may exhibit a greater stretch at peak load than the additional fibrous structure or portions thereof.

Processes for Making a Fibrous Structure

The non-woven fibrous structure and/or sanitary tissue product comprising such non-woven fibrous structure may be made from any suitable fibrous structure making process so long as the non-woven fibrous structure exhibits Flex Modulus, Wet Caliper, Dry Caliper and/or VFS properties that facilitate consumers of the fibrous structure to associate the fibrous structure with cloth.

Nonlimiting examples of processes for making non-woven fibrous structures of the present invention include known wet-laid papermaking processes, air-laid papermaking processes, meltblown fibrous structure making processes, spunbond fibrous structure making processes and coform fibrous structure making processes. For the wet-laid and/or air-laid processes, the processes typically include steps of preparing a fiber composition in the form of a suspension in a medium, either wet, more specifically aqueous medium, or dry, more specifically gaseous, i.e. with air as medium. The suspension of fibers is then deposited onto a forming wire or belt such that an embryonic fibrous structure comprising a plurality of fibers is formed. The embryonic fibrous structure (web) is then subjected to drying and/or bonding of fibers operation, which results in a non-woven web (which may also be the finished non-woven fibrous structure).

Further processing of the non-woven web may be carried out such that a finished non-woven fibrous structure is formed. For example, in typical papermaking processes, the finished fibrous structure is the fibrous structure that is wound on the reel at the end of papermaking, and may subsequently be converted into a finished product, e.g. a sanitary tissue product.

The fibrous structure may be subjected to one or more of the following process steps: 1) forming the web on a structured through-air-drying fabric, 2) foreshortening, 3) creping, 4) wet microcontracting, and/or 5) rush transferring. Alternatively, the web (e.g., fibrous structure) may not be foreshortened.

Fig. 4 shows a nonlimiting example of an apparatus and process for making a fibrous structure that exhibits Flex Modulus, Wet Caliper, Dry Caliper and/or VFS properties that facilitate consumers of the fibrous structure to associate the fibrous structure with cloth. The exemplified process is an example of a tuft generating operation. The apparatus 100 comprises a pair of intermeshing rolls 102 and 104, each rotating about an axis A, the axes A being parallel in the same plane. Roll 102 comprises a plurality of ridges 106 and corresponding grooves 108 which extend unbroken about the entire circumference of roll 102. Roll 104 is similar to roll 102, but rather than having ridges that extend unbroken about the entire circumference, roll 104 comprises a plurality of rows of circumferentially-extending ridges that have been modified to be rows of circumferentially-spaced teeth 110 that extend in spaced relationship about at least a portion of roll 104. The individual rows of teeth 110 of roll 104 are separated by corresponding grooves 112. In operation, rolls 102 and 104 intermesh such that the ridges 106 of roll 102 extend into the grooves 112 of roll 104 and the teeth 110 of roll 104 extend into the grooves 108 of roll 102. The intermeshing is shown in greater detail in the cross sectional representation of Fig. 5, discussed below.

In Fig. 4, the apparatus 100 is shown having one patterned roll, e.g., roll 104, and one non-patterned grooved roll 102. However, in certain examples it may be desirable to use two patterned rolls 104 having either the same or differing patterns, in the same or different corresponding regions of the respective rolls. Such an apparatus can produce fibrous structures with tufts protruding from both sides of the fibrous structure.

The process of the present invention is similar in many respects to a process as described in U.S. Pat. No. 5,518,801 entitled "Web Materials Exhibiting Elastic-Like Behavior" and referred to in subsequent patent literature as "SELF" webs, which stands for "Structural Elastic-

like Film". However, there are significant differences between the apparatus of the present invention and the apparatus disclosed in the above-identified '801 patent. These differences account for the novel features of the web of the present invention. As described below, the teeth 110 of roll 104 have a specific geometry associated with the leading and trailing edges that permit the teeth, e.g., teeth 110, to essentially "punch" through the fibrous structure 28 as opposed to, in essence, emboss the web. The difference in the apparatus 100 of the present invention results in a fundamentally different fibrous structure.

Fibrous structure 28 is provided either directly from a web making process or indirectly from a supply roll (neither shown) and moved in the machine direction to the nip 116 of counter-rotating intermeshing rolls 102 and 104. Fibrous structure 28 can be any suitable fibrous structure that exhibits or is capable of exhibiting sufficient stretch at peak load to permit formation of tufts in the fibrous structure. Fibrous structure 28 can be plasticized by any means known in the art, such as by subjecting the precursor web to a humid environment. As fibrous structure 28 goes through the nip 116 the teeth 110 of roll 104 enter grooves 108 of roll 102 and simultaneously urge fibers out of the plane of plane of fibrous structure 28 to form tufts 12 and discontinuities 22, not shown in Fig. 4. In effect, teeth 110 "push" or "punch" through fibrous structure 28. As the tip of teeth 110 push through fibrous structure 28 the portions of fibers that are oriented predominantly in the CD and across teeth 110 are urged by the teeth 110 out of the plane of fibrous structure 28 and are stretched, pulled, and/or plastically deformed in the z-axis, resulting in formation of the tuft 12. Fibers that are predominantly oriented generally parallel in the machine direction of fibrous structure 28 as shown in Fig. 4, are simply spread apart by teeth 110 and remain substantially in the non-tufted region of the fibrous structure 10. The number, spacing, and size of tufts can be varied by changing the number, spacing, and size of teeth 110 and making corresponding dimensional changes as necessary to roll 104 and/or roll 102. This variation, together with the variation possible in fibrous structures 28 and line speeds, permits many varied fibrous structures to be made for many purposes. For example, a fibrous structure made from a high basis weight textile fabric having MD and CD woven extensible threads could be made into a soft, porous ground covering, such as a cow carpet useful for reducing udder and teat problems in cows. A fibrous structure made from a relatively low basis weight nonwoven web of extensible spunbond polymer fibers could be used as a terry cloth-like fabric for semi-durable or durable clothing.

Fig. 5 shows in cross section a portion of the intermeshing rolls 102 and 104 including ridges 106 and teeth 110. As shown teeth 110 have a tooth height TH (note that TH can also be applied to ridge 106 height; in a preferred example tooth height and ridge height are equal), and a tooth-to-tooth spacing (or ridge-to-ridge spacing) referred to as the pitch P. As shown, depth of engagement E is a measure of the level of intermeshing of rolls 102 and 104 and is measured from tip of ridge 106 to tip of tooth 110. The depth of engagement E, tooth height TH, and pitch P can be varied as desired depending on the properties of the precursor web and the desired characteristics of fibrous structure. Also, the greater the density of the tufted regions desired (tufted regions per unit area of fibrous structure), the smaller the pitch should be, and the smaller the tooth length TL and tooth distance TD should be, as described below.

Fig. 6 shows one example of a roll 104 having a plurality of teeth 110 useful for making a fibrous structure of the present invention having a basis weight of less than about 120 g/m^2 and/or from about 10 g/m^2 to about 120 g/m^2 and/or from about 14 g/m^2 to about 100 g/m^2 and/or from about 20 g/m^2 to about 90 g/m^2 and/or from about 20 g/m^2 to about 60 g/m^2 and/or from about 25 g/m^2 to about 60 g/m^2. In one example, the resulting fibrous structure of the present invention exhibits a basis weight of from about 18 g/m^2 to about 50 g/m^2 and/or from about 15 g/m^2 to about 40 g/m^2. An enlarged view of teeth 110 shown in Fig. 6 is shown in Fig. 7. In this example of roll 104 teeth 110 have a uniform circumferential length dimension TL of about 1.25 mm measured generally from the leading edge LE to the trailing edge TE at the tooth tip 111, and are uniformly spaced from one another circumferentially by a distance TD of about 1.5 mm. For making a fibrous structure from a precursor web having a basis weight in the range of about 15 gsm to 100 gsm, teeth 110 of roll 104 can have a length TL ranging from about 0.5 mm to about 3 mm and a spacing TD from about 0.5 mm to about 3 mm, a tooth height TH ranging from about 0.5 mm to about 10 mm, and a pitch P between about 1 mm (0.040 inches) and 2.54 mm (0.100 inches). Depth of engagement E can be from about 0.5 mm to about 5 mm (up to a maximum approaching the tooth height TH). Of course, E, P, TH, TD and TL can each be varied independently of each other to achieve a desired size, spacing, and area density of tufts (number of tufts per unit area of fibrous structure).

As shown in Fig. 7, each tooth 110 has a tip 111, a leading edge LE and a trailing edge TE. The tooth tip 111 is elongated and has a generally longitudinal orientation, corresponding to

the longitudinal axes L of tufted regions. It is believed that to get the tufts of the fibrous structure that can be described as being terry cloth-like, the LE and TE should be very nearly orthogonal to the local peripheral surface 120 of roll 104. As well, the transition from the tip 111 and the LE or TE should be a sharp angle, such as a right angle, having a sufficiently small radius of curvature such that, in use the teeth 110 push through precursor web at the LE and TE. Without being bound by theory, it is believed that having relatively sharply angled tip transitions between the tip of tooth 110 and the LE and TE permits the teeth 110 to punch through precursor web "cleanly", that is, locally and distinctly, so that the resulting fibrous structure can be described as "tufted" in tufted regions rather than "embossed" for example. When so processed, the fibrous structure is not imparted with any particular elasticity, beyond what the precursor web may have possessed originally.

Although the fibrous structure of the present invention is disclosed in preferred examples as a single ply fibrous structure made from a single ply precursor web, it is not necessary that it be so. For example, a laminate or composite precursor web having two or more plies can be used so long as one of the plies is a fibrous structure according to the present invention. In general, the above description for the fibrous structure holds, recognizing that tufted, aligned fibers, for example, formed from a laminate precursor web would be comprised of fibers from both (or all) plies of the laminate. In such a fibrous structure, it is important, therefore, that all the fibers of all the plies have sufficient diameter, elongation characteristics, and fiber mobility, so as not to break prior to extension and tufting. In this manner, fibers from all the plies of the laminate may contribute to the tufts. In a multi-ply fibrous structure, the fibers of the different plies may be mixed or intermingled in the tuft and/or tufted regions. The fibers may not protrude through but combine with the fibers in an adjacent ply.

The fibrous structures of the present invention, in addition to being used as web products, may also be used for a wide variety of other applications. Nonlimiting examples of such other applications include various filter sheets such as air filter, bag filter, liquid filter, vacuum filter, water drain filter, and bacterial shielding filter; sheets for various electric appliances such as capacitor separator paper, and floppy disk packaging material; beach mat; various industrial sheets such as tacky adhesive tape base cloth, oil absorbing material, and paper felt; various wiper sheets such as wipers for homes, services and medical treatment, printing roll wiper, wiper

for cleaning copying machine, and wiper for optical systems; hygiene or personal cleansing wiper such as baby wipes, feminine wipes, facial wipes, or body wipes, various medicinal and sanitary sheets, such as surgical gown, gown, covering cloth, cap, mask, sheet, towel, gauze, base cloth for cataplasm, diaper, diaper core, diaper acquisition layer, diaper liner, diaper cover, base cloth for adhesive plaster, wet towel, and tissue; various sheets for clothes, such as padding cloth, pad, jumper liner, and disposable underwear; various life material sheets such as base cloth for artificial leather and synthetic leather, table top, wall paper, shoji-gami (paper for paper screen), blind, calendar, wrapping, and packages for drying agents, shopping bag, suit cover, and pillow cover; various agricultural sheets, such as cow carpets, cooling and sun light-shielding cloth, lining curtain, sheet for overall covering, light-shielding sheet and grass preventing sheet, wrapping materials of pesticides, underlining paper of pots for seeding growth; various protection sheets such as fume prevention mask and dust prevention mask, laboratory gown, and dust preventive clothes; various sheets for civil engineering building, such as house wrap, drain material, filtering medium, separation material, overlay, roofing, tuft and carpet base cloth, wall interior material, soundproof or vibration reducing sheet, and curing sheet; and various automobile interior sheets, such as floor mat and trunk mat, molded ceiling material, head rest, and lining cloth, in addition to a separator sheet in alkaline batteries.

Another advantage of the process described to produce the fibrous structures of the present invention is that the fibrous structures can be produced in-line with other fibrous structure production equipment. Additionally, there may be other solid state formation processes that can be used either prior to or after the process of the present invention. Nonlimiting examples of suitable solid state formation processes include printing, embossing, laminating, slitting, perforating, cutting edges, stacking, folding, mechanical softening, and the like.

As can be understood from the above description of the fibrous structures and methods for making such fibrous structure of the present invention, many various fibrous structures can be made without departing from the scope of the present invention as claimed in the appended claims. For example, fibrous structures can be coated or treated with lotions, medicaments, cleaning fluids, anti-bacterial solutions, emulsions, fragrances, surfactants.

Nonlimiting Examples

Example 1 – A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 70% NSK fibers, 20% Eucalyptus fibers and 10% Co-PET/PET (sheath/core) staple fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 17.1% wet microcontraction (i.e., a papermaking belt that transfers the web to a through-air-dried fabric is running faster than the through-air-dried fabric) and 19% crepe off a Yankee dryer. The fibrous structure is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.042". This tufted ply of fibrous structure is combined with a non-tufted ply of fibrous structure made by the same process except without passing through the tuft generating operation. The two plies are combined using an embossing process. The resulting fibrous structure is a non-woven fibrous structure that exhibits a flex modulus of 0.22 GM Bmean, a wet caliper of 30.5 mils, a dry caliper of 38.7 mils and a VFS of 10.4 g/g.

Example 2 – A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 70% NSK fibers, 20% Eucalyptus fibers and 10% Co-PET/PET (sheath/core) staple fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 17.1% wet microcontraction (i.e., a papermaking belt that transfers the web to a through-air-dried fabric is running faster than the through-air-dried fabric) and 19% crepe off a Yankee dryer. The fibrous structure is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.012". Two plies of the fibrous structures comprising tufts are combined using an embossing process. The resulting fibrous structure is a non-woven fibrous structure that exhibits a flex modulus of 0.25 GM Bmean, a wet caliper of 27.9 mils, a dry caliper of 29.3 mils and a VFS of 19.6 g/g.

Example 3 – A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 75% NSK fibers and 25% Eucalyptus fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The

fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 17.1% wet microcontraction (i.e., a papermaking belt that transfers the web to a through-air-dried fabric is running faster than the through-air-dried fabric) and 19% crepe off a Yankee dryer. The fibrous structure is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.042". This tufted ply of fibrous structure is combined with a non-tufted ply of fibrous structure made by the same process except without passing through the tuft generating operation. The two plies are combined using an embossing process. The resulting fibrous structure is a non-woven fibrous structure that exhibits a flex modulus of 0.22 GM Bmean, a wet caliper of 28.1 mils, a dry caliper of 39.8 mils and a VFS of 10.5 g/g.

Example 4 - A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 70% NSK fibers, 20% Eucalyptus fibers and 10% Co-PET/PET (sheath/core) staple fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 17.1% wet microcontraction (i.e., a papermaking belt that transfers the web to a through-air-dried fabric is running faster than the through-air-dried fabric) and 19% crepe off a Yankee dryer. Two plies of the fibrous structures are combined using an embossing process. The resulting fibrous structure is a non-woven fibrous structure that exhibits a flex modulus of 0.23 GM Bmean, a wet caliper of 27.3 mils, a dry caliper of 29.1 mils and a VFS of 19.4 g/g.

Example 5 – A fibrous structure in accordance with the present invention is made on a pilot wet-laid papermaking machine. A homogeneous blend of 75% NSK fibers and 25% Eucalyptus fibers is used to make the fibrous structure. 25#/ton of Kymene (permanent wet strength agent), 6#/ton carboxymethylcellulose and 4#/ton of DTDMAMS is mixed into the fiber slurry. The fibrous structure is formed on a three-dimensional molded through-air-dried belt. The papermaking machine is run at 3% wet microcontraction (i.e., a papermaking belt that transfers the web to a through-air-dried fabric is running faster than the through-air-dried fabric) and 10% crepe off a Yankee dryer. The fibrous structure is then passed through a tuft generating operation wherein the tuft generating roll has a depth of engagement of about 0.032". This tufted ply of fibrous structure is combined with a non-tufted ply of fibrous structure made by the

same process except without passing through the tuft generating operation. The two plies are combined using an embossing process. The resulting fibrous structure is a non-woven fibrous structure that exhibits a flex modulus of 0.22 GM Bmean, a wet caliper of 29.2 mils, a dry caliper of 35.8 mils and a VFS of 9.8 g/g.

TEST METHODS

Unless otherwise indicated, all tests described herein including those described under the Definitions section and the following test methods are conducted on samples that have been conditioned in a conditioned room at a temperature of 73°F ± 4°F (about 23°C ± 2.2°C) and a relative humidity of 50% ± 10% for 2 hours prior to the test. Further, all tests are conducted in such conditioned room. Tested samples should be subjected to 73°F ± 4°F (about 23°C ± 2.2°C) and a relative humidity of 50% ± 10% for 24 hours prior to testing.

Flex Modulus Test Method

The Flex Modulus is a measurement of the bending stiffness of the fibrous structure and/or sanitary tissue product comprising a fibrous structure herein. The following procedure can be used to determine the bending stiffness of paper product. The Kawabata Evaluation System-2, Pure Bending Tester (i.e.; KES-FB2, manufactured by a Division of Instrumentation, Kato Tekko Company, Ltd. of Kyoto, Japan) may be used for this purpose.

Samples of the paper product to be tested are cut to approximately 20×20 cm in the machine and cross machine direction. The sample width is measured to 0.01 inches (0.025 cm). The outer ply (i.e.; the ply that is facing outwardly on a roll of the paper sample) and inner ply as presented on the roll are identified and marked.

The sample is placed in the jaws of the KES-FB2 Auto A such that the sample is first bent with the outer ply undergoing compression and the inner ply undergoing tension. In the orientation of the KES-FB2 the outer ply is right facing and the inner ply is left facing. The distance between the front moving jaw and the rear stationary jaw is 1 cm. The sample is secured in the instrument in the following manner. First the front moving chuck and the rear stationary chuck are opened to accept the sample. The sample is inserted midway between the top and bottom of the jaws such that the machine direction of the sample is parallel to the jaws (i.e.; vertical in the KES-FB2 holder).

The rear stationary chuck is then closed by uniformly tightening the upper and lower thumb screws until the sample is snug, but not overly tight. The jaws on the front stationary

chuck are then closed in a similar fashion. The sample is adjusted for squareness in the chuck, then the front jaws are tightened to insure the sample is held securely. The distance (d) between the front chuck and the rear chuck is 1 cm.

The output of the instrument is load cell voltage (Vy) and curvature voltage (Vx). The load cell voltage is converted to a bending moment normalized for sample width (M) in the following manner:

Moment (M , gf*cm/cm)=($Vy*Sy*d$)/ W

where Vy is the load cell voltage; Sy is the instrument sensitivity in gf*cm/V; d is the distance between the chucks;and W is the sample width in centimeters.

The sensitivity switch of the instrument is set at 5×1. Using this setting the instrument is calibrated using two 50 gram weights. Each weight is suspended from a thread. The thread is wrapped around the bar on the bottom end of the rear stationary chuck and hooked to a pin extending from the front and back of the center of the shaft. One weight thread is wrapped around the front and hooked to the back pin. The other weight thread is wrapped around the back of the shaft and hooked to the front pin. Two pulleys are secured to the instrument on the right and left side. The top of the pulleys are horizontal to the center pin. Both weights are then hung over the pulleys (one on the left and one on the right) at the same time. The full scale voltage is set at 10 V. The radius of the center shaft is 0.5 cm. Thus the resultant full scale sensitivity (Sy) for the Moment axis is 100 gf*0.5 cm/10V (5 gf*cm/V).

The output for the Curvature axis is calibrated by starting the measurement motor and manually stopping the moving chuck when the indicator dial reaches the stop . The output voltage (Vx) is adjusted to 0.5 volts. The resultant sensitivity (Sx) for the curvature axis is 2/(volts*cm). The curvature (K) is obtained in the following manner:

Curvature (K , cm^{-1})= $Sx*Vx$

where Sx is the sensitivity of the curvature axis; and Vx is the output voltage.

For determination of the bending stiffness the moving chuck is cycled from a curvature of 0 cm^{-1} to +2.5 cm^{-1} to -2.5 cm^{-1} to 0 cm^{-1} at a rate of 0.5 cm^{-1} /sec. Each sample is cycled once. The output voltage of the instrument is recorded in a digital format using a personal computer. At the start of the test there is no tension on the sample. As the test begins the load cell begins to

experience a load as the sample is bent. The initial rotation is clockwise when viewed from the top down on the instrument.

The load continues to increase until the bending curvature reaches approximately +2.5 cm^{-1} (this is the Forward Bend (FB)). At approximately +2.5 cm^{-1} the direction of rotation was reversed. During the return the load cell reading decreases. This is the Forward Bend Return (FR). As the rotating chuck passes 0, curvature begins in the opposite direction. The Backward Bend (BB) and Backward Bend Return (BR) is obtained.

The data was analyzed in the following manner. A linear regression line is obtained between approximately 0.5 and 1.5 cm^{-1} for the Forward Bend (FB). The slope of the line is reported as the Bending Stiffness (B) or Flex Modulus, in units of $gf*cm^2/cm$. The method is repeated with the sample oriented such that the cross direction is parallel to the jaws. Three or more separate samples are run. The reported values are the geometric mean (GM) of the averages of the BFB on the MD and CD samples. Therefore, the GM Bmean is determined by the following equation: GM Bmean = $(MD_{average} \times CD_{average})^{1/2}$.

Wet Caliper Test Method

The Wet Caliper of a sample of fibrous structure and/or sanitary tissue product comprising a fibrous structure is determined by cutting a sample of the fibrous structure and/or sanitary tissue product comprising a fibrous structure such that it is larger in size than a load foot loading surface where the load foot loading surface has a circular surface area of about 3.14 in^2. Each sample is wetted by submerging the sample in a distilled water bath for 30 seconds. The caliper of the wet sample is measured within 30 seconds of removing the sample from the bath. The sample is then confined between a horizontal flat surface and the load foot loading surface. The load foot loading surface applies a confining pressure to the sample of 14.7 g/cm^2 (about 0.21 psi). The caliper is the resulting gap between the flat surface and the load foot loading surface. Such measurements can be obtained on a VIR Electronic Thickness Tester Model II available from Thwing-Albert Instrument Company, Philadelphia, PA. The caliper measurement is repeated and recorded at least five (5) times so that an average caliper can be calculated. The result is reported in mils.

Dry Caliper Test Method

The Dry Caliper of a sample of fibrous structure and/or sanitary tissue product comprising a fibrous structure is determined by cutting a sample of the fibrous structure and/or

sanitary tissue product comprising a fibrous structure such that it is larger in size than a load foot loading surface where the load foot loading surface has a circular surface area of about 3.14 in^2. The sample is confined between a horizontal flat surface and the load foot loading surface. The load foot loading surface applies a confining pressure to the sample of 14.7 g/cm^2 (about 0.21 psi). The caliper is the resulting gap between the flat surface and the load foot loading surface. Such measurements can be obtained on a VIR Electronic Thickness Tester Model II available from Thwing-Albert Instrument Company, Philadelphia, PA. The caliper measurement is repeated and recorded at least five (5) times so that an average caliper can be calculated. The result is reported in mils.

VFS Test Method

The Vertical Full Sheet (VFS) test method determines the amount of distilled water absorbed and retained by the fibrous structure sample and/or sanitary tissue product sample of the present invention after the sample has been wetted and drained in both a horizontal and vertical position. This method is performed by first weighing a sample of the fibrous structure and/or sanitary tissue product to be tested (referred to herein as the "dry weight of the sample"), then thoroughly wetting the sample, draining the wetted sample in a horizontal position, then in a vertical position and then reweighing (referred to herein as "wet weight of the sample"). The absorptive capacity of the sample is then computed as the amount of water retained in units of grams of water absorbed by the sample. When evaluating different fibrous structure samples and/or different sanitary tissue product samples, the same size of fibrous structure or sanitary tissue product is used for all samples tested.

The apparatus for determining the VFS capacity of fibrous structures and/or sanitary tissue products comprises the following: 1) An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sample tested (i.e.; a fibrous structure sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used; 2) A sample support rack and sample support cover is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to

form a grid of 0.5 inch squares (1.27 cm^2). The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The VFS test is performed in an environment maintained at 23± 1° C and 50± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23± 1 ° C to a depth of 3 inches (7.6 cm).

The fibrous structure sample and/or sanitary tissue product to be tested is carefully weighed on the balance to the nearest 0.01 grams. The dry weight of the sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). The sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched between the rack and cover) is submerged in the water reservoir. After the sample is submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain horizontally for 120±5 seconds, taking care not to excessively shake or vibrate the sample. While the sample is draining, the rack cover is carefully removed and all excess water is wiped from the support rack. The wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The gram per fibrous structure sample and/or sanitary tissue product sample absorptive capacity of the sample is defined as (wet weight of the sample - dry weight of the sample). The vertical full sheet absorbent capacity (VFS) is defined as: VFS = (wet weight of the sample - dry weight of the sample) / (dry weight of the sample) and has a unit of gram/gram.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm".

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention. To the extent that any meaning or definition of a term in this written document conflicts with any meaning or definition

of the term in a document incorporated by reference, the meaning or definition assigned to the term in this written document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed is:

1. A fibrous structure comprising a plurality of fibers, wherein the fibrous structure exhibits a combination of properties selected from the group consisting of:

a. a Wet Caliper of greater than 23 mils;

b. a Flex Modulus of less than 0.25 GM Bmean;

c. a VFS of greater than 9.6 g/g; and

d. a Dry Caliper of greater than 31 mils;

wherein when the Flex Modulus is less than 0.25 GM Bmean, the Wet Caliper is greater than 25 mils; wherein when the VFS is greater than 10.2 g/g, the Wet Caliper is greater than 23 mils; and wherein when the Dry Caliper is greater than 31 mils, the VFS is greater than 9.6 g/g.

2. The fibrous structure according to Claim 1 wherein the fibrous structure exhibits a basis weight of less than 120 g/m^2.

3. The fibrous structure according to any of the preceding claims wherein the fibrous structure comprises an embossment.

4. The fibrous structure according to any of the preceding claims wherein the fibrous structure comprises a tuft.

5. The fibrous structure according to any of the preceding claims wherein the fibrous structure comprises two or more regions that exhibit different densities.

6. The fibrous structure according to any of the preceding claims wherein the fibrous structure comprises a surface comprising undulations.

7. A single- or multi-ply sanitary tissue product comprising a fibrous structure according to any of the preceding claims, preferably wherein the sanitary tissue

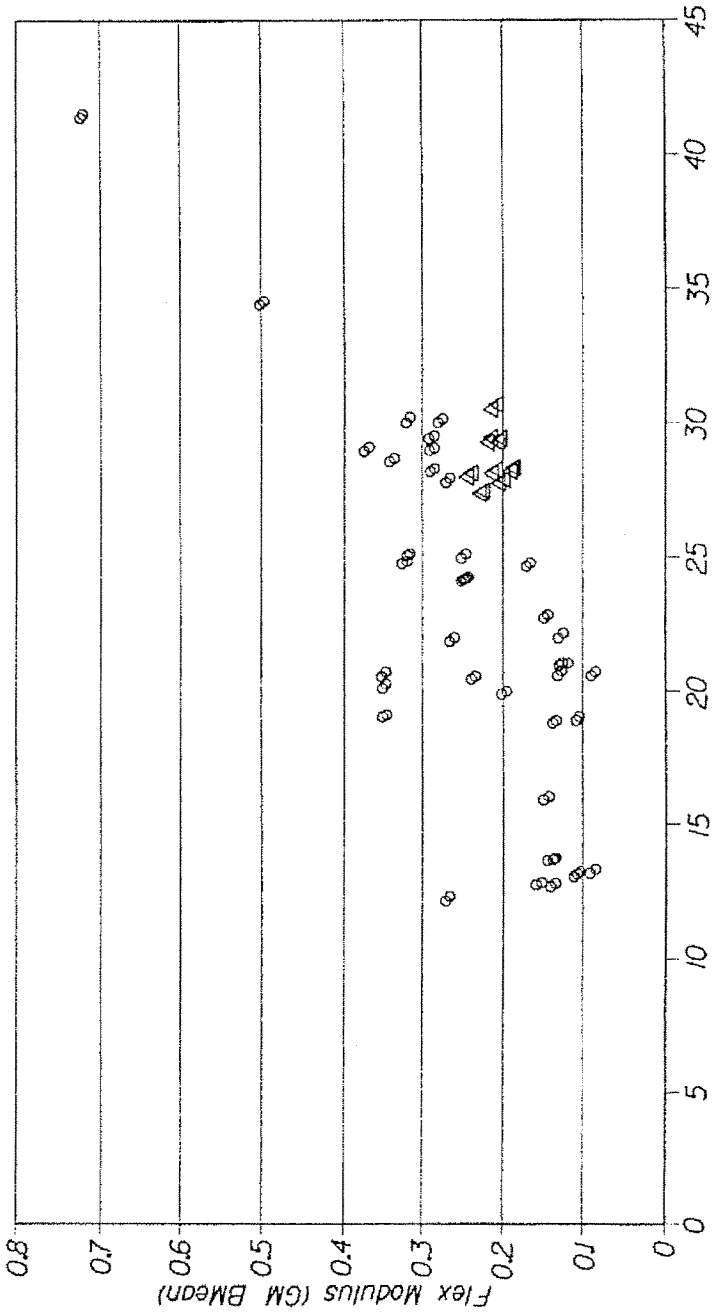
Flex Modulus (GM Bmean)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5
10
15
20
25
30
35
40
45
Wet Caliper (mils)
o Comp
Δ Invention

Fig. 1

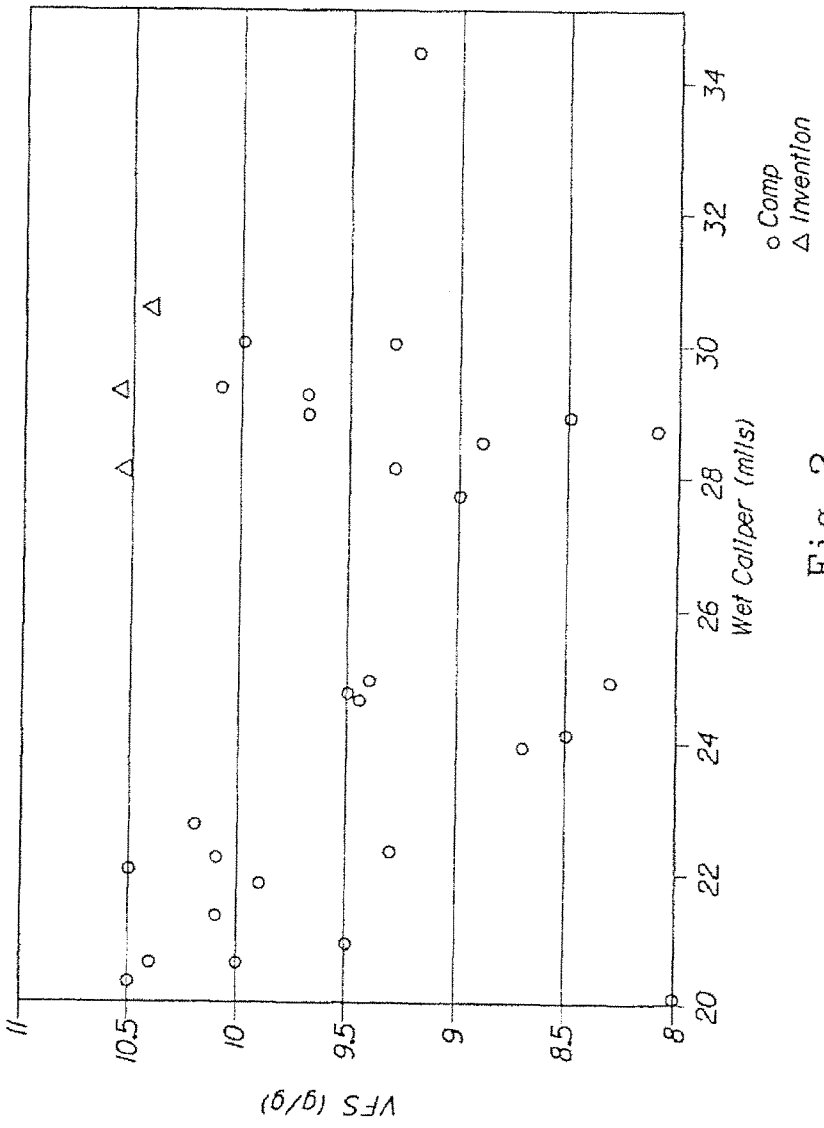
VFS (g/g)
11
10.5
10
9.5
9
8.5
8
Wet Caliper (mils)
20
22
24
26
28
30
32
34
o Comp
Δ Invention

Fig. 2

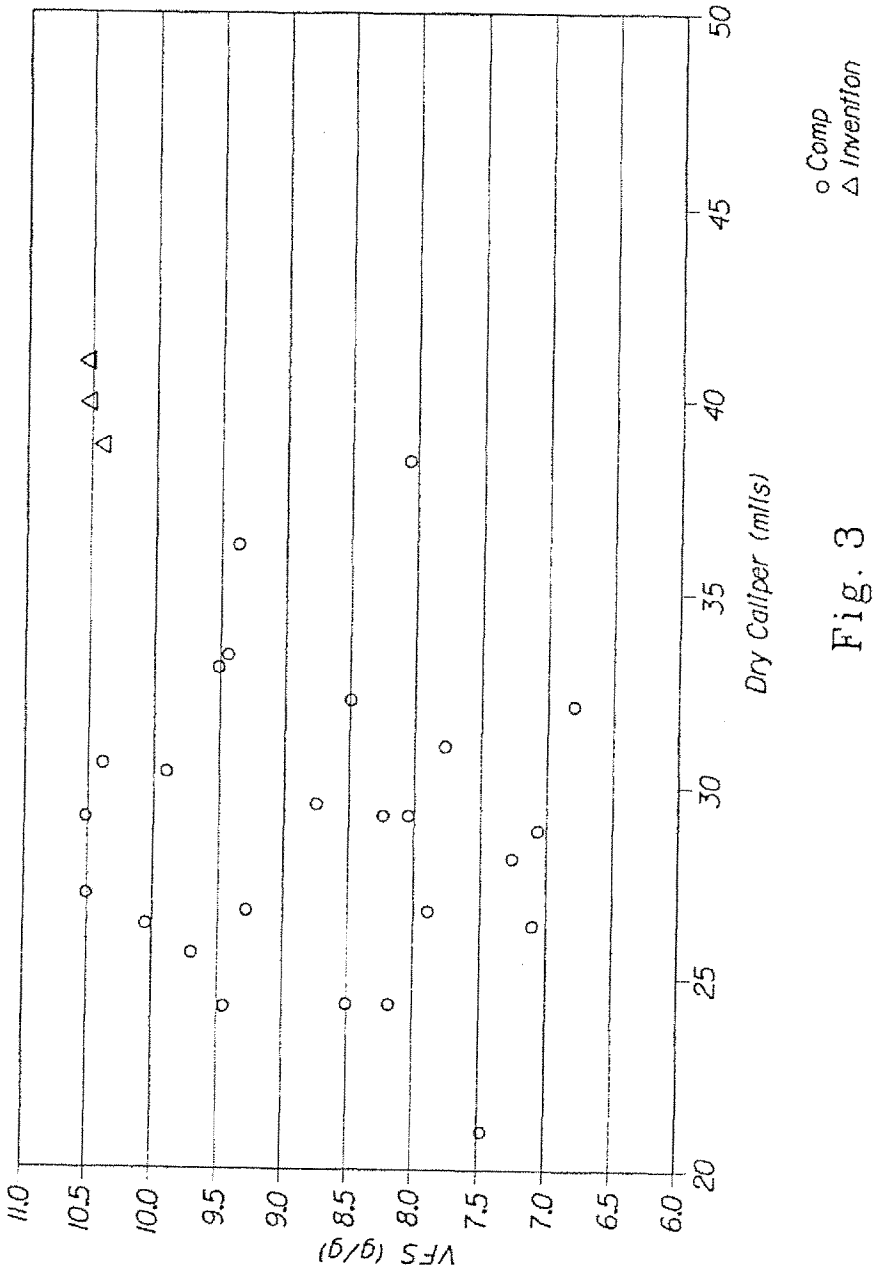
VFS (g/g)
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
Dry Caliper (mils)
20
25
30
35
40
45
50
o Comp
Δ Invention

Fig. 3

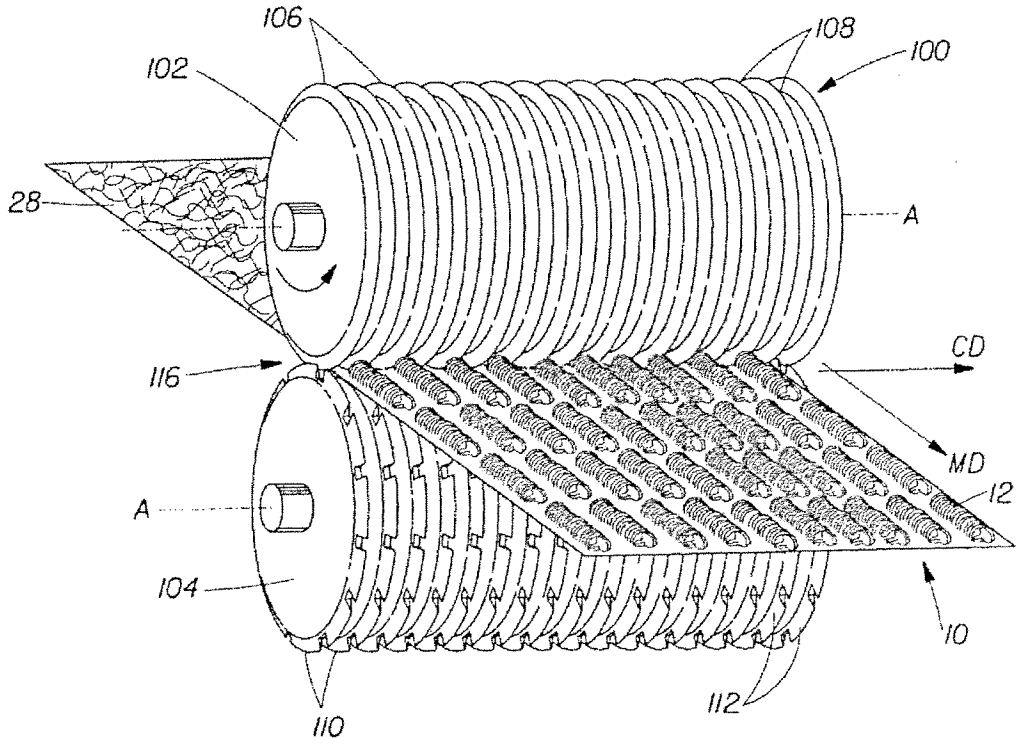

Fig. 4

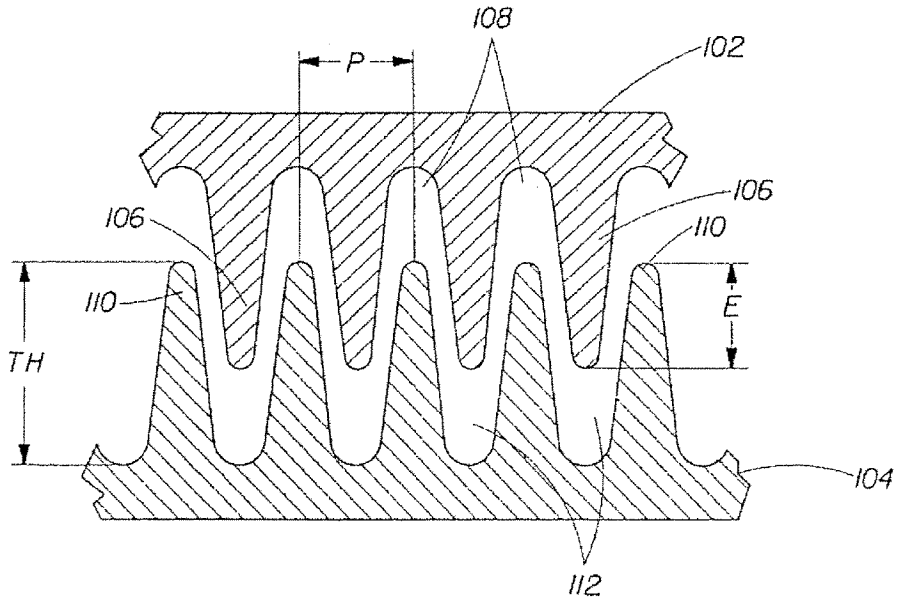

Fig. 5

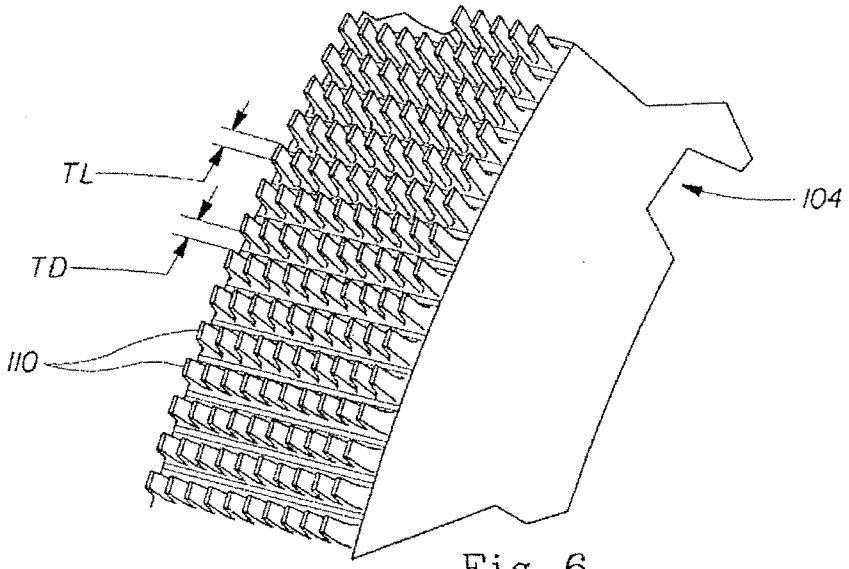

Fig. 6

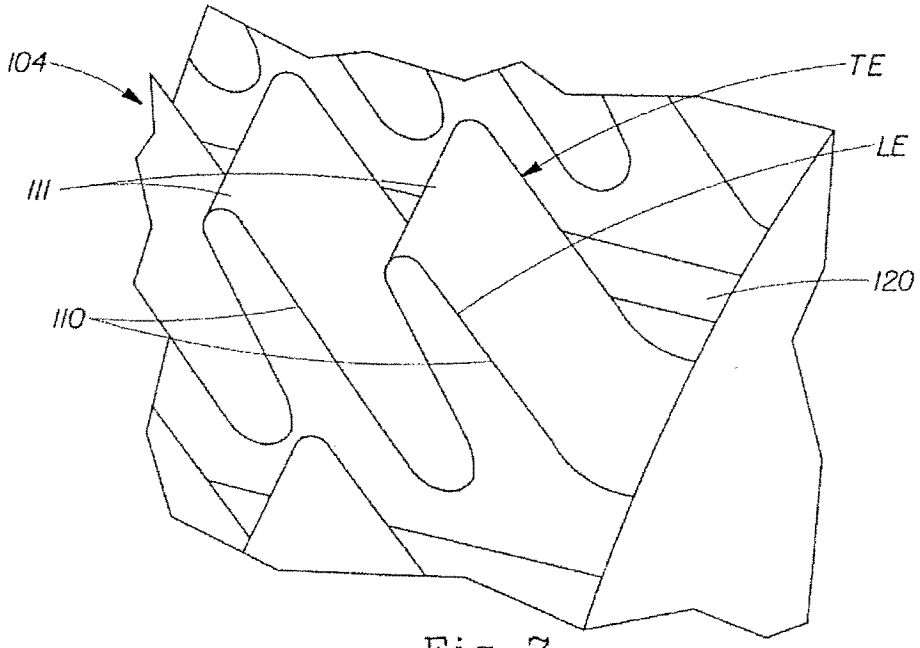

Fig. 7

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[Continued on next page]

(54) Title: PROCESS FOR MAKING FIBROUS STRUCTURES

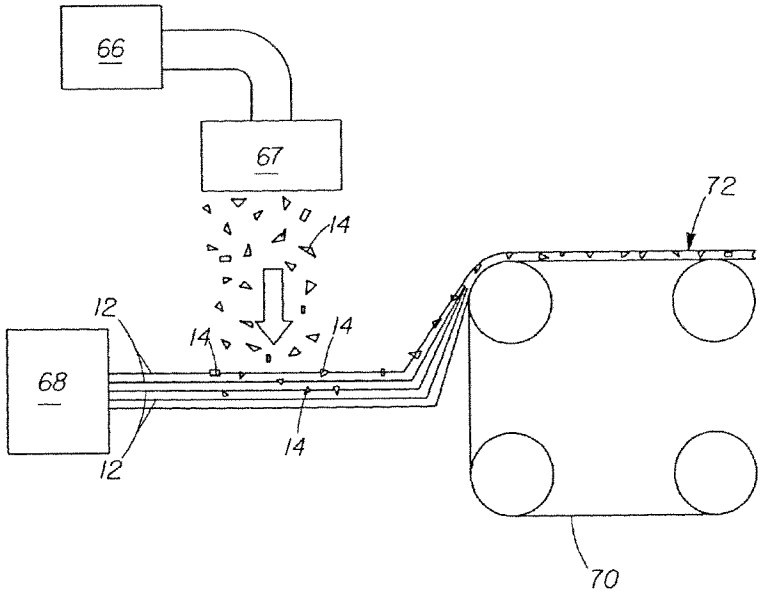

Fig. 10

(57) Abstract: Processes for making fibrous structures and more particularly processes for making fibrous structures comprising filaments are provided.

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PROCESS FOR MAKING FIBROUS STRUCTURES

FIELD OF THE INVENTION

The present invention relates to processes for making fibrous structures and more particularly to processes for making fibrous structures comprising filaments.

BACKGROUND OF THE INVENTION

Processes for making fibrous structures comprising filaments are known in the art. An example of such a known process is a co-form process.

Known co-form processes utilize a knife-edge die that comprises filament-forming holes. The filaments produced by the filament-forming holes are contacted after exiting by air. The air contacts the filaments at an angle of 30° to less than 90°, not parallel to or substantially parallel to the filament produced from the filament-forming holes.

The problem with current processes for making fibrous structures, especially processes that utilize knife-edge dies, is that the fibrous structures comprise filaments having a distribution of average filament diameters that does not optimize the properties, for example absorbency properties (such as absorption capacity and/or rate of absorption) of the fibrous structures.

Accordingly, there is a need for a process for making fibrous structures, especially fibrous structure that comprise filaments, that provide improved properties compared to fibrous structures produced by known processes for making fibrous structures, especially processes that utilize knife-edge dies.

SUMMARY OF THE INVENTION

The present invention solves the problem identified above by providing a process for making fibrous structures, especially fibrous structure that comprise filaments, that exhibit improved properties compared to fibrous structure produced by known processes for making fibrous structures, especially processes that utilize knife-edge dies.

In one example of the present invention, a process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying at least a first polymer to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. combining the filaments with solid additives to form a mixture; and

e. collecting the mixture on a collection device to produce a fibrous structure;

is provided.

In another example of the present invention, a process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying a polyolefin polymer to the die;

c. producing a plurality of filaments comprising the polyolefin polymer from the die;

d. combining the filaments with wood pulp fibers to form a mixture; and

e. collecting the mixture on a collection device to produce a fibrous structure;

is provided.

In yet another example of the present invention, a fibrous structure made by a process according to the present invention is provided.

Accordingly, the present invention provides a process for making fibrous structures, especially fibrous structure that comprise filaments, that exhibit improved properties compared to fibrous structure produced by known processes for making fibrous structures, especially processes that utilize knife-edge dies.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a Pore Volume Distribution graph of various fibrous structures, including a fibrous structure according to the present invention, showing the Ending Pore Radius of from 1μm to 1000μm and the Capacity of Water in Pores;

Fig. 2 is a Pore Volume Distribution graph of various fibrous structures, including a fibrous structure according to the present invention, showing the Ending Pore Radius of from 1μm to 300μm and the Capacity of Water in Pores;

Fig. 3 is a schematic representation of an example of a fibrous structure according to the present invention;

Fig. 4 is a schematic, cross-sectional representation of Fig. 3 taken along line 4-4;

Fig. 5 is a schematic representation of another example of a fibrous structure according to the present invention;

Fig. 6 is a schematic, cross-sectional representation of another example of a fibrous structure according to the present invention;

Fig. 7 is a schematic, cross-sectional representation of another example of a fibrous structure according to the present invention;

Fig. 8 is a schematic representation of another example of a fibrous structure in roll form according to the present invention;

Fig. 9 is a schematic representation of another example of a fibrous structure;

Fig. 10 is a schematic representation of an example of a process for making a fibrous structure according to the present invention;

Fig. 11 is a schematic representation of an example of a filament-forming hole and fluid-releasing hole from a suitable die useful in making a fibrous structure according to the present invention;

Fig. 12 is a scanning electromicrograph of a fibrous structure made by a known die;

Fig. 13 is a scanning electromicrograph of a fibrous structure made by a die according to the present invention;

Fig. 14 is a schematic representation of an example of a solid additive spreader useful in the processes of the present invention;

Fig. 15 is a schematic representation of another example of a solid additive spreader useful in the processes of the present invention;

Fig. 16 is a diagram of a support rack utilized in the HFS and VFS Test Methods described herein;

Fig. 17 is a diagram of a support rack cover utilized in the HFS and VFS Test Methods described herein.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

"Fibrous structure" as used herein means a structure that comprises one or more filaments and/or fibers. In one example, a fibrous structure according to the present invention means an orderly arrangement of filaments and/or fibers within a structure in order to perform a function. Nonlimiting examples of fibrous structures of the present invention include paper, fabrics

(including woven, knitted, and non-woven), and absorbent pads (for example for diapers or feminine hygiene products).

Nonlimiting examples of processes for making fibrous structures include known wet-laid papermaking processes and air-laid papermaking processes. Such processes typically include steps of preparing a fiber composition in the form of a suspension in a medium, either wet, more specifically aqueous medium, or dry, more specifically gaseous, i.e. with air as medium. The aqueous medium used for wet-laid processes is oftentimes referred to as a fiber slurry. The fibrous slurry is then used to deposit a plurality of fibers onto a forming wire or belt such that an embryonic fibrous structure is formed, after which drying and/or bonding the fibers together results in a fibrous structure. Further processing the fibrous structure may be carried out such that a finished fibrous structure is formed. For example, in typical papermaking processes, the finished fibrous structure is the fibrous structure that is wound on the reel at the end of papermaking, and may subsequently be converted into a finished product, e.g. a sanitary tissue product.

The fibrous structures of the present invention may be homogeneous or may be layered. If layered, the fibrous structures may comprise at least two and/or at least three and/or at least four and/or at least five layers.

The fibrous structures of the present invention may be co-formed fibrous structures.

"Co-formed fibrous structure" as used herein means that the fibrous structure comprises a mixture of at least two different materials wherein at least one of the materials comprises a filament, such as a polypropylene filament, and at least one other material, different from the first material, comprises a solid additive, such as a fiber and/or a particulate. In one example, a co-formed fibrous structure comprises solid additives, such as fibers, such as wood pulp fibers, and filaments, such as polypropylene filaments.

"Solid additive" as used herein means a fiber and/or a particulate.

"Particulate" as used herein means a granular substance or powder.

"Fiber" and/or "Filament" as used herein means an elongate particulate having an apparent length greatly exceeding its apparent width, i.e. a length to diameter ratio of at least about 10. For purposes of the present invention, a "fiber" is an elongate particulate as described above that exhibits a length of less than 5.08 cm (2 in.) and a "filament" is an elongate particulate as described above that exhibits a length of greater than or equal to 5.08 cm (2 in.).

Fibers are typically considered discontinuous in nature. Nonlimiting examples of fibers include wood pulp fibers and synthetic staple fibers such as polyester fibers.

Filaments are typically considered continuous or substantially continuous in nature. Filaments are relatively longer than fibers. Nonlimiting examples of filaments include meltblown and/or spunbond filaments. Nonlimiting examples of materials that can be spun into filaments include natural polymers, such as starch, starch derivatives, cellulose and cellulose derivatives, hemicellulose, hemicellulose derivatives, and synthetic polymers including, but not limited to polyvinyl alcohol filaments and/or polyvinyl alcohol derivative filaments, and thermoplastic polymer filaments, such as polyesters, nylons, polyolefins such as polypropylene filaments, polyethylene filaments, and biodegradable or compostable thermoplastic fibers such as polylactic acid filaments, polyhydroxyalkanoate filaments and polycaprolactone filaments. The filaments may be monocomponent or multicomponent, such as bicomponent filaments.

In one example of the present invention, "fiber" refers to papermaking fibers. Papermaking fibers useful in the present invention include cellulosic fibers commonly known as wood pulp fibers. Applicable wood pulps include chemical pulps, such as Kraft, sulfite, and sulfate pulps, as well as mechanical pulps including, for example, groundwood, thermomechanical pulp and chemically modified thermomechanical pulp. Chemical pulps, however, may be preferred since they impart a superior tactile sense of softness to tissue sheets made therefrom. Pulps derived from both deciduous trees (hereinafter, also referred to as "hardwood") and coniferous trees (hereinafter, also referred to as "softwood") may be utilized. The hardwood and softwood fibers can be blended, or alternatively, can be deposited in layers to provide a stratified web. U.S. Pat. No. 4,300,981 and U.S. Pat. No. 3,994,771 are incorporated herein by reference for the purpose of disclosing layering of hardwood and softwood fibers. Also applicable to the present invention are fibers derived from recycled paper, which may contain any or all of the above categories as well as other non-fibrous materials such as fillers and adhesives used to facilitate the original papermaking.

In addition to the various wood pulp fibers, other cellulosic fibers such as cotton linters, rayon, lyocell and bagasse can be used in this invention. Other sources of cellulose in the form of fibers or capable of being spun into fibers include grasses and grain sources.

"Sanitary tissue product" as used herein means a soft, low density (i.e. < about 0.15 g/cm3) web useful as a wiping implement for post-urinary and post-bowel movement cleaning (toilet tissue), for otorhinolaryngological discharges (facial tissue), and multi-functional absorbent and cleaning uses (absorbent towels). The sanitary tissue product may be convolutedly wound upon itself about a core or without a core to form a sanitary tissue product roll.

In one example, the sanitary tissue product of the present invention comprises a fibrous structure according to the present invention.

The sanitary tissue products of the present invention may exhibit a basis weight between about 10 g/m^2 to about 120 g/m^2 and/or from about 15 g/m^2 to about 110 g/m^2 and/or from about 20 g/m^2 to about 100 g/m^2 and/or from about 30 to 90 g/m^2. In addition, the sanitary tissue product of the present invention may exhibit a basis weight between about 40 g/m^2 to about 120 g/m^2 and/or from about 50 g/m^2 to about 110 g/m^2 and/or from about 55 g/m^2 to about 105 g/m^2 and/or from about 60 to 100 g/m^2.

The sanitary tissue products of the present invention may exhibit a total dry tensile strength of greater than about 59 g/cm (150 g/in) and/or from about 78 g/cm (200 g/in) to about 394 g/cm (1000 g/in) and/or from about 98 g/cm (250 g/in) to about 335 g/cm (850 g/in). In addition, the sanitary tissue product of the present invention may exhibit a total dry tensile strength of greater than about 196 g/cm (500 g/in) and/or from about 196 g/cm (500 g/in) to about 394 g/cm (1000 g/in) and/or from about 216 g/cm (550 g/in) to about 335 g/cm (850 g/in) and/or from about 236 g/cm (600 g/in) to about 315 g/cm (800 g/in). In one example, the sanitary tissue product exhibits a total dry tensile strength of less than about 394 g/cm (1000 g/in) and/or less than about 335 g/cm (850 g/in).

In another example, the sanitary tissue products of the present invention may exhibit a total dry tensile strength of greater than about 196 g/cm (500 g/in) and/or greater than about 236 g/cm (600 g/in) and/or greater than about 276 g/cm (700 g/in) and/or greater than about 315 g/cm (800 g/in) and/or greater than about 354 g/cm (900 g/in) and/or greater than about 394 g/cm (1000 g/in) and/or from about 315 g/cm (800 g/in) to about 1968 g/cm (5000 g/in) and/or from about 354 g/cm (900 g/in) to about 1181 g/cm (3000 g/in) and/or from about 354 g/cm (900 g/in) to about 984 g/cm (2500 g/in) and/or from about 394 g/cm (1000 g/in) to about 787 g/cm (2000 g/in).

The sanitary tissue products of the present invention may exhibit an initial total wet tensile strength of less than about 78 g/cm (200 g/in) and/or less than about 59 g/cm (150 g/in) and/or less than about 39 g/cm (100 g/in) and/or less than about 29 g/cm (75 g/in).

The sanitary tissue products of the present invention may exhibit an initial total wet tensile strength of greater than about 118 g/cm (300 g/in) and/or greater than about 157 g/cm (400 g/in) and/or greater than about 196 g/cm (500 g/in) and/or greater than about 236 g/cm (600 g/in) and/or greater than about 276 g/cm (700 g/in) and/or greater than about 315 g/cm (800

g/in) and/or greater than about 354 g/cm (900 g/in) and/or greater than about 394 g/cm (1000 g/in) and/or from about 118 g/cm (300 g/in) to about 1968 g/cm (5000 g/in) and/or from about 157 g/cm (400 g/in) to about 1181 g/cm (3000 g/in) and/or from about 196 g/cm (500 g/in) to about 984 g/cm (2500 g/in) and/or from about 196 g/cm (500 g/in) to about 787 g/cm (2000 g/in) and/or from about 196 g/cm (500 g/in) to about 591 g/cm (1500 g/in).

The sanitary tissue products of the present invention may exhibit a density (measured at 95 g/in^2) of less than about 0.60 g/cm^3 and/or less than about 0.30 g/cm^3 and/or less than about 0.20 g/cm^3 and/or less than about 0.10 g/cm^3 and/or less than about 0.07 g/cm^3 and/or less than about 0.05 g/cm^3 and/or from about 0.01 g/cm^3 to about 0.20 g/cm^3 and/or from about 0.02 g/cm^3 to about 0.10 g/cm^3.

The sanitary tissue products of the present invention may exhibit a total absorptive capacity of according to the Horizontal Full Sheet (HFS) Test Method described herein of greater than about 10 g/g and/or greater than about 12 g/g and/or greater than about 15 g/g and/or from about 15 g/g to about 50 g/g and/or to about 40 g/g and/or to about 30 g/g.

The sanitary tissue products of the present invention may exhibit a Vertical Full Sheet (VFS) value as determined by the Vertical Full Sheet (VFS) Test Method described herein of greater than about 5 g/g and/or greater than about 7 g/g and/or greater than about 9 g/g and/or from about 9 g/g to about 30 g/g and/or to about 25 g/g and/or to about 20 g/g and/or to about 17 g/g.

The sanitary tissue products of the present invention may be in the form of sanitary tissue product rolls. Such sanitary tissue product rolls may comprise a plurality of connected, but perforated sheets of fibrous structure, that are separably dispensable from adjacent sheets. In one example, one or more ends of the roll of sanitary tissue product may comprise an adhesive and/or dry strength agent to mitigate the loss of fibers, especially wood pulp fibers from the ends of the roll of sanitary tissue product.

The sanitary tissue products of the present invention may comprises additives such as softening agents, temporary wet strength agents, permanent wet strength agents, bulk softening agents, lotions, silicones, wetting agents, latexes, especially surface-pattern-applied latexes, dry strength agents such as carboxymethylcellulose and starch, and other types of additives suitable for inclusion in and/or on sanitary tissue products.

"Weight average molecular weight" as used herein means the weight average molecular weight as determined using gel permeation chromatography according to the protocol found in

Colloids and Surfaces A. Physico Chemical & Engineering Aspects, Vol. 162, 2000, pg. 107-121.

"Basis Weight" as used herein is the weight per unit area of a sample reported in lbs/3000 ft^2 or g/m^2.

"Machine Direction" or "MD" as used herein means the direction parallel to the flow of the fibrous structure through the fibrous structure making machine and/or sanitary tissue product manufacturing equipment.

"Cross Machine Direction" or "CD" as used herein means the direction parallel to the width of the fibrous structure making machine and/or sanitary tissue product manufacturing equipment and perpendicular to the machine direction.

"Ply" as used herein means an individual, integral fibrous structure.

"Plies" as used herein means two or more individual, integral fibrous structures disposed in a substantially contiguous, face-to-face relationship with one another, forming a multi-ply fibrous structure and/or multi-ply sanitary tissue product. It is also contemplated that an individual, integral fibrous structure can effectively form a multi-ply fibrous structure, for example, by being folded on itself.

"Total Pore Volume" as used herein means the sum of the fluid holding void volume in each pore range from 1μm to 1000μm radii as measured according to the Pore Volume Test Method described herein.

"Pore Volume Distribution" as used herein means the distribution of fluid holding void volume as a function of pore radius. The Pore Volume Distribution of a fibrous structure is measured according to the Pore Volume Test Method described herein.

As used herein, the articles "a" and "an" when used herein, for example, "an anionic surfactant" or "a fiber" is understood to mean one or more of the material that is claimed or described.

All percentages and ratios are calculated by weight unless otherwise indicated. All percentages and ratios are calculated based on the total composition unless otherwise indicated.

Unless otherwise noted, all component or composition levels are in reference to the active level of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources.

Fibrous Structure

It has surprisingly been found that the fibrous structures of the present invention exhibit a pore volume distribution unlike pore volume distributions of other known fibrous structures.

The fibrous structures of the present invention may comprise a plurality of filaments, a plurality of solid additives, such as fibers, and a mixture of filaments and solid additives.

As shown in Figs. 1 and 2, examples of fibrous structures according to the present invention as represented by plots A and B exhibit a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121μm to about 200μm and/or greater than about 50% of the total pore volume present in the fibrous structure exists in pores of radii of from about 101μm to about 200μm. The ranges of 101μm to 200μm and 121μm to 200μm are explicitly identified on the graph of Fig. 2. It should be noted that the value for the ending pore radius for the range of 101μm to 120μm is plotted at the ending pore radius; namely, 120μm. A similar result is shown on Fig. 2 for the value for the ending pore radius for the range of 121μm to 140μm, where the value is plotted at the ending pore radius; namely, 140μm. This data is also supported by the values present in Table 1 below.

Such fibrous structures have been found to exhibit consumer-recognizable beneficial absorbent capacity. In one example, the fibrous structures comprise a plurality of solid additives, for example fibers. In another example, the fibrous structures comprise a plurality of filaments. In yet another example, the fibrous structures comprise a mixture of filaments and solid additives, such as fibers.

As shown in Fig. 2, the examples of fibrous structures according to the present invention as represented by plots A and B may exhibit a bi-modal pore volume distribution such that the fibrous structure exhibits a pore volume distribution such that the greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121μm to about 200μm and greater than about 2% and/or greater than about 5% and/or greater than about 10% of the total pore volume present in the fibrous structure exists in pores of radii of less than about 100μm and/or less than about 80μm and/or less than about 50μm and/or from about 1μm to about 100μm and/or from about 5μm to about 75μm and/or 10μm to about 50μm.

A fibrous structure according to the present invention exhibiting a bi-modal pore volume distribution as described above provides beneficial absorbent capacity and absorbent rate as a result of the larger radii pores and beneficial surface drying as a result of the smaller radii pores.

Figs. 3 and 4 show schematic representations of an example of a fibrous structure in accordance with the present invention. As shown in Figs. 3 and 4, the fibrous structure 10 may be a co-formed fibrous structure. The fibrous structure 10 comprises a plurality of filaments 12, such as polypropylene fibers, and a plurality of solid additives, such as wood pulp fibers 14. The

filaments 12 may be randomly arranged as a result of the process by which they are spun and/or formed into the fibrous structure 10. The wood pulp fibers 14, may be randomly dispersed throughout the fibrous structure 10 in the x-y plane. The wood pulp fibers 14 may be non-randomly dispersed throughout the fibrous structure in the z-direction. In one example (not shown), the wood pulp fibers 14 are present at a higher concentration on one or more of the exterior, x-y plane surfaces than within the fibrous structure along the z-direction.

As shown in Fig. 5, another example of a fibrous structure in accordance with the present invention is a layered fibrous structure 10'. The layered fibrous structure 10' comprises a first layer 16 comprising a plurality of filaments 12, such as polypropylene filaments, and a plurality of solid additives, in this example wood pulp fibers 14. The layered fibrous structure 10' further comprises a second layer 18 comprising a plurality of filaments 20, such as polypropylene filaments. In one example, the first and second layers 16, 18, respectively, are sharply defined zones of concentration of the filaments and/or solid additives. The plurality of filaments 20 may be deposited directly onto a surface of the first layer 16 to form a layered fibrous structure that comprises the first and second layers 16, 18, respectively.

Further, the layered fibrous structure 10' may comprise a third layer 22, as shown in Fig. 5. The third layer 22 may comprise a plurality of filaments 24, which may be the same or different from the filaments 20 in the second and/or first layers 18, 16. As a result of the addition of the third layer 22, the first layer 16 is positioned, for example sandwiched, between the second layer 18 and the third layer 22. The plurality of filaments 24 may be deposited directly onto a surface of the first layer 16, opposite from the second layer, to form the layered fibrous structure 10' that comprises the first, second and third layers 16, 18, 22, respectively.

As shown in Fig. 6, a cross-sectional schematic representation of another example of a fibrous structure in accordance with the present invention comprising a layered fibrous structure 10" is provided. The layered fibrous structure 10" comprises a first layer 26, a second layer 28 and optionally a third layer 30. The first layer 26 comprises a plurality of filaments 12, such as polypropylene filaments, and a plurality of solid additives, such as wood pulp fibers 14. The second layer 28 may comprise any suitable filaments, solid additives and/or polymeric films. In one example, the second layer 28 comprises a plurality of filaments 34. In one example, the filaments 34 comprise a polymer selected from the group consisting of: polysaccharides, polysaccharide derivatives, polyvinylalcohol, polyvinylalcohol derivatives and mixtures thereof.

In another example of a fibrous structure in accordance with the present invention, instead of being layers of fibrous structure 10", the material forming layers 26, 28 and 30, may be in the

form of plies wherein two or more of the plies may be combined to form a fibrous structure. The plies may be bonded together, such as by thermal bonding and/or adhesive bonding, to form a multi-ply fibrous structure.

Another example of a fibrous structure of the present invention in accordance with the present invention is shown in Fig. 7. The fibrous structure 10"' may comprise two or more plies, wherein one ply 36 comprises any suitable fibrous structure in accordance with the present invention, for example fibrous structure 10 as shown and described in Figs. 3 and 4 and another ply 38 comprising any suitable fibrous structure, for example a fibrous structure comprising filaments 40, such as polypropylene filaments. The fibrous structure of ply 38 may be in the form of a net and/or mesh and/or other structure that comprises pores that expose one or more portions of the fibrous structure 10 to an external environment and/or at least to liquids that may come into contact, at least initially, with the fibrous structure of ply 38. In addition to ply 38, the fibrous structure 10"' may further comprise ply 42. Ply 42 may comprise a fibrous structure comprising filaments 44, such as polypropylene filaments, and may be the same or different from the fibrous structure of ply 38.

Two or more of the plies 36, 38 and 42 may be bonded together, such as by thermal bonding and/or adhesive bonding, to form a multi-ply fibrous structure. After a bonding operation, especially a thermal bonding operation, it may be difficult to distinguish the plies of the fibrous structure 10"' and the fibrous structure 10"' may visually and/or physically be a similar to a layered fibrous structure in that one would have difficulty separating the once individual plies from each other. In one example, ply 36 may comprise a fibrous structure that exhibits a basis weight of at least about 15 g/m^2 and/or at least about 20 g/m^2 and/or at least about 25 g/m^2 and/or at least about 30 g/m^2 up to about 120 g/m^2 and/or 100 g/m^2 and/or 80 g/m^2 and/or 60 g/m^2 and the plies 38 and 42, when present, independently and individually, may comprise fibrous structures that exhibit basis weights of less than about 10 g/m^2 and/or less than about 7 g/m^2 and/or less than about 5 g/m^2 and/or less than about 3 g/m^2 and/or less than about 2 g/m^2 and/or to about 0 g/m^2 and/or 0.5 g/m^2.

Plies 38 and 42, when present, may help retain the solid additives, in this case the wood pulp fibers 14, on and/or within the fibrous structure of ply 36 thus reducing lint and/or dust (as compared to a single-ply fibrous structure comprising the fibrous structure of ply 36 without the plies 38 and 42) resulting from the wood pulp fibers 14 becoming free from the fibrous structure of ply 36.

The fibrous structures of the present invention may comprise any suitable amount of filaments and any suitable amount of solid additives. For example, the fibrous structures may comprise from about 10% to about 70% and/or from about 20% to about 60% and/or from about 30% to about 50% by dry weight of the fibrous structure of filaments and from about 90% to about 30% and/or from about 80% to about 40% and/or from about 70% to about 50% by dry weight of the fibrous structure of solid additives, such as wood pulp fibers.

The filaments and solid additives of the present invention may be present in fibrous structures according to the present invention at weight ratios of filaments to solid additives of from at least about 1:1 and/or at least about 1:1.5 and/or at least about 1:2 and/or at least about 1:2.5 and/or at least about 1:3 and/or at least about 1:4 and/or at least about 1:5 and/or at least about 1:7 and/or at least about 1:10.

The fibrous structures of the present invention and/or any sanitary tissue products comprising such fibrous structures may be subjected to any post-processing operations such as embossing operations, printing operations, tuft-generating operations, thermal bonding operations, ultrasonic bonding operations, perforating operations, surface treatment operations such as application of lotions, silicones and/or other materials and mixtures thereof.

Any hydrophobic or non-hydrophilic materials within the fibrous structure, such as polypropylene filaments, may be surface treated and/or melt treated with a hydrophilic modifier. Nonlimiting examples of surface treating hydrophilic modifiers include surfactants, such as Triton X-100. Nonlimiting examples of melt treating hydrophilic modifiers that are added to the melt, such as the polypropylene melt, prior to spinning filaments, include hydrophilic modifying melt additives such as VW351 commercially available from Polyvel, Inc. and Irgasurf commercially available from Ciba. The hydrophilic modifier may be associated with the hydrophobic or non-hydrophilic material at any suitable level known in the art. In one example, the hydrophilic modifier is associated with the hydrophobic or non-hydrophilic material at a level of less than about 20% and/or less than about 15% and/or less than about 10% and/or less than about 5% and/or less than about 3% to about 0% by dry weight of the hydrophobic or non-hydrophilic material.

The fibrous structures of the present invention may include optional additives, each, when present, at individual levels of from about 0% and/or from about 0.01% and/or from about 0.1% and/or from about 1% and/or from about 2% to about 95% and/or to about 80% and/or to about 50% and/or to about 30% and/or to about 20% by dry weight of the fibrous structure. Nonlimiting examples of optional additives include permanent wet strength agents, temporary

wet strength agents, dry strength agents such as carboxymethylcellulose and/or starch, softening agents, lint reducing agents, opacity increasing agents, wetting agents, odor absorbing agents, perfumes, temperature indicating agents, color agents, dyes, osmotic materials, microbial growth detection agents, antibacterial agents and mixtures thereof.

The fibrous structure of the present invention may itself be a sanitary tissue product. It may be convolutedly wound about a core to form a roll. It may be combined with one or more other fibrous structures as a ply to form a multi-ply sanitary tissue product. In one example, a co-formed fibrous structure of the present invention may be convolutedly wound about a core to form a roll of co-formed sanitary tissue product. The rolls of sanitary tissue products may also be coreless.

As shown in Fig. 8, a fibrous structure roll 46 comprising a fibrous structure, such as a fibrous structure according to the present invention, comprises end edges 48, 50. At least one of the end edges 48, 50 comprises a bond region 52. The bond region 52 may comprise a plurality of bond subregions (not shown) that are present at a frequency of at least about 10 and/or at least about 50 and/or at least about 100 and/or at least about 200 per inch, such as dots per inch (dpi). In one example, the bond region 52 may cover the entire or substantially the entire surface area of the end edge 48. In one example, the bond region 52 comprises greater than about 20% and/or greater than about 25% and/or greater than about 30% and/or greater than about 50% of the total surface area of the end edge 48. In one example, the bond region 52 is a film that comprises the entire or substantially entire total surface area of the end edge 48. In another example, the bond region 52 is present on a non-lotioned fibrous structure.

The bond region 52 may comprise a bonding agent selected from chemical agents and/or mechanical agents. Nonlimiting examples of chemical agents include dry strength agents and wet strength agents and mixtures thereof. The mechanical agents may be in the form of a liquid and/or a solid. A liquid mechanical agent may be an oil. A solid mechanical agent may be a wax.

The bond region 52 may comprise different types of bonding agents and/or bonding agents that are chemically different from the filaments and/or fibers present in the fibrous structure. In one example, the material comprises a bonding agent, such as a dry strength resin such as a polysaccharide and/or a polysaccharide derivative and temporary and permanent wet strength resins. Nonlimiting examples of suitable bonding agents include latex dispersions, polyvinyl alcohol, Parez®, Kymene®, carboxymethylcellulose and starch.

As shown in Fig. 9, a fibrous structure 54 in accordance with the present invention may comprise edges 56, 58, 60, 62. One or more of the edges 56, 58, 60, 62 may comprise a bond region 64. The bond region 64 may extend inwardly from the edge 56, for example less than about 1 cm and/or less than about 0.5 cm. Any of the edges may comprise such a bond region. The bond region 64 may comprise a plurality of bond subregions (not shown) that are present at a frequency of at least 10 and/or at least 50 and/or at least 100 and/or at least 200 per inch, such as dots per inch (dpi). The bond region 64 may comprise a material chemically different from the filaments and/or fibers present in the fibrous structure. In one example, the material comprises a bonding agent, such as a dry strength resin such as a polysaccharide and/or a polysaccharide derivative. Nonlimiting examples of suitable bonding agents include carboxymethylcellulose and starch

To further illustrate the fibrous structures of the present invention, Table 1 sets forth the average pore volume distributions of known and/or commercially available fibrous structures and a fibrous structure in accordance with the present invention.

Table 1

Pore Radius (μm)	Huggies®	Huggies® Wash Cloth	Duramax	Concert EBT.055.1010 TBAL	LBAL-DUNI embossed	Bounty®	Invention Example A	Invention Example B
1	0	0	0	0	0	0	0	0
2.5	19.25	29.6	32.4	33.65	34.4	31.1	19.55	15.85
5	11.65	16.1	17.85	18.1	18.25	17.6	12.4	7.95
10	11.7	12.6	28.5	14.4	14.75	32.8	10.35	6.45
15	7.95	7.05	101.7	8.65	8.5	52.3	6.45	3.2
20	7.15	4.65	62.7	6.45	6.4	36.7	3.8	2.45
30	31.35	6.45	91.55	9.1	9.55	54	7.1	3.65
40	110.4	5.5	82.1	26.3	127.25	47.8	6.4	3.4
50	133.05	6.5	77.35	65.95	71.4	43.6	6.5	4.6
60	200.1	96.55	70.5	74.7	59.95	38.9	7.5	6.55
70	302.45	144.85	61.65	70.25	69.05	36.3	13.85	11.3
80	336.9	132.35	56.05	102.05	95.05	33.9	150.85	63.15
90	250.9	150.8	49.3	174.05	150.1	33	137.5	128
100	160.15	162.8	48.3	293	232.9	32.2	143.35	129.25
120	172.8	394.1	95.6	693.4	464.15	64.7	359.75	306.05
140	85.1	451.7	89.5	162.55	176.45	68.5	578.8	521.95
160	54	505.45	76.6	19.35	49.6	74.8	485.85	613.35
180	37.3	509.7	63.45	10.15	24.3	78.5	257.65	243.3
200	30.15	450.95	50	8.2	18.55	89.2	108.7	69.15
225	28.2	409.15	51.6	8.5	18.95	134.4	56.15	32.55

250	22.85	245.2	44	7.5	16.25	149.8	32.3	20.6
275	22.15	144.1	40.25	2.7	14.9	157.9	22.75	13.75
300	18.4	101.3	35.95	10.05	13.75	125.7	24.6	7.9
350	29.95	153.2	60.7	10.9	25.4	145	41.95	24.45
400	24.25	141.7	59.25	9.65	26.65	52.4	40.55	17.55
500	45.6	271.15	266.45	15.75	116.85	56	51.45	31.05
600	34.3	230.95	291.9	14.5	71.3	23.9	33.45	27.95
800	46.65	261.6	162.4	24.3	34.25	34.9	45.35	32.6
1000	38.75	112.55	29.15	24.9	30.35	24.9	34.6	25.55
Total	2273.45	5158.6	2196.75	1919.05	1999.25	1770.8	2699.5	2373.55
101-200 μm	16.7%	44.8%	17.1%	46.6%	36.7%	21.2%	66.3%	73.9%
121-200 μm	9.1%	37.2%	12.7%	10.4%	13.5%	17.6%	53.0%	61.0%

The fibrous structures of the present invention may exhibit a unique combination of fibrous structure properties that do not exist in known fibrous structures. For example, the fibrous structures may exhibit a VFS of greater than about 11 g/g and/or greater than about 12 g/g and/or greater than about 13 g/g and/or greater than about 14 g/g and/or less than about 50 g/g and/or less than about 40 g/g and/or less than about 30 g/g and/or less than about 20 g/g and/or from about 11 g/g to about 50 g/g and/or from about 11 g/g to about 40 g/g and/or from about 11 g/g to about 30 g/g and/or from about 11 g/g to about 20 g/g.

In addition to the VFS property, the fibrous structures of the present invention may exhibit a Dry CD Tensile Modulus of less than about 1500 g/cm and/or less than about 1400 g/cm and/or less than about 1300 g/cm and/or less than about 1100 g/cm and/or less than about 1000 g/cm and/or less than about 800 g/cm and/or greater than about 50 g/cm and/or greater than about 100 g/cm and/or greater than about 300 g/cm and/or from about 50 g/cm to about 1500 g/cm and/or from about 100 g/cm to about 1400 g/cm and/or from about 100 g/cm to about 1300 g/cm.

In addition to the VFS property and/or the Dry CD Tensile Modulus property, the fibrous structures of the present invention may exhibit a Wet CD TEA of greater than about 35 (g · in)/in^2 and/or greater than about 50 (g · in)/in^2 and/or greater than about 75 (g · in)/in^2 and/or greater than about 90 (g · in)/in^2 and/or greater than about 150 (g · in)/in^2 and/or greater than about 175 (g · in)/in^2 and/or less than about 500 (g · in)/in^2 and/or less than about 400 (g · in)/in^2 and/or less than about 350 (g · in)/in^2 and/or less than about 300 (g · in)/in^2 and/or from about 35 (g · in)/in^2 to about 500 (g · in)/in^2 and/or from about 35 (g · in)/in^2 to about 400 (g · in)/in^2 and/or

from about 50 (g · in)/in^2 to about 350 (g · in)/in^2 and/or from about 75 (g · in)/in^2 to about 300 (g · in)/in^2.

In addition to the VFS property and/or the Dry CD Tensile Modulus property and/or the Wet CD TEA, the fibrous structures of the present invention may exhibit a Wet MD TEA of greater than about 40 (g · in)/in^2 and/or greater than about 50 (g · in)/in^2 and/or greater than about 75 (g · in)/in^2 and/or greater than about 90 (g · in)/in^2 and/or greater than about 150 (g · in)/in^2 and/or greater than about 175 (g · in)/in^2 and/or less than about 500 (g · in)/in^2 and/or less than about 400 (g · in)/in^2 and/or less than about 350 (g · in)/in^2 and/or less than about 300 (g · in)/in^2 and/or from about 40 (g · in)/in^2 to about 500 (g · in)/in^2 and/or from about 35 (g · in)/in^2 to about 400 (g · in)/in^2 and/or from about 50 (g · in)/in^2 to about 350 (g · in)/in^2 and/or from about 75 (g · in)/in^2 to about 300 (g · in)/in^2.

In one example of the fibrous structures of the present invention, the fibrous structure exhibits a VFS of greater than about 11 g/g and one or more of the following: a Dry CD Tensile Modulus of less than about 1500 g/cm and/or a Wet CD TEA of greater than about 35 (g · in)/in^2 and/or a Wet MD TEA of greater than about 40 (g · in)/in^2.

The values of these properties associated with a fibrous structure are determined according to the respective test methods described herein.

To further illustrate the fibrous structures of the present invention, Table 2 sets forth certain properties of known and commercially available fibrous structures and a fibrous structure in accordance with the present invention.

Table 2

Property	Duramax®	Viva® (Wetlaid)	Viva® (Airlaid)	Bounty®	Scott®	Sparkle®	Invention Example
Wet MD TEA (g·in)/in^2	377	21.4	34.5	22.4	16.7	14.8	90
Wet CD TEA (g·in)/in^2	340	22.6	31.7	18.1	8.9	8.1	209
Dry CD Tensile Modulus g/cm	728	299	660	1844	1500	5900	400

Property	Duramax®	Viva® (Wetlaid)	Viva® (Airlaid)	Bounty®	Scott®	Sparkle®	Invention Example
VFS g/g	5.7	10.4	10.9	9.9	8	5.6	13

Process For Making A Fibrous Structure

A nonlimiting example of a process for making a fibrous structure according to the present invention is represented in Fig. 10. The process shown in Fig. 10 comprises the step of mixing a plurality of solid additives 14 with a plurality of filaments 12. In one example, the solid additives 14 are wood pulp fibers, such as SSK fibers and/or Eucalytpus fibers, and the filaments 12 are polypropylene filaments. The solid additives 14 may be combined with the filaments 12, such as by being delivered to a stream of filaments 12 from a hammermill 66 via a solid additive spreader 67 to form a mixture of filaments 12 and solid additives 14. The filaments 12 may be created by meltblowing from a meltblow die 68. The mixture of solid additives 14 and filaments 12 are collected on a collection device, such as a belt 70 to form a fibrous structure 72. The collection device may be a patterned and/or molded belt that results in the fibrous structure exhibiting a surface pattern, such as a non-random, repeating pattern. The molded belt may have a three-dimensional pattern on it that gets imparted to the fibrous structure 72 during the process.

In one example of the present invention, the fibrous structures are made using a die comprising at least one filament-forming hole, and/or 2 or more and/or 3 or more rows of filament-forming holes from which filaments are spun. At least one row of holes contains 2 or more and/or 3 or more and/or 10 or more filament-forming holes. In addition to the filament-forming holes, the die comprises fluid-releasing holes, such as gas-releasing holes, in one example air-releasing holes, that provide attenuation to the filaments formed from the filament-forming holes. One or more fluid-releasing holes may be associated with a filament-forming hole such that the fluid exiting the fluid-releasing hole is parallel or substantially parallel (rather than angled like a knife-edge die) to an exterior surface of a filament exiting the filament-forming hole. In one example, the fluid exiting the fluid-releasing hole contacts the exterior surface of a filament formed from a filament-forming hole at an angle of less than 30° and/or less than 20° and/or less than 10° and/or less than 5° and/or about 0°. One or more fluid releasing holes may be arranged around a filament-forming hole. In one example, one or more fluid-releasing holes are associated with a single filament-forming hole such that the fluid exiting the one or more fluid releasing holes contacts the exterior surface of a single filament formed from

the single filament-forming hole. In one example, the fluid-releasing hole permits a fluid, such as a gas, for example air, to contact the exterior surface of a filament formed from a filament-forming hole rather than contacting an inner surface of a filament, such as what happens when a hollow filament is formed.

In one example, the die comprises a filament-forming hole positioned within a fluid-releasing hole. The fluid-releasing hole 74 may be concentrically or substantially concentrically positioned around a filament-forming hole 76 such as is shown in Fig. 11.

In another example, the die comprises filament-forming holes and fluid-releasing holes arranged to produce a plurality of filaments that exhibit a broader range of filament diameters than known filament-forming hole dies, such as knife-edge dies. For example, as shown in Fig. 12, a fibrous structure made by a known knife-edge die produces a fibrous structure comprising filaments having a narrower distribution of average filament diameters than a fibrous structure made by a die according to the present invention, as shown in Fig. 13. As is evidenced by Fig. 13, the fibrous structure made by a die according to the present invention may comprise filaments that exhibit an average filament diameter of less than 1μm. Such filaments are not seen in the fibrous structure made by the known knife-edge die as shown in Fig. 12.

After the fibrous structure 72 has been formed on the collection device, the fibrous structure 72 may be subjected to post-processing operations such as embossing, thermal bonding, tuft-generating operations, moisture-imparting operations, and surface treating operations to form a finished fibrous structure. One example of a surface treating operation that the fibrous structure may be subjected to is the surface application of an elastomeric binder, such as ethylene vinyl acetate (EVA), latexes, and other elastomeric binders. Such an elastomeric binder may aid in reducing the lint created from the fibrous structure during use by consumers. The elastomeric binder may be applied to one or more surfaces of the fibrous structure in a pattern, especially a non-random repeating pattern, or in a manner that covers or substantially covers the entire surface(s) of the fibrous structure.

In one example, the fibrous structure 72 and/or the finished fibrous structure may be combined with one or more other fibrous structures. For example, another fibrous structure, such as a filament-containing fibrous structure, such as a polypropylene filament fibrous structure may be associated with a surface of the fibrous structure 72 and/or the finished fibrous structure. The polypropylene filament fibrous structure may be formed by meltblowing polypropylene filaments (filaments that comprise a second polymer that may be the same or different from the polymer of the filaments in the fibrous structure 72) onto a surface of the fibrous structure 72 and/or finished

fibrous structure. In another example, the polypropylene filament fibrous structure may be formed by meltblowing filaments comprising a second polymer that may be the same or different from the polymer of the filaments in the fibrous structure 72 onto a collection device to form the polypropylene filament fibrous structure. The polypropylene filament fibrous structure may then be combined with the fibrous structure 72 or the finished fibrous structure to make a two-ply fibrous structure – three-ply if the fibrous structure 72 or the finished fibrous structure is positioned between two plies of the polypropylene filament fibrous structure like that shown in Fig. 5 for example. The polypropylene filament fibrous structure may be thermally bonded to the fibrous structure 72 or the finished fibrous structure via a thermal bonding operation.

In yet another example, the fibrous structure 72 and/or finished fibrous structure may be combined with a filament-containing fibrous structure such that the filament-containing fibrous structure, such as a polysaccharide filament fibrous structure, such as a starch filament fibrous structure, is positioned between two fibrous structures 72 or two finished fibrous structures like that shown in Fig. 6 for example.

The process for making fibrous structure 72 may be close coupled (where the fibrous structure is convolutedly wound into a roll prior to proceeding to a converting operation) or directly coupled (where the fibrous structure is not convolutedly wound into a roll prior to proceeding to a converting operation) with a converting operation to emboss, print, deform, surface treat, or other post-forming operation known to those in the art. For purposes of the present invention, direct coupling means that the fibrous structure 72 can proceed directly into a converting operation rather than, for example, being convolutedly wound into a roll and then unwound to proceed through a converting operation.

The process of the present invention may include preparing individual rolls of fibrous structure and/or sanitary tissue product comprising such fibrous structure(s) that are suitable for consumer use. The fibrous structure may be contacted by a bonding agent (such as an adhesive and/or dry strength agent), such that the ends of a roll of sanitary tissue product according to the present invention comprise such adhesive and/or dry strength agent.

The process may further comprise contacting an end edge of a roll of fibrous structure with a material that is chemically different from the filaments and fibers, to create bond regions that bond the fibers present at the end edge and reduce lint production during use. The material may be applied by any suitable process known in the art. Nonlimiting examples of suitable processes for applying the material include non-contact applications, such as spraying, and contact applications, such as gravure roll printing, extruding, surface transferring. In addition,

the application of the material may occur by transfer from contact of a log saw and/or perforating blade containing the material since, for example, the perforating operation, an edge of the fibrous structure that may produce lint upon dispensing a fibrous structure sheet from an adjacent fibrous structure sheet may be created.

Nonlimiting Example of Process for Making a Fibrous Structure of the Present Invention:

A 47.5% :47.5%:5% blend of Exxon-Mobil PP3546 polypropylene : Sunoco CP200VM polypropylene : Polyvel S-1416 wetting agent is dry blended, to form a melt blend. The melt blend is heated to 475°F through a melt extruder. A 10" wide Biax 12 row spinnerette with 192 nozzles per cross-direction inch, commercially available from Biax Fiberfilm Corporation, is utilized. 32 nozzles per cross-direction inch of the 192 nozzles have a 0.018" inside diameter while the remaining nozzles are solid, i.e. there is no opening in the nozzle. Approximately 0.17 grams per hole per minute (ghm) of the melt blend is extruded from the open nozzles to form meltblown filaments from the melt blend. Approximately 200 SCFM of compressed air is heated such that the air exhibits a temperature of 395°F at the spinnerette. Approximately 175 grams / minute of Koch 4825 semi-treated SSK pulp is defibrillated through a hammermill to form SSK wood pulp fibers (solid additive). 330 SCFM of air at 85-90°F and 85% relative humidity (RH) is drawn into the hammermill and carries the pulp fibers to a solid additive spreader. The solid additive spreader turns the pulp fibers and distributes the pulp fibers in the cross-direction such that the pulp fibers are injected into the meltblown filaments in a perpendicular fashion through a 2" x 10" cross-direction (CD) slot. A forming box surrounds the area where the meltblown filaments and pulp fibers are commingled. This forming box is designed to reduce the amount of air allowed to enter or escape from this commingling area; however, there is a 2" x 12" opening in the bottom of the forming box designed to permit additional cooling air to enter. A forming vacuum pulls air through a forming fabric thus collecting the commingled meltblown filaments and pulp fibers to form a fibrous structure. The forming vacuum is adjusted until an additional 400 SCFM of room air is drawn into the slot in the forming box. The fibrous structure formed by this process comprises about 75% by dry fibrous structure weight of pulp and about 25% by dry fibrous structure weight of meltblown filaments.

As shown in Fig. 14, the solid additive spreader 78 has an inlet 80 and an exit 82. Any suitable material known in the art may be used to make the spreader 78. Nonlimiting examples of suitable materials include non-conductive materials. For example, stainless steel and/or sheet metal may be used to fabricate the spreader 78. A pulp and air mixture 84 created in the hammermill (not shown) enters the spreader 78 through a duct (not shown) connecting the

hammermill and spreader 78 at greater than about 8,000 fpm velocity and/or greater than about 14,000 fpm. The inlet 80 is tilted at an angle α at approximately 5° upstream from perpendicular of the exit 82. The exit 82 of the solid additive spreader 78 has a height H in the range of about 2.54 cm (1 inch) to about 25.40 cm (10 inches). The width W of the exit 82 is from about 1.27 cm (0.5 inch) to about 10.16 cm (4 inches). Typically the width W of the exit 82 is about 5.08 cm (2 inches). The length L of the spreader 78 is from about 60.96 cm (24 inches) to about 243.84 cm (96 inches) and/or from about 91.44 cm (36 inches) to about 182.88 cm (72 inches) and/or from about 121.92 cm (48 inches) to about 152.40 cm (60 inches). A tapering of the height H of the spreader 78 occurs from the inlet end 86 to the exit end 88 to continually accelerate the pulp and air mixture 84. This tapering is from about 10.16 cm (4 inches) in height at the inlet 80 to about 5.08 cm (2 inches) in height at the exit 82. However, the spreader 78 may incorporate other similar taperings. The inlet end 86 of the spreader 78 has a semi-circular arc from the top view with a radius of from about 7.62 cm (3 inches) to about 50.80 cm (20 inches) and/or from about 12.70 cm (5 inches) to about 25.40 cm (10 inches). As shown in Fig. 15, multiple semi-circular arcs can be assembled to produce the desired spreader width. Each semi-circular arc would comprise its own inlet 80 centered in each of these semi-circular arcs.

Optionally, a meltblown layer of the meltblown filaments can be added to one or both sides of the above formed fibrous structure. This addition of the meltblown layer can help reduce the lint created from the fibrous structure during use by consumers and is preferably performed prior to any thermal bonding operation of the fibrous structure. The meltblown filaments for the exterior layers can be the same or different than the meltblown filaments used on the opposite layer or in the center layer(s).

The fibrous structure may be convolutedly wound to form a roll of fibrous structure. The end edges of the roll of fibrous structure may be contacted with a material to create bond regions.

TEST METHODS

Unless otherwise indicated, all tests described herein including those described under the Definitions section and the following test methods are conducted on samples that have been conditioned in a conditioned room at a temperature of 73°F ± 4°F (about 23°C ± 2.2°C) and a relative humidity of 50% ± 10% for 2 hours prior to the test. Samples conditioned as described herein are considered dry samples (such as "dry fibrous structures") for purposes of this invention. Further, all tests are conducted in such conditioned room.

A. Pore Volume Distribution Test Method

Pore Volume Distribution measurements are made on a TRI/Autoporosimeter (TRI/Princeton Inc. of Princeton, NJ). The TRI/Autoporosimeter is an automated computer-controlled instrument for measuring pore volume distributions in porous materials (e.g., the volumes of different size pores within the range from 1 to 1000 μm effective pore radii). Complimentary Automated Instrument Software, Release 2000.1, and Data Treatment Software, Release 2000.1 is used to capture, analyze and output the data. More information on the TRI/Autoporosimeter, its operation and data treatments can be found in The Journal of Colloid and Interface Science 162 (1994), pgs 163-170, incorporated here by reference.

As used in this application, determining Pore Volume Distribution involves recording the increment of liquid that enters a porous material as the surrounding air pressure changes. A sample in the test chamber is exposed to precisely controlled changes in air pressure. The size (radius) of the largest pore able to hold liquid is a function of the air pressure. As the air pressure increases (decreases), different size pore groups drain (absorb) liquid. The pore volume of each group is equal to this amount of liquid, as measured by the instrument at the corresponding pressure. The effective radius of a pore is related to the pressure differential by the following relationship.

$$\text{Pressure differential} = [(2)\,\gamma\cos\Theta] / \text{effective radius}$$

where γ = liquid surface tension, and Θ = contact angle.

Typically pores are thought of in terms such as voids, holes or conduits in a porous material. It is important to note that this method uses the above equation to calculate effective pore radii based on the constants and equipment controlled pressures. The above equation assumes uniform cylindrical pores. Usually, the pores in natural and manufactured porous materials are not perfectly cylindrical, nor all uniform. Therefore, the effective radii reported here may not equate exactly to measurements of void dimensions obtained by other methods such as microscopy. However, these measurements do provide an accepted means to characterize relative differences in void structure between materials.

The equipment operates by changing the test chamber air pressure in user-specified increments, either by decreasing pressure (increasing pore size) to absorb liquid, or increasing pressure (decreasing pore size) to drain liquid. The liquid volume absorbed (drained) at each pressure increment is the cumulative volume for the group of all pores between the preceding pressure setting and the current setting.

In this application of the TRI/Autoporosimeter, the liquid is a 0.2 weight % solution of octylphenoxy polyethoxy ethanol (Triton X-100 from Union Carbide Chemical and Plastics Co. of Danbury, CT.) in distilled water. The instrument calculation constants are as follows: ρ (density) = 1 g/cm^3; γ (surface tension) = 31 dynes/cm; cosΘ = 1. A 0.22μm Millipore Glass Filter (Millipore Corporation of Bedford, MA; Catalog # GSWP09025) is employed on the test chamber's porous plate. A plexiglass plate weighing about 24 g (supplied with the instrument) is placed on the sample to ensure the sample rests flat on the Millipore Filter. No additional weight is placed on the sample.

The remaining user specified inputs are described below. The sequence of pore sizes (pressures) for this application is as follows (effective pore radius in μm): 1, 2.5, 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200, 225, 250, 275, 300, 350, 400, 500, 600, 800, 1000. This sequence starts with the sample dry, saturates it as the pore settings increase (typically referred to with respect to the procedure and instrument as the 1st absorption).

In addition to the test materials, a blank condition (no sample between plexiglass plate and Millipore Filter) is run to account for any surface and/or edge effects within the chamber. Any pore volume measured for this blank run is subtracted from the applicable pore grouping of the test sample. This data treatment can be accomplished manually or with the available TRI/Autoporosimeter Data Treatment Software, Release 2000.1.

Percent (%)Total Pore Volume is a percentage calculated by taking the volume of fluid in the specific pore radii range divided by the Total Pore Volume. The TRI/Autoporosimeter outputs the volume of fluid within a range of pore radii. The first data obtained is for the "2.5 micron" pore radii which includes fluid absorbed between the pore sizes of 1 to 2.5 micron radius. The next data obtained is for "5 micron" pore radii, which includes fluid absorbed between the 2.5micron and 5 micron radii, and so on. Following this logic, to obtain the volume held within the range of 101-200 micron radii, one would sum the volumes obtained in the range titled "120 micron", "140 micron", "160 micron", "180 micron", and finally the "200 micron" pore radii ranges. For example, % Total Pore Volume 101-200 micron pore radii = (volume of fluid between 101-200 micron pore radii) / Total Pore Volume

B. Horizontal Full Sheet (HFS) Test Method

The Horizontal Full Sheet (HFS) test method determines the amount of distilled water absorbed and retained by a fibrous structure of the present invention. This method is performed by first weighing a sample of the fibrous structure to be tested (referred to herein as the "dry weight of the sample"), then thoroughly wetting the sample, draining the wetted sample in a

horizontal position and then reweighing (referred to herein as "wet weight of the sample"). The absorptive capacity of the sample is then computed as the amount of water retained in units of grams of water absorbed by the sample. When evaluating different fibrous structure samples, the same size of fibrous structure is used for all samples tested.

The apparatus for determining the HFS capacity of fibrous structures comprises the following:

1) An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sample tested (i.e.; a fibrous structure sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

2) A sample support rack (Fig. 16) and sample support rack cover (Fig. 17) is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid as shown in Fig. 16. The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The HFS test is performed in an environment maintained at 23± 1° C and 50± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23± 1 ° C to a depth of 3 inches (7.6 cm).

Eight samples of a fibrous structure to be tested are carefully weighed on the balance to the nearest 0.01 grams. The dry weight of each sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). One sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched between the rack and cover) is submerged in the water reservoir. After the sample is submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain horizontally for 120±5 seconds, taking care not to excessively shake or vibrate the sample. While the sample is draining, the rack cover is carefully removed and all excess water is wiped from the support rack. The wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The gram per fibrous structure sample absorptive capacity of the sample is defined as (wet weight of the sample - dry weight of the sample). The horizontal absorbent capacity (HAC)

is defined as: absorbent capacity = (wet weight of the sample - dry weight of the sample) / (dry weight of the sample) and has a unit of gram/gram.

C. Vertical Full Sheet (VFS) Test Method

The Vertical Full Sheet (VFS) test method determines the amount of distilled water absorbed and retained by a fibrous structure of the present invention. This method is performed by first weighing a sample of the fibrous structure to be tested (referred to herein as the "dry weight of the sample"), then thoroughly wetting the sample, draining the wetted sample in a vertical position and then reweighing (referred to herein as "wet weight of the sample"). The absorptive capacity of the sample is then computed as the amount of water retained in units of grams of water absorbed by the sample. When evaluating different fibrous structure samples, the same size of fibrous structure is used for all samples tested.

The apparatus for determining the VFS capacity of fibrous structures comprises the following:

1) An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sample tested (i.e.; a fibrous structure sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

2) A sample support rack (Fig. 16) and sample support rack cover (Fig. 17) is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid as shown in Fig. 16. The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The VFS test is performed in an environment maintained at 23± 1° C and 50± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23± 1 ° C to a depth of 3 inches (7.6 cm).

Eight 19.05 cm (7.5 inch) x 19.05 cm (7.5 inch) to 27.94 cm (11 inch) x 27.94 cm (11 inch) samples of a fibrous structure to be tested are carefully weighed on the balance to the nearest 0.01 grams. The dry weight of each sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). One sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched

between the rack and cover) is submerged in the water reservoir. After the sample is submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain vertically for 60±5 seconds, taking care not to excessively shake or vibrate the sample. While the sample is draining, the rack cover is carefully removed and all excess water is wiped from the support rack. The wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The procedure is repeated for with another sample of the fibrous structure, however, the sample is positioned on the support rack such that the sample is rotated 90° compared to the position of the first sample on the support rack.

The gram per fibrous structure sample absorptive capacity of the sample is defined as (wet weight of the sample - dry weight of the sample). The calculated VFS is the average of the absorptive capacities of the two samples of the fibrous structure.

D. Wet MD TEA, Wet CD TEA, Dry CD Tensile Modulus ("Tangent Modulus") Test Methods

The Wet MD TEA, Wet CD TEA and Dry CD Tensile Modulus of a fibrous structure are all determined using a Thwing Albert EJA Tensile Tester. A 2.54 cm (1 inch) wide strip of the fibrous structure to be tested is placed in the grips of the Tensile Tester at a gauge length of 10.16 cm (4 inches). The Crosshead Speed of the Tensile Tester is set at 10.16 cm/min (4 inches/min) and the Break Sensitivity is set at 20 g. Eight (8) samples are run on the Tensile Tester and an average of the respective Wet MD TEA, Wet CD TEA values from the 8 samples is reported as the Wet MD TEA value and the Wet CD TEA. The Dry CD Tensile Modulus is reported as the average of the Dry CD Tensile Modulus from the 8 samples measured at 15 g/cm.

E. Basis Weight Test Method

Basis weight is measured by preparing one or more samples of a certain area (m^2) and weighing the sample(s) of a fibrous structure according to the present invention and/or a paper product comprising such fibrous structure on a top loading balance with a minimum resolution of 0.01 g. The balance is protected from air drafts and other disturbances using a draft shield. Weights are recorded when the readings on the balance become constant. The average weight (g) is calculated and the average area of the samples (m^2). The basis weight (g/m^2) is calculated by dividing the average weight (g) by the average area of the samples (m^2).

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range

surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention. To the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

CLAIMS

What is claimed is:

1. A process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying at least a first polymer to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. combining the filaments with solid additives to form a mixture; and

e. collecting the mixture on a collection device to produce a fibrous structure.

2. The process according to Claim 1 wherein the die comprises two or more rows of filament-forming holes, preferably wherein at least one row of filament-forming holes comprises two or more filament-forming holes.

3. The process according to either of Claims 1 or 2 wherein more than one fluid-releasing hole are associated with a filament-forming hole.

4. The process according to any of the preceding claims wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole.

5. The process according to any of the preceding claims wherein the first polymer comprises a synthetic polymer, preferably wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates , polycaprolactones and mixtures thereof, more preferably wherein the synthetic polymer comprises a polyolefin, even more preferably wherein the polyolefin comprises polypropylene.

6. The process according to any of the preceding claims wherein the first polymer comprises a natural polymer, preferably wherein the natural polymer is selected from the group consisting of: starch, starch derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives and mixtures thereof.

7. The process according to any of the preceding claims wherein the solid additives comprise fibers, preferably wherein the fibers comprise wood pulp fibers.

8. The process according to any of the preceding claims wherein the solid additives are combined with the plurality of filaments by a solid additive spreader.

9. The process according to any of the preceding claims wherein the process further comprises the step of:

f. contacting a surface of the fibrous structure with a plurality of filaments comprising a second polymer, preferably wherein the plurality of filaments comprising the second polymer are in the form of a second fibrous structure, more preferably wherein the second polymer is the same as the first polymer.

10. The process according to any of the preceding claims wherein the fluid released by the fluid-releasing holes comprises air.

11. The process according to any of the preceding claims wherein the fibrous structure exhibits a pore volume distribution such that greater than 40% of the total pore volume present in the fibrous structure exists in pores of radii of from 121μm to 200μm.

12. The process according to any of the preceding claims wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation.

13. The process according to any of the preceding claims wherein the process is directly coupled to a post-processing operation.

14. The process according to any of the preceding claims wherein the process is closely coupled to a post-processing operation.

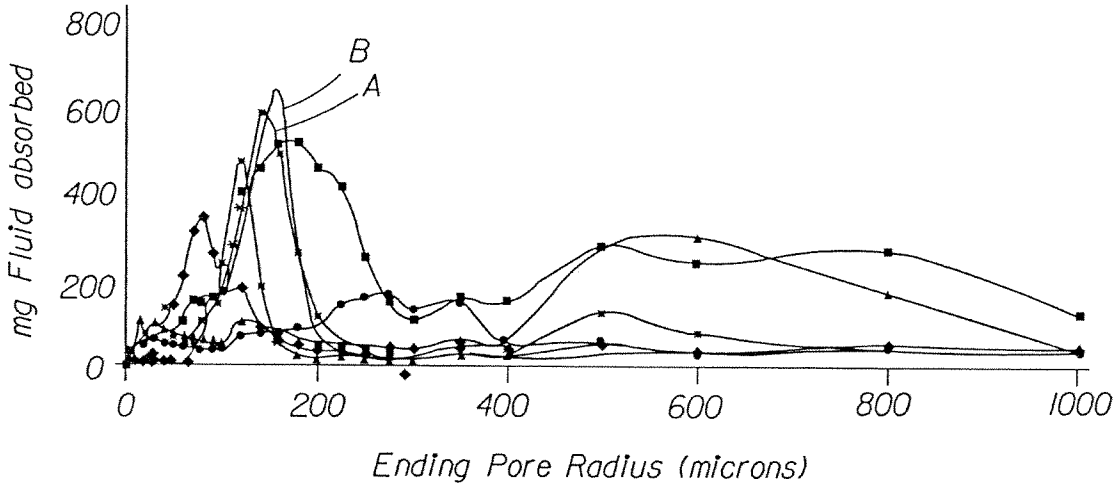
800
600
400
200
0
mg Fluid absorbed
B
A
0
200
400
600
800
1000
Ending Pore Radius (microns)
Huggies (coform prior art)
Duramax
LBAL-DUNI embossed
Invention Example A
Huggies Wash Cloth (coform prior art)
Concert EBT.055.1010 TBAL
Bounty
Invention Example B

Fig. 1

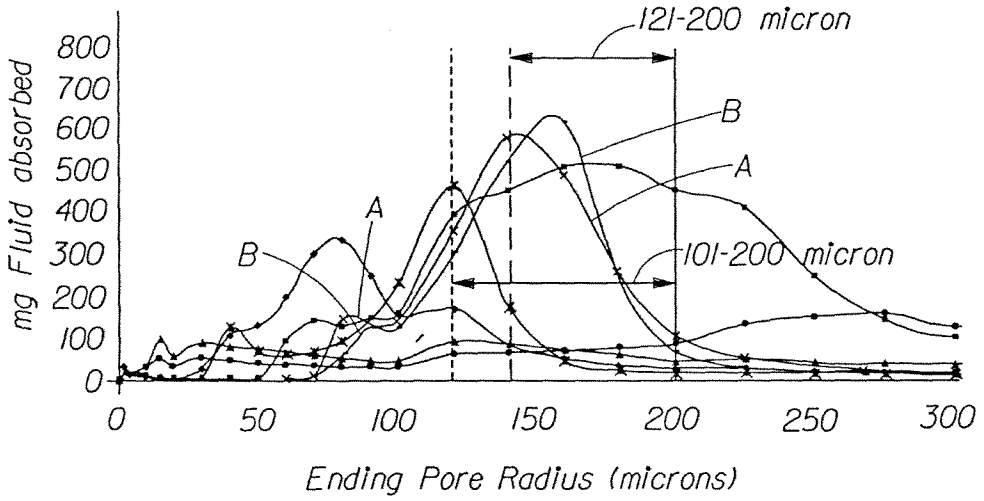
121-200 micron
101-200 micron
B
A
B
A
mg Fluid absorbed
800
700
600
500
400
300
200
100
0
0
50
100
150
200
250
300
Ending Pore Radius (microns)
• Huggies (coform prior art)
▲ Duramax
× LBAL-DUNI embossed
* Invention Example A
▪ Huggies Wash Cloth (coform prior art)
– Concert EBT.055.1010 TBAL
• Bounty
– Invention Example B

Fig. 2

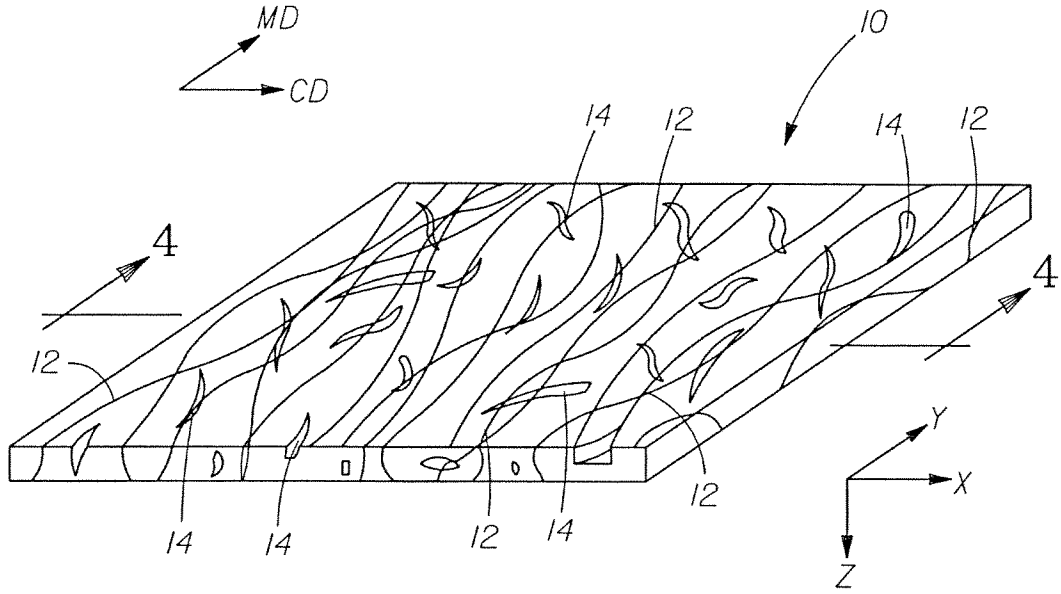
MD
CD
10
14
12
14
12
4
4
12
12
14
14
12
14
Y
X
Z

Fig. 3

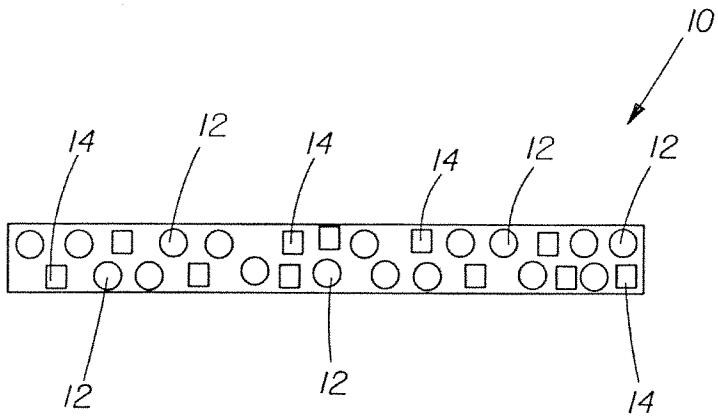
10
14
12
14
14
12
12
12
12
14

Fig. 4

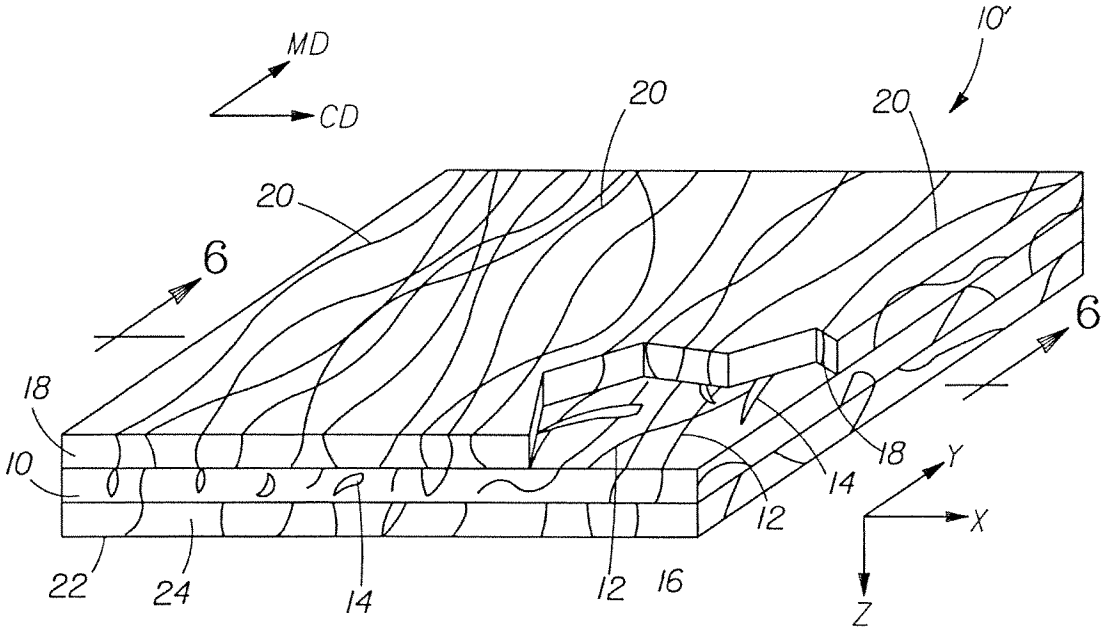

Fig. 5

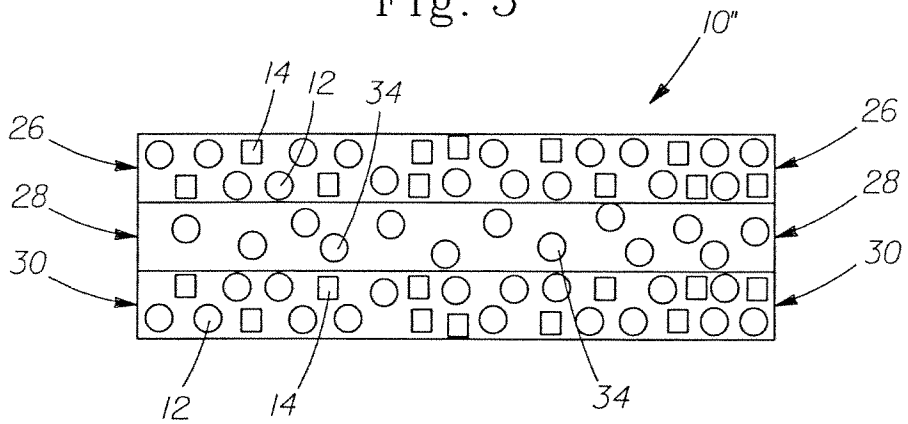

Fig. 6

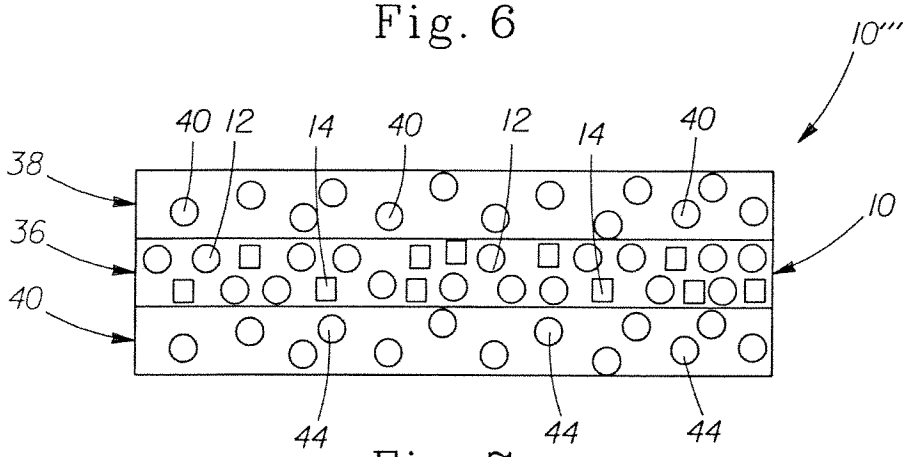

Fig. 7

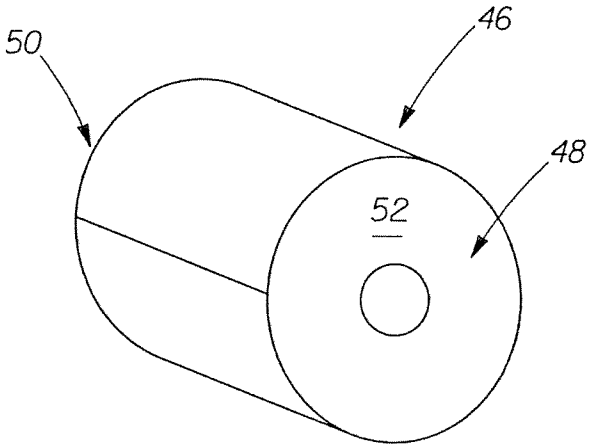

Fig. 8

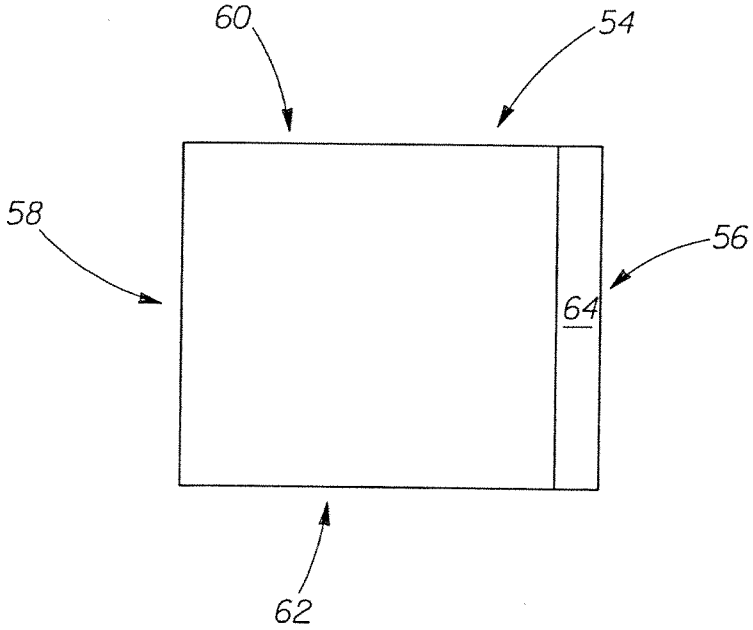

Fig. 9

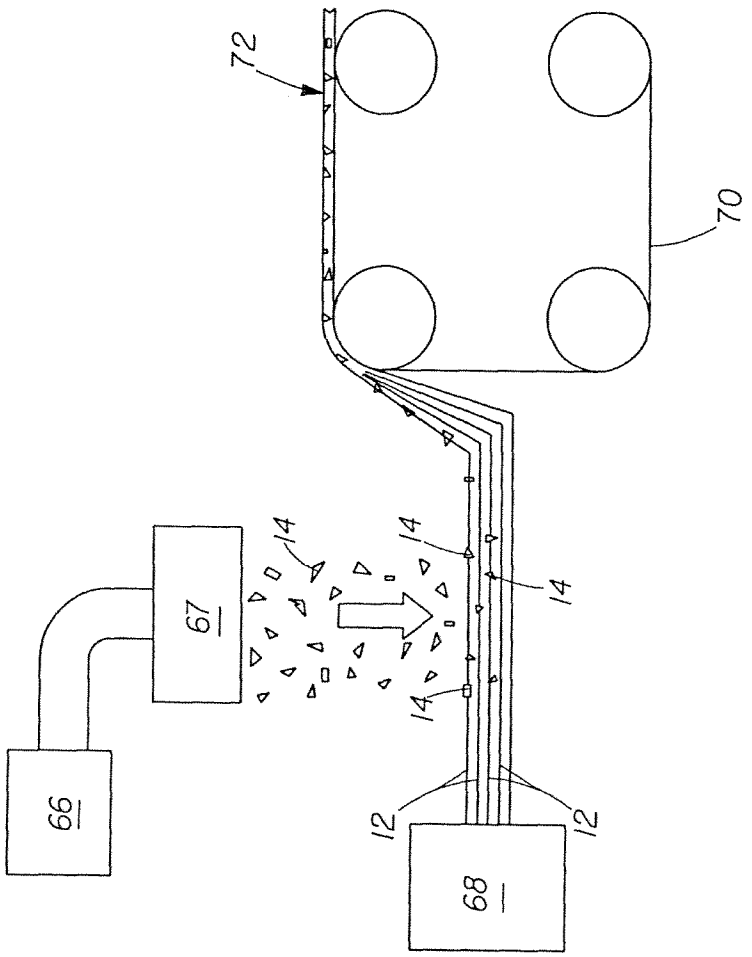

Fig. 10

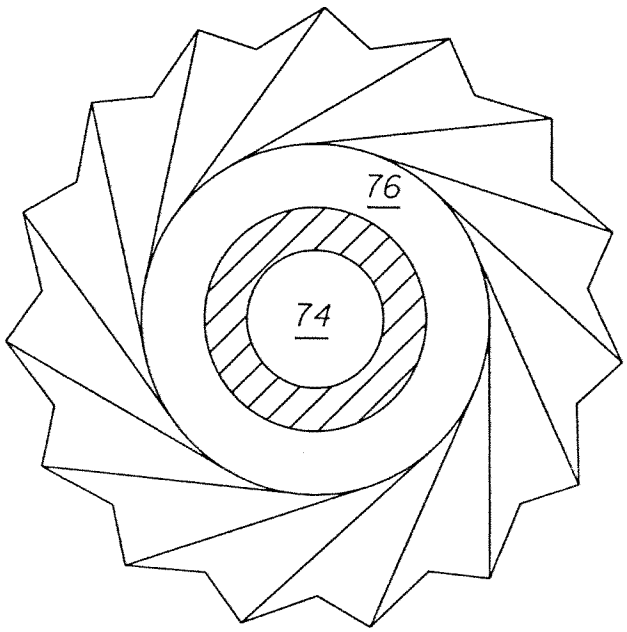

Fig. 11

Huggies Baby Cloth
9.5µm
5.8µm
SE 07-Jun-06 352-05 WD12.9mm 5.00kV x300 100um

Fig. 12

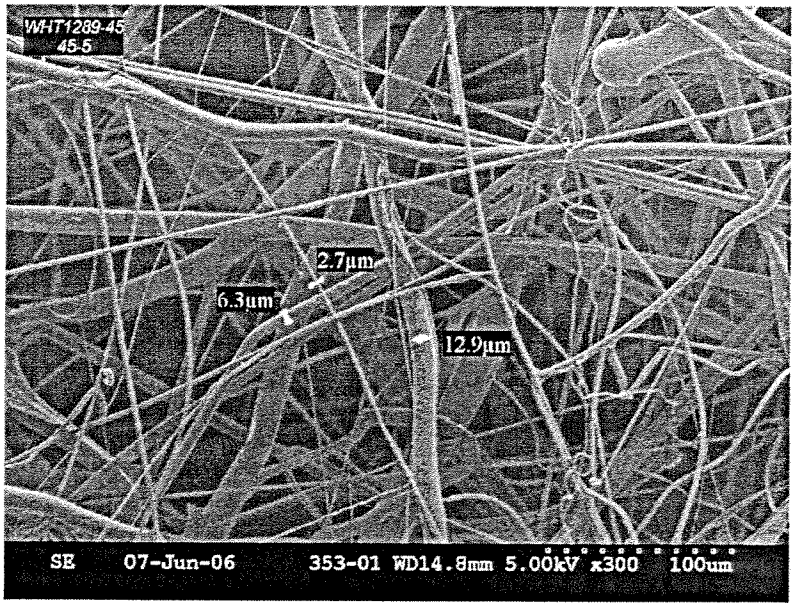
WHT1289-45
45-5
2.7µm
6.3µm
12.9µm
SE 07-Jun-06 353-01 WD14.8mm 5.00kV x300 100um

Fig. 13

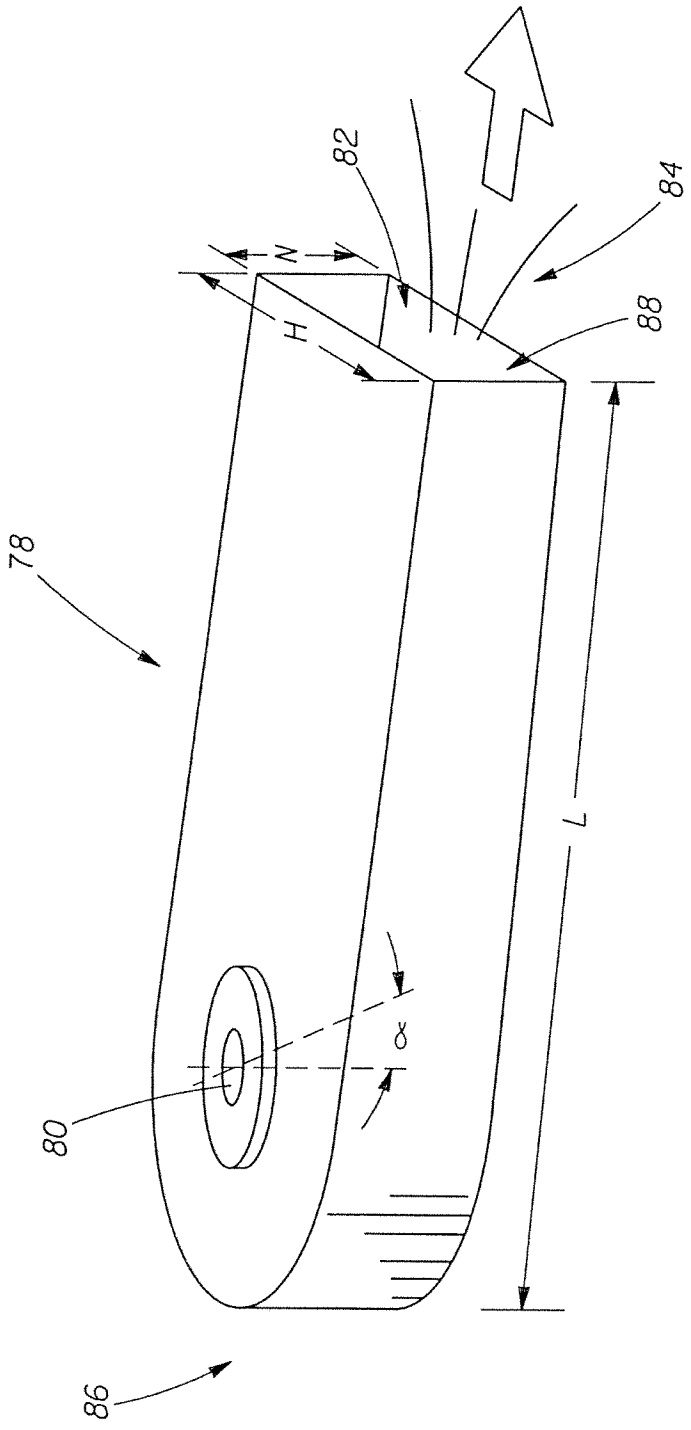

Fig. 14

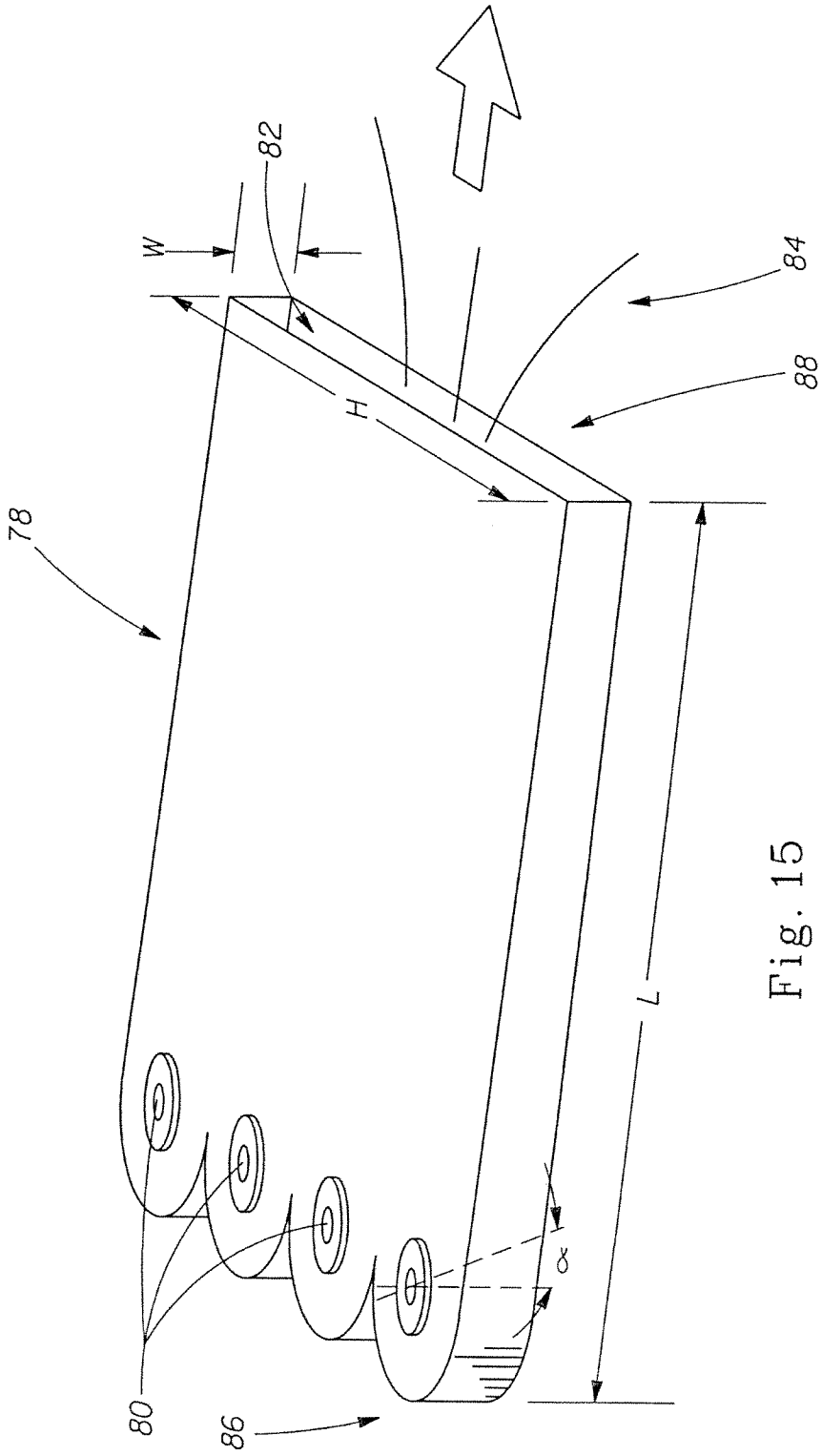

Fig. 15

Fig. 16A

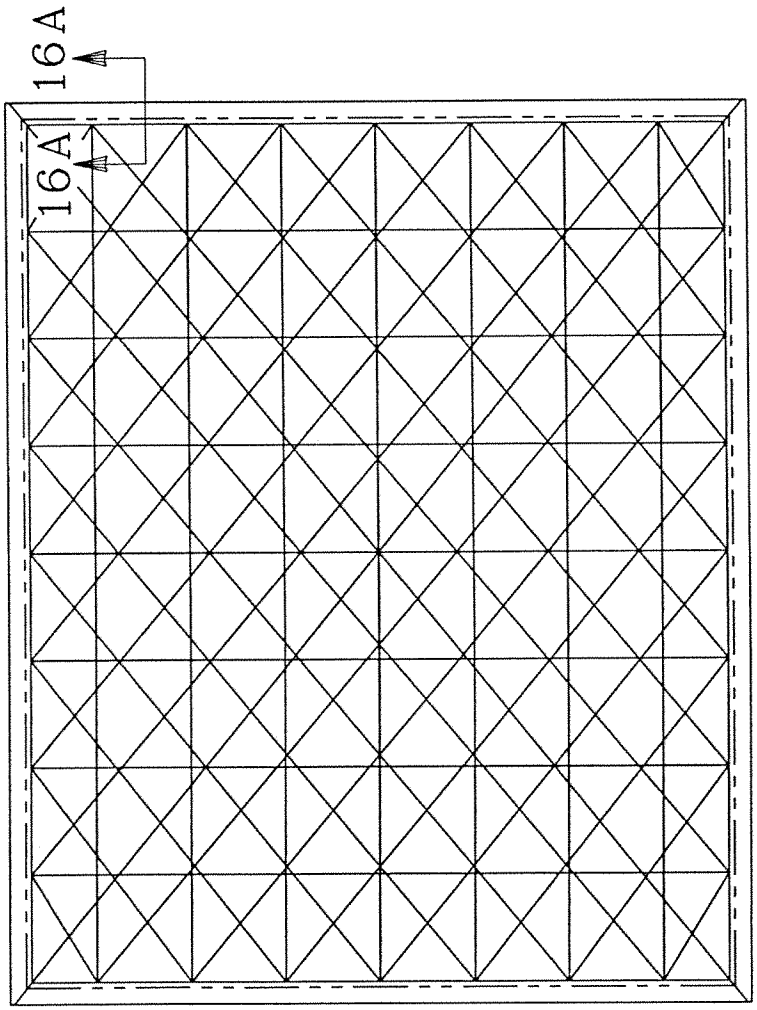

Fig. 16

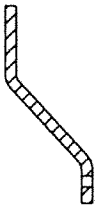

Fig. 17A

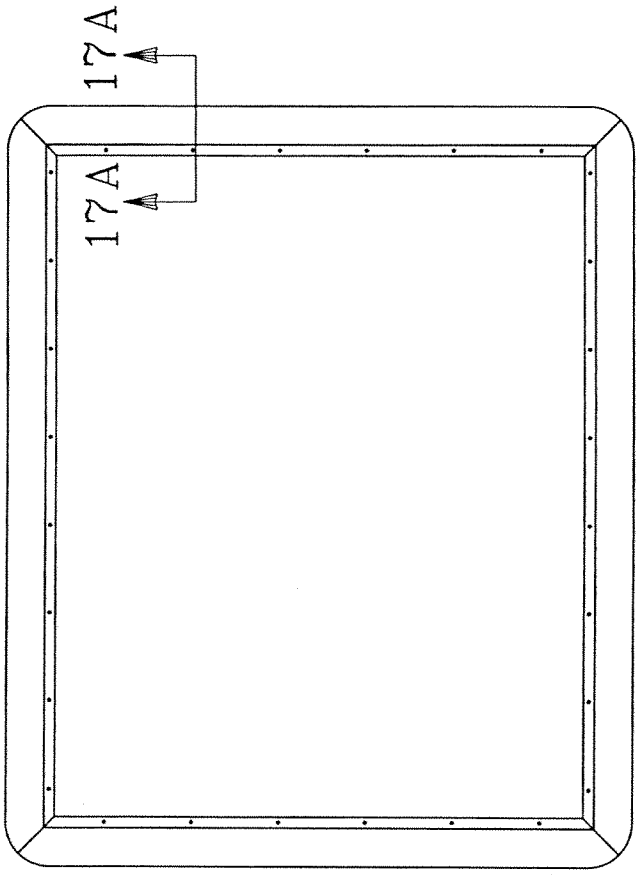

Fig. 17

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61/065,319	11 February 2008 (11.02.2008)	US

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(54) Title: FIBROUS STRUCTURES

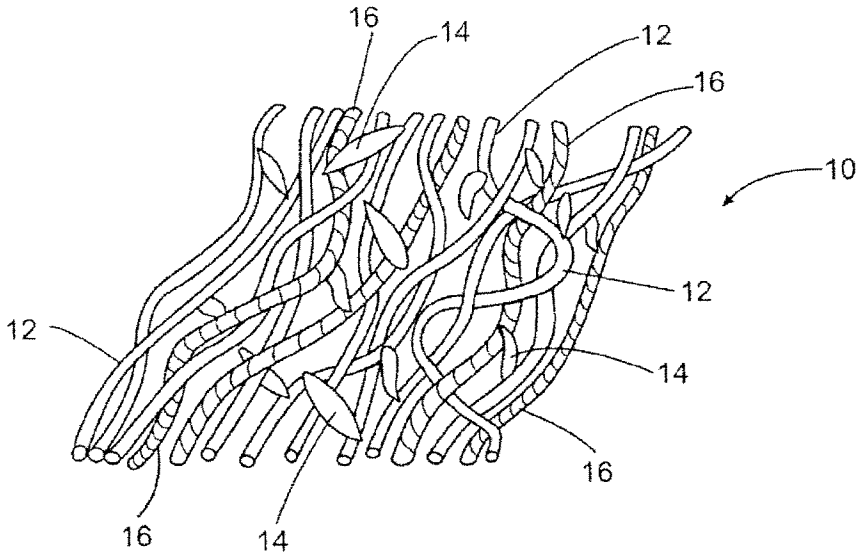

Fig. 1

(57) Abstract: Fibrous structures containing a mixture of three or more different fibrous elements (filaments and/or fibers) are provided.

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FIBROUS STRUCTURES

FIELD OF THE INVENTION

The present invention relates to fibrous structures and more particularly to fibrous structures comprising a mixture of three or more different fibrous elements (filaments and/or fibers), especially a mixture of three or more fibrous elements that provide different benefits from one another for the fibrous structures.

BACKGROUND OF THE INVENTION

Fibrous structures that comprise three or more different fibrous elements are known in the art. For example, commercially available baby care wipe products include rayon (cellulose) fibers, pulp (cellulose) fibers and polypropylene filaments. Such known fibrous structures, however, exhibit performance issues that have yet to be solved in a fibrous structure comprising three or more different fibrous elements.

The problem faced by formulators of fibrous structures is that consumers of fibrous structures, especially sanitary tissue products comprising fibrous structures, desire more and different performance and/or properties from a fibrous structure. Oftentimes the properties consumers desire are inversely related. For example, in the past, if consumers wanted greater softness then the fibrous structure would need to be less strong and vice versa. In addition, if consumers desired greater wet strength then the fibrous structures would need to be less absorbent, for example more hydrophobic, and vice versa.

Accordingly, there is a need for new fibrous structures that provide consumers desired performance and/or properties to meet their use needs.

SUMMARY OF THE INVENTION

The present invention solves the problem described above by providing a fibrous structure comprising a mixture of three or more different fibrous elements, wherein the fibrous structure meets the performance and/or property needs of the consumers of fibrous structures, especially sanitary tissue product consumers.

In one example of the present invention, a fibrous structure comprising:

a. a non-thermoplastic, first fibrous element, wherein the first fibrous element exhibits a length to average diameter ratio of greater than 2000 and/or a length to effective diameter ratio of greater than 2000;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

In another example of the present invention, a fibrous structure comprising:

a. a first fibrous element comprising a random mixture of different polymers wherein at least one of the polymers is a biodegradable polymer, wherein the first fibrous element exhibits a length to average diameter ratio of greater than 2000 and/or a length to effective diameter ratio of greater than 2000;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

In yet another example of the present invention, a fibrous structure comprising:

a. a first fibrous element comprising a filament comprising a random mixture of different polymers wherein at least one of the polymers is a biodegradable polymer;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

In yet another example of the present invention, a fibrous structure comprising:

a. a non-thermoplastic, first fibrous element comprising a filament;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

In still yet another example of the present invention, a fibrous structure comprising:

a. a non-thermoplastic, non-cellulose-containing first fibrous element;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

In another example of the present invention, a fibrous structure comprising:

a. a non-cellulose-containing first fibrous element comprising a random mixture of different polymers wherein at least one of the polymers is a biodegradable polymer;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

In even yet another example of the present invention, a fibrous structure comprising:

a. a non-cellulose-containing first fibrous element comprising a filament comprising a random mixture of different polymers wherein at least one of the polymers is a biodegradable polymer;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

In even still yet another example of the present invention, a fibrous structure comprising:

a. a non-thermoplastic, non-cellulose-containing first fibrous element comprising a filament;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements is provided.

Accordingly, the present invention provides fibrous structures comprising a mixture of three or more fibrous elements that are different from one another.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic representation of an example of a fibrous structure according to the present invention;

Fig. 2 is a schematic representation of another example of a fibrous structure according to the present invention;

Fig. 3 is a schematic representation of another example of a fibrous structure according to the present invention;

Fig. 4 is a schematic, partially cut-away representation of another example of a fibrous structure according to the present invention;

Fig. 5 is a schematic representation of an example of a method for making a fibrous structure according to the present invention;

Fig. 6 is a schematic representation of an example of a method for making a fibrous structure according to the present invention;

Fig. 7 is a schematic representation of an example of a method for making a fibrous structure according to the present invention;

Fig. 8 is a diagram of a support rack utilized in the HFS and VFS Test Methods described herein; and

Fig. 9 is a diagram of a support rack cover utilized in the HFS and VFS Test Methods described herein.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

"Fibrous structure" as used herein means a structure that comprises one or more fibrous elements. In one example, a fibrous structure according to the present invention means an association of fibrous elements that together form a structure, such as a unitary structure, capable

of performing a function. Nonlimiting examples of fibrous structures of the present invention include paper, fabrics (including woven, knitted, and non-woven).

The fibrous structures of the present invention may be homogeneous or may be layered. If layered, the fibrous structures may comprise at least two and/or at least three and/or at least four and/or at least five layers.

The fibrous structures of the present invention may be co-formed fibrous structures.

In one example, the fibrous structures of the present invention are disposable. For example, the fibrous structures of the present invention are non-textile fibrous structures. In another example, the fibrous structures of the present invention are flushable, such as toilet tissue.

Nonlimiting examples of processes for making fibrous structures include known wet-laid papermaking processes and air-laid papermaking processes. Such processes typically include the steps of preparing a fibrous element composition, such as a fiber composition, in the form of a suspension in a medium, either wet, more specifically an aqueous medium, i.e., water, or dry, more specifically a gaseous medium, i.e. air. The suspension of fibers within an aqueous medium is oftentimes referred to as a fiber slurry. The fibrous suspension is then used to deposit a plurality of fibers onto a forming wire or belt such that an embryonic fibrous structure is formed, after which drying and/or bonding the fibers together results in the association of the fibers into a fibrous structure. Further processing the fibrous structure may be carried out such that a finished fibrous structure is formed. For example, in typical papermaking processes, the finished fibrous structure is the fibrous structure that is wound on the reel at the end of papermaking. The finished fibrous structure may subsequently be converted into a finished product, e.g. a sanitary tissue product.

In one example, the fibrous structure of the present invention is a "unitary fibrous structure."

"Unitary fibrous structure" as used herein is an arrangement comprising a plurality of two or more and/or three or more fibrous elements that are inter-entangled or otherwise associated with one another to form a fibrous structure. A unitary fibrous structure in accordance with the present invention may be incorporated into a fibrous structure according to the present invention. A unitary fibrous structure of the present invention may be one or more plies within a multi-ply fibrous structure. In one example, a unitary fibrous structure of the present invention may comprise three or more different fibrous elements. In another example, a unitary fibrous structure of the present invention may comprise two different fibrous elements, for example a co-

formed fibrous structure, upon which a different fibrous element is deposited to form a fibrous structure comprising three or more different fibrous elements.

"Co-formed fibrous structure" as used herein means that the fibrous structure comprises a plurality of filaments and a plurality of fibers. In one example, a co-formed fibrous structure comprises starch filaments and wood pulp fibers.

"Fibrous element" as used herein means an elongate particulate having a length greatly exceeding its average diameter, i.e. a length to average diameter ratio of at least about 10. A fibrous element may be a filament or a fiber. In one example, the fibrous element is a single fibrous element rather than a yarn comprising a plurality of fibrous elements.

The fibrous elements of the present invention may be spun from polymer melt compositions via suitable spinning operations, such as meltblowing and/or spunbonding and/or they may be obtained from natural sources such as vegetative sources, for example trees.

The fibrous elements of the present invention may be monocomponent and/or multicomponent. For example, the fibrous elements may comprise bicomponent fibers and/or filaments. The bicomponent fibers and/or filaments may be in any form, such as side-by-side, core and sheath, islands-in-the-sea and the like.

"Filament" as used herein means an elongate particulate as described above that exhibits a length of greater than or equal to 5.08 cm (2 in.) and/or greater than or equal to 7.62 cm (3 in.) and/or greater than or equal to 10.16 cm (4 in.) and/or greater than or equal to 15.24 cm (6 in.).

Filaments are typically considered continuous or substantially continuous in nature. Filaments are relatively longer than fibers. Nonlimiting examples of filaments include meltblown and/or spunbond filaments. Nonlimiting examples of polymers that can be spun into filaments include natural polymers, such as starch, starch derivatives, cellulose, such as rayon and/or lyocell, and cellulose derivatives, hemicellulose, hemicellulose derivatives, and synthetic polymers including, but not limited to thermoplastic polymer filaments, such as polyesters, nylons, polyolefins such as polypropylene filaments, polyethylene filaments, and biodegradable thermoplastic fibers such as polylactic acid filaments, polyhydroxyalkanoate filaments, polyesteramide filaments and polycaprolactone filaments.

"Fiber" as used herein means an elongate particulate as described above that exhibits a length of less than 5.08 cm (2 in.) and/or less than 3.81 cm (1.5 in.) and/or less than 2.54 cm (1 in.).

Fibers are typically considered discontinuous in nature. Nonlimiting examples of fibers include pulp fibers, such as wood pulp fibers, and synthetic staple fibers such as polypropylene, polyethylene, polyester, copolymers thereof, rayon, glass fibers and polyvinyl alcohol fibers.

Staple fibers may be produced by spinning a filament tow and then cutting the tow into segments of less than 5.08 cm (2 in.) thus producing fibers.

In one example of the present invention, a fiber may be a naturally occurring fiber, which means it is obtained from a naturally occurring source, such as a vegetative source, for example a tree and/or plant. Such fibers are typically used in papermaking and are oftentimes referred to as papermaking fibers. Papermaking fibers useful in the present invention include cellulosic fibers commonly known as wood pulp fibers. Applicable wood pulps include chemical pulps, such as Kraft, sulfite, and sulfate pulps, as well as mechanical pulps including, for example, groundwood, thermomechanical pulp and chemically modified thermomechanical pulp. Chemical pulps, however, may be preferred since they impart a superior tactile sense of softness to tissue sheets made therefrom. Pulps derived from both deciduous trees (hereinafter, also referred to as "hardwood") and coniferous trees (hereinafter, also referred to as "softwood") may be utilized. The hardwood and softwood fibers can be blended, or alternatively, can be deposited in layers to provide a stratified web. Also applicable to the present invention are fibers derived from recycled paper, which may contain any or all of the above categories of fibers as well as other non-fibrous polymers such as fillers, softening agents, wet and dry strength agents, and adhesives used to facilitate the original papermaking.

In addition to the various wood pulp fibers, other cellulosic fibers such as cotton linters, rayon, lyocell and bagasse fibers can be used in the fibrous structures of the present invention.

"Sanitary tissue product" as used herein means a soft, low density (i.e. < about 0.15 g/cm3) fibrous structure useful as a wiping implement for post-urinary and post-bowel movement cleaning (toilet tissue), for otorhinolaryngological discharges (facial tissue), and multi-functional absorbent and cleaning uses (absorbent towels). The sanitary tissue product may be convolutedly wound upon itself about a core or without a core to form a sanitary tissue product roll.

In one example, the sanitary tissue product of the present invention comprises one or more fibrous structures according to the present invention.

The sanitary tissue products of the present invention may exhibit a basis weight between about 10 g/m^2 to about 120 g/m^2 and/or from about 15 g/m^2 to about 110 g/m^2 and/or from about 20 g/m^2 to about 100 g/m^2 and/or from about 30 to 90 g/m^2. In addition, the sanitary tissue product of the present invention may exhibit a basis weight between about 40 g/m^2 to about 120 g/m^2 and/or from about 50 g/m^2 to about 110 g/m^2 and/or from about 55 g/m^2 to about 105 g/m^2 and/or from about 60 to 100 g/m^2.

The sanitary tissue products of the present invention may exhibit a total dry tensile strength of greater than about 59 g/cm (150 g/in) and/or from about 78 g/cm (200 g/in) to about

394 g/cm (1000 g/in) and/or from about 98 g/cm (250 g/in) to about 335 g/cm (850 g/in). In addition, the sanitary tissue product of the present invention may exhibit a total dry tensile strength of greater than about 196 g/cm (500 g/in) and/or from about 196 g/cm (500 g/in) to about 394 g/cm (1000 g/in) and/or from about 216 g/cm (550 g/in) to about 335 g/cm (850 g/in) and/or from about 236 g/cm (600 g/in) to about 315 g/cm (800 g/in). In one example, the sanitary tissue product exhibits a total dry tensile strength of less than about 394 g/cm (1000 g/in) and/or less than about 335 g/cm (850 g/in).

In another example, the sanitary tissue products of the present invention may exhibit a total dry tensile strength of greater than about 500 g/in and/or greater than about 600 g/in and/or greater than about 700 g/in and/or greater than about 800 g/in and/or greater than about (900 g/in) and/or greater than about 394 g/cm (1000 g/in) and/or from about 315 g/cm (800 g/in) to about 1968 g/cm (5000 g/in) and/or from about 354 g/cm (900 g/in) to about 1181 g/cm (3000 g/in) and/or from about 354 g/cm (900 g/in) to about 984 g/cm (2500 g/in) and/or from about 394 g/cm (1000 g/in) to about 787 g/cm (2000 g/in).

The sanitary tissue products of the present invention may exhibit an initial total wet tensile strength of less than about 78 g/cm (200 g/in) and/or less than about 59 g/cm (150 g/in) and/or less than about 39 g/cm (100 g/in) and/or less than about 29 g/cm (75 g/in).

The sanitary tissue products of the present invention may exhibit an initial total wet tensile strength of greater than about 118 g/cm (300 g/in) and/or greater than about 157 g/cm (400 g/in) and/or greater than about 196 g/cm (500 g/in) and/or greater than about 236 g/cm (600 g/in) and/or greater than about 276 g/cm (700 g/in) and/or greater than about 315 g/cm (800 g/in) and/or greater than about 354 g/cm (900 g/in) and/or greater than about 394 g/cm (1000 g/in) and/or from about 118 g/cm (300 g/in) to about 1968 g/cm (5000 g/in) and/or from about 157 g/cm (400 g/in) to about 1181 g/cm (3000 g/in) and/or from about 196 g/cm (500 g/in) to about 984 g/cm (2500 g/in) and/or from about 196 g/cm (500 g/in) to about 787 g/cm (2000 g/in) and/or from about 196 g/cm (500 g/in) to about 591 g/cm (1500 g/in).

The sanitary tissue products of the present invention may exhibit a density of less than about 0.60 g/cm^3 and/or less than about 0.30 g/cm^3 and/or less than about 0.20 g/cm^3 and/or less than about 0.10 g/cm^3 and/or less than about 0.07 g/cm^3 and/or less than about 0.05 g/cm^3 and/or from about 0.01 g/cm^3 to about 0.20 g/cm^3 and/or from about 0.02 g/cm^3 to about 0.10 g/cm^3.

The sanitary tissue products of the present invention may exhibit a total absorptive capacity of according to the Horizontal Full Sheet (HFS) Test Method described herein of greater

than about 10 g/g and/or greater than about 12 g/g and/or greater than about 15 g/g and/or from about 15 g/g to about 50 g/g and/or to about 40 g/g and/or to about 30 g/g.

The sanitary tissue products of the present invention may exhibit a Vertical Full Sheet (VFS) value as determined by the Vertical Full Sheet (VFS) Test Method described herein of greater than about 5 g/g and/or greater than about 7 g/g and/or greater than about 9 g/g and/or from about 9 g/g to about 30 g/g and/or to about 25 g/g and/or to about 20 g/g and/or to about 17 g/g.

The sanitary tissue products of the present invention may be in the form of sanitary tissue product rolls. Such sanitary tissue product rolls may comprise a plurality of connected, but perforated sheets of fibrous structure, that are separably dispensable from adjacent sheets.

The sanitary tissue products of the present invention may comprises additives such as softening agents, temporary wet strength agents, permanent wet strength agents, bulk softening agents, lotions, silicones, wetting agents, latexes, patterned latexes and other types of additives suitable for inclusion in and/or on sanitary tissue products.

"Hydroxyl polymer" as used herein includes any hydroxyl-containing polymer that can be incorporated into a fibrous structure of the present invention, such as into a fibrous structure in the form of a fibrous element. In one example, the hydroxyl polymer of the present invention includes greater than 10% and/or greater than 20% and/or greater than 25% by weight hydroxyl moieties.

"Biodegradable" as used herein means, with respect to a material, such as a fibrous element as a whole and/or a polymer within a fibrous element, that the fibrous element and/or polymer is capable of undergoing and/or does undergo physical, chemical, thermal and/or biological degradation in a municipal solid waste composting facility such that at least 5% and/or at least 7% and/or at least 10% of the original fibrous element and/or polymer is converted into carbon dioxide after 30 days as measured according to the OECD (1992) Guideline for the Testing of Chemicals 301B; Ready Biodegradability – CO_2 Evolution (Modified Sturm Test) Test incorporated herein by reference.

"Non-biodegradable" as used herein means, with respect to a material, such as a fibrous element as a whole and/or a polymer within a fibrous element, that the fibrous element and/or polymer is not capable of undergoing physical, chemical, thermal and/or biological degradation in a municipal solid waste composting facility such that at least 5% of the original fibrous element and/or polymer is converted into carbon dioxide after 30 days as measured according to the OECD (1992) Guideline for the Testing of Chemicals 301B; Ready Biodegradability – CO_2 Evolution (Modified Sturm Test) Test incorporated herein by reference.

"Non-thermoplastic" as used herein means, with respect to a material, such as a fibrous element as a whole and/or a polymer within a fibrous element, that the fibrous element and/or polymer exhibits no melting point and/or softening point, which allows it to flow under pressure, in the absence of a plasticizer, such as water, glycerin, sorbitol, urea and the like.

"Non-thermoplastic, biodegradable fibrous element" as used herein means a fibrous element that exhibits the properties of being biodegradable and non-thermoplastic as defined above.

"Non-thermoplastic, non-biodegradable fibrous element" as used herein means a fibrous element that exhibits the properties of being non-biodegradable and non-thermoplastic as defined above.

"Thermoplastic" as used herein means, with respect to a material, such as a fibrous element as a whole and/or a polymer within a fibrous element, that the fibrous element and/or polymer exhibits a melting point and/or softening point at a certain temperature, which allows it to flow under pressure, in the absence of a plasticizer

"Thermoplastic, biodegradable fibrous element" as used herein means a fibrous element that exhibits the properties of being biodegradable and thermoplastic as defined above.

"Thermoplastic, non-biodegradable fibrous element" as used herein means a fibrous element that exhibits the properties of being non-biodegradable and thermoplastic as defined above.

"Non-cellulose-containing" as used herein means that less than 5% and/or less than 3% and/or less than 1% and/or less than 0.1% and/or 0% by weight of cellulose polymer, cellulose derivative polymer and/or cellulose copolymer is present in fibrous element. In one example, "non-cellulose-containing" means that less than 5% and/or less than 3% and/or less than 1% and/or less than 0.1% and/or 0% by weight of cellulose polymer is present in fibrous element.

"Different from" as used herein means, with respect to a material, such as a fibrous element as a whole and/or a polymer within a fibrous element, that one material, such as a fibrous element and/or polymer, is chemically, physically and/or structurally different from another material, such as a fibrous element and/or polymer. For example, a polymer in the form of a filament is different from the same polymer in the form of a fiber. Likewise, a starch polymer is different from a cellulose polymer. However, different molecular weights of the same material, such as different molecular weights of a starch, are not different materials from one another for purposes of the present invention.

"Random mixture of polymers" as used herein means that two or more different polymers are randomly combined to form a fibrous element. Accordingly, two or more different polymers

that are orderly combined to form a fibrous element, such as a core and sheath bicomponent fibrous element, is not a random mixture of different polymers for purposes of the present invention.

"Associate," "Associated," "Association," and/or "Associating" as used herein with respect to fibrous elements means combining, either in direct contact or in indirect contact, fibrous elements such that a fibrous structure is formed. In one example, the associated fibrous elements may be bonded together for example by adhesives and/or thermal bonds. In another example, the fibrous elements may be associated with one another by being deposited onto the same fibrous structure making belt and/or patterned belt.

"Weight average molecular weight" as used herein means the weight average molecular weight as determined using gel permeation chromatography according to the protocol found in Colloids and Surfaces A. Physico Chemical & Engineering Aspects, Vol. 162, 2000, pg. 107-121.

"Length" as used herein, with respect to a fibrous element, means the length along the longest axis of the fibrous element from one terminus to the other terminus. If a fibrous element has a kink, curl or curves in it, then the length is the length along the entire path of the fibrous element. If a portion of the fibrous element is bonded to another fibrous element such that both termini are not discernible, such as a thermal bond site, then the an effective terminus of such a fibrous element is the point of the fibrous element immediately prior to the bond site.

"Average Diameter" as used herein, with respect to a fibrous element, is measured according to the Average Diameter Test Method described herein. In one example, a fibrous element of the present invention exhibits an average diameter of less than 25 μm and/or less than 20 μm and/or less than 15 μm and/or less than 10 μm and/or less than 6 μm and/or greater than 1 μm and/or greater than 3 μm.

"Length to Average Diameter Ratio" as used herein is the Length in millimeters divided by the Average Diameter in millimeters of a fibrous element. The Length to Average Diameter Ratio is unitless. In one example, the Length to Average Diameter Ratio is greater than 2000 and/or greater than 3000 and/or greater than 3500 and/or greater than 4000.

"Effective Diameter" as used herein is the product of the following mathematical formula: 0.01128 x Square Root of (Decitex of a fibrous element/Material density (g/cm^3) of the fibrous element).

"Decitex" as used herein means the weight in grams of a 10,000 meter length of a fibrous element. A fibrous element's decitex can be determined either by direct weight measurement or

by indirect means such as calculations based on the cross-sectional area of the fibrous element and the material density of the fibrous element.

"Material density" as used herein means the quantity of fibrous element per unit volume. Material density is expressed in g/cm^3.

"Length to Effective Diameter Ratio" as used herein is the Length in millimeters divided by the Effective Diameter in millimeters of a fibrous element. The Length to Effective Diameter Ratio is unitless. In one example, the Length to Effective Diameter Ratio is greater than 2000 and/or greater than 3000 and/or greater than 3500 and/or greater than 4000.

"Basis Weight" as used herein is the weight per unit area of a sample reported in lbs/3000 ft^2 or g/m^2.

"Water-soluble" as used herein means a material that is miscible in water. In other words, a material that is capable of forming a stable (stable for greater than 5 minutes) homogeneous solution with water at ambient conditions.

"Machine Direction" or "MD" as used herein means the direction parallel to the flow of the fibrous structure through the papermaking machine and/or product manufacturing equipment.

"Cross Machine Direction" or "CD" as used herein means the direction perpendicular to the machine direction in the same plane of the fibrous structure and/or paper product comprising the fibrous structure.

"Ply" or "Plies" as used herein means an individual fibrous structure optionally to be disposed in a substantially contiguous, face-to-face relationship with other plies, forming a multiple ply fibrous structure. It is also contemplated that a single fibrous structure can effectively form two "plies" or multiple "plies", for example, by being folded on itself.

As used herein, the articles "a" and "an" when used herein, for example, "an anionic surfactant" or "a fiber" is understood to mean one or more of the material that is claimed or described.

All percentages and ratios are calculated by weight unless otherwise indicated. All percentages and ratios are calculated based on the total composition unless otherwise indicated.

Unless otherwise noted, all component or composition levels are in reference to the active level of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources.

Polymers

The fibrous elements, such as filaments and/or fibers, of the present invention that associate to form the fibrous structures of the present invention may contain various types of

polymers such as hydroxyl polymers, non-thermoplastic polymers, thermoplastic polymers, biodegradable polymers, non-biodegradable polymers and mixtures thereof.

a. Hydroxyl Polymers - Nonlimiting examples of hydroxyl polymers in accordance with the present invention include polyols, such as polyvinyl alcohol, polyvinyl alcohol derivatives, polyvinyl alcohol copolymers, starch, starch derivatives, starch copolymers, chitosan, chitosan derivatives, chitosan copolymers, cellulose, cellulose derivatives such as cellulose ether and ester derivatives, cellulose copolymers, hemicellulose, hemicellulose derivatives, hemicellulose copolymers, gums, arabinans, galactans, proteins and various other polysaccharides and mixtures thereof.

In one example, a hydroxyl polymer of the present invention is a polysaccharide.

In another example, a hydroxyl polymer of the present invention is a non-thermoplastic polymer.

The hydroxyl polymer may have a weight average molecular weight of from about 10,000 g/mol to about 40,000,000 g/mol and/or greater than about 100,000 g/mol and/or greater than about 1,000,000 g/mol and/or greater than about 3,000,000 g/mol and/or greater than about 3,000,000 g/mol to about 40,000,000 g/mol. Higher and lower molecular weight hydroxyl polymers may be used in combination with hydroxyl polymers having a certain desired weight average molecular weight.

Well known modifications of hydroxyl polymers, such as natural starches, include chemical modifications and/or enzymatic modifications. For example, natural starch can be acid-thinned, hydroxy-ethylated, hydroxy-propylated, and/or oxidized. In addition, the hydroxyl polymer may comprise dent corn starch hydroxyl polymer.

Polyvinyl alcohols herein can be grafted with other monomers to modify its properties. A wide range of monomers has been successfully grafted to polyvinyl alcohol. Nonlimiting examples of such monomers include vinyl acetate, styrene, acrylamide, acrylic acid, 2-hydroxyethyl methacrylate, acrylonitrile, 1,3-butadiene, methyl methacrylate, methacrylic acid, vinylidene chloride, vinyl chloride, vinyl amine and a variety of acrylate esters.

"Polysaccharides" as used herein means natural polysaccharides and polysaccharide derivatives and/or modified polysaccharides. Suitable polysaccharides include, but are not limited to, starches, starch derivatives, chitosan, chitosan derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives, gums, arabinans, galactans and mixtures thereof. The polysaccharide may exhibit a weight average molecular weight of from about 10,000 to about 40,000,000 g/mol and/or greater than about 100,000 and/or greater than about

1,000,000 and/or greater than about 3,000,000 and/or greater than about 3,000,000 to about 40,000,000.

Non-cellulose and/or non-cellulose derivative and/or non-cellulose copolymer hydroxyl polymers, such as non-cellulose polysaccharides may be selected from the group consisting of: starches, starch derivatives, chitosan, chitosan derivatives, hemicellulose, hemicellulose derivatives, gums, arabinans, galactans and mixtures thereof.

b. Thermoplastic Polymers - Nonlimiting examples of suitable thermoplastic polymers include polyolefins, polyesters, copolymers thereof, and mixtures thereof. Nonlimiting examples of polyolefins include polypropylene, polyethylene and mixtures thereof. A nonlimiting example of a polyester includes polyethylene terephthalate.

The thermoplastic polymers may comprise a non-biodegradable polymer, examples of such include polypropylene, polyethylene and certain polyesters; and the thermoplastic polymers may comprise a biodegradable polymer, examples of such include polylactic acid, polyhydroxyalkanoate, polycaprolactone, polyesteramides and certain polyesters.

The thermoplastic polymers of the present invention may be hydrophilic or hydrophobic. The thermoplastic polymers may be surface treated and/or internally treated to change the inherent hydrophilic or hydrophobic properties of the thermoplastic polymer.

Any suitable weight average molecular weight for the thermoplastic polymers may be used. For example, the weight average molecular weight for a thermoplastic polymer in accordance with the present invention is greater than about 10,000 g/mol and/or greater than about 40,000 g/mol and/or greater than about 50,000 g/mol and/or less than about 500,000 g/mol and/or less than about 400,000 g/mol and/or less than about 200,000 g/mol.

c. Biodegradable Polymers - Nonlimiting examples of suitable biodegradable polymers include hydroxyl polymers described above, polylactic acid, polyhydroxyalkanoate, polycarprolactone, polyesteramides and other biodegradable polymers known in the art, and mixtures thereof.

Any suitable weight average molecular weight for the biodegradable thermoplastic polymers may be used. For example, the weight average molecular weight for a biodegradable thermoplastic polymer in accordance with the present invention can be from about 10,000 g/mol to about 40,000,000 g/mol and/or greater than about 100,000 g/mol and/or greater than about 1,000,000 g/mol and/or greater than about 3,000,000 g/mol and/or greater than about 3,000,000 g/mol to about 40,000,000 g/mol.

d. Non-biodegradable Polymers – Nonlimiting examples of suitable non-biodegradable polymers include polypropylene, polyethylene, polyesters, copolymers thereof, other non-biodegradable polymers known in the art, and mixtures thereof.

Any suitable weight average molecular weight for the non-biodegradable thermoplastic polymers may be used. For example, the weight average molecular weight for a non-biodegradable thermoplastic polymer in accordance with the present invention is greater than about 10,000 g/mol and/or greater than about 40,000 g/mol and/or greater than about 50,000 g/mol and/or less than about 500,000 g/mol and/or less than about 400,000 g/mol and/or less than about 200,000 g/mol.

Fibrous Structures

As shown in Figs. 1-3, the fibrous structure 10 of the present invention may comprise one or more first fibrous elements 12, one or more second fibrous elements 14 and one or more third fibrous elements 16 wherein the first, second and third fibrous elements 12, 14, 16 are all different from each other.

The first fibrous element 12 may comprise one or more of the following types of fibrous elements: 1) a non-thermoplastic, fibrous element having a length to average diameter ratio of greater than 2000 and/or a length to effective diameter ratio of greater than 2000; 2) a fibrous element comprising a random mixture of polymers wherein at least one of the polymers is a biodegradable polymer, wherein the fibrous element exhibits a length to average diameter ratio of greater than 2000 and/or a length to effective diameter ratio of greater than 2000; 3) a filament comprising a random mixture of polymers wherein at least one of the polymers is a biodegradable polymer; and 4) a non-thermoplastic filament.

The fibrous structure 10 of the present invention may comprise a mixture of fibers and/or filaments. In one example, the fibrous structure comprises at least one filament and at least one fiber. In another example, the fibrous structure may comprise two different filaments and a fiber. In yet another example, the fibrous structure may comprise two different fibers and a filament. As shown in Fig. 2, the first, second and third fibrous elements 12, 14, 16 may all be fibers. As shown in Fig. 3, the first, second and third fibrous elements 12, 14, 16 may all be filaments.

In one example, the first fibrous element 12 comprises a filament, the second fibrous element 14 comprises a fiber and the third fibrous element 16 comprises a filament.

In another example, the first fibrous element 12 comprises a filament, the second fibrous element 14 comprises a filament and the third fibrous element 16 comprises a fiber.

In yet another example, the first fibrous element 12 comprises a fiber, the second fibrous element 14 comprises a filament and the third fibrous element 16 comprises a filament.

In still yet another example, the first fibrous element 12 comprises a filament, the second fibrous element 14 comprises a fiber and the third fibrous element 16 comprises a fiber.

In even yet another example, the first fibrous element 12 comprises a fiber, the second fibrous element 14 comprises a filament and the third fibrous element 16 comprises a fiber.

In even still yet another example, the first fibrous element 12 comprises a fiber, the second fibrous element 14 comprises a fiber and the third fibrous element 16 comprises a filament.

The fibrous structure 10 of the present invention may comprise a mixture of biodegradable and/or non-biodegradable fibrous elements. In one example, the first, second and third fibrous elements 12, 14, 16 may all be biodegradable. In another example, the first, second and third fibrous elements 12, 14, 16 may all be non-biodegradable.

In one example, the first fibrous element 12 is a biodegradable fibrous element, the second fibrous element 14 is a biodegradable fibrous element and the third fibrous element 16 is a non-biodegradable fibrous element.

In another example, the first fibrous element 12 is a biodegradable fibrous element, the second fibrous element 14 is a non-biodegradable fibrous element and the third fibrous element 16 is a biodegradable fibrous element.

In yet another example, the first fibrous element 12 is a non-biodegradable fibrous element, the second fibrous element 14 is a biodegradable fibrous element and the third fibrous element 16 is a biodegradable fibrous element.

In another example, the first fibrous element 12 is a biodegradable fibrous element, the second fibrous element 14 is a non-biodegradable fibrous element and the third fibrous element 16 is a non-biodegradable fibrous element.

In even another example, the first fibrous element 12 is a non-biodegradable fibrous element, the second fibrous element 14 is a biodegradable fibrous element and the third fibrous element 16 is a non-biodegradable fibrous element.

In still yet another example, the first fibrous element 12 is a non-biodegradable fibrous element, the second fibrous element 14 is a non-biodegradable fibrous element and the third fibrous element 16 is a biodegradable fibrous element.

The fibrous elements of the fibrous structure of the present invention may comprise a biodegradable and/or non-biodegradable polymer.

In one example, the first fibrous element 12 comprises a biodegradable polymer. In another example, the first fibrous element 12 comprises a non-biodegradable polymer. In yet another example, the second fibrous element 14 comprises a biodegradable polymer. In still

another example, the second fibrous element 14 comprises a non-biodegradable polymer. In even another example, the third fibrous element 16 comprises a biodegradable polymer. In still yet another example, the third fibrous element 16 comprises a non-biodegradable polymer.

In one example, the first fibrous element 12 comprises a biodegradable polymer. The second fibrous element 14 may comprise a biodegradable polymer. The third fibrous element 16 may comprise a non-biodegradable polymer and/or a biodegradable polymer.

The fibrous structure 10 of the present invention may comprise a mixture of thermoplastic and/or non-thermoplastic fibrous elements. In one example, the first, second and third fibrous elements 12, 14, 16 may all be non-thermoplastic. In another example, the first, second and third fibrous elements 12, 14, 16 may all be thermoplastic.

In one example, the first fibrous element 12 is a non-thermoplastic fibrous element, the second fibrous element 14 is a non-thermoplastic fibrous element and the third fibrous element 16 is a thermoplastic fibrous element.

In another example, the first fibrous element 12 is a non-thermoplastic fibrous element, the second fibrous element 14 is a thermoplastic fibrous element and the third fibrous element 16 is a non-thermoplastic fibrous element.

In yet another example, the first fibrous element 12 is a thermoplastic fibrous element, the second fibrous element 14 is a non-thermoplastic fibrous element and the third fibrous element 16 is a non-thermoplastic fibrous element.

In another example, the first fibrous element 12 is a non-thermoplastic fibrous element, the second fibrous element 14 is a thermoplastic fibrous element and the third fibrous element 16 is a thermoplastic fibrous element.

In even another example, the first fibrous element 12 is a thermoplastic fibrous element, the second fibrous element 14 is a non-thermoplastic fibrous element and the third fibrous element 16 is a thermoplastic fibrous element.

In still yet another example, the first fibrous element 12 is a thermoplastic fibrous element, the second fibrous element 14 is a thermoplastic fibrous element and the third fibrous element 16 is a non-thermoplastic fibrous element.

Each of the first, second and third fibrous elements 12, 14, 16 may comprise a non-thermoplastic polymer and/or a thermoplastic polymer.

In one example, the first fibrous element 12 comprises a non-thermoplastic polymer, the second fibrous element 14 comprises a non-thermoplastic polymer, and the third fibrous element 16 comprises a thermoplastic polymer.

In another example, the first fibrous element 12 comprises a non-thermoplastic polymer, the second fibrous element 14 comprises a non-thermoplastic polymer, and third fibrous element 16 comprises a non-thermoplastic polymer.

The fibrous structure of the present invention may comprise a pulp fiber.

In one example, the fibrous structure of the present invention may comprise a polysaccharide filament, such as a starch filament. In another example, the polysaccharide filament may comprise a non-cellulose polysaccharide.

In another example, the fibrous structure of the present invention may comprise a polysaccharide fiber, such as a cellulosic fiber, for example a pulp fiber, especially a wood pulp fiber.

In yet another example, the fibrous structure of the present invention may comprise a polysaccharide filament, such as a starch filament, and a polysaccharide fiber, such as a wood pulp fiber.

In still another example, the fibrous structure of the present invention may comprise a polysaccharide filament, such as a starch filament, a polysaccharide fiber, such as a wood pulp fiber, and a thermoplastic fiber, such as a polypropylene fiber.

The distribution of the fibrous elements within the fibrous structure of the present invention may be homogeneous or substantially homogeneous or layered.

In one example, the fibrous structure comprises an inner layer of polysaccharide filaments, such as starch filaments, and at least one outer layer comprising a mixture of polysaccharide fibers, such as wood pulp fibers, and thermoplastic fibers, such as polypropylene fibers.

In another example, the fibrous structure comprises an inner layer comprising a mixture of thermoplastic filaments, such as polypropylene filaments, and pulp fibers, and an outer layer comprising polysaccharide filaments, such as starch filaments.

In yet another example, the first fibrous element 12 is chemically different from the second and third fibrous elements 14, 16.

One or more of the fibrous elements may comprise a greater than about 5% and/or greater than about 10% and/or greater than about 25% and/or greater than about 40% and/or greater than about 50% by weight of a water-soluble polymer, such as a starch, and exhibit an initial total wet tensile of greater than about 0.2 MPa and/or greater than 0.5 MPa and/or greater than 0.75 MPa and/or greater than 1.0 MPa and/or less than about 50 MPa and/or less than about 30 MPa and/or less than about 20 MPa.

The fibrous elements may be present in the fibrous structure at any suitable range, such as from 1% to about 98% and/or from about 5% to about 90% and/or from about 10% to about 80% by weight. For example, a fibrous structure may comprise from about 1% to about 98% and/or from about 5% to about 90% and/or from about 10% to about 80% by weight of a first fibrous element 12, from about 1% to about 98% and/or from about 5% to about 90% and/or from about 10% to about 80% by weight of a second fibrous element 14 and from about 1% to about 98% of a third fibrous element.

In one example, a fibrous structure in accordance with the present invention comprises from about 25% to about 80% by weight a second fibrous element 14 and from about 0.5% to about 50% by weight of a third fibrous element and the remaining balance of a first fibrous element 12.

In another example, a fibrous structure in accordance with the present invention comprises greater than 30% to about 80% by weight of a first fibrous element 12, from about 1% to less than 30% by weight of a second fibrous element 14 and from about 0.5% to about 10% by weight of a third fibrous element.

In yet another example, a fibrous structure in accordance with the present invention comprises from about 0.5% to about 10% by weight of a first fibrous element 12, from about 30% to about 80% by weight of a second fibrous element 14 and from about 10% to about 50% of a third fibrous element.

The fibrous elements may be associated together to form a fibrous structure in any suitable manner. In one example, the fibrous elements may be associated in a pattern such that the fibrous structure exhibits a non-uniform basis weight. For example, as shown in Fig. 4, discrete deposits and/or a discontinuous or continuous network 18, a portion of which is shown in Fig. 4, of a mixture of second and third fibrous elements 14, 16 may be associated, such as by deposition, with a surface of a filament web 20 comprising a plurality of first fibrous elements 12 such that the mixture of second and third fibrous elements 14, 16 results in a fibrous structure 10 comprising a pattern. The pattern may be random or non-random and/or repeating or non-repeating.

Methods for Making Fibrous Structures

Figure 5 illustrates one example of a method for making fibrous structures of the present invention. As shown in Fig. 5, the method 22 for making a fibrous structure 10 comprises the step of associating a plurality of first fibrous elements 12 produced from a first source 13, such as a meltblow die, a plurality of second fibrous elements 14 different from the first fibrous elements 12 produced from a second source 15, such as a hammermill and former for delivering pulp

fibers, and a plurality of third fibrous elements 16 different from the first and second fibrous elements 12, 14 produced from a third source 17, such as a meltblow die. Any of the fibrous elements 12, 14, 16 may be in the form of a fibrous structure (web) or as individual fibrous elements.

After forming the fibrous structure 10, the fibrous structure 10 may be subjected to various post-processing operations such as thermal bonding, embossing, surface treating, perforating, tuft generating process, folding, printing and other post-processing operations known to those skilled in the art.

As shown in Fig. 6, a fibrous structure of the present invention may be made by a method 24 comprising the steps of associating a plurality of second and third fibrous elements 14, 16 different from one another produced from a second and third source 15, 17, respectively, to form a web 26; and associating a plurality of first fibrous elements 12 different from the second and third fibrous elements 14, 16 produced from a first source 13 with the web 26 such that a fibrous structure 10 according to the present invention is formed.

In another example as shown in Fig. 7, a fibrous structure of the present invention may be made by first forming a web 20 comprising a plurality of fibrous elements, in this case, a plurality of first fibrous elements 12 (e.g, filaments) produced from a source 13, such as a meltblow die. Next, a mixture of fibrous elements, in this case a plurality of second and third fibrous elements 14, 16 (e.g., fibers), from sources 15 and 17, are associated as discrete deposits 28 on a surface 30 of the web 20 to produce a fibrous structure in accordance with the present invention.

Nonlimiting Examples of Fibrous Structures

a. Fibrous Structure comprising Starch Filaments/Wood Pulp Fibers/Thermoplastic Fibers

A melt composition comprising 10% Mowiol 10-98 commercially available from Kuraray Co. (polyvinyl alcohol), 39.25% Ethylex 2035 commercially available from Tate & Lyle (starch derivative), 39.25% Eclipse G commercially available from Tate & Lyle (starch), 0.7% C-12 quaternary ammonium compound commercially available from Degussa, 6.9% Urea glyoxal adduct crosslinking agent, 3.9% Ammonium Chloride available from Aldrich is prepared. The melt composition is cooked and extruded from a co-rotating twin screw extruder at approx 50% solids (50% H_2O).

The melt composition is then pumped to a meltblown spinnerette and attenuated with a 160°F saturated air stream to form non-thermoplastic, non-cellulose-containing, biodegradable filaments. The filaments are then dried by convection drying before being deposited on a

forming belt to form a filament web. These meltblown filaments are essentially continuous filaments.

Wood pulp fibers (non-thermoplastic, biodegradable fibers), Southern Softwood Kraft available as roll comminution pulp, is disintegrated by a hammermill and conveyed to an airlaid former via a blower.

Thermoplastic fibers (non-biodegradable, polypropylene/polyethylene bicomponent fibers) are metered into the wood pulp fiber stream prior to the same blower described above. This mixed fiber stream is then laid down on a surface of the previously formed filament web. The airlaid forming system used in this example is manufactured by Danweb of Aarhus, Denmark. The resulting fibrous structure is then thermally bonded with a patterned bonding roll to produce a fibrous structure according to the present invention.

b. Fibrous Structures comprising Starch Filaments, Wood Pulp Fibers/Thermoplastic Fibers

A fibrous structure is made according to Example a. above, except that polylactic acid fibers (thermoplastic, biodegradable fibers) are used in place of polypropylene/polyethylene bicomponent fibers (thermoplastic, non-biodegradable fibers).

c. Fibrous Structures comprising Starch Filaments/Wood Pulp Fibers/Thermoplastic Filaments

A fibrous structure is made according to Example a. above, except that polypropylene/polyethylene bicomponent thermoplastic fibers (thermoplastic, non-biodegradable fibers) are replaced with polypropylene thermoplastic filaments (thermoplastic, non-biodegradable filaments). The polypropylene thermoplastic filaments are meltblown and/or spunbonded and combined with wood pulp fibers to form a mixture of polypropylene filaments and wood pulp fibers. The mixture of polypropylene filaments and wood pulp fibers are associated with the starch filament web to form a fibrous structure. The resulting fibrous structure is then thermally bonded with a patterned bonding roll to produce a fibrous structure according to the present invention.

d. Fibrous Structures comprising Starch Filaments/Starch Fibers/Thermoplastic Fibers

A fibrous structure is made according to Example a. above, except that the wood pulp fibers (non-thermoplastic, biodegradable fibers) are replaced with starch fibers (non-cellulose-containing, non-thermoplastic, biodegradable fibers).

e. Fibrous Structures comprising Polyvinyl alcohol Filaments/Wood Pulp Fibers/Thermoplastic Fibers

A fibrous structure is made according to Example a. above, except that the non-cellulose-containing, non-thermoplastic, biodegradable filaments are replaced with polyvinyl alcohol filaments (non-cellulose-containing, non-thermoplastic, biodegradable filaments).

f. Fibrous Structures comprising Starch Filaments/Cellulose Filaments/Thermoplastic Filaments

A fibrous structure is made according to Example c. above, except that the wood pulp fibers (non-thermoplastic, biodegradable fibers) have been replaced with cellulose filaments (non-thermoplastic, biodegradable filaments), for example a pre-formed rayon web. The non-cellulose-containing, non-thermoplastic, biodegradable filaments can be deposited on the cellulose filament web and then the thermoplastic filaments (polypropylene filaments) can be deposited on the non-cellulose-containing, non-thermoplastic, biodegradable filaments.

g. Fibrous Structures comprising Starch Fibers/Wood Pulp Fibers/Thermoplastic Fibers

A fibrous structure is made according to Example a. above, except that the non-cellulose-containing, non-thermoplastic, biodegradable filaments are replaced with non-cellulose-containing, non-thermoplastic, biodegradable fibers. Wood pulp is disintegrated with a hammermill to produce wood pulp fibers (non-thermoplastic, biodegradable fibers). The wood pulp fibers are conveyed to an airlaid former via a blower. A mixture of non-cellulose-containing, non-thermoplastic, biodegradable fibers and thermoplastic fibers (polypropylene/polyethylene bicomponent fibers) are metered into the wood pulp fiber stream prior to the same blower described above. This mixed fiber stream is deposited on a forming belt to produce a fibrous structure. The resulting fibrous structure is then thermally bonded with a patterned bonding roll to produce a fibrous structure according to the present invention.

Test Methods

Unless otherwise specified, all tests described herein including those described under the Definitions section and the following test methods are conducted on samples that have been conditioned in a conditioned room at a temperature of 73°F ± 4°F (about 23°C ± 2.2°C) and a relative humidity of 50% ± 10% for 2 hours prior to the test. All tests are conducted in such conditioned room.

Basis Weight Test Method

Basis weight of a fibrous structure sample is measured by preparing five samples of a certain area (m^2) and weighing each sample of the fibrous structure on a top loading balance with a minimum resolution of 0.01 g. The top loading balance is protected from air drafts and other disturbances using a draft shield. Weights are recorded when the readings on the top loading balance become constant. The average weight (g) of the samples is calculated and the average area (m^2) is calculated. The basis weight (g/m^2) is calculated by dividing the average weight (g) by the average area (m^2) of the five samples.

Horizontal Full Sheet (HFS) Test Method

The Horizontal Full Sheet (HFS) test method determines the amount of distilled water absorbed and retained by a fibrous structure of the present invention. This method is performed by first weighing a sample of the fibrous structure to be tested (referred to herein as the "dry weight of the sample"), then thoroughly wetting the sample, draining the wetted sample in a horizontal position and then reweighing (referred to herein as "wet weight of the sample"). The absorptive capacity of the sample is then computed as the amount of water retained in units of grams of water absorbed by the sample. When evaluating different fibrous structure samples, the same size of fibrous structure is used for all samples tested.

The apparatus for determining the HFS capacity of fibrous structures comprises the following:

1) An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sample tested (i.e.; a fibrous structure sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

2) A sample support rack (Fig. 8) and sample support rack cover (Fig. 9) is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid as shown in Fig. 8. The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The HFS test is performed in an environment maintained at 23± 1° C and 50± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23± 1 ° C to a depth of 3 inches (7.6 cm).

Eight samples of a fibrous structure to be tested are carefully weighed on the balance to the nearest 0.01 grams. The dry weight of each sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). One sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched between the rack and cover) is submerged in the water reservoir. After the sample is submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain horizontally for 120±5 seconds, taking care not to excessively shake or vibrate the sample. While the sample is draining, the rack cover is carefully removed and all excess water is wiped from the support rack. The wet sample

and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The gram per fibrous structure sample absorptive capacity of the sample is defined as (wet weight of the sample - dry weight of the sample). The horizontal absorbent capacity (HAC) is defined as: absorbent capacity = (wet weight of the sample - dry weight of the sample) / (dry weight of the sample) and has a unit of gram/gram.

Vertical Full Sheet (VFS) Test Method

The Vertical Full Sheet (VFS) test method determines the amount of distilled water absorbed and retained by a fibrous structure of the present invention. This method is performed by first weighing a sample of the fibrous structure to be tested (referred to herein as the "dry weight of the sample"), then thoroughly wetting the sample, draining the wetted sample in a vertical position and then reweighing (referred to herein as "wet weight of the sample"). The absorptive capacity of the sample is then computed as the amount of water retained in units of grams of water absorbed by the sample. When evaluating different fibrous structure samples, the same size of fibrous structure is used for all samples tested.

The apparatus for determining the VFS capacity of fibrous structures comprises the following:

1) An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sample tested (i.e.; a fibrous structure sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

2) A sample support rack (Fig. 8) and sample support rack cover (Fig. 9) is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid as shown in Fig. 8. The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The VFS test is performed in an environment maintained at 23± 1° C and 50± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23± 1 ° C to a depth of 3 inches (7.6 cm).

Eight 19.05 cm (7.5 inch) x 19.05 cm (7.5 inch) to 27.94 cm (11 inch) x 27.94 cm (11 inch) samples of a fibrous structure to be tested are carefully weighed on the balance to the nearest 0.01 grams. The dry weight of each sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above.

The balance is then zeroed (tared). One sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched between the rack and cover) is submerged in the water reservoir. After the sample is submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain vertically for 60±5 seconds, taking care not to excessively shake or vibrate the sample. While the sample is draining, the rack cover is carefully removed and all excess water is wiped from the support rack. The wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The procedure is repeated for with another sample of the fibrous structure, however, the sample is positioned on the support rack such that the sample is rotated 90° compared to the position of the first sample on the support rack.

The gram per fibrous structure sample absorptive capacity of the sample is defined as (wet weight of the sample - dry weight of the sample). The calculated VFS is the average of the absorptive capacities of the two samples of the fibrous structure.

Average Diameter Test Method

A fibrous structure comprising fibrous elements is cut into a rectangular shape, approximately 20 mm by 35 mm. The sample is then coated using a SEM sputter coater (EMS Inc, PA, USA) with gold so as to make the fibrous elements relatively opaque. Typical coating thickness is between 50 and 250 nm. The sample is then mounted between two standard microscope slides and compressed together using small binder clips. The sample is imaged using a 10X objective on an Olympus BHS microscope with the microscope light-collimating lens moved as far from the objective lens as possible. Images are captured using a Nikon D1 digital camera. A Glass microscope micrometer is used to calibrate the spatial distances of the images. The approximate resolution of the images is 1 μm/pixel. Images will typically show a distinct bimodal distribution in the intensity histogram corresponding to the fibrous elements and the background. Camera adjustments or different basis weights are used to achieve an acceptable bimodal distribution. Typically 10 images per sample are taken and the image analysis results averaged.

The images are analyzed in a similar manner to that described by B. Pourdeyhimi, R. and R. Dent in "Measuring fiber diameter distribution in nonwovens" (Textile Res. J. 69(4) 233-236, 1999). Digital images are analyzed by computer using the MATLAB (Version. 6.3) and the MATLAB Image Processing Tool Box (Version 3). The image is first converted into a grayscale. The image is then binarized into black and white pixels using a threshold value that

minimizes the intraclass variance of the thresholded black and white pixels. Once the image has been binarized, the image is skeltonized to locate the center of each fibrous element in the image. The distance transform of the binarized image is also computed. The scalar product of the skeltonized image and the distance map provides an image whose pixel intensity is either zero or the radius of the fibrous element at that location. Pixels within one radius of the junction between two overlapping fibrous elements are not counted if the distance they represent is smaller than the radius of the junction. The remaining pixels are then used to compute a length-weighted histogram of fibrous elements diameters contained in the image.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention. To the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

CLAIMS

What is claimed is:

1. A fibrous structure comprising:

a. a non-thermoplastic, first fibrous element, wherein the first fibrous element exhibits a length to average diameter ratio of greater than 2000;

b. a second fibrous element different from the first fibrous element; and

c. a third fibrous element different from the first and second fibrous elements.

2. The fibrous structure according to Claim 1 wherein the first fibrous element comprises a biodegradable polymer, preferably wherein the biodegradable polymer comprises a hydroxyl polymer, more preferably wherein the hydroxyl polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, cellulose, cellulose derivatives, proteins, starch, starch derivatives, chitosan, chitosan derivatives, hemicellulose, hemicellulose derivatives and mixtures thereof and/or wherein the hydroxyl polymer exhibits a weight average molecular weight of greater than 10,000 g/mol.

3. The fibrous structure according to Claim 1 or 2 wherein the first fibrous element exhibits an average diameter of less than 25 μm.

4. The fibrous structure according to any of the preceding claims wherein the second fibrous element comprises a biodegradable polymer.

5. The fibrous structure according to any of the preceding claims wherein the second fibrous element comprises a pulp fiber.

6. The fibrous structure according to any of the preceding claims wherein the third fibrous element comprises a non-biodegradable polymer, preferably wherein the non-biodegradable polymer is selected from the group consisting of: polypropylene, polyethylene, polyesters, copolymers thereof and mixtures thereof.

7. The fibrous structure according to any of the preceding claims wherein the third fibrous element comprises a biodegradable polymer, preferably wherein the biodegradable polymer is selected from the group consisting of: polylactic acid, polyhydroxyalkanoate, polycaprolactone,

polyesteramides, copolymers thereof, polyvinyl alcohol, polyvinyl alcohol derivatives, cellulose, cellulose derivatives, proteins, starch, starch derivatives, chitosan, chitosan derivatives, hemicellulose, hemicellulose derivatives and mixtures thereof.

8. The fibrous structure according to any of the preceding claims wherein the second fibrous element comprises a non-thermoplastic polymer.

9. The fibrous structure according to any of the preceding claims wherein the third fibrous element comprises a thermoplastic polymer.

10. The fibrous structure according to any of the preceding claims wherein the first, second and third fibrous elements all comprise filaments.

11. The fibrous structure according to any of the preceding claims wherein the first, second and third fibrous elements all comprise fibers.

12. The fibrous structure according to any of the preceding claims wherein at least one of the first, second and third fibrous elements comprise a filament and at least one of the first, second and third fibrous elements comprise a fiber.

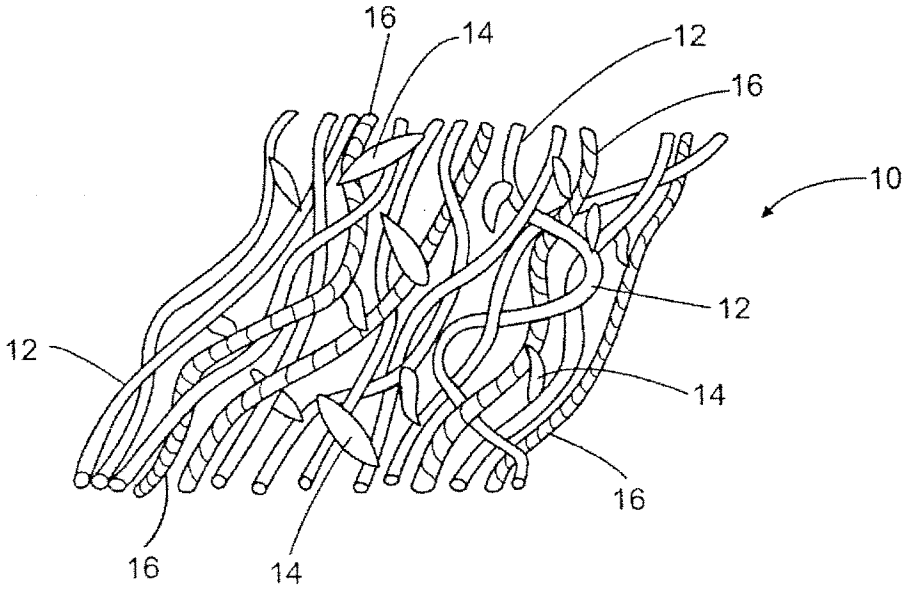
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Fig. 1

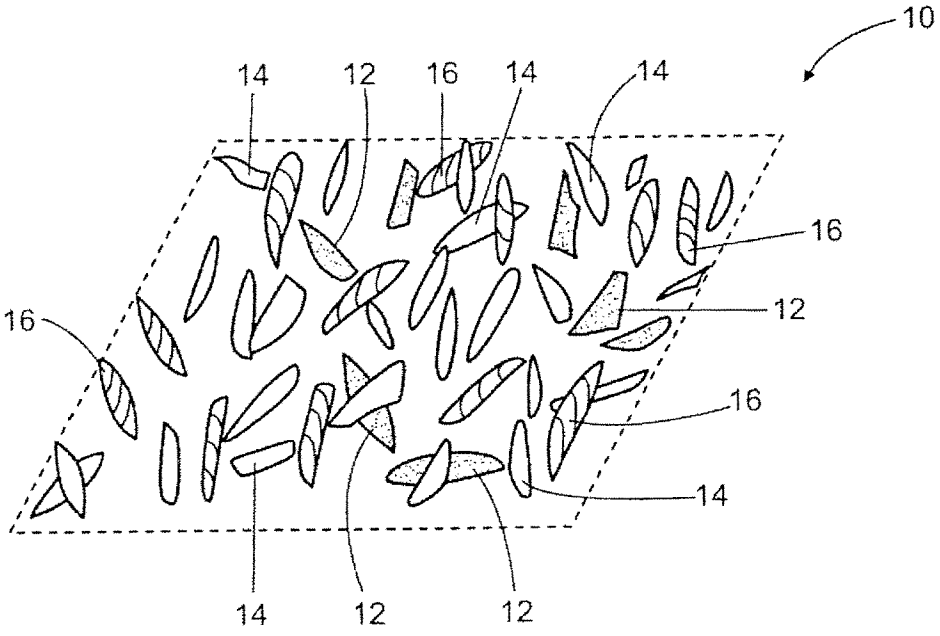
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Fig. 2

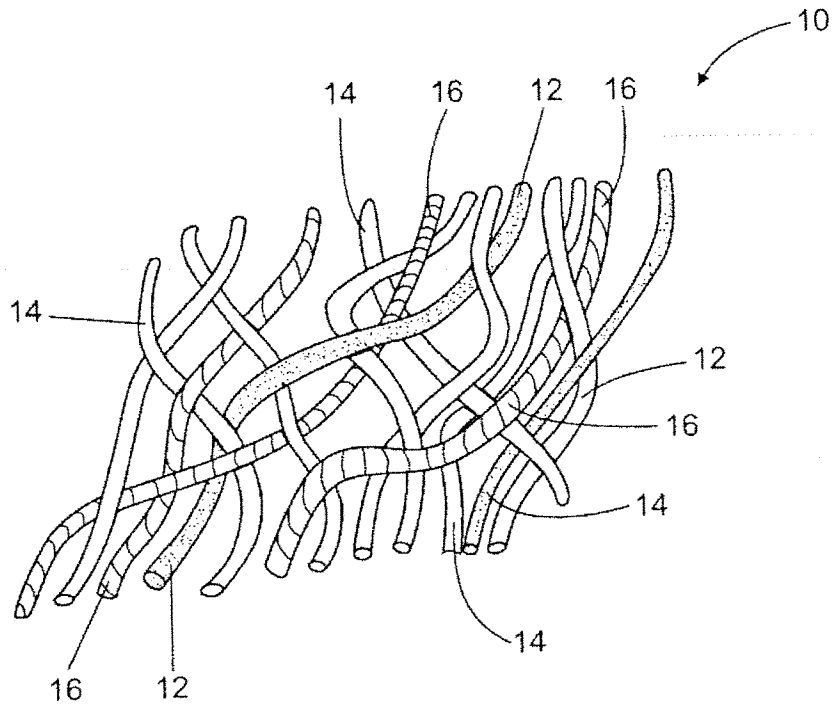

Fig. 3

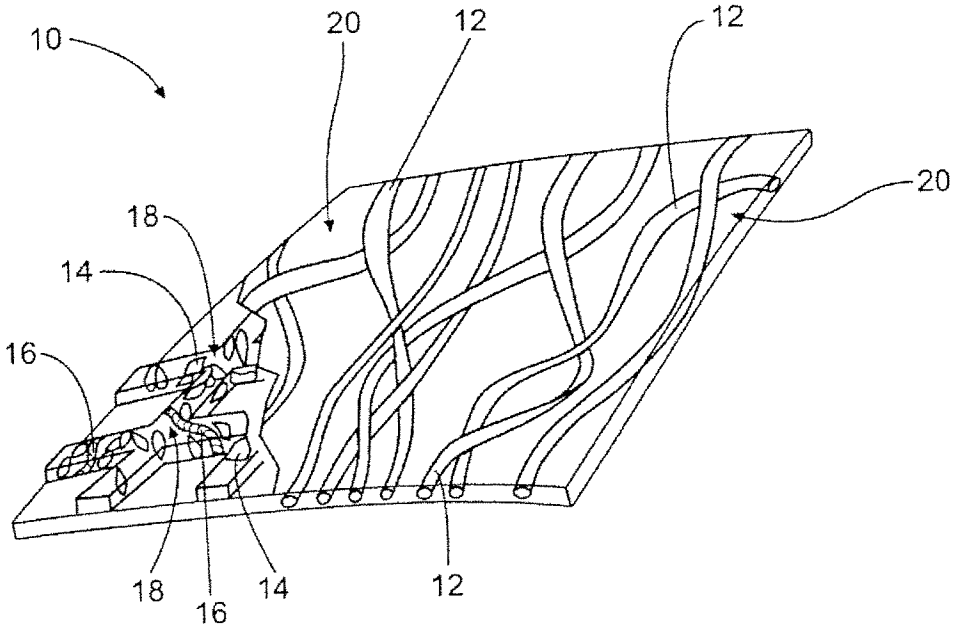

Fig. 4

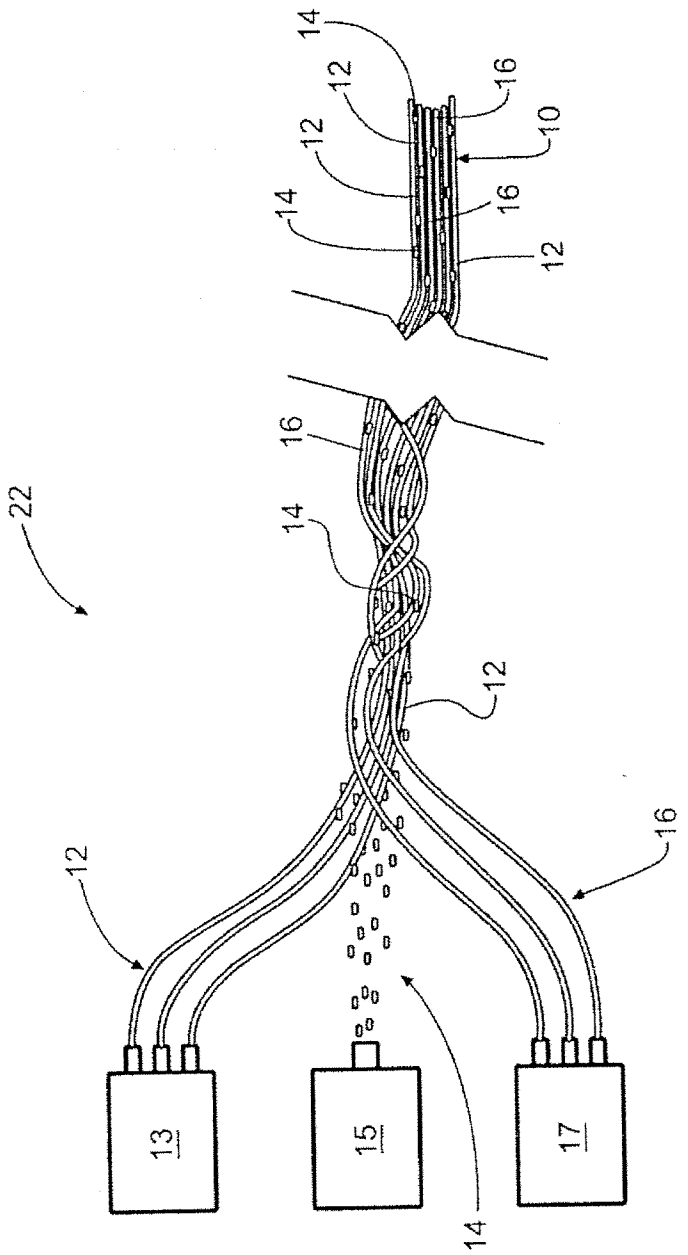

Fig. 5

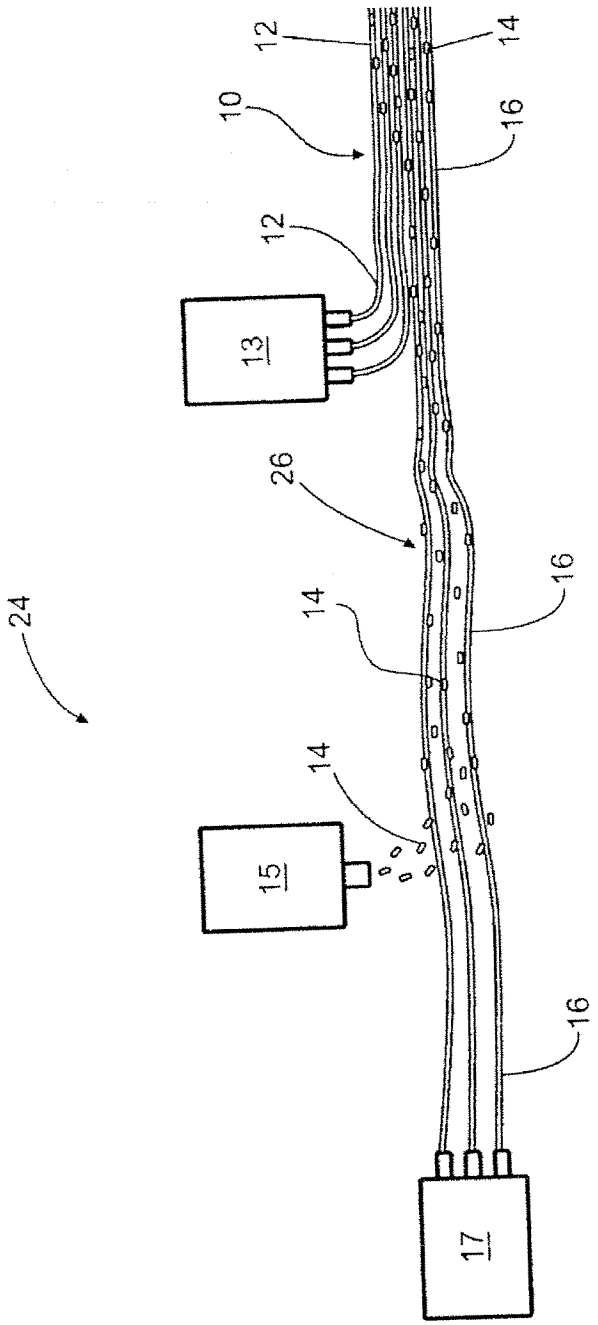

Fig. 6

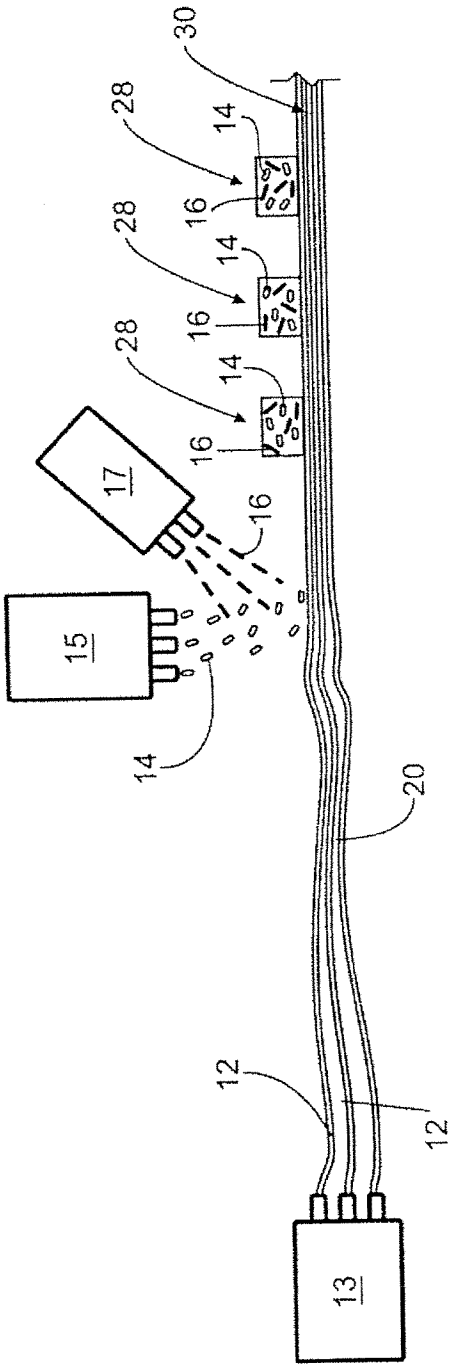

Fig. 7

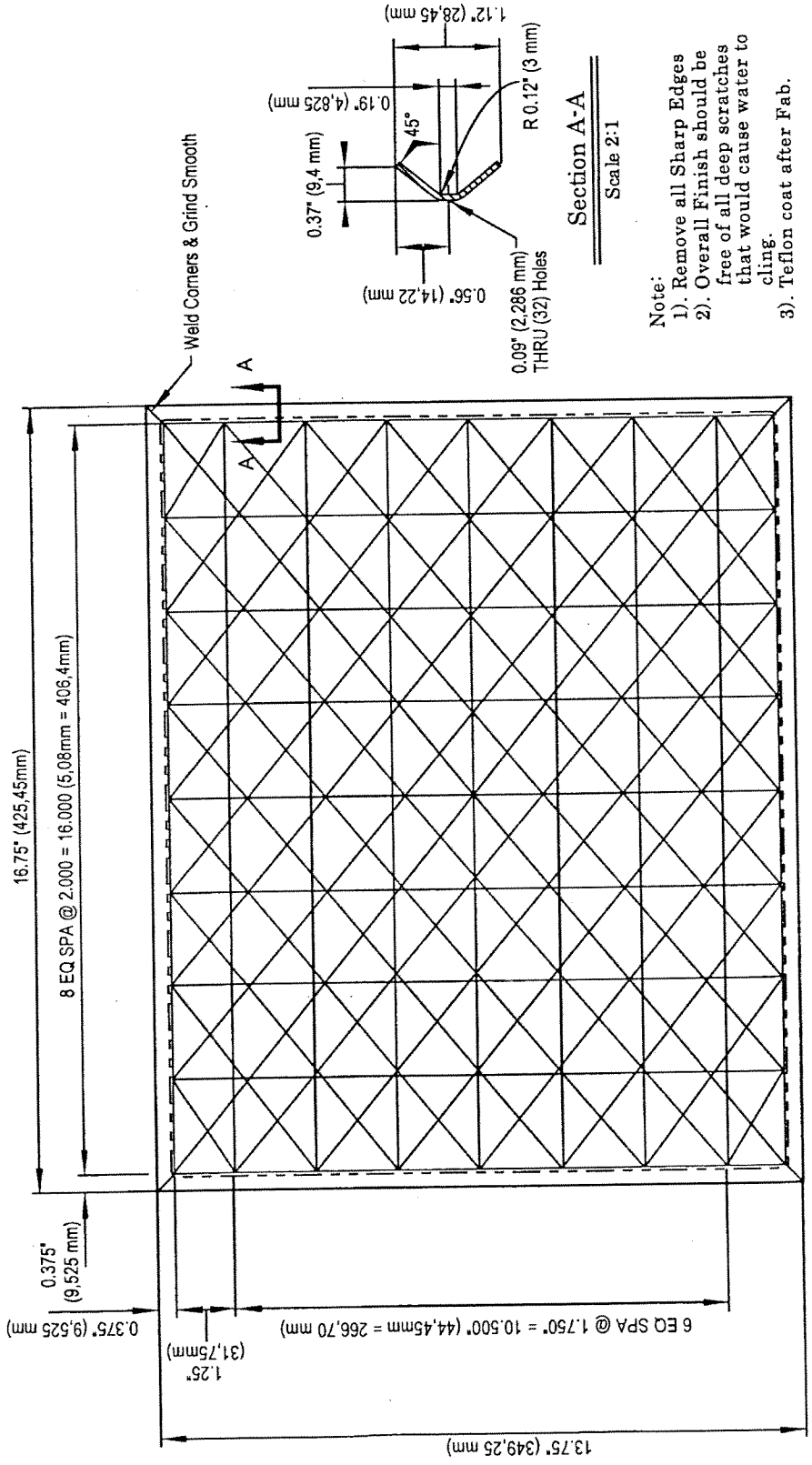
Weld Corners & Grind Smooth
A
A
16.75" (425,45mm)
8 EQ SPA @ 2.000 = 16.000 (5,08mm = 406,4mm)
0.375" (9,525 mm)
0.375" (9,525 mm)
1.25" (31,75mm)
6 EQ SPA @ 1.750" = 10.500" (44,45mm = 266,70 mm)
13.75" (349,25 mm)
1.12" (28,45 mm)
0.19" (4,825 mm)
0.37" (9,4 mm)
45°
R 0.12" (3 mm)
0.56" (14,22 mm)
0.09" (2,286 mm) THRU (32) Holes
Section A-A
Scale 2:1
Note:
1). Remove all Sharp Edges
2). Overall Finish should be free of all deep scratches that would cause water to cling.
3). Teflon coat after Fab.

Fig. 8

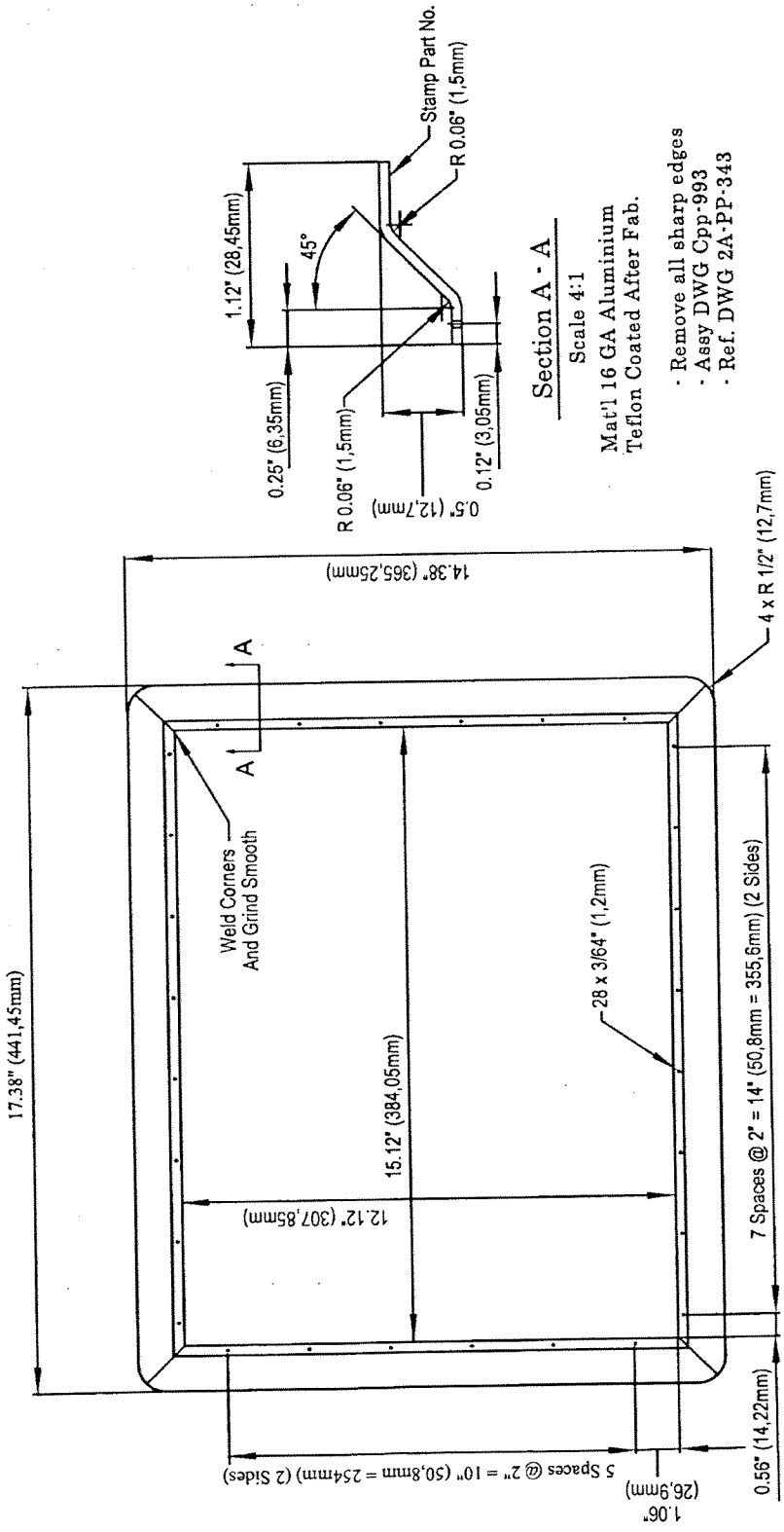
Stamp Part No.
R 0.06" (1,5mm)
1.12" (28,45mm)
45°
0.25" (6,35mm)
R 0.06" (1,5mm)
0.5" (12,7mm)
0.12" (3,05mm)
Section A - A
Scale 4:1
Mat'l 16 GA Aluminium
Teflon Coated After Fab.
· Remove all sharp edges
· Assy DWG Cpp-993
· Ref. DWG 2A-PP-343
14.38" (365,25mm)
4 x R 1/2" (12,7mm)
A
A
Weld Corners
And Grind Smooth
28 x 3/64" (1,2mm)
17.38" (441,45mm)
15.12" (384,05mm)
12.12" (307,85mm)
7 Spaces @ 2" = 14" (50,8mm = 355,6mm) (2 Sides)
5 Spaces @ 2" = 10" (50,8mm = 254mm) (2 Sides)
1.06"
(26,9mm)
0.56" (14,22mm)

Fig. 9

Electronic Acknowledgement Receipt

EFS ID:	12900154
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	31-MAY-2012
Filing Date:	10-JUL-2008
Time Stamp:	12:03:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS_Supp_5-31-12.pdf	98128 c439ff3d2e5304561f7b9a458e59eb9529c4d5e1	yes	4

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	2	
	Information Disclosure Statement (IDS) Form (SB08)		3	4	
Warnings:					
Information:					
2	Foreign Reference	EP1887036A2.pdf	1425164 b0050568032c2e379bdd445987dd7544042762aa	no	25
Warnings:					
Information:					
3	Foreign Reference	WO2008005500A2.pdf	1481150 c461b70bc122f4dc187c7ce62f2e46c0fe822d64	no	33
Warnings:					
Information:					
4	Foreign Reference	WO2008050311A2.pdf	914803 58750a13db90b9e1d061ad9ab72da9f6bb738326	no	32
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Information:					
5	Foreign Reference	WO2009010940A2.pdf	1369557 f167249259aa2286f3942573119d69ebf340278d	no	43
Warnings:					
Information:					
6	Foreign Reference	WO2009010942A2.pdf	1030115 17f419eaebb53f6077843a823a825d630c90d490	no	36
Warnings:					
Information:					
		Total Files Size (in bytes):	6318917		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

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Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, it is respectfully requested that the document(s) cited in this submission be carefully considered by the Examiner and made of record in this case. As provided in §1.97(g), no representation is made or intended that a thorough art search was made. As provided in 37 C.F.R. §1.97(h), this Information Disclosure Statement does not constitute an admission of any kind, and specifically is not an admission that the document(s) cited in this submission is (are), or is (are) considered to be, material to the patentability of the above-identified patent application, as defined in 37 C.F.R. §1.56(b).

This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(b)(4) together with a Request For Continued Examination and/or before a first Office Action after filing a Request For Continued Examination (RCE) has been received. Therefore, no fee is believed to be due. However, in the event that this paper is crossing in the mail with a first Office Action, authorization is hereby given to charge the required fee pursuant to 37 C.F.R. §1.97(c) and 37 C.F.R. §1.17(p) to Deposit Account No. 16-2480 in the name of The Procter & Gamble Company.

Additional Items to be Noted by the Examiner

In accordance with 37 C.F.R. §1.98(a)(2), a foreign patent document and/or non-patent literature is provided.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: May 31, 2012
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 7

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Grant/Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-3,521,638	07-1970	Parrish	
	2	US-4,139,699	02-1979	Hernandez, et al.	
	3	US-4,203,939	05-1980	Drachenberg, et al.	
	4	US-4,243,480	01-1981	Hernandez, et al.	
	5	US-4,355,066	10-19-1982	Newman	
	6	US-4,370,289	01-25-1983	Sorenson	
	7	US-4,436,780	03-13-1984	Hotchkiss, et al.	
	8	US-4,623,576	11-18-1986	Lloyd, et al.	
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	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 2 of 7	Docket Number	10859

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	30	US-6,589,892 B1	07-08-2003	Smith, et al.	
	31	US-6,709,526	03-2004	Bailey, et al.	
	32	US-6,946,413 B2	09-20-2005	Lange, et al.	
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	48	US-2003/0200991 A1	10-30-2003	Keck, et al.	
	49	US-2004/0048542	03-2004	Thomaschefsy, et al.	
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	51	US-2004/163781 A1	08-26-2004	Hernandez-Munoa, et al.	
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	53	US-2005/0090175	04-2005	Bergholm, et al.	
	54	US-2005/0130536 A1	06-16-2005	Siebers, et al.	
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	58	US-2005/0245159 A1	11-03-2005	Chmielewski, et al.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 3 of 7	Docket Number	10859

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	59	US-2005/0247416	11-2005	Forry, et al.	
	60	US-2005/0274470 A1	12-15-2005	Shannon, et al.	
	61	US-2005/133177 A1	06-23-2005	Stralin, et al.	
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	69	US-2009/0084513 A1	04-02-2009	Barnholtz, et al.	
	70	US-2009/0151748 A1	06-18-2009	Ridenhour	
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	78	US-2011/0244199 A1	10-06/2011	Brennan, et al.	
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	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 4 of 7	Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	79	EP 0 308 320 A2	03-22-1989	James River Corp.		
	80	EP 0 333 209 B1	09-1989	Kimberly-Clark Corp.		
	81	EP 0423 619 A1	04-24-1991	Fiberweb North America		
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	85	EP 2 028 296 A1	02-25-2009	Reifenhäuser GmbH & Co. KG Maschinenfabrik	English Abstract	
	86	EP 0 357 496 B1	05-18-1194	Colgate-Palmolive Co.		
	87	EP 0 590 307 B1	12-16-1998	Kimberly-ClarkWorldwide Inc.		
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	91	EP 1 156 147 A1	11-21-2001	Kang Na Hsiung Enterprise Co. Ltd.		
	92	EP 1 156 160 A2	10-02-1985	Kimberly Clark Ltd.		
	93	EP 1 504 145 B1	11-05-2008	Kimberly-ClarkWorldwide Inc.		
	94	EP 1 589 137 A1	10-26-2005	Teijin Fibers, Ltd.		
	95	JP 2000/303335 A2	10-31-2000	Humatro Corp.	English Abstract	
	96	JP 2002/088660 A	03-27-2002	Crecia Corp.	English Abstract	
	97	JP 2005/218525 A2	08-18-2005	Kao Corp.	English Abstract	

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	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 5 of 7	Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	98	WO 92/07985 A1	05-14-1992	Weyerhaeuser Company		
	99	WO 94/19179 A1	09-01-1994	The University of Tennessee Research Corporation		
	100	WO 97/37757 A1	10-16-1997	Kimberly-ClarkWorldwide Inc.		
	101	WO 98/03713 A1	01-29-1998	Kimberly Clark Co.		
	102	WO 98/27257 A2	06-25-1998	Kimberly-ClarkWorldwide Inc.		
	103	WO 98/36117 A1	08-20-1998	Kimberly-ClarkWorldwide Inc.		
	104	WO 98/55295 A1	12-10-1998	International Paper Co.		
	105	WO 00/21476	04-2000	Weyhaueser Co.		
	106	WO 00/29655 A1	05-25-2000	Kimberly-ClarkWorldwide Inc.		
	107	WO 00/38565 A1	07-06-2000	Kimberly Clark Co.		
	108	WO 01/66345 A1	09-13-2001	The Procter & Gamble Co.		
	109	WO 02/50357 A1	06-27-2002	M & J Fibretech A/S		
	110	WO 02/053003 A2	07-11-2002	Kimberly-ClarkWorldwide Inc.		
	111	WO 02/053365 A2	07-11-2002	Kimberly-ClarkWorldwide Inc.		
	112	WO2004/092474 A2	10-28-2004	Polymer Group, Inc.		
	113	WO 2005/065516 A2	07-21-2005	Kimberly-ClarkWorldwide Inc.		
	114	WO 2005/065932	07-2005	Kimberly-Clark Worldwide Inc.		
	115	WO 2005/073446 A1	08-11-2005	The Procter & Gamble Company		

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 2/1909

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 6 of 7

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee BARNHOLTZ
Art Unit	1742
Examiner Name	Saeed M. Huda
Docket Number	10859

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	116	WO 2005/080497 A1	09-01-2005	Exxon-Mobil Chemical Patents, Inc.		
	117	WO 2005/118934 A1	12-15-2005	Dan-Web Holding A/S		
	118	WO 2006/060813 A1	06-08-2009	Procter & Gamble Co.		
	119	WO 2006/060815 A2	06-08-2009	Procter & Gamble Co.		
	120	WO 2006/060816 A1	06-08-2006	Procter & Gamble Co.		
	121	WO 2006/069120 A2	06-29-2006	Procter & Gamble Co.		
	122	WO 2007/092303 A2	08-16-2007	SNS Nano Fiber Technology LLC		
	123	WO 2008/073101 A1	06-19-2008	Kimberly-ClarkWorldwide Inc.		
	124	WO 2009/010938 A1	01-22-2009	The Procter & Gamble Co.		
	125	WO 2009/010939 A2	01-2-2009	The Procter & Gamble Co.		
	126	WO 2009/105490 A1	08-27-2009	Sellars Absorbent Materials, Inc.		
	127	WO 2011/019908 A1	02-17-2011	The Procter & Gamble Co.		
	128	WO 2011/053677 A1	05-05-2011	The Procter & Gamble Co.		

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Rev. 2/1909

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Confirmation Number	1328
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee BARNHOLTZ
	Group Art Unit	1742
	Examiner Name	Saeed M. Huda
SHEET 7 of 7	Docket Number	10859

NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Provide relevant information to identify the Non-Patent Literature being submitted (e.g., name of the author (in CAPITAL LETTERS), title of the article, title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published, related application serial number, filing date and brief description of the papers being submitted).	T[2]
	129	Anonymous, "NanoDispense® Contact Angle Measurements", *First Ten Angstroms*, (October 3, 2004). Retrieved from the Internet: URL: http://www.firsttenangstroms.com/pdfdocs/NanoDispenseExamples.pdf, (retrieved February 15, 2011) Entire document.	
	130	Meyer, et al., "Comparison between different presentations of pore size distribution in porous materials." Fresenius J. Anal Chem. 1999. 363: pp. 174-178	
	131	All Office Actions in U.S. Patent Application Serial Nos. 13/106,302, 12/170,578, 12/170,575, 12/170,557, 12/917,535, 12/917,547, 12/917,558, 12/917,574, 12/917,585, and 13/076,492 are available on Private Pair. (P&G Cases 10857C, 10858, 10859, 11002, 11476, 11477, 11478, 11479, 11480, and 11672M, respectively)	
EXAMINER		**DATE CONSIDERED**	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	11963496
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	31-JAN-2012
Filing Date:	10-JUL-2008
Time Stamp:	14:36:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$180
RAM confirmation Number	1029
Deposit Account	162480
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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	Document Description		**Start**	**End**	
	Transmittal Letter		1	2	
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Warnings:					
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			Total Files Size (in bytes):	69561481	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1742
Examiner	:	Saeed M. Juda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, it is respectfully requested that the document(s) cited in this submission be carefully considered by the Examiner and made of record in this case. As provided in §1.97(g), no representation is made or intended that a thorough art search was made. As provided in 37 C.F.R. §1.97(h), this Information Disclosure Statement does not constitute an admission of any kind, and specifically is not an admission that the document(s) cited in this submission is (are), or is (are) considered to be, material to the patentability of the above-identified patent application, as defined in 37 C.F.R. §1.56(b).

This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(b)(4) together with a Request For Continued Examination and/or before a first Office Action after filing a Request For Continued Examination (RCE) has been received. Therefore, no fee is believed to be due. However, in the event that this paper is crossing in the mail with a first Office Action, authorization is hereby given to charge the required fee pursuant to 37 C.F.R. §1.97(c) and 37 C.F.R. §1.17(p) to Deposit Account No. 16-2480 in the name of The Procter & Gamble Company.

Additional Items to be Noted by the Examiner

In accordance with 37 C.F.R. §1.98(a)(2), a foreign patent document and/or non-patent literature is provided.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: January 31, 2012
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1791
Examiner	:	Saeed M. Huda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

STATUS INQUIRY

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

An RCE with Amendment in the above-identified application was filed on Jun 10, 2010. No communication in response to the RCE with Amendment has been received from the Patent Office to date. Inquiry is hereby respectfully made as to the status of this application.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: August 25, 2011
Customer No. 27752

Status_Inquiry.doc
Rev. 04/25/2006

Electronic Acknowledgement Receipt

EFS ID:	10814900
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	25-AUG-2011
Filing Date:	10-JUL-2008
Time Stamp:	15:34:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	10859_Status_Inquiry_8-25-11.pdf	68119 82d4b9748d3bb702510a232ae63f6a1f75056ac1	no	1

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Total Files Size (in bytes):	68119

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL **Address to:** Mail Stop RCE Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450		
	Application Number	12/170,575
	Filing Date	July 10, 2008
	First Named Inventor	Steven Lee Barnholtz
	Art Unit	1791
	Examiner Name	Saeed M. Huda
	Docket Number	10859
	Confirmation Number	1328

This is a Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application.

1. **Submission required under 37 C.F.R. § 1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

   a. [ ] Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.
      i. [ ] Consider the arguments in the Appeal Brief or Reply Brief previously filed on ____
      ii. [ ] Other _____

   b. [X] Enclosed
      i. [X] Amendment/Reply
      ii. [ ] Affidavit(s)/Declaration(s)
      iii. [ ] Information Disclosure Statement (IDS)
      iv. [ ] Other ____

2. **Miscellaneous**

   a. [] Suspension of action on the above-identified application is requested under 37 C.F.R. §1.103(c) for a period of __ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. § 1.17(i) required)
   b. [] Other ___

3. **Fees** The RCE fee under 37 C.F.R. §1.17(e) is required by 37 C.F.R. §1.114 when the RCE is filed.

   [X] Authorization is hereby given to charge the following fees, or credit any overpayments, to Deposit Account No. **16-2480**.
      i. [X] RCE fee required under 37 C.F.R. §1.17(e)
      ii. [] Extension of time fee (37 C.F.R. §§1.136 and 1.17)
      iii. [] Suspension of action fee under 37 C.F.R. 1.17(i)
      iv. [] Other ____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED		
NAME (Print/Type)	C. Brant Cook	Reg. No. (Attorney/Agent) 39,151
SIGNATURE	/C. Brant Cook/	DATE June 10, 2010

RCE Transmittal.doc
Rev. 12/08 (PTO updated 12/08)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1791
Examiner	:	Saeed M. Huda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUBMISSION OF AMENDMENT WITH FILING OF RCE

Mail Stop RCE
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of March 11, 2010, please amend the above-identified application as follows and consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently amended) A process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying at least a first polymer to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with solid additives to form a mixture; and

f. collecting the mixture on a collection device to produce a fibrous structure.

Claim 2 (Original) The process according to Claim 1 wherein the die comprises two or more rows of filament-forming holes.

Claim 3 (Original) The process according to Claim 2 wherein at least one row of filament-forming holes comprises two or more filament-forming holes.

Claim 4 (Original) The process according to Claim 1 wherein more than one fluid-releasing hole are associated with a filament-forming hole.

Claim 5 (Original) The process according to Claim 1 wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole.

Claim 6 (Original)he process according to Claim 1 wherein the first polymer comprises a synthetic polymer.

Claim 7 (Original) The process according to Claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates , polycaprolactones and mixtures thereof.

Claim 8 (Original) The process according to Claim 7 wherein the synthetic polymer comprises a polyolefin.

Claim 9 (Original) The process according to Claim 8 wherein the polyolefin comprises polypropylene.

Claim 10 (Original) The process according to Claim 1 wherein the first polymer comprises a natural polymer.

Claim 11 (Original) The process according to Claim 10 wherein the natural polymer is selected from the group consisting of: starch, starch derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives and mixtures thereof.

Claim 12 (Original) The process according to Claim 1 wherein the solid additives comprise fibers.

Claim 13 (Original) The process according to Claim 12 wherein the fibers comprise wood pulp fibers.

Claim 14 (Original) The process according to Claim 1 wherein the solid additives are combined with the plurality of filaments by a solid additive spreader.

Claim 15 (Currently amended) The process according to Claim 1 wherein the process further comprises the step of:

~~f~~g. contacting a surface of the fibrous structure with a plurality of filaments comprising a second polymer.

Claim 16 (Original) The process according to Claim 15 wherein the plurality of filaments comprising the second polymer are in the form of a second fibrous structure.

Claim 17 (Original) The process according to Claim 15 wherein the second polymer is the same as the first polymer.

Claim 18 (Original) The process according to Claim 1 wherein the fluid released by the fluid-releasing holes comprises air.

Claim 19 (Original) The process according to Claim 1 wherein the fibrous structure exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121μm to about 200μm.

Claim 20 (Original) The process according to Claim 1 wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation.

Claim 21 (Original) The process according to Claim 1 wherein the process is directly coupled to a post-processing operation.

Claim 22 (Original) The process according to Claim 1 wherein the process is closely coupled to a post-processing operation.

Claim 23 (Currently amended) A process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying a polyolefin polymer to the die;

c. producing a plurality of filaments comprising the polyolefin polymer from the die;

d. supplying a fluid to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments;

e. combining the filaments with wood pulp fibers to form a mixture; and

f. collecting the mixture on a collection device to produce a fibrous structure.

REMARKS

Claim Status

Claims 1 and 23 have been amended to define the claimed invention with greater specificity by reciting that a fluid is supplied to the die such that the fluid exits the one or more fluid-releasing holes parallel or substantially parallel to the exterior surface of at least one of the filaments. Support for this amendment is found within the Specification, for example at page 17, line 21 to page 18, line 2.

Claim 15 has been amended to be consistent with Claim 1, as amended.

Claims 1-23 are pending in the present application. No additional claims fee is believed to be due.

It is believed these changes do not involve any introduction of new matter. Consequently, entry of these changes is believed to be in order and is respectfully requested.

Rejection Under 35 USC §103(a) Over EP 333 209 in view of U.S. Patent No. 5,476,616

Claims 1-4, 6-9, 12-13, 18, and 21-23 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over EP 0 333 209 to Radwanski, et al., ("Radwanski") in view of U.S. Patent No. 5,476,616 to Schwarz ("Schwarz"). The Examiner asserts that Radwanski teaches a method of forming a nonwoven fibrous elastomeric web material involving extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas supplied from nozzles to break the polymer streams into fibers of relatively small diameter. The Examiner asserts that the nozzles (Radwanski, Fig. 1, reference numerals 8 and 10), supply high velocity air streams that converge into a singular stream and exit the fluid release hole parallel to the exterior surface of Radwanski's filament. The Examiner further asserts that the direction of the fluid flow prior to reaching the fluid release hole is immaterial as along as the exit of the fluid release hole is parallel to the exterior surface of the filament. The Examiner further asserts that Radwanski's process

would still be able to break the polymer streams into fibers even with the modification using Schwarz.

Applicants respectfully submit that Radwanski in view of Schwarz fails to teach each and every element of Claims 1 and 23, the independent claims, as amended, because Radwanski in view of Schwarz fails to teach its air streams exits is nozzles 8 and 10 parallel or substantially parallel to the exterior surface of its filament. Applicants submit that the high velocity air streams delivered by nozzles 8 and 10 of Radwanski's Fig. 1 exit the nozzles 8 and 10 at an angle, not parallel or substantial parallel to the exterior surface of its filament that is produced by its filament-forming hole. Applicants submit that Radwanski teaches that its air streams from nozzles 8 and 10 converge to break its polymer stream exiting its filament-forming hole into fibers of relatively small diameter. Therefore, Applicants submit that replacing the converging flows with the parallel flows as taught by Schwarz would render Radwanski inoperable and it would not function for its intended purpose; namely, to break the polymer streams into fibers. Accordingly, Applicants respectfully submit that the teachings of Radwanski and Schwarz cannot properly be combined to render the claimed invention as claimed in Claims 1 and 23 obvious. Therefore, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness.

In light of the foregoing, Applicants submit that Claims 1 and 23, as amended, are not rendered obvious over Radwanski in view of Schwarz. MPEP 2143.03. Further, Applicants submit that Claims 2-4, 6-9, 12-13, 18, and 21-22, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Schwarz. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616 and further in view of U.S. Patent No. 6,506,873

Claims 5 and 10-11 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of U.S. Patent No. 6,506,873 to Ryan, et al. ("Ryan").

Applicants respectfully submit that Claims 5 and 10-11, which ultimately depend from Claim 1, as amended, are not rendered obvious over Radwanski in view of Schwarz and further in view of Ryan. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616 and further in view of U.S. Patent No. 4,118,531

Claim 14 is rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of U.S. Patent No. 4,118,531 to Hauser ("Hauser").

Applicants respectfully submit that Claim 14, which ultimately depends from Claim 1, as amended, is not rendered obvious over Radwanski in view of Schwarz and further in view of Hauser. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616 and further in view of WO 2005/065932

Claims 15-17 and 20 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of WO 2005/065932 to Zhou, et al. ("Zhou").

Applicants respectfully submit that Claims 15-17 and 20, as amended, which ultimately depend from Claim 1, as amended, are not rendered obvious over Radwanski in view of Schwarz and further in view of Zhou. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, reconsideration of this application, and allowance of the pending claim(s) are respectfully requested.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: June 10, 2010
Customer No. 27752

Amendment_Response_to_Office_Action.doc
Revised 02/09/2009

Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt

EFS ID:	7785788
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	10-JUN-2010
Filing Date:	10-JUL-2008
Time Stamp:	12:40:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$810
RAM confirmation Number	10779
Deposit Account	162480
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_Submission_of_Amendment_w_Filing_of_RCE_06-10-10.pdf	278493 88e2720e504b8a17b0d09a7b7efbfcf288bc493b	yes	10
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Request for Continued Examination (RCE)		1	1	
	Amendment Submitted/Entered with Filing of CPA/RCE		2	10	
Warnings:					
Information:					
2	Fee Worksheet (PTO-875)	fee-info.pdf	30384 83b5924e697eeec6e71ae1cad789dfc5159bc877	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	308877		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
12/170,575	07/10/2008	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY ☐ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 06/10/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 23	Minus	** 23	= 0	X $ =		OR	X $52=	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $ =		OR	X $220=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/phyllis canty/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 05/19/2010

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
HUDA, SAEED M	
ART UNIT	PAPER NUMBER
1791	

MAIL DATE	DELIVERY MODE
05/19/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 12/170,575	**Applicant(s)** BARNHOLTZ ET AL.	
	Examiner SAEED M. HUDA	**Art Unit** 1791	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 10 May 2010 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☐ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires _____months from the mailing date of the final rejection.
   b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: *1-23*.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: see continuation sheet.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/Saeed M. Huda/
Examiner, Art Unit 1791

/KHANH NGUYEN/
Primary Examiner, Art Unit 1791

continuation of 11

Rejection Under 35 USC § 103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616

Applicants disagree with the Examiner's interpretation and conclusion regarding Radwanski. Applicants submit that the high velocity air streams delivered by nozzles 8 and 10 of Radwanski's Fig. 1 do not converge prior to exiting their respective "fluid-releasing holes." Though, Applicant makes this statement, this is not required in the claims.

Further, Applicants submit that Radwanski's fluids (air streams delivered by nozzles 8 and 10) do not exit their respective fluid-releasing holes parallel or substantially parallel to an exterior surface of the filament that is produced by Radwanski's filament-forming hole. Clearly as shown in Radwanski's Fig. 1, the air streams from nozzles 8 and 10 exit their respective "fluid-releasing" holes at an angle to the filament produced from Radwanski's filament-forming hole. As stated in the rejection, the Radwanski reference has been modified to show this claimed subject matter.

Applicants submit that Radwanski teaches that its air streams from nozzles 8 and 10 converge to break its polymer stream exiting its filament-forming hole into fibers of relatively small diameter. Therefore, Applicants submit that replacing the converging flows with the parallel flows as taught by Schwarz would render Radwanski inoperable and it would not function for its intended purpose; namely, to break the polymer streams into fibers. Though this conclusion is reached, Applicant has failed to provide evidence to support this claim.

OK to ENTER
/Saeed M. Huda/
Examiner
Art Unit 1791

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1791
Examiner	:	Saeed M. Huda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

REPLY AFTER FINAL OFFICE ACTION UNDER 37 CFR §1.113

Mail Stop AF
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of March 11, 2010, please consider the following remarks and reconsider the application.

Remarks begin on page 2 of this paper.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1791
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In response to the Office Action of March 11, 2010, please consider the following remarks and reconsider the application.

Remarks begin on page 2 of this paper.

REMARKS

Claim Status

Claims 1-23 are pending in the present application. No additional claims fee is believed to be due.

Rejection Under 35 USC §103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616

Claims 1-4, 6-9, 12-13, 18, and 21-23 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over EP 0 333 209 to Radwanski, et al., ("Radwanski") in view of U.S. Patent No. 5,476,616 to Schwarz ("Schwarz"). The Examiner asserts that Radwanski teaches a method of forming a nonwoven fibrous elastomeric web material involving extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas supplied from nozzles to break the polymer streams into fibers of relatively small diameter. The Examiner asserts that the nozzles (Radwanski, Fig. 1, reference numerals 8 and 10), supply high velocity air streams that converge into a singular stream and exit the fluid release hole parallel to the exterior surface of Radwanski's filament. The Examiner further asserts that the direction of the fluid flow prior to reaching the fluid release hole is immaterial as along as the exit of the fluid release hole is parallel to the exterior surface of the filament. The Examiner further asserts that Radwanski's process would still be able to break the polymer streams into fibers even with the modification using Schwarz.

Applicants respectfully disagree with the Examiner's interpretation and conclusion regarding Radwanski. Applicants submit that the high velocity air streams delivered by nozzles 8 and 10 of Radwanski's Fig. 1 do not converge prior to exiting their respective "fluid-releasing holes." Further, Applicants submit that Radwanski's fluids (air streams delivered by nozzles 8 and 10) do not exit their respective fluid-releasing holes parallel or substantially parallel to an exterior surface of the filament that is produced by Radwanski's filament-forming hole. Clearly as shown in Radwanski's Fig. 1, the air streams from nozzles 8 and 10 exit their respective "fluid-releasing" holes at an angle to the filament produced from Radwanski's filament-forming hole. Applicants submit that Radwanski teaches that its air streams from nozzles 8 and 10 converge to

break its polymer stream exiting its filament-forming hole into fibers of relatively small diameter. Therefore, Applicants submit that replacing the converging flows with the parallel flows as taught by Schwarz would render Radwanski inoperable and it would not function for its intended purpose; namely, to break the polymer streams into fibers. Accordingly, Applicants respectfully submit that the teachings of Radwanski and Schwarz cannot properly be combined to render the claimed invention as claimed in Claims 1 and 23 obvious. Therefore, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness.

In light of the foregoing, Applicants submit that Claims 1 and 23 are not rendered obvious over Radwanski in view of Schwarz. MPEP 2143.03. Further, Applicants submit that Claims 2-4, 6-9, 12-13, 18, and 21-22, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Schwarz. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616 and further in view of U.S. Patent No. 6,506,873

Claims 5 and 10-11 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of U.S. Patent No. 6,506,873 to Ryan, et al. ("Ryan").

Applicants respectfully submit that Claims 5 and 10-11, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Schwarz and further in view of Ryan. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616 and further in view of U.S. Patent No. 4,118,531

Claim 14 is rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of U.S. Patent No. 4,118,531 to Hauser ("Hauser").

Applicants respectfully submit that Claim 14, which ultimately depends from Claim 1, is not rendered obvious over Radwanski in view of Schwarz and further in view of Hauser. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 0333209 in view of U.S. Patent No. 5,476,616 and further in view of WO 2005/065932

Claims 15-17 and 20 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of WO 2005/065932 to Zhou, et al. ("Zhou").

Applicants respectfully submit that Claims 15-17 and 20, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Schwarz and further in view of Zhou. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, reconsideration of this application, and allowance of the pending claim(s) are respectfully requested.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: May 10, 2010
Customer No. 27752

Amendment_Response_to_Office_Action.doc
Revised 02/09/2009

Electronic Acknowledgement Receipt

EFS ID:	7577904
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	10-MAY-2010
Filing Date:	10-JUL-2008
Time Stamp:	11:48:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment After Final	10859_Amendment_Response_to_Final_OA_mailed_3-11-10.pdf	93546 bfd57df782eff2fcd8b26bdcf44e68a481290eec	no	4

Warnings:	
Information:	

Total Files Size (in bytes):	93546

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 03/11/2010

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
HUDA, SAEED M	
ART UNIT	**PAPER NUMBER**
1791	

MAIL DATE	DELIVERY MODE
03/11/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/170,575	BARNHOLTZ ET AL.	
	Examiner	Art Unit	
	SAEED M. HUDA	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 July 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The response filed on 12/21/2009 has been fully considered and entered into the record. Claims 1, 3, 4, 8, 10, 11, 13, 15, 17, 19, and 20 are cancelled and the rejections applying to the cancelled claims withdrawn.

Response to Arguments

2. Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection, to the extent that the arguments are applicable to the new grounds of rejection; they are addressed below.

Rejection over EP 333209 in view of US 5476616

Applicant states that Radwanski (EP 333209) in view of Schwarz (US 5476616) fails to teach each and every element of claims 1 and 23 because the teachings of Radwanski and Schwarz cannot be properly combined to arrive at the claimed invention as claimed. Applicant states that the Examiner had recognized that Radwanski requires converging flows of high velocity, heated gas supplied from nozzles to break the polymer streams into fibers of relatively small diameter. Applicant states that replacing the converging flows with the parallel flows as taught by Schwarz would render Radwanski inoperable and it would not function for its intended purpose; namely, to break the polymer streams into fiber.

The Examiner does not agree with Applicant's statements. Applicant states that replacing the converging flows with the parallel flows as taught by Schwarz would

render Radwanski inoperable and it would not function for its intended purpose, but does not provide any basis or facts regarding this statement.

Radwanski states that the method of formation involve extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas (usually air) supplied from nozzles 8 and 10 to break the polymer streams into fibers of relativity small diameter. Though these nozzles 8 and 10 supply air, they converge into a singular stream and exit the fluid release hole parallel to the exterior surface of the filament. Thus, the direction of the fluid flow prior to reaching the fluid release hole is immaterial as long as the exit of the fluid release hole is parallel to the exterior surface of the filament. Radwanski would still be able to break the polymer streams into fibers even with the modification using Schwarz.

Rejection over EP 333209 in view of US 5476616 & further in view of US 4118531

Applicant states that claim 14 is rejected by the Examiner as allegedly defining over obvious subject matter, but that this is not obvious in view of the comments/reasoning presented in above for claim 1.

Rejection over EP 333209 in view of US 5476616 & further in view of WO 2005/065932

Applicant states that claim 14 is rejected by the Examiner as allegedly defining over obvious subject matter, but that this is not obvious in view of the comments/reasoning presented in above for claim 15-17 and 20.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 6-9, 12-13, 18, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616).

a. Regarding claims 1-3, 18, and 23, Radwanski et al. teach a method of forming a nonwoven fibrous elastomeric web material (page 2, lines 3-5). Radwanski et al. disclose that the method of formation involve extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas (usually air) supplied from nozzles 8 and 10 to break the polymer streams into fibers of relativity small diameter. The die head preferably includes at least one straight row of extrusion apertures (page 9, lines 34-43). Two gas streams are used in the process and a primary gas stream is merged with a secondary gas stream containing at least one of pulp fiber, staple fibers, meltblown fibers, and continuous filaments, with or without particulate material (solid additives) (page 9, lines 43-48). The integrated stream flows in the same direction (parallel) as the primary stream and the integrated stream is collected on a belt to form a conform (page 10, lines 8-11). Radwanski et al. fail to teach that a fluid exiting the fluid-releasing hole is

parallel or substantially parallel to an exterior surface of a filament exiting the filament forming hole.

Schwarz teach an apparatus and process for melt-blowing fiberforming thermoplastic polymers to form fine fibers by extruding through spinning nozzles arranged in four or more rows. The molten fibers are accelerated to near sonic velocity by gas being blown in parallel flow through small circular gas orifices surrounding each nozzle. The air orifices are formed by a family of plates which effect the perfect centering of each nozzle in each of the circular air orifices (abstract). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the gas that is flown parallel to the fiber, as disclosed in Schwarz, in the invention of Radwanski et al. because this will provide for a uniform stream of attenuating gas around each spinning nozzle by centering the nozzles in round holes of gas cover plates to achieve an even gas flow around the circumference of each nozzle (column 1, lines 9-16).

b. Regarding claim 4, the modified invention of Radwanski et al. fails to explicitly teach that more than one fluid-releasing hole is associated with a filament forming hole. The number of fluid releasing holes directly determines the amount of fluid that will be released (i.e. the greater the number of holes, the greater the amount of fluid). Therefore this is a result effective variable. Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to

determine the optimum number of holes to obtain the desired amount of released fluid.

c. Regarding claim 6-9, Radwanski et al. teach that the polymer may be elastomeric polyolefin material (including polypropylene rubbers) (page 8, line 8-12).

d. Regarding claim 12-13, Radwanski et al. teach that pulp fibers (solid additives - see claim 1) may be used such as Southern Pines (cellulosic material) (page 8, lines 35-36).

e. Regarding claim 19, Radwanski et al. fail explicitly teach the pore volume distribution percentage or the pore radii. The pore volume distribution related to the pore radii directly determines the density of the fibrous structures which will directly affect the degree and speed penetration of liquid or resinous materials into the fibrous structure. Therefore this is a result effective variable. Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to determine the optimum pore volume distribution related to the pore radii to obtain the desired amount of penetration of liquid or resinous materials into the fibrous structure.

f. Regarding claims 21-22, Radwanski et al. teach that after the preform has been hydraulically entangled, it may, optionally, be treated (post processing operation) at a bonding station to further enhance its strength.

5. Claims 5 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616) as applied to claim 1 above, and further in view of Ryan et al. (US 6506873 B1).

a. Regarding claim 5, Radwanski et al. fail to teach that one fluid releasing hole is concentrically positioned around one filament forming hole. Ryan et al. teach a method to form a fibrous material (abstract) where the air stream (fluid) passage is positioned concentrically around the fibrous material 106 (figure 3). It would have been obvious to one having ordinary skill in the art at the time of the invention to use a concentric arrangement in the invention of Radwanski et al. as this is an art recognized method to form a fibrous structure as exemplified by the teachings of Ryan et al.

b. Regarding claims 10-11, Radwanski et al. fail to teach that a first polymer comprises a natural polymer or that said polymer is selected from the group listed in claim 11. Ryan et al. teach that preferred fibers include polylactic acid (column 3, lines 55-60) where polylactic acid is made from corn starch or sugarcane.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616) as applied to claim 1 above, and further in view of Hauser (US 4118531).

Radwanski et al. fail to teach that solid additives are combined with the use of a solid additive spreader. Hauser teach a method of forming mixtures of microfibers and bulking fibers to produce a web (abstract). Hauser disclose that picked fibers are

conveyed in an air stream through an inclined trough or duct 20 (column 4, lines 48-53 and figure 1) and a die 10 (is used to deposited fiber forming material on the fibers (figure 1). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the solid additive spreader of Hauser in the invention of Radwanski et al. because the spreader will help to deposit additive on the fiber uniformly.

7. Claims 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616) as applied to claim 1 above, and further in view of Zhou et al. (WO 2005/065932).

a. Regarding claims 15-17, Radwanski et al. fail to teach that the surface of the fibrous structure is contacted with plurality of filaments of a second polymer. Zhou et al. teach the production of a laminate (abstract) where an apparatus 20 extrudes filaments 13 directly onto a conveyor system and a melt blown layer, also of an elastomeric material is extruded from an adjacent bank 35 or 45, such that the meltblown fibers 36 or 46 are placed on top of the continuous filament 31. In one embodiment, the styrenic block copolymer or elastic polyolefin-based polymer composition is the same in both the filament and meltblown materials ([0089]). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the methods described above to form the fibrous material of Radwanski et al. as this is an art recognized method of forming a fibrous material as exemplified by the teaching of Zhou et al.

b. Regarding claim 20, Radwanski et al. fail to teach the use of thermal bonding. Zhou et al. teach that one boding method for the web is via heating ([0043]).

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAEED M. HUDA whose telephone number is (571)270-5514. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KHANH NGUYEN/
Primary Examiner, Art Unit 1791

/SAEED M. HUDA/
Examiner, Art Unit 1791

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	("5476616").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/03/04 13:33
L2	347	264/165.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:34
L3	438	264/500.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:34
L4	347	264/165.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:34
L5	1778	264/176.1.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:34
L6	315	264/177.1.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:34
L7	139	264/177.2.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:34
L8	909	425/66.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:35
L9	675	425/72.1.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:35
L10	976	425/224.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:35
L11	946	425/542.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:35
L12	978	425/461.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/04 13:35
S1	1	("20090065962").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/09/21 17:57

S2	383	264/40.3.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/21 17:57
S3	1097	425/149.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/21 17:57
S4	1	("20030062643").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/03/01 11:42
S5	938	425/135.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:20
S6	1752	425/145.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:20
S7	1125	425/149.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:20
S8	946	425/542.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:20
S9	217	264/645.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:20
S10	414	264/297.2.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:20
S11	1833	264/328.1.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:21
S12	390	264/40.3.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2010/03/01 12:21

3/4/2010 1:41:01 PM
C:\Documents and Settings\shuda\My Documents\EAST\Workspaces\12087384_2.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	**Art Unit**
	SAEED M HUDA	1791

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/04/2009	09/25/2009	03/04/2010						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	✓	✓						
	12	✓	✓	✓						
	13	✓	✓	✓						
	14	✓	✓	✓						
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	16	✓	✓	✓						
	17	✓	✓	✓						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	✓	✓						
	21	✓	✓	✓						
	22	✓	✓	✓						
	23	✓	✓	✓						

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	SAEED M HUDA	1791

SEARCHED

Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
523	222	5/4/2009	Saeed M. Huda
264	210.8, 211.14	9/28/2009	Saeed M. Huda
425	72.2	9/28/2009	Saeed M. Huda
264	165, 500, 165, 176.1, 177.1, 177.2	3/4/2010	Saeed M. Huda
425	66, 72.1, 224, 542, 461	3/4/2010	Saeed M. Huda

SEARCH NOTES

Search Notes	Date	Examiner
Searched Inventor and Assignee	5/4/2009	Saeed M. Huda
Reviewed Provisional Application	5/4/2009	Saeed M. Huda

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

/SAEED M HUDA/ Examiner.Art Unit 1791	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1791
Examiner	:	Saeed M. Huda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

REPLY AFTER 2ND OFFICE ACTION UNDER 37 CFR §1.112

Mail Stop Amendment
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of October 1, 2009, please consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Remarks begin on page 2 of this paper.

REMARKS

Claim Status

Applicants acknowledge the withdrawal of the previous rejections.

Claims 1-23 are pending in the present application. No additional claims fee is believed to be due.

Rejection Under 35 USC §103(a) Over EP 333 209 in view of U.S. Patent No. 5,476,616

Claims 1-4, 6-9, 12-13, 18, and 21-23 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over EP 0 333 209 to Radwanski, et al. ("Radwanski") in view of U.S. Patent No. 5,476,616 to Schwarz ("Schwarz"). The Examiner asserts teaches a method of forming a nonwoven fibrous elastomeric web material involving extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas supplied from nozzles to break the polymer streams into fibers of relatively small diameter. The Examiner further asserts that Radwanski teaches a secondary gas stream that supplies pulp fibers, staple fibers, meltblown fibers, and/or continuous filaments, to the fibers. The Examiner asserts that Schwarz teaches an apparatus and process for melt-blowing fiberforming thermoplastic polymers to form fine fibers by extruding through spinning nozzles arranged in four or more rows wherein the molten fibers are accelerated by gas being blow in parallel flow through small circular gas orifices surrounding each nozzle. The Examiner concludes it would have been obvious to one having ordinary skill in the art at the time of the invention to use the gas that is flown parallel to the fiber, as disclosed in Schwarz, in the invention of Radwanski because this will provide for a uniform stream of attenuating gas around each spinning nozzle by centering the nozzles in round holes of gas cover plates to achieve an even gas flow around the circumference of each nozzle.

Applicants respectfully disagree with the Examiner's conclusion. Applicants respectfully submit that Radwanski in view of Schwarz fails to teach each and every element of Claims 1 and 23, the independent claims, because the teachings of Radwanski and Schwarz cannot properly be combined to arrive at the claimed invention as claimed in Claims 1 and 23. Applicants submit and the Examiner has recognized that Radwanski

requires converging flows of high velocity, heated gas supplied from nozzles to break the polymer streams into fibers of relatively small diameter. Radwanski, page 9, lines 40-41. Applicants submit that replacing the converging flows with the parallel flows as taught by Schwarz would render Radwanski inoperable and it would not function for its intended purpose; namely, to break the polymer streams into fibers. Accordingly, Applicants respectfully submit that the teachings of Radwanski and Schwarz cannot properly be combined to render the claimed invention as claimed in Claims 1 and 23 obvious. Therefore, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness.

In light of the foregoing, Applicants submit that Claims 1 and 23 are not rendered obvious over Radwanski in view of Schwarz. MPEP 2143.03. Further, Applicants submit that Claims 2-4, 6-9, 12-13, 18, and 21-22, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Schwarz. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 333 209 in view of U.S. Patent No. 5,476,616, and further in view of U.S. Patent No. 6,506,873

Claims 5 and 10-11 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of U.S. Patent No. 6,506,873 to Ryan, et al. ("Ryan").

Applicants respectfully submit that Claims 5 and 10-11, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Schwarz and further in view of Ryan. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 333 209 in view of U.S. Patent No. 5,476,616, and further in view of U.S. Patent No. 4,118,531

Claim 14 is rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of U.S. Patent No. 4,118,531 to Hauser ("Hauser").

Applicants respectfully submit that Claim 14, which ultimately depends from Claim 1, is not rendered obvious over Radwanski in view of Schwarz and further in view of Hauser. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 333 209 in view of U.S. Patent No. 5,476,616, and further in view of WO 2005/065932

Claims 15-17 and 20 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski in view of Schwarz, both discussed above, and further in view of WO 2005/065932 to Zhou, et al. ("Zhou").

Applicants respectfully submit that Claims 15-17 and 20, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Schwarz and further in view of Zhou. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, reconsideration of this application, and allowance of the pending claim(s) are respectfully requested.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: December 21, 2009
Customer No. 27752
(Amendment-Response to Office Action.doc)
Revised 02/09/2009

Electronic Acknowledgement Receipt

EFS ID:	6677754
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	21-DEC-2009
Filing Date:	10-JUL-2008
Time Stamp:	13:17:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	10859_Amendment_Response_to_OA_Mailed_10-1-09.pdf	93884 c6ddc20ea4a5b31bbe3faffc67e83bcfb147c731	no	4

Warnings:	
Information:	

Total Files Size (in bytes):	93884

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 10/01/2009

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
HUDA, SAEED M	
ART UNIT	PAPER NUMBER
1791	

MAIL DATE	DELIVERY MODE
10/01/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/170,575	BARNHOLTZ ET AL.	
	Examiner	Art Unit	
	SAEED M. HUDA	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08/24/2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The response filed on 08/24/2009 has been fully considered and entered into the record.

Response to Arguments

2. Applicant's arguments filed 08/24/2009 on, with respect to the rejection(s) of claim(s) 1-23 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 6-9, 12-13, 18, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616).

a. Regarding claims 1-3, 18, and 23, Radwanski et al. teach a method of forming a nonwoven fibrous elastomeric web material (page 2, lines 3-5). Radwanski et al. disclose that the method of formation involve extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas (usually air) supplied

from nozzles 8 and 10 to break the polymer streams into fibers of relativity small diameter. The die head preferably includes at least one straight row of extrusion apertures (page 9, lines 34-43). Two gas streams are used in the process and a primary gas stream is merged with a secondary gas stream containing at least one of pulp fiber, staple fibers, meltblown fibers, and continuous filaments, with or without particulate material (solid additives) (page 9, lines 43-48). The integrated stream flows in the same direction (parallel) as the primary stream and the integrated stream is collected on a belt to form a conform (page 10, lines 8-11). Radwanski et al. fail to teach that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament forming hole.

Schwarz teach an apparatus and process for melt-blowing fiberforming thermoplastic polymers to form fine fibers by extruding through spinning nozzles arranged in four or more rows. The molten fibers are accelerated to near sonic velocity by gas being blown in parallel flow through small circular gas orifices surrounding each nozzle. The air orifices are formed by a family of plates which effect the perfect centering of each nozzle in each of the circular air orifices (abstract). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the gas that is flown parallel to the fiber, as disclosed in Schwarz, in the invention of Radwanski et al. because this will provide for a uniform stream of attenuating gas around each spinning nozzle by

centering the nozzles in round holes of gas cover plates to achieve an even gas flow around the circumference of each nozzle (column 1, lines 9-16).

b. Regarding claim 4, the modified invention of Radwanski et al. fails to explicitly teach that more than one fluid-releasing hole is associated with a filament forming hole. The number of fluid releasing holes directly determines the amount of fluid that will be released (i.e. the greater the number of holes, the greater the amount of fluid). Therefore this is a result effective variable. Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to determine the optimum number of holes to obtain the desired amount of released fluid.

c. Regarding claim 6-9, Radwanski et al. teach that the polymer may be elastomeric polyolefin material (including polypropylene rubbers) (page 8, line 8-12).

d. Regarding claim 12-13, Radwanski et al. teach that pulp fibers (solid additives - see claim 1) may be used such as Southern Pines (cellulosic material) (page 8, lines 35-36).

e. Regarding claim 19, Radwanski et al. fail explicitly teach the pore volume distribution percentage or the pore radii. The pore volume distribution related to the pore radii directly determines the density of the fibrous structures which will directly affect the degree and speed penetration of liquid or resinous materials into the fibrous structure. Therefore this is a result effective variable.

Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to determine the optimum pore volume distribution related to the pore radii to obtain the desired amount of penetration of liquid or resinous materials into the fibrous structure.

f. Regarding claims 21-22, Radwanski et al. teach that after the preform has been hydraulically entangled, it may, optionally, be treated (post processing operation) at a bonding station to further enhance its strength.

5. Claims 5 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616) as applied to claim 1 above, and further in view of Ryan et al. (US 6506873 B1).

a. Regarding claim 5, Radwanski et al. fail to teach that one fluid releasing hole is concentrically positioned around one filament forming hole. Ryan et al. teach a method to form a fibrous material (abstract) where the air stream (fluid) passage is positioned concentrically around the fibrous material 106 (figure 3). It would have been obvious to one having ordinary skill in the art at the time of the invention to use a concentric arrangement in the invention of Radwanski et al. as this is an art recognized method to form a fibrous structure as exemplified by the teachings of Ryan et al.

b. Regarding claims 10-11, Radwanski et al. fail to teach that a first polymer comprises a natural polymer or that said polymer is selected from the group listed in claim 11. Ryan et al. teach that preferred fibers include polylactic acid

(column 3, lines 55-60) where polylactic acid is made from corn starch or sugarcane.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616) as applied to claim 1 above, and further in view of Hauser (US 4118531).

Radwanski et al. fail to teach that solid additives are combined with the use of a solid additive spreader. Hauser teach a method of forming mixtures of microfibers and bulking fibers to produce a web (abstract). Hauser disclose that picked fibers are conveyed in an air stream through an inclined trough or duct 20 (column 4, lines 48-53 and figure 1) and a die 10 (is used to deposited fiber forming material on the fibers (figure 1). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the solid additive spreader of Hauser in the invention of Radwanski et al. because the spreader will help to deposit additive on the fiber uniformly.

7. Claims 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) in view of Schwarz (US 5476616) as applied to claim 1 above, and further in view of Zhou et al. (WO 2005/065932).

a. Regarding claims 15-17, Radwanski et al. fail to teach that the surface of the fibrous structure is contacted with plurality of filaments of a second polymer. Zhou et al. teach the production of a laminate (abstract) where an apparatus 20 extrudes filaments 13 directly onto a conveyor system and a melt blown layer, also of an elastomeric material is extruded from an adjacent bank 35 or 45, such

that the meltblown fibers 36 or 46 are placed on top of the continuous filament 31. In one embodiment, the styrenic block copolymer or elastic polyolefin-based polymer composition is the same in both the filament and meltblown materials ([0089]). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the methods described above to form the fibrous material of Radwanski et al. as this is an art recognized method of forming a fibrous material as exemplified by the teaching of Zhou et al.

b. Regarding claim 20, Radwanski et al. fail to teach the use of thermal bonding. Zhou et al. teach that one boding method for the web is via heating ([0043]).

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAEED M. HUDA whose telephone number is (571)270-5514. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KHANH NGUYEN/
Primary Examiner, Art Unit 1791

/SAEED M. HUDA/
Examiner, Art Unit 1791

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	SAEED M HUDA	1791

SEARCHED

Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
523	222	5/4/2009	Saeed M. Huda
264	210.8, 211.14	9/28/2009	Saeed M. Huda
425	72.2	9/28/2009	Saeed M. Huda

SEARCH NOTES

Search Notes	Date	Examiner
Searched Inventor and Assignee	5/4/2009	Saeed M. Huda
Reviewed Provisional Application	5/4/2009	Saeed M. Huda

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
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	Examiner	Art Unit
	SAEED M HUDA	1791

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/04/2009	09/25/2009							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
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	20	✓	✓							
	21	✓	✓							
	22	✓	✓							
	23	✓	✓							

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1004	425/72.2.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:04
L2	818	l1 and (fibrous or filamentary or filament or fiber)	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:05
L3	236	l1 and (fibrous or filamentary or filament or fiber) and (die or mold)	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:05
L4	227	l1 and (fibrous or filamentary or filament or fiber) same (die or mold)	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:05
L5	1671	264/210.8.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:09
L6	350	l5 and (fibrous or filamentary or filament or fiber) same (die or mold)	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:09
L7	812	264/211.14.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:15
L8	203	l7 and (fibrous or filamentary or filament or fiber) same (die or mold)	US-PGPUB; USPAT; USOCR	OR	ON	2009/09/28 12:15
S1	1	("20090023839").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:14
S2	1	("4118531").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:15
S3	1	("4773903").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:17
S4	0	("2005067732").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:17
S5	1	("20050067732").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:17
S6	2	(("6506873") or ("6177193")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:20

S7	0	EP-0333209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:41
S8	0	EP-00333209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:41
S9	0	EP-033300209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:41
S10	0	EP-03330209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S11	0	EP-003330209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S12	0	EP-000333209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S13	0	EP-033300209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S14	0	EP-00033300209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:43
S15	2	(("4879170") or ("4939016")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 14:12

S16	2	S15 and (mold or die)	US-PGPUB; USPAT; USOCR	OR	ON	2009/04/30 14:30
S17	2	S6 and (mold or die)	US-PGPUB; USPAT; USOCR	OR	ON	2009/04/30 14:39
S18	817	264/13.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/05/01 11:29
S19	194	523/222.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/05/01 11:29
S20	48	("20030073367" | "20030131457" | "20030150090" | "20050148264" | "20050159065" | "4100324" | "4118531" | "4604313" | "4634621" | "4636418" | "4720415" | "4724114" | "4786550" | "4803117" | "4855179" | "4863779" | "4879170" | "4906513" | "4931355" | "4939016" | "4970104" | "5145727" | "5149576" | "5227107" | "5284703" | "5350624" | "5409768" | "5508102" | "5652048" | "5811178" | "5948710" | "5952251" | "6103061" | "6200120" | "6296936" | "6319342" | "6417120" | "6465073" | "6494974" | "6506873" | "6686303" | "6739023" | "6759356" | "6797226" | "6811638" | "6823568" | "6836937" | "6992028").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2009/05/01 11:30
S21	2	(("4100324") or ("5476616")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/09/25 20:32

9/28/2009 12:33:51 PM
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FITESA/Exhibit 1013, Page 418 of 624

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1791
Examiner	:	Saeed M. Huda
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

REPLY AFTER 1ST OFFICE ACTION UNDER 37 CFR §1.111(b)

Mail Stop Amendment
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

INTRODUCTORY REMARKS

The Director is hereby authorized to charge all required fees (including any extension of time fees) and to credit any overpayments in this and any concurrent or future correspondence to Deposit Account No. 16-2480.

In response to the Office Action of May 29, 2009, please consider the following remarks and reconsider the application.

Please amend the above-identified application as follows:

Remarks begin on page 2 of this paper.

REMARKS

Claim Status

Claims 1-23 are pending in the present application. No additional claims fee is believed to be due.

Rejection Under 35 USC §102(b) as being anticipated by EP 333 209

Claims 1-3, 6-9, 12-13, 18, and 21-23 are rejected by the Examiner under 35 USC §102(b) as allegedly being anticipated by EP 333 209 B1 to Radwanski, et al. ("Radwanski"). The Examiner asserts that Radwanski teaches a method of forming a nonwoven fibrous elastomeric web wherein the method of formation of the web involves extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas supplied from nozzles 8 and 10 in Fig. 1 of Radwanski.

Applicants respectfully submit that Radwanski fails to teach each and every element of Claims 1 and 23, the independent claims, because Radwanski fails to teach using a die comprising one or more fluid-releasing holes such that a fluid exiting the one or more fluid releasing holes is parallel or substantially parallel to an exterior surface of a filament exiting a filament-forming hole of the die. Applicants submit, and the Examiner appreciates that Radwanski's attenuation occurs as a result of converging gas streams. Therefore, Applicants submit that clearly Radwanski's filaments are not attenuated by a fluid that exits a fluid-releasing hole within its die such that the fluid is parallel or substantially parallel to an exterior surface of its filaments. Clearly as shown in Fig. 1 of Radwanski, the attenuation gas streams from nozzles 8 and 10 exit the nozzles in a converging manner and thus not parallel or substantially parallel to an exterior surface of a filament. Therefore, Applicants submit that Claims 1 and 23 are not anticipated by Radwanski. Further, Applicants submit that Claims 2-3, 6-9, 12-13, 18, and 21-22, which ultimately depend from Claim 1, are not anticipated by Radwanski for the same reasons that Claim 1 is not anticipated by Radwanski.

Rejection Under 35 USC §103(a) Over EP 333 209

Claims 4 and 19 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski, discussed above.

Applicants submit that Radwanski fails to teach each and every element of Claim 1, the independent claim, for reasons stated above. Therefore, Applicants submit that Claim 1 is not rendered obvious over Radwanski. MPEP 2143.03. Further, Applicants submit that Claims 4 and 19, which ultimately depend from Claim 1, are not rendered obvious over Radwanski. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 333 209
and further in view of U.S. Patent No. 6,506,873

Claims 5 and 10-11 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject over Radwanski, discussed above, and further in view of U.S. Patent No. 6,506,873 B1 to Ryan, et al. ("Ryan").

Applicants submit that Claims 5 and 10-11, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Ryan for the same reasons that Claim 1 is not rendered obvious over Radwanski. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 333 209
and further in view of U.S. Patent No. 4,118,531

Claim 14 is rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski, discussed above, and further in view of U.S. Patent No. 4,118,531 B1 to Hauser ("Hauser").

Applicants submit that Claim 14, which depends from Claim 1, is not rendered obvious over Radwanski in view of Hauser for the same reasons that Claim 1 is not rendered obvious over Radwanski. MPEP 2143.03.

Rejection Under 35 USC §103(a) Over EP 333 209
and further in view of WO 2005/065932

Claims 5 and 10-11 are rejected by the Examiner under 35 USC §103(a) as allegedly defining obvious subject matter over Radwanski, discussed above, and further in view of WO 2005/065932 to Zhou, et al. ("Zhou").

Applicants submit that Claims 5 and 10-11, which ultimately depend from Claim 1, are not rendered obvious over Radwanski in view of Zhou for the same reasons that Claim 1 is not rendered obvious over Radwanski. MPEP 2143.03.

Conclusion

This response represents an earnest effort to place the present application in proper form and to distinguish the invention as claimed from the applied reference(s). In view of the foregoing, reconsideration of this application, and allowance of the pending claim(s) are respectfully requested.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: August 24, 2009
Customer No. 27752
(Amendment-Response to Office Action.doc)
Revised 02/09/2009

Electronic Acknowledgement Receipt

EFS ID:	5937156
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	24-AUG-2009
Filing Date:	10-JUL-2008
Time Stamp:	10:36:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	10859_Amendment-Response_to_OA_Mailed_5-29-09.pdf	90855 f5dccacb7cb157e8d3d6bdf2c2a1efa454419a52	no	4

Warnings:	
Information:	

Total Files Size (in bytes):	90855

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/170,575	07/10/2008	Steven Lee Barnholtz	10859	1328

27752 7590 05/29/2009

THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

EXAMINER	
HUDA, SAEED M	
ART UNIT	**PAPER NUMBER**
1791	

MAIL DATE	DELIVERY MODE
05/29/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/170,575	BARNHOLTZ ET AL.	
	Examiner	Art Unit	
	SAEED M. HUDA	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07/10/2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/29/2008, 03/26/2009, 04/28/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 6-9, 12-13, 18, and 21-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Radwanski et al. (EP 0333209 B1).

a. Regarding claims 1-3, 18, and 23, Radwanski et al. teach a method of forming a nonwoven fibrous elastomeric web material (page 2, lines 3-5). Radwanski et al. disclose that the method of formation involve extruding a molten polymeric material through a die head into fine streams and attenuating the streams by converging flows of high velocity, heated gas (usually air) supplied from nozzles 8 and 10 to break the polymer streams into fibers of relativity small diameter. The die head preferably includes at least one straight row of extrusion apertures (page 9, lines 34-43). Two gas streams are used in the process and a primary gas stream is merged with a secondary gas stream containing at least one of pulp fiber, staple fibers, meltblown fibers, and continuous filaments, with or without particulate material (solid additives) (page 9, lines 43-48). The integrated stream flows in the same direction (parallel) as the primary stream and the integrated stream is collected on a belt to form a coform (page 10, lines 8-11).

a. Regarding claim 6-9, Radwanski et al. teach that the polymer may be elastomeric polyolefin material (including polypropylene rubbers) (page 8, line 8-12).

b. Regarding claim 12-13, Radwanski et al. teach that pulp fibers (solid additives - see claim 1) may be used such as Southern Pines (cellulosic material) (page 8, lines 35-36).

c. Regarding claims 21-22, Radwanski et al. teach that after the preform has been hydraulically entangled, it may, optionally, be treated (post processing operation) at a bonding station to further enhance its strength.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 4 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1).

a. Regarding claim 4, Radwanski et al. fail to explicitly teach that more the one fluid-releasing hole is associated with a filament forming hole. The number of fluid releasing holes directly determines the amount of fluid that will be released (i.e. the greater the number of holes, the greater the amount of fluid). Therefore this is a result effective variable. Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have

conducted routine experimentation to determine the optimum number of holes to obtain the desired amount of released fluid.

b. Regarding claim 19, Radwanski et al. fail explicitly teach the pore volume distribution percentage or the pore radii. The pore volume distribution related to the pore radii directly determines the density of the fibrous structures which will directly affect the degree and speed penetration of liquid or resinous materials into the fibrous structure. Therefore this is a result effective variable. Consequently, it would have been obvious to one having ordinary skill in the art at the time of the invention to have conducted routine experimentation to determine the optimum pore volume distribution related to the pore radii to obtain the desired amount of penetration of liquid or resinous materials into the fibrous structure.

2. Claims 5 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) as applied to claim 1 above, and further in view of Ryan et al. (US 6506873 B1).

a. Regarding claim 5, Radwanski et al. fail to teach that one fluid releasing hole is concentrically positioned around one filament forming hole. Ryan et al. teach a method to form a fibrous material (abstract) where the air stream (fluid) passage is positioned concentrically around the fibrous material 106 (figure 3). It would have been obvious to one having ordinary skill in the art at the time of the invention to use a concentric arrangement in the invention of Radwanski et al. as

this is an art recognized method to form a fibrous structure as exemplified by the teachings of Ryan et al.

b. Regarding claims 10-11, Radwanski et al. fail to teach that a first polymer comprises a natural polymer or that said polymer is selected from the group listed in claim 11. Ryan et al. teach that preferred fibers include polylactic acid (column 3, lines 55-60) where polylactic acid is made from corn starch or sugarcane.

2. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) as applied to claim 1 above, and further in view of Hauser (US 4118531).

Radwanski et al. fail to teach that solid additives are combined with the use of a solid additive spreader. Hauser teach a method of forming mixtures of microfibers and bulking fibers to produce a web (abstract). Hauser disclose that picked fibers are conveyed in an air stream through an inclined trough or duct 20 (column 4, lines 48-53 and figure 1) and a die 10 (is used to deposited fiber forming material on the fibers (figure 1). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the solid additive spreader of Hauser in the invention of Radwanski et al. because the spreader will help to deposit additive on the fiber uniformly.

3. Claims 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Radwanski et al. (EP 0333209 B1) as applied to claim 1 above, and further in view of Zhou et al. (WO 2005/065932).

a. Regarding claims 15-17, Radwanski et al. fail to teach that the surface of the fibrous structure is contacted with plurality of filaments of a second polymer. Zhou et al. teach the production of a laminate (abstract) where an apparatus 20 extrudes filaments 13 directly onto a conveyor system and a melt blown layer, also of an elastomeric material is extruded from an adjacent bank 35 or 45, such that the meltblown fibers 36 or 46 are placed on top of the continuous filament 31. In one embodiment, the styrenic block copolymer or elastic polyolefin-based polymer composition is the same in both the filament and meltblown materials ([0089]). It would have been obvious to one having ordinary skill in the art at the time of the invention to use the methods described above to form the fibrous material of Radwanski et al. as this is an art recognized method of forming a fibrous material as exemplified by the teaching of Zhou et al.

b. Regarding claim 20, Radwanski et al. fail to teach the use of thermal bonding. Zhou et al. teach that one boding method for the web is via heating ([0043]).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAEED M. HUDA whose telephone number is (571)270-5514. The examiner can normally be reached on 8:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SAEED M. HUDA/
Examiner, Art Unit 1791
/ Carlos Lopez/
Primary Examiner, Art Unit 1791

Notice of References Cited	Application/Control No. 12/170,575	Applicant(s)/Patent Under Reexamination BARNHOLTZ ET AL.	
	Examiner SAEED M. HUDA	Art Unit 1791	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,506,873	01-2003	Ryan et al.	528/354
*	B	US-4,118,531	10-1978	Hauser, Edward R.	442/344
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	EP 0333209 B1	09-1989	EP	Radwanski et al.	
	O	WO 2005/065932	07-2005	WO	Zhou et al.	
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	SAEED M HUDA	1791

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/04/2009								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
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	18	✓								
	19	✓								
	20	✓								
	21	✓								
	22	✓								
	23	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12170575	BARNHOLTZ ET AL.
	Examiner	Art Unit
	SAEED M HUDA	1791

SEARCHED

Class	Subclass	Date	Examiner
264	13	5/4/2009	Saeed M. Huda
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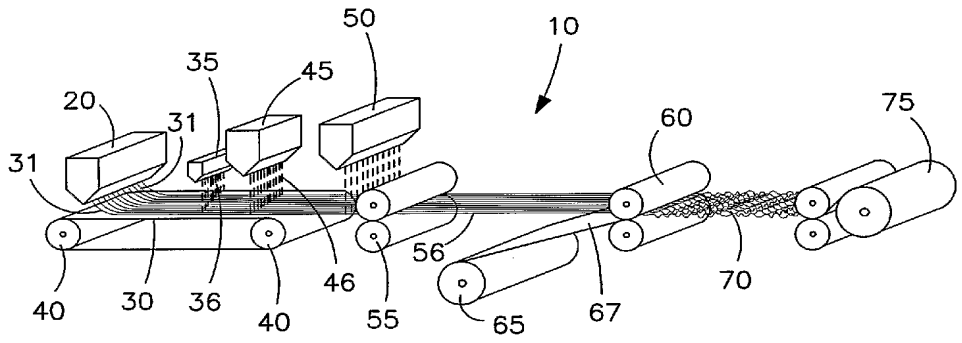
(54) Title: SINGLE SIDED STRETCH BONDED LAMINATES, AND METHOD OF MAKING SAME



(57) Abstract: An elastic laminate capable of being rolled for storage and unwound from a roll when needed for use, includes an elastic layer selected from the group consisting of an array of continuous filament strands, an array of continuous filament strands with meltblown deposited on the continuous filament strands, and a film; and a facing layer bonded to only one side of the elastic layer. The laminate may also include an adhesive that demonstrates a relatively short open time deposited between the elastic layer and facing layer, or such adhesive and a postbonding adhesive or nonblocking agent, or a nonblocking agent layer deposited on the elastic layer on a side opposite to the facing layer. The meltblown layer may include an elastic polyolefin-based meltblown polymer having a degree of crystallinity between about 3% and about 40%. The laminate suitably has an inter-layer peel strength of less than about 70 grams per 3 inches cross-directional width at a strain rate of 300 mm/min. Alternatively or additionally, the continuous filament strands and/or the facing layer may include an elastic polyolefin-based meltblown polymer having a degree of crystallinity between about 3% and about 40%. In certain embodiments, the elastic laminate may include an extensible facing layer bonded to an elastic or semi-elastic film layer having a basis weight of about 50 gsm or less, wherein the facing layer includes an elastic polyolefin-based polymer having a degree of crystallinity between about 3% and about 40%.

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
19924.10		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2004/043380	23/12/2004	31/12/2003
Applicant		
KIMBERLY-CLARK WORLDWIDE, INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
      [ ] The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
   b. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box II).

3. [ ] **Unity of invention is lacking** (see Box III).

4. With regard to the **title,**
   [ ] the text is approved as submitted by the applicant.
   [X] the text has been established by this Authority to read as follows:

   SINGLE SIDE FACING STRETCH BONDED LAMINATES, AND METHOD OF MAKING SAME

5. With regard to the **abstract,**
   [X] the text is approved as submitted by the applicant.
   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 1A
      [X] as suggested by the applicant.
      [ ] as selected by this Authority, because the applicant failed to suggest a figure.
      [ ] as selected by this Authority, because this figure better characterizes the invention.
   b. [ ] none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (January 2004)

SINGLE SIDE FACING STRETCH BONDED LAMINATES, AND METHOD OF MAKING SAME

FIELD OF THE INVENTION

[0001] The present invention relates to continuous filament and film-based stretch bonded laminate materials for use on or in various personal care products, and other products requiring stretch capability, and manufacturing methods for making such stretch bonded laminate materials.

BACKGROUND OF THE INVENTION

[0002] The term "stretch bonded laminate" refers to a composite elastic material made according to a stretch bonding lamination process, i.e., elastic layer(s) are joined together with additional facing layers when only the elastic layer is in an extended condition (such as by at least about 25 percent of its relaxed length) so that upon relaxation of the layers, the additional layer(s) is/are gathered. Such laminates usually have machine directional (MD) stretch properties and may be subsequently stretched to the extent that the additional (typically non-elastic) material gathered between the bond locations allows the elastic material to elongate. One type of stretch bonded laminate is disclosed, for example, by U.S. Patent No. 4,720,415 to Vander Wielen et al., in which multiple layers of the same polymer produced from multiple banks of extruders are used. Other composite elastic materials are disclosed in U.S. Patent No. 5,385,775 to Wright and copending U.S. Patent Publication No. 2002-0104608, published 8 August 2002, each of which is incorporated by reference herein in its entirety. Such stretch bonded laminates may include an elastic component that is a web, such as a meltblown web, a film, an array/series of generally parallel continuous filament strands (either extruded or pre-formed), or a combination of such. The elastic layer is bonded in a stretched condition to two inelastic or extendable nonwoven facing materials, such that the resulting laminate is imparted with a textural feel that is pleasing on the hand. In particular, the elastic layer is bonded between the two facing layers, such that the facing layers sandwich the elastic layer. In some instances, the gatherable facing layers may also be necked, such that the stretch bonded laminate is actually a necked stretch bonded laminate that may have some extension/elasticity in the cross-machine direction (CD).

[0003] To "neck" or "necked" refers to a process of tensioning a fabric in a particular direction thereby reducing the width dimension of the fabric in the direction

perpendicular to the direction of tension. For example, tensioning a nonwoven fabric in the MD causes the fabric to "neck" or narrow in the CD and give the necked fabric CD stretchability. Examples of such extensible and/or elastic fabrics include, but are not limited to, those described in U.S. Patent Nos. 4,965,122 to Morman et al. and 5,336,545 to Morman et al. each of which is incorporated herein by reference in its entirety.

[0004] "Neck bonding" refers to the process wherein an elastic member is bonded to a non-elastic member while only the non-elastic member is extended or necked so as to reduce its dimension in the direction orthogonal to the extension. "Neck bonded laminate" refers to a composite elastic material made according to the neck bonding process, i.e., the layers are joined together when only the non-elastic layer is in an extended/necked condition. Such laminates usually have cross directional stretch properties. Further examples of neck-bonded laminates are such as those described in U.S. Patent Nos. 5,226,992, 4,981,747 to Morman and U.S. Patent No. 5,514,470 to Haffner et al., each of which is incorporated by reference herein in its entirety.

[0005] "Neck-stretch bonding" generally refers to a process wherein an elastic member is bonded to another member while the elastic member is extended (such as by about 25 percent of its relaxed length) and the other layer is a necked, non-elastic layer. "Neck-stretch bonded laminate" refers to a composite elastic material made according to the neck-stretch bonding process, i.e., the layers are joined together when both layers are in an extended condition and then allowed to relax. Such laminates usually have multi-directional stretch properties.

[0006] Such stretch bonded laminates may be used to provide elasticity to various components of a personal care product and with the added benefit of a pleasant fabric-like touch, such as a diaper liner or outercover, diaper waist band material, diaper leg gasketing (cuff) material, diaper ear portions (that is, the point of attachment of a fastening system to a diaper), as well as side panel materials for diapers and child training pants. Since such materials often come in contact with skin of a human body, it is desirable that such materials be relatively soft to the touch, rather than rubbery in their feel (a sensation common for elastic materials). Such materials may likewise provide elasticity and comfort for materials that are incorporated into protective workwear, such as surgical gowns, face masks and drapes, labcoats, or protective outercovers, such as car, grill or boat covers.

[0007] While such soft and stretchy materials have assisted in making such elastic materials more user-friendly, there is still a need for such products that provide even more

of a cloth-like fabric feel. In this regard, there is a need for such materials that provide even higher levels of gathering. Further, there is a need for such laminate products with even greater flexibility as a result of reduced overall basis weight. There is likewise a need for a laminate material that provides reduced stiffness as a result of the elimination of one facing layer on the laminate and the use of lower basis weight elastic layer components. Such a laminate would be more efficient in its use as an elastic material, plus the elimination of one facing layer would be cost-effective. Such a laminate could provide ease of use/extension, with better ability to retract since there would be no drag of extra facing layers. Essentially, such a laminate would provide for higher levels of retraction with lower weights of polymer. However, even with all of these perceived benefits, to date a single sided stretch bonded laminate (that is a stretch bonded laminate with a gatherable facing layer on only one side) has been elusive because of manufacturing challenges.

[0008] In utilizing stretch bonded laminates that themselves incorporate an adhesive component, it has been desirable to select adhesives that do not add to the stiffness of the material. Such stiffness has a negative impact on the overall feel of the product and the ability of the product to provide stretch attributes when in use. It therefore would be desirable to develop additional adhesive arrangements that would not negatively impact laminate material feel and performance, while still allowing for the formation of a single sided material.

[0009] Many adhesives are typically somewhat elastic themselves, and tend to retain some level of tackiness even after they are dried or cured. As a result, because of their inherent tackiness, it has been necessary, at least with respect to filament, film, and web based stretch bonded laminates, to utilize facings on both sides of the center elastic component (i.e. filament array), so as to avoid roll blocking during processing/storage. For the purposes of this application, the terms "roll blocking" and "roll sticking" shall be used interchangeably, and shall refer to the propensity of tacky films, tacky filament arrays or other tacky sheet materials to stick to themselves upon being rolled up for storage, prior to final use. Such roll blocking may prevent use of the material contained on a roll as a result of the inability to unwind such rolled material when it is actually needed. In filament-based stretch bonded laminates, adhesive is often applied to the facing layers themselves, and then the facing layers are combined in a nip with the filament array between them. Such an arrangement may generally be described as an ABA laminate, where A is a facing layer and B is an elastic layer.

[0010] While it would be desirable to reduce the basis weight of the stretch bonded laminate such that the material is less costly and more flexible, it has been heretofore unclear how to eliminate the extra facing layer(s) without causing the rolled material to stick, if it is to be stored prior to use. It is therefore desirable to have a single sided stretch-bonded laminate that demonstrates acceptable elastic performance, but that is also capable of being stored on a roll without concern for roll blocking. It is also desirable to have a material that may be maintained on a roll under acceptable storage conditions, such as for a given period of time, and at a range of temperatures. It is to such needs that the current invention is directed.

SUMMARY OF THE INVENTION

[0011] An elastic laminate capable of being rolled for storage, and unwound from a roll when needed for use, includes an elastic layer selected from the group consisting of an array of continuous filament strands, an array of continuous filament strands with meltblown deposited on the continuous filament strands, and a film; and a facing layer bonded to only one side of the elastic layer. The elastic laminate may include an elastic polyolefin-based polymer having a degree of crystallinity between about 3% and about 40%, or between about 5% and about 30%. The elastic polyolefin-based polymer may have a melt flow rate between about 10 and about 600 grams per 10 minutes, or between about 60 and about 300 grams per 10 minutes, or between about 150 and about 200 grams per 10 minutes; a melting/softening point between about 40 and about 160 degrees Celsius; and/or a density from about 0.8 to about 0.95, or about 0.85 to about 0.93, or about 0.86 to about 0.89 grams per cubic centimeter. The elastic polyolefin-based polymer may include polyethylene, polypropylene, butene, or octene homo- or copolymers, ethylene methacrylate, ethylene vinyl acetate, butyl acrylate copolymers, or a combination of any of these polymers. The elastic polyolefin-based polymer may be used to form the meltblown layer, the continuous filament strands, and/or the facing layer.

[0012] The elastic laminate may further include an adhesive that demonstrates a relatively short open time deposited between the array of continuous filament strands and the meltblown layer, or between the elastic layer and the gatherable facing layer. In certain embodiments, the elastic laminate may include a nonblocking agent layer deposited on the elastic layer, on a side opposite to the facing layer; however, a nonblocking agent layer is not necessary when the meltblown layer includes the elastic polyolefin-based polymer.

[0013] More particularly, when the meltblown layer includes the elastic polyolefin-based polymer, the elastic laminate suitably has an inter-layer peel strength of less than about 70 grams per 3 inches cross-directional width at a strain rate of 300 millimeters/minute (mm/min). For example, when the elastic laminate is rolled upon itself, it can be unwound for future use and demonstrates a peel strength from a roll (while it is being unwound) of less than about 200, or less than about 100, or less than about 70, or less than about 60, or less than about 50 grams per 3 inches cross-directional width at a strain rate of 300 mm/min. Thus, the elastic laminate may not require any post-calender treatment such as a nonblocking agent or the like.

[0014] In still a further alternative embodiment, the elastic laminate includes an adhesive between the array of continuous filament strands and the meltblown layer, or between the facing layer and the elastic layer, that demonstrates an open time of between about 0.2 seconds and 1 minute, or between about 0.2 seconds and 3 seconds, or between about 0.5 seconds and 2 seconds. In still another alternative embodiment, such elastic laminate includes an adhesive between the array of continuous filament strands and the meltblown layer, or between the facing layer and the elastic layer, wherein the adhesive is applied in an amount less than about 16 gsm, or less than about 8 gsm, or less than about 4 gsm, or between about 1 and 4 gsm. In still another alternative embodiment, the laminate includes an adhesive between the facing layer and the elastic layer, and also on a side of the elastic layer opposite to that of the facing layer. In still a further alternative embodiment, such adhesive is distributed in similar add-on amounts between the facing layer and the elastic layer and also to the side of the elastic layer opposite to that of the facing layer.

[0015] The meltblown layer in the elastic layer may be a single layer of meltblown material or, alternatively, may include two or more layers. For example, one of the layers may include an elastic polyolefin-based meltblown polymer having a degree of crystallinity between about 3% and about 40%, or between about 5% and about 30%, and another layer may include a styrenic block copolymer-based meltblown polymer.

[0016] The meltblown layer may be present within the elastic laminate at an add-on up to about 34 grams per square meter (gsm), or between about 1 and about 5 gsm, or between about 1.25 and about 2.5 gsm, at the point of lamination.

[0017] In still another alternative embodiment of the invention, the elastic layer has an overall basis weight up to about 54 gsm. In still another alternative embodiment of

the invention, the elastic layer has a basis weight of between about 4 gsm and 23 gsm, or between about 10 gsm and 18 gsm.

[0018] In still another alternative embodiment of the invention, the elastic laminate includes a meltblown nonblocking agent deposited on the elastic layer on a side opposite to the facing layer. In yet another alternative embodiment of the invention, the meltblown nonblocking agent is deposited in an amount of between about 0.2 and 2.0 gsm, or between about 0.2 and 1.5 gsm, or between about 0.2 and 0.8 gsm, or between about 0.2 and 0.5 gsm. In yet another alternative embodiment of the invention, the meltblown nonblocking agent is selected from the group consisting of polyolefins and elastomeric polymers.

[0019] In still another alternative embodiment of the invention, the elastic layer has a basis weight of between about 3 gsm and 20 gsm. In still another alternative embodiment of the invention, the elastic layer has a basis weight of between about 4 gsm and 15 gsm. In still another alternative embodiment of the invention, the elastic layer is an array of continuous filament strands or continuous filament strands with an elastic meltblown deposited thereon.

[0020] In still another alternative embodiment of the invention, the facing layer has a basis weight of between about 0.3 and 1.5 osy. In yet another alternative embodiment of the invention, the facing layer is selected from the group consisting of nonwoven webs, nonwoven web laminates, foams, scrims, netting, films, and combinations thereof. In yet another embodiment of the invention, the single gatherable facing layer is necked. In certain embodiments, the facing layer may include a spunbond-meltblown-spunbond laminate in which the meltblown layer includes an elastic polyolefin-based polymer and is positioned between two spunbond layers.

[0021] In yet another alternative embodiment of the invention, an extensible facing layer is bonded to an elastic or semi-elastic film having a basis weight of about 50 grams per square meter (gsm) or less, or between about 35 to about 45 gsm, or between about 38 and about 42 gsm. The film and/or the facing layer(s) may include an elastic polyolefin-based polymer as described herein. The laminate displays greater retraction than comparable laminates having two conventional facing layers. The laminate may also include elastomeric strands. As a further alternative, the laminate may include a second extensible facing layer bonded to the opposite surface of the film.

[0022] In an alternative embodiment, a method for forming a stretch bonded laminate includes forming an elastic layer by applying an elastic meltblown polymer to an array of continuous filament strands; stretching the elastic layer; bonding a gatherable facing layer to the stretched elastic layer adjacent to the meltblown layer while the stretched elastic layer is in a stretched condition, to form a stretch bonded laminate; and allowing such stretched bonded laminate to retract.

[0023] In another alternative embodiment, a method for forming a single facing stretch bonded laminate includes providing an elastic layer; applying a meltblown nonblocking agent to one side of the elastic layer; stretching the elastic layer; bonding a gatherable facing layer only to the stretched elastic layer on a side opposite to the meltblown nonblocking agent while the stretched elastic layer is in a stretched condition, to form a single sided stretch bonded laminate; and allowing such stretched bonded laminate to retract. A single side facing stretch bonded laminate (which term shall be used synonymously with single sided stretch bonded laminate) made by the method, for use in a personal care or other stretchable article is also contemplated by the invention.

[0024] In a further alternative embodiment, a method for forming a single sided stretch bonded laminate includes providing an elastic layer; stretching the elastic layer; bonding a gatherable facing layer to only one side of the stretched elastic layer while the stretched elastic layer is in a stretched condition to form a stretch bonded laminate by using an adhesive with a relatively short open time, and that is not tacky following curing; and allowing such stretched bonded laminate to retract. In still a further alternative embodiment, the adhesive is applied to bond the elastic layer to the single gatherable facing layer both prior to contacting the elastic layer with the facing layer (prebonding adhesive application) and following contacting the elastic layer with the facing layer (postbonding application). The prebonding adhesive application is applied prior to the elastic layer and facing layer being brought together into a laminate. In one embodiment, the postbonding adhesive application is applied to the filament side of the laminate, after the elastic layer and facing layer have been laminated. In a further alternative embodiment, similar amounts of adhesive are applied in both the prebonding and postbonding adhesive applications. It is contemplated that the invention also includes a single sided stretch bonded laminate made by such adhesive methods and articles made from such laminates.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The invention will be better understood by reference to the following description of embodiments of the invention taken in conjunction with the accompanying drawings, wherein:

[0026] Figures 1A and 1B illustrate methods of manufacturing a single sided stretch bonded laminate in accordance with the invention.

[0027] Figure 2 illustrates a cross sectional view of one embodiment of a single sided stretch bonded laminate material.

[0028] Figure 3 illustrates a cross sectional view of another embodiment of a single sided stretch bonded laminate material.

[0029] Figure 4 illustrates a cross sectional view of yet another embodiment of a single sided stretch bonded laminate material.

[0030] Figure 5 illustrates a cross sectional view of yet another embodiment of a single sided stretch bonded laminate material.

[0031] Figure 6 illustrates a cross sectional view of one embodiment of a double sided stretch bonded laminate material.

[0032] Figures 7A and 7B illustrate alternative methods of manufacturing a single sided stretch bonded laminate in accordance with the invention.

[0033] Figure 8 illustrates a cross sectional view of still another embodiment of a single sided stretch bonded laminate material.

[0034] Figure 9 illustrates a cross sectional view of still another embodiment of a single sided stretch bonded laminate material.

[0035] Figure 10 illustrates a personal care product utilizing a single sided stretch bonded laminate made in accordance with the invention.

DEFINITIONS

[0036] Within the context of this specification, each term or phrase below will include the following meaning or meanings.

[0037] As used herein, the term "personal care product" means diapers, training pants, swimwear, absorbent underpants, adult incontinence products, and feminine hygiene products, such as feminine care pads, napkins and pantiliners. While a diaper is illustrated in Figure 10, it should be recognized that the inventive material may just as easily be incorporated in any of the previously listed personal care products as an elastic component. For instance, such material may be utilized to make the elastic side panels of training pants.

[0038] As used herein the term "protective outerwear" means garments used for protection in the workplace, such as surgical gowns, hospital gowns, covergowns, labcoats, masks, and protective coveralls.

[0039] As used herein, the terms "protective cover" and "protective outercover" mean covers that are used to protect objects such as for example car, boat and barbeque grill covers, as well as agricultural fabrics.

[0040] As used herein, the terms "polymer" and "polymeric" when used without descriptive modifiers, generally include but are not limited to, homopolymers, copolymers, such as for example, block, graft, random and alternating copolymers, terpolymers, etc. and blends and modifications thereof. Furthermore, unless otherwise specifically limited, the term "polymer" includes all possible spatial configurations of the molecule. These configurations include, but are not limited to isotactic, syndiotactic and random symmetries.

[0041] As used herein, the terms "machine direction" or MD means the direction along the length of a fabric in the direction in which it is produced. The terms "cross machine direction," "cross directional," or CD mean the direction across the width of fabric, i.e. a direction generally perpendicular to the MD.

[0042] As used herein, the term "nonwoven web" means a polymeric web having a structure of individual fibers or threads which are interlaid, but not in an identifiable, repeating manner. Nonwoven webs have been, in the past, formed by a variety of processes such as, for example, meltblowing processes, spunbonding processes, hydroentangling, air-laid and bonded carded web processes.

[0043] As used herein, the term "bonded carded webs" refers to webs that are made from staple fibers which are usually purchased in bales. The bales are placed in a fiberizing unit/picker which separates the fibers. Next, the fibers are sent through a combining or carding unit which further breaks apart and aligns the staple fibers in the machine direction so as to form a machine direction-oriented fibrous nonwoven web. Once the web has been formed, it is then bonded by one or more of several bonding methods. One bonding method is powder bonding wherein a powdered adhesive is distributed throughout the web and then activated, usually by heating the web and adhesive with hot air. Another bonding method is pattern bonding wherein heated calender rolls or ultrasonic bonding equipment is used to bond the fibers together, usually in a localized bond pattern through the web and/or alternatively the web may be bonded across its entire surface if so

desired. When using bicomponent staple fibers, through-air bonding equipment is, for many applications, especially advantageous.

[0044] As used herein the term "spunbond" refers to small diameter fibers which are formed by extruding molten thermoplastic material as filaments from a plurality of fine, usually circular capillaries of a spinneret with the diameter of the extruded filaments being rapidly reduced as by means shown, for example in U.S. Pat. No. 4,340,563 to Appel et al., and U.S. Pat. No. 3,692,618 to Dorschner et al., U.S. Pat. No. 3,802,817 to Matsuki et al., U.S. Pat. Nos. 3,338,992 and 3,341,394 to Kinney, U.S. Pat. No. 3,542,615 to Dobo et al., each of which is incorporated by reference in its entirety herein.

[0045] As used herein, the term "meltblown" means fibers formed by extruding a molten thermoplastic material through a plurality of fine, usually circular die capillaries as molten threads or filaments into converging high velocity gas (e.g. air) streams which attenuate the filaments of molten thermoplastic material to reduce their diameter, which may be to microfiber diameter. Thereafter, the meltblown fibers are carried by the high velocity gas stream and are deposited on a collecting surface to form a web of randomly dispersed meltblown fibers. Such a process is disclosed, in various patents and publications, including NRL Report 4364, "Manufacture of Super-Fine Organic Fibers" by B. A. Wendt, E. L. Boone and D.D. Fluharty; NRL Report 5265, "An Improved Device For The Formation of Super-Fine Thermoplastic Fibers" by K.D. Lawrence, R. T. Lukas, J. A. Young; and U.S. Patent No. 3,849,241, issued November 19, 1974, to Butin, et al. incorporated by reference herein in its entirety.

[0046] As used herein, the terms "sheet" and "sheet material" shall be interchangeable and in the absence of a word modifier, refer to woven materials, nonwoven webs, polymeric films, polymeric scrim-like materials, and polymeric foam sheeting.

[0047] The basis weight of nonwoven fabrics or films is usually expressed in ounces of material per square yard (osy) or grams per square meter (g/m^2 or gsm) and the fiber diameters are usually expressed in microns. (Note that to convert from osy to gsm, multiply osy by 33.91). Film thicknesses may also be expressed in microns or mil.

[0048] As used herein, the term "laminate" refers to a composite structure of two or more sheet material layers that have been adhered through a bonding step, such as through adhesive bonding, thermal bonding, point bonding, pressure bonding, extrusion coating or ultrasonic bonding.

[0049] As used herein, the term "elastomeric" shall be interchangeable with the term "elastic" and refers to sheet material which, upon application of a stretching force, is stretchable in at least one direction (such as the CD direction), and which upon release of the stretching force contracts/returns to approximately its original dimension. For example, a stretched material having a stretched length which is at least 50 percent greater than its relaxed unstretched length, and which will recover to within at least 50 percent of its stretched length upon release of the stretching force. A hypothetical example would be a one (1) inch sample of a material which is stretchable to at least 1.50 inches and which, upon release of the stretching force, will recover to a length of not more than 1.25 inches. Desirably, such elastomeric sheet contracts or recovers up to 50 percent of the stretch length in a particular direction, such as in either the machine direction or the cross machine direction. Even more desirably, such elastomeric sheet material recovers up to 80 percent of the stretch length in a particular direction, such as in either the machine direction or the cross machine direction. Even more desirably, such elastomeric sheet material recovers greater than 80 percent of the stretch length in a particular direction, such as in either the machine direction or the cross machine direction. Desirably, such elastomeric sheet is stretchable and recoverable in both the MD and CD directions.

[0050] As used herein, the term "semi-elastic" refers to sheet material that may be elastic or elastomeric, or that may be stretchable in at least one direction (such as the CD direction) and upon release of the stretching force at least partially retracts. For example, when a semi-elastic material is stretched to 200% its original dimension, upon release of the stretching force, the semi-elastic material will retract to less than 200% its original dimension, such as less than 175% its original dimension, or less than 150% its original dimension.

[0051] As used herein, the term "elastomer" shall refer to a polymer which is elastomeric.

[0052] As used herein, the term "thermoplastic" shall refer to a polymer which is capable of being melt processed.

[0053] As used herein, the term "inelastic" or "nonelastic" refers to any material which does not fall within the definition of "elastic" above.

[0054] As used herein, the term "multilayer laminate" means a laminate including a variety of different sheet materials. For instance, a multilayer laminate may include some layers of spunbond and some meltblown such as a spunbond/meltblown/spunbond (SMS)

laminate and others as disclosed in U.S. Patent 4,041,203 to Brock et al., U.S. Patent 5,169,706 to Collier, et al., U.S. Patent 5,145,727 to Potts et al., U.S. Patent 5,178,931 to Perkins et al., and U.S. Patent 5,188,885 to Timmons et al., each incorporated by reference herein in its entirety. Such a laminate may be made by sequentially depositing onto a moving forming belt first a spunbond fabric layer, then a meltblown fabric layer and last another spunbond layer and then bonding the laminate, such as by thermal point bonding. Alternatively, the fabric layers may be made individually, collected in rolls, and combined in a separate bonding step or steps. Multilayer laminates may also have various numbers of meltblown layers or multiple spunbond layers in many different configurations and may include other materials like films (F) or coform materials, e.g. SMMS, SM, SFS.

[0055] As used herein, the term "coform" means a process in which at least one meltblown diehead is arranged near a chute through which other materials are added to the web while it is forming. Such other materials may be pulp, superabsorbent particles, cellulose or staple fibers, for example. Coform processes are shown in U.S. Patents 4,818,464 to Lau and 4,100,324 to Anderson et al., each incorporated by reference herein in its entirety.

[0056] As used herein, the term "conjugate fibers" refers to fibers which have been formed from at least two polymers extruded from separate extruders but spun together to form one fiber. Conjugate fibers are also sometimes referred to as multicomponent or bicomponent fibers. The polymers are usually different from each other though conjugate fibers may be monocomponent fibers. The polymers are arranged in substantially constantly positioned distinct zones across the cross-section of the conjugate fibers and extend continuously along the length of the conjugate fibers. The configuration of such conjugate fiber may be, for example, a sheath/core arrangement wherein one polymer is surrounded by another or may be a side-by-side arrangement, a pie arrangement or an "islands-in-the-sea" arrangement. Conjugate fibers are taught in U.S. Patent 5,108,820 to Kaneko et al., U.S. Patent 4,795,668 to Krueger et al., and U.S. Patent 5,336,552 to Strack et al. Conjugate fibers are also taught in U.S. Patent 5,382,400 to Pike et al., and may be used to produce crimp in the fibers by using the differential rates of expansion and contraction of the two or more polymers. For two component fibers, the polymers may be present in varying desired ratios. The fibers may also have shapes such as those described in U.S. Patents 5,277,976 to Hogle et al., U.S. Patent 5,466,410 to Hills and U. S. Patents

5,069,970 and 5,057,368 to Largman et al., which describe fibers with unconventional shapes. Each of the foregoing patents is incorporated by reference herein in its entirety.

[0057] As used herein the term "thermal point bonding" involves passing a fabric or web of fibers to be bonded between a heated calender roll and an anvil roll. The calender roll is usually, though not always, patterned in some way so that the entire fabric is not bonded across its entire surface, and the anvil roll is usually flat. As a result, various patterns for calender rolls have been developed for functional as well as aesthetic reasons. One example of a pattern has points and is the Hansen Pennings or "H&P" pattern with about a 30 percent bond area with about 200 bonds/square inch as taught in U.S. Patent 3,855,046 to Hansen and Pennings, incorporated herein by reference in its entirety. The H&P pattern has square point or pin bonding areas wherein each pin has a side dimension of 0.038 inches (0.965 mm), a spacing of 0.070 inches (1.778 mm) between pins, and a depth of bonding of 0.023 inches (0.584 mm). The resulting pattern has a bonded area of about 29.5 percent. Another typical point bonding pattern is the expanded Hansen Pennings or "EHP" bond pattern which produces a 15 percent bond area with a square pin having a side dimension of 0.037 inches (0.94 mm), a pin spacing of 0.097 inches (2.464 mm) and a depth of 0.039 inches (0.991 mm). Another typical point bonding pattern designated "714" has square pin bonding areas wherein each pin has a side dimension of 0.023 inches, a spacing of 0.062 inches (1.575 mm) between pins, and a depth of bonding of 0.033 inches (0.838 mm). The resulting pattern has a bonded area of about 15 percent. Yet another common pattern is the C-Star pattern which has a bond area of about 16.9 percent. The C-Star pattern has a cross-directional bar or "corduroy" design interrupted by shooting stars. Other common patterns include a diamond pattern with repeating and slightly offset diamonds with about a 16 percent bond area and a wire weave pattern looking as the name suggests, e.g. like a window screen pattern having a bond area in the range of from about 15 percent to about 21 percent and about 302 bonds per square inch.

[0058] Typically, the percent bonding area varies from around 10 percent to around 30 percent of the area of the fabric laminate. As is well known in the art, the spot bonding holds the laminate layers together as well as imparts integrity to each individual layer by bonding filaments and/or fibers within each layer.

[0059] As used herein, the term "ultrasonic bonding" means a process performed, for example, by passing the fabric between a sonic horn and anvil roll as illustrated in U.S. Patent 4,374,888 to Bornslaeger, incorporated by reference herein in its entirety.

[0060] As used herein, the term "adhesive bonding" means a bonding process which forms a bond by application of an adhesive. Such application of adhesive may be by various processes such as slot coating, spray coating and other topical applications. Further, such adhesive may be applied within a product component and then exposed to pressure such that contact of a second product component with the adhesive containing product component forms an adhesive bond between the two components.

[0061] As used herein, the term "post-calender treatment" refers to any treatment, such as the application of a nonblocking agent, that is typically applied to a laminate toward the end of the lamination process, such as following the passage of the laminate through a nip or over a calender roll, in order to reduce inter-layer peel strength.

[0062] As used herein, the term "inter-layer peel strength" refers to the peel strength required to separate a laminate from itself when unwound from a roll, as opposed to the peel strength between layers within the laminate. Inter-layer peel strength can be determined using the Roll Blocking Test Method described in detail below.

[0063] As used herein, and in the claims, the term "comprising" is inclusive or open-ended and does not exclude additional unrecited elements, compositional components, or method steps. Accordingly, such term is intended to be synonymous with the words "has", "have", "having", "includes", "including", and any derivatives of these words.

[0064] As used herein, the terms "extensible" or "expandable" mean elongatable in at least one direction, but not necessarily recoverable.

[0065] Unless otherwise indicated, percentages of components in formulations are by weight.

DETAILED DESCRIPTION OF THE INVENTION

[0066] For the purposes of this invention an elastic single sided stretch bonded laminate includes at least one elastic layer and one gatherable facing layer, the gatherable facing layer being applied to only one side of at least one elastic layer. A nonblocking agent may be applied to the elastic layer either as a nonblocking agent layer on a side opposite to that of the facing layer, or as a bonding agent (adhesive) between the elastic layer and the gatherable facing layer, or alternatively, as a bonding agent between the elastic layer and the gatherable facing layer and additionally over the bonded laminate, on a side opposite to that of the facing layer.

[0067] It is desirable that such single-sided stretch bonded laminate material demonstrate a stretch to stop value of between about 30 and 400 percent. In an alternative embodiment, such material demonstrates a stretch to stop value of between about 50 and 300 percent. In still a further alternative embodiment, such laminate material demonstrates a stretch to stop value of between about 80 and 250 percent.

[0068] The elastic layer may include an array of continuous filament strands with a meltblown layer deposited on the continuous filament strands. Additionally or alternatively, other components may be included in the elastic layer, such as a film, or an array of continuous filaments, either with or without another laminate material (such as an elastic meltblown layer) attached thereto. Such elastic layer may also comprise an elastic scrim or netting structure, a foam material, or a combination of any of the foregoing materials. If a film is used, it may be an apertured film. In certain embodiments, any of these additional components may be used in place of the array of continuous filament strands and/or the meltblown layer. The combination of a generally parallel series of elastomeric continuous filaments or strands (fiber array) and meltblown materials deposited on the filaments. is described in previously noted U.S. Patent No. 5,385,775 to Wright. Desirably, The filament to meltblown basis weight ratio in such an elastic layer may be about 90:10, for example.

[0069] As mentioned, the elastic layer may include an array of continuous filament strands with a meltblown layer deposited on the continuous filament strands. The laminate suitably includes an elastic polyolefin-based polymer having a degree of crystallinity between about 3% and about 40%, or between about 5% and about 30%, or between about 15% and about 25%. The elastic polyolefin-based polymer may also have a melt flow rate between about 10 and about 600 grams per 10 minutes, or between about 60 and about 300 grams per 10 minutes, or between about 150 and about 200 grams per 10 minutes; a melting/softening point between about 40 and about 160 degrees Celsius; and/or a density from about 0.8 to about 0.95, or about 0.85 to about 0.93, or about 0.86 to about 0.89 grams per cubic centimeter. The elastic polyolefin-based polymer may include polyethylene, polypropylene, butene, or octene homo- or copolymers, ethylene methacrylate, ethylene vinyl acetate, butyl acrylate copolymers, or a combination of any of these polymers.

[0070] One example of a suitable elastic polyolefin-based polymer is VISTAMAXX, available from ExxonMobil Chemical of Baytown, Texas. Other examples

of suitable polyolefin-based polymers include EXACT plastomer, OPTEMA ethylene methacrylate, and VISTANEX polyisobutylene, and metallocene-catalyzed polyethylene, all available from ExxonMobil Chemical, as well as AFFINITY polyolefin plastomers, such as AFFINITY EG8185 or AFFINITY GA1950, available from Dow Chemical Company of Midland, Michigan; ELVAX ethylene vinyl acetate, available from E. I. Du Pont de Nemours and Company of Wilmington, Delaware; and ESCORENE Ultra ethylene vinyl acetate, available from ExxonMobil.

[0071] The elastic polyolefin-based polymer suitably has a slow crystallization rate, with partial regions of crystalline and amorphous phases that make it inherently elastic and tacky. The elastic polyolefin-based polymer may be incorporated within the meltblown layer, the continuous filament strands, and/or the facing layer, as described in greater detail below.

[0072] At least one of the components of the elastic layer may be formed from an elastic polyolefin-based polymer having a degree of crystallinity between about 3% and about 40%, or between about 5% and about 30%, or between about 15% and about 25%, as described above. When the elastic polymer is used to form the meltblown layer, for example, the slow crystallization rate of the elastic polymer is advantageous because the meltblown fibers are semi-tacky as they are deposited on the forming wire, which keeps the elastic strands in place and adhesively bonds the composite. Additionally, when the meltblown layer includes the elastic polymer, the meltblown layer may be applied at a higher add-on compared to non-elastic meltblown layers. More particularly, the elastic meltblown layer may be applied at an add-on up to about 34 gsm, or between about 1 and about 5 grams per square meter (gsm), or between about 1.25 and about 2.5 gsm, as measured when the layer is fully extended. Inelastic meltblown tends to crack and form discrete islands as the strands stretch prior to lamination at higher add-on levels, which leads to non-uniformity. However, elastic meltblown does not suffer such drawbacks at higher add-on levels. Furthermore, the higher add-on of elastic meltblown coupled with the tackiness of the elastic meltblown helps to better secure the filaments to the facing layer such that the filaments are less likely to come loose, as demonstrated by inter-layer peel strength that is greater than intra-layer peel strength. More particularly, the peel strength of the layers within the laminate is greater than the peel strength of the exterior surfaces of the layers to one another when the laminate is unwound from a roll. For instance, the laminate may have an intra-layer peel strength of about 200 to about 450 grams per 3 inches cross-

directional width at a strain rate of 300 mm/min, using the same test method as used for determining the inter-layer peel strength but instead pulling apart the elastic layer from the facing layer. The higher add-on of elastic meltblown may also help reduce porosity.

[0073] Another benefit of using the elastic polyolefin-based polymer in the meltblown layer is the reduction or elimination of roll blocking, as demonstrated through the low inter-layer peel strength of the laminate. Other laminates may include post-calender treatment, such as non-elastic polypropylene meltblown dusting, to prevent roll blocking, but the incorporation of the elastic polymer in the meltblown layer may remove the need for any post-calender treatment. Incorporation of the elastic meltblown layer without any post-calender treatment may result in an inter-layer peel strength of the laminate of less than about 70 grams per 3 inches cross-directional width at a strain rate of 300 mm/min, or less than about 60 grams per 3 inches cross-directional width at a strain rate of 300 mm/min, or less than about 50 grams per 3 inches cross-directional width at a strain rate of 300 mm/min. A shorter width of laminate may provide non-uniform results, but for the most part the inter-layer peel strength of the laminate has a linear relationship with respect to the width of the laminate. Thus, for example, a laminate having a width of 3 inches may exhibit inter-layer peel strength of about 60 grams per 3 inches cross-directional width at a strain rate of 300 mm/min, while the same laminate having a width of 1 inch may exhibit inter-layer peel strength of about 20 grams per inch cross-directional width at a strain rate of 300 mm/min.

[0074] The meltblown layer may include, for example, between about 30% and about 100%, or between about 50% and about 80%, by weight elastic polyolefin-based polymer. The meltblown layer may be a single layer or a multi-layer component. For example, the meltblown layer may also include a layer of styrenic block copolymer-based meltblown polymer, as described in greater detail below.

[0075] As mentioned, the continuous filament strands may also include an elastic polyolefin-based polymer. More particularly, the continuous filament strands may be composed of between about 5% and about 90%, or between about 30% and about 70%, by weight elastic polyolefin-based polymer.

[0076] Furthermore, any or all of the components within the elastic layer (whether film, filament or other described structure) may include thermoplastic materials such as block copolymers having the general formula A-B-A' where A and A' are each a thermoplastic polymer endblock which contains a styrenic moiety such as a poly (vinyl

arene) and where B is an elastomeric polymer midblock such as a conjugated diene or a lower alkene polymer.

[0077] Specific examples of useful styrenic block copolymers include hydrogenated polyisoprene polymers such as styrene-ethylenepropylene-styrene (SEPS), styrene-ethylenepropylene-styrene-ethylenepropylene (SEPSEP), hydrogenated polybutadiene polymers such as styrene-ethylenebutylene-styrene (SEBS), styrene-ethylenebutylene-styrene-ethylenebutylene (SEBSEB), styrene-butadiene-styrene (SBS), styrene-isoprene-styrene (SIS), and hydrogenated poly-isoprene/butadiene polymer such as styrene-ethylene-ethylenepropylene- styrene (SEEPS). Polymer block configurations such as diblock, triblock, multiblock, star and radial are also contemplated in this invention. In some instances, higher molecular weight block copolymers may be desirable. Block copolymers are available from Kraton Polymers U.S. LLC of Houston, TX under the designations Kraton G or D polymers, for example G1652 , G1657, G1730, D1114, D1155, D1102 and Septon Company of America, Pasadena, TX under the designations Septon 2004, Septon 4030, and Septon 4033. Other potential suppliers of such polymers include Dexco Polymers of TX and Dynasol of Spain. Blends of such elastomeric resin materials are also contemplated as the primary component of the elastic layer. Additionally, other desirable block copolymers are disclosed in U.S. Patent Publication 2003/0232928A1 which is incorporated by reference herein in its entirety.

[0078] Such base resins may be further combined with tackifiers and/or processing aids in compounds. Exemplary compounds include but are not limited to KRATON G 2760, and KRATON G 2755. Processing aids that may be added to the elastomeric polymer described above include a polyolefin to improve the processability of the composition. The polyolefin must be one which, when so blended and subjected to an appropriate combination of elevated pressure and elevated temperature conditions, is extrudable, in blended form, with the elastomeric base polymer. Useful blending polyolefin materials include, for example, polyethylene, polypropylene and polybutene, including ethylene copolymers, propylene copolymers and butene copolymers. A particularly useful polyethylene may be obtained from Eastman Chemical under the designation EPOLENE C-10. Two or more of the polyolefins may also be utilized. Extrudable blends of elastomeric polymers and polyolefins are disclosed in, for example, U.S. Pat. No 4,663,220.

[0079] The elastomeric filaments or film layer may have some tackiness/adhesiveness to enhance autogenous bonding. For example, the elastomeric polymer itself may be tacky when formed into films, and/or filaments or, alternatively, a compatible tackifying resin may be added to the extrudable elastomeric compositions described above to provide tackified elastomeric fibers and/or filaments that autogenously bond. In regards to the tackifying resins and tackified extrudable elastomeric compositions, note the resins and compositions as disclosed in U.S. Pat. No.4,787,699, hereby incorporated by reference in its entirety.

[0080] Any tackifier resin can be used which is compatible with the elastomeric polymer and can withstand the high processing (e.g. extrusion) temperatures. If the elastomeric polymer (e.g. A-B-A elastomeric block copolymer) is blended with processing aids such as, for example, polyolefins or extending oils, the tackifier resin should also be compatible with those processing aids. Generally, hydrogenated hydrocarbon resins are preferred tackifying resins, because of their better temperature stability. REGALREZ series tackifiers are examples of such hydrogenated hydrocarbon resins. REGALREZ hydrocarbon resins are available from Eastman Chemical. Of course, the present invention is not limited to use of such tackifying resins, and other tackifying resins which are compatible with the other components of the composition and can withstand the high processing temperatures, can also be used. Other tackifiers are available from ExxonMobil under the ESCOREZ designation.

[0081] Other exemplary elastomeric materials which may be used include polyurethane elastomeric materials such as, for example, those available under the trademark ESTANE from Noveon, polyamide elastomeric materials such as, for example, those available under the trademark PEBAX (polyether amide) from Ato Fina Company, and polyester elastomeric materials such as, for example, those available under the trade designation HYTREL from E.I. DuPont De Nemours & Company.

[0082] Useful elastomeric polymers also include, for example, elastic polymers and copolymers of ethylene and at least one vinyl monomer such as, for example, vinyl acetates, unsaturated aliphatic monocarboxylic acids, and esters of such monocarboxylic acids. The elastic copolymers and formation of elastomeric meltblown fibers from those elastic copolymers are disclosed in, for example, U.S. Pat. No. 4,803,117, incorporated by reference herein in its entirety.

[0083] Additional materials which may be utilized in the elastic layer to provide some extensibility with limited recovery, include single site catalyzed polyolefinic materials, such as metallocene catalyzed polyolefins and constrained geometry polyolefins, as available from Dow under the designation AFFINITY and from ExxonMobil, under the designation EXACT. Desirably, such materials have densities of less than 0.89 g/cc.

[0084] Finally, pre-formed elastic strands are also contemplated to be within the scope of this invention. Such preformed strands, such as solution treated materials, include LYCRA from Dupont, and GLOSPAN available from GLOBE. This material may serve as the basis for a continuous filament array component (elastic layer) of a stretch bonded laminate material, or alternatively a film component of a stretch bonded laminate.

[0085] Typically, the blend used to form the web, film or filaments when such is made from an extruded material in an on-line process, includes for example, from about 40 to about 90 percent by weight elastomeric polymer base resin, from about 0 to about 40 percent polyolefin processing aid, and from about 5 to about 40 percent resin tackifier. These ratios can be varied depending on the specific properties desired and the polymers utilized. For an alternative embodiment, such blend includes between about 60 and 80 percent base resin, between about 5 to 30 percent processing aid, and between about 10 and 30 percent tackifier. In a further alternative embodiment, such blend includes a tackifier in an amount of between about 10 and 20 percent tackifier.

[0086] In embodiments in which the meltblown layer does not include the elastic polyolefin-based polymer, a nonblocking agent may be applied to the elastic layer either as a nonblocking agent layer on a side opposite to that of the facing layer, or as a bonding agent (adhesive) between the elastic layer and the gatherable facing layer, or alternatively, as a bonding agent between the elastic layer and the gatherable facing layer and additionally over the bonded laminate, on a side opposite to that of the facing layer.

[0087] The gatherable facing layer gathers between points on its surface that are bonded to the elastic layer. Essentially, those areas that are gathered are not bonded to the elastic layer. While it is desirable that the gatherable layer be a nonwoven layer, such gatherable layer may also be a woven web, a cellulosic web as will later be described, a metallic foil-type layer or a combination of such. Such gatherable material may also be pretreated in some fashion prior to being bonded to the elastic layer. Such pretreatments include for instance being necked. Such pretreatment may offer additional properties to

the overall laminate material, such as bi or multidirectional stretch capabilities. Such gatherable layer may itself include multiple layers, and as such be a multilayered laminate.

[0088] The gatherable facing layer may be a nonwoven material such as, for example, one or more spunbonded webs (such as a conjugate fiber spunbond web), meltblown webs, or bonded carded webs. An example of a spunbond web may be a polypropylene spunbond web having a basis weight of between about 0.3 and 0.8 osy. In a further alternative embodiment, the spunbond web is necked between about 25 and 60 percent before it is bonded to the elastic layer. In still a further embodiment of the invention, the gatherable layer is a multilayer material having, for example, at least one layer of spunbond web joined to at least one layer of meltblown web, bonded carded web, or other suitable material. The gatherable layer may also be a composite material made of a mixture of two or more different fibers or a mixture of fibers and particulates, such as a coform material. Such mixtures may be formed by adding fibers and/or particulates to the gas stream in which meltblown fibers are carried so that an intimate entangled comingling of meltblown fibers and other materials, i.e. woodpulp, staplefibers and particulates such as, for example, hydrocolloid (hydrogel), particulates commonly referred to as superabsorbent materials, occurs prior to collection of the meltblown fibers upon a collecting device to form a coherent web of randomly dispersed meltblown fibers and other materials such as disclosed in U.S. Patent No. 4,100,324, the disclosure of which is hereby incorporated by reference in its entirety. The facing layer may either be unwound from a roll or formed in-line.

[0089] As mentioned, the facing layer may also include an elastic polyolefin-based polymer, as described above. More particularly, the facing layer may be composed of between about 0% and about 100%, or between about 60% and about 100%, by weight elastic polyolefin-based polymer. In certain embodiments, for example, the facing layer may be a spunbond-meltblown-spunbond laminate in which the meltblown layer includes, in whole or in part, the elastic polyolefin-based polymer. Alternatively, the facing layer may be spunbond, meltblown, hydroentangled, or other type of nonwoven material including the elastic polyolefin-based polymer. In certain embodiments, for example, both the facing layer and the elastic meltblown layer may include an elastic polyolefin-based polymer, as described above. In such embodiments, the laminate does not include any conventional facing layers per se, but instead may include two layers of the elastic polyolefin-based polymer positioned on opposite sides of the array of continuous filament

strands. More particularly, as illustrated in Figure 2, both the facing layer 85 and the meltblown layer 89 may include the elastic polyolefin-based polymer.

[0090] The gatherable layer may be made of pulp fibers, including wood pulp fibers, to form a material such as, for example, a tissue layer. Additionally, the gatherable layer may be a layer or layers of hydraulically entangled fibers such as, for example hydraulically entangled mixtures of wood pulp and staple fibers such as disclosed, for example, in U.S. Patent No. 4,781,966, the disclosure of which is hereby incorporated by reference in its entirety.

[0091] The single sided stretch bonded laminate is desirably made using one of three methods. In particular, the material may be made using either an extrusion and bonding method with an elastic polyolefin-based meltblown layer having a slow rate of crystallization, or an extrusion and bonding method with a meltblown nonblocking agent treatment thereon (to form a nonblocking agent layer), an application of a pre-bonding adhesive that has a relatively low open time and becomes non-tacky following application, or an application of a pre-bonding adhesive that has a relatively low open time and a post-bonding application of such an adhesive, with the adhesive becoming non-tacky following application. The various methods may be described in one embodiment as involving a bonding agent, even though all of the methods do not involve "adhesives" per se. The methods can be variously characterized as involving mechanical entanglement which, in effect, mechanically bonds layers together without a tacky result.

[0092] The attributes of a semi-tacky elastic polyolefin-based meltblown layer having a slow rate of crystallization are described above. More particularly, the meltblown fibers are semi-tacky when deposited on the forming wire, which keeps the elastic strands in place and adhesively bonds the laminate. Additionally, the elastic meltblown layer can be applied at a relatively high add-on, which contributes to the bonding between the facing layer and the filaments.

[0093] In embodiments including a nonblocking agent, the nonblocking agent treatment may include application of a relatively low basis weight meltblown material, such that no readily visible (with the human eye) web is formed, to the top of tacky elastic layers within the laminate. Such nonblocking agent treatment is desirably a dusting of meltblown, such as between about 0.2 and 2.0 gsm of meltblown materials. In an alternative embodiment, such meltblown application is between about 0.2 and 1.5 gsm of meltblown materials. In still another alternative embodiment, such meltblown application is

between about 0.2 and 0.8 gsm. In yet another alternative embodiment, such meltblown application is between about 0.2 and 0.5 gsm. The basis weight of the meltblown materials is determined at the point of lamination. Depending on what attributes are desired, the meltblown application is varied within these respective ranges. For instance, if a more elastic laminate is desired, the meltblown application would necessarily be on the lower end of the range. Desirably, such meltblown is a non-tacky polypropylene meltblown material which is exemplified by VALTEC HH442H (having a MFR of 1100 at 230° C/2.16 kg of ASTM D1238) by Basell, and Basell PF-015. Such meltblown material may be produced by one or more meltblown banks depending on the basis weight desired. Alternatively, such meltblown may be of an elastic material without tackifier.

[0094] If an adhesive method is used to create such single sided facing stretch bonded laminate, it is desirable that such adhesive have a relatively short open time of between about 0.2 seconds (sec) and 1 minute. In an alternative embodiment, such open time is between about 0.2 sec and 3 seconds. In still a further alternative embodiment, such open time is between about 0.5 sec and 2 seconds. An exemplary adhesive with such properties is a polypropylene-based hot melt adhesive (that becomes nontacky shortly after application, upon solidification) consisting of up to 65 percent or between about 15-40 percent atactic polypropylene, in one embodiment about 39 weight percent Eastman P1023 PP (atactic polypropylene from Eastman Chemical) or 50 weight percent Huntsman H2115 (atactic polypropylene from Huntsman Polymers); between about 30-60 or 20-50 percent tackifier, in one embodiment about 30 percent ExxonMobil ESCOREZ 5300 or 39 percent ExxonMobil ESCOREZ 5690; between about 2-10 percent styrenic block copolymer, in one embodiment about 4 percent SEPTON 2002 of Septon Polymers or about 5 percent VECTOR 4411 of Dexco Polymers; between about 10-20 percent isotactic polypropylene, in one embodiment, about 14-16 percent PP 3746G (isotactic polypropylene) also of ExxonMobil; between about 0-2 percent coloring agent, in one embodiment about 2 percent of a coloring agent, such as 50 percent titanium dioxide in VECTOR 4411 and finally; between about 0.2 -1 percent stabilizer, in one embodiment, about 0.5 percent IRGANOX 1010 from Ciba Specialty Chemicals. This adhesive was used in some of the adhesive examples appearing below. It should be appreciated that the various components may have other substitutes, such as stabilizers other than IRGANOX. Furthermore, it should be appreciated that such adhesives may also not contain coloring agents, depending on product application. Other adhesives may be used with the present invention including

those derived from the adhesives described in U.S. Patent Nos. 6,657,009 and 6,774,069, U.S. Application Serial Nos. 09/945239, 09/945240, 10/655717, and U.S. Publication Nos. US20020122953, US20020123726, each of which is incorporated herein by reference in its entirety.

[0095] In one embodiment, it is desirable that the adhesive be applied in a pre-bonding step (that is prior to (such as immediately prior to) bringing the elastic layer and the single facing layer together in a nip) at a basis weight of less than about 16 gsm. In an alternative embodiment, such adhesive is applied at a basis weight of less than about 8 gsm. In still a further alternative embodiment, it is desirable that such adhesive be applied at a basis weight of less than about 4 gsm. In still a further alternative embodiment, it is desirable that the adhesive be applied at between 1 and 4 gsm. In one embodiment, it is desirable that such adhesive be applied by spray, such as through systems available from ITW or other such spray applications. Such spray application is in one embodiment sprayed onto one of the layers, such as on the facing layer or the meltblown layer. In an alternative embodiment, such spray is into the nip at which the facing and elastic layers are joined, or at which the meltblown layer and the filaments are joined.

[0096] If the adhesive is to be applied as a pre-bonding and postbonding step (prebonding as previously described), it is desirable that the adhesive be applied on the materials (as will be described below) in an amount of less than 4 gsm prior to bonding of the various layers. In an alternative embodiment, such adhesive is desirably applied in an amount of less than 2 gsm prior to bonding of the various layers. In still another alternative embodiment, such adhesive is applied in a prebonding step in a range of between about 1 and 4 gsm and in a post bonding step of between about 0-4 gsm. In still a further alternative embodiment, such adhesive is applied in a prebonding and post bonding method at a total of between about 6 and 8 gsm. The term postbonding refers to a post-calender treatment and, more specifically, shall mean application of the adhesive or nonblocking agent following exiting of the bonded elastic layer and facing layer from a nip, and before winding on a roll for storage. For example, application of the postbonding adhesive or nonblocking agent can be to a side of the elastic layer/facing layer laminate opposite to the facing layer.

[0097] In one embodiment, a method for producing a single sided facing stretch bonded elastic laminate material utilizes a facing such as that which has been previously described, and an array of continuous elastic filaments bonded to the facing either

adhesively or through the application of the elastic meltblown layer. However, in accordance with the method, a nonblocking agent may also applied to the side of the filament array which is opposite to that of the facing layer. The resulting laminate may have a structure of ABC, in which the "A" represents the single side facing, the "B" represents the elastic meltblown layer, and the "C" represents the continuous elastic filaments. Alternatively, the "B" may represent the continuous elastic filaments and the "C" may represent the elastic meltblown layer. As yet another alternative, "B" may represent the elastic component/layer of the laminate and "C" may represent the "nonblocking" agent (or adhesive as described). For the purposes of this application, the term "nonblocking" agent shall mean a light coating in the range previously described, of an agent which provides a light surface covering to a tacky layer, but that does not impact the performance ability of the laminate to retract. For example, the nonblocking agent in one embodiment is less than about 14 percent of the basis weight of the elastic layer without considering the nonblocking agent. Desirably, the nonblocking agent in an alternative embodiment is less than 7 percent of the basis weight of the elastic layer. In still a further alternative embodiment, the nonblocking agent is less than 4 percent of the basis weight of the elastic layer. Desirably, the application of the nonblocking agent is so lightly applied, that no perceptible gathering occurs in the nonblocking agent itself after the elastic layer is allowed to retract. The nonblocking agent is essentially adhered tightly to the surfaces of the elastic layer such that there is negligible separation from the elastic layer (especially when compared to the facing separation on the opposite side of the elastic layer), when the elastic layer is allowed to retract.

[0098] In such a fashion the resulting material demonstrates increased stretch levels, and the ability of the material to be rolled for storage over itself if it is not to be used immediately. The material likewise demonstrates enhanced gathering of the single facing since the stretch bonded laminate is allowed to retract to a greater extent than would be possible with two opposing facing layers attached.

[0099] As can be seen in Figures 1A and 1B, each of which illustrate a schematic view of a method for manufacturing a single sided stretch bonded laminate material in accordance with the invention, these figures illustrate a horizontal, continuous filament laminate manufacturing process 10. A first extrusion apparatus 20 is fed with a polymer blend composition from one or more sources (not shown) which is extruded onto a forming surface 30 in filament form 31. The extruded polymer is desirably a styrenic block

copolymer elastomer and/or an elastic polyolefin-based polymer. In various embodiments, the extrusion apparatus 20, or a second extrusion apparatus 35, can be configured to produce other materials, e.g. thermoplastic fibers 36, to achieve the inline placement of layers of the same or different materials, e.g. thermoplastic fibers, to achieve the inline placement of layers of the same or different materials. Techniques for fiber extrusion, such as modified meltblowing of the fibers, are further set forth in the previously mentioned U.S. Patent 5,385,775 to Wright. Apparatus 20 extrudes filaments 31 directly onto a conveyor system, which can be a forming surface system 30 (e.g., a foraminous belt) moving clockwise about rollers 40. A vacuum (not shown) can also help hold the filaments 31 against the foraminous wire system. A meltblown layer, also of an elastomeric material such as the materials previously described, particularly an elastic polyolefin-based polymer, is extruded from adjacent bank 35 or 45, such that the meltblown fibers 36 or 46 are placed on top of the continuous filaments 31 (array). The meltblown material is in one embodiment applied such that it represents 10 basis weight percent of the filament and meltblown structure, for example. In a particular embodiment, the styrenic block copolymer or elastic polyolefin-based polymer composition is the same in both the filaments and meltblown materials. In an alternative embodiment, the compositions are different (which may include the same base resin, but different percentages of processing aid or tackifiers).

[00100] In certain embodiments, particularly those wherein the meltblown layer does not include an elastic polyolefin-based polymer, one or more additional meltblown banks 45 and 50 (Figure 1A) may be positioned downstream and adjacent the first meltblown bank to extrude a nonblocking agent 46 onto the top of the extruded elastic meltblown layer(s). Such a nonblocking agent may be a polyolefin or elastic polyolefin polymer as previously described. Additionally, amorphous polyalpha olefins (APAO) that are non tacky may be utilized. Additionally, elastomeric materials without tackifiers may also be utilized. In a further alternative embodiment polypropylene adhesives such as previously described may likewise be meltblown on top of the previous elastic meltblown material. In melting the materials, a grid melter (typical hot melt equipment) may be used to melt/provide inorganic or organic drums, pellets, or blocks of nonblocking agent.

[00101] The filament/meltblown and (optionally) nonblocking agent laminate may be compacted by optional rolls 55 (optional), and stretched by the differential speed of either such optional compaction rolls or tensioning rollers (nip rolls) 60 to elongate and

tension the filaments 56. The tension rollers are therefore operating at speeds which exceed the speed at which the meltblown covered filament array is exiting the forming surface. Desirably the tension rollers 55 or 60 are provided with a surface having little to no affinity for the filaments or fibers. In one embodiment, the filaments are stretched between about 3 and 6X from the forming surface to the tensioning rollers.

[00102] At the same time, a single facing layer 67 is either made in line or unwound from a roll 65 and introduced into the set of nip rolls 60 with the filament array laminate such that the facing layer 67 faces the filament array side of the laminate, as opposed to the nonblocking agent or meltblown side of the laminate. Alternatively, the single facing layer 67a may be introduced into the set of nip rolls 60 with the filament array laminate such that the facing layer 67a faces the meltblown side of the laminate, as opposed to the filament array side of the laminate, as shown in dashed lines in Figure 1B.

[00103] The facing is bonded to the elastic layer (meltblown in particular, via pressure in the nip) while the elastic layer is still being stretched. Both the filament array and facing then exit the nip 60 as a continuous filament elastic stretch bonded laminate with a single side facing layer. The elastic laminate 70 is then allowed to relax, forming gathers therein between bonding points on the facing layer, and is collected on a collection roll 75 for further use. The collection roll then winds the laminate, typically at a speed less than that of the nip rolls, such as between about 0.50 and 0.75 of the nip roll speeds. The nip rollers 60 may be desirably designed to provide a 100 percent bond area through the use of flat calender rolls or may provide a patterned bond area. The rollers 60 can be heated to a degree below the melting/softening points of the various laminate components, or may be ambient, or chilled. As an alternative embodiment, of the method, all rolls that come into contact with the non-facing side of the laminate desirably include a non-stick surface, such as a coating of PTFE (TEFLON), or silicone rubber, release coating. Such rolls may further be coated with IMPREGLON coatings of Southwest Impreglon, of Houston, Texas, or Stowe-Woodward Silfex silicone rubber coatings of a hardness of 60 Shore A. In an alternative embodiment of this continuous filament array laminate method, rather than extruding continuous filaments, preformed elastic strands such as LYCRA strands may be unwound from a drum and fed into a laminating nip under tension. In still another embodiment, the facing can be necked prior to being bonded to the elastic layer. Such necking may be between about 25 and 60 percent.

[00104] Such laminate structure can be seen in Figure 2 which illustrates a cross sectional stylistic view of a laminate 80 made in accordance with the invention. As can be seen in the figure, the facing 85 may be situated under/immediately adjacent the filament array 87. An elastic meltblown layer 89 is positioned on top of the filament array 87 on a side opposite to that of the facing layer 85. Alternatively, as shown in Figure 3, a nonblocking agent layer 90 is positioned on top of and immediately adjacent the elastic meltblown layer(s) 89. As another alternative, illustrated in cross section in Figure 4, a laminate 80 made in accordance with the invention may include the facing 85 situated under/immediately adjacent the elastic meltblown layer 89, with the filament array 87 on top of the meltblown layer 89 on a side opposite to that of the facing layer 85. The thicknesses of the various layers are not to scale, and are exaggerated to illustrate their existence. It should be emphasized, that particularly with respect to the nonblocking agent layer, the layer merely is a close topical covering to the underlying meltblown layer fibers. The nonblocking agent layer does not form visually (with the human eye) distinct gathers between bond points to the elastic meltblown layer, as does the facing layer with respect to the filaments strands. It should also be recognized that while each of the various cross sections of these figures illustrate a relatively flat facing layer material, such nonwoven facing layer materials are actually gathered between where they are bonded to the respective elastic layers (either the strands, film, or webs), but for stylistic purposes, such web is shown in a relatively flat configuration. If desired, such single sided filament laminate may then be bonded to additional sheet materials as previously described.

[00105] In one embodiment, the continuous filaments in such laminates are desirably present in an amount between about 7 to 18, or about 8 to 15 per cross-directional inch. The basis weight of the meltblown material from the first elastic meltblown bank may be up to about 34 gsm, or between about 1 and 5, or between about 1 and 3 gsm, at the point of lamination. The basis weight of such facing materials bonded to such filaments is desirably between about 0.3 and 0.8 osy. In one embodiment, the filament and elastic meltblown materials are stretched between approximately 50 and 800 percent by the action of the nip rolls (expressed in a ratio, such as about 0.16 to 0.18 (forming surface speed/nip roll speed)). In a second alternative embodiment, the filaments are stretched between about 100 and 600 percent by the action of the nip rolls.

[00106] As an example of this embodiment of the invention, an ABC structure laminate may be produced in accordance with the methods of U.S. Patent Number

5,385,775, with a polypropylene spunbond facing ("A") having a basis weight between about 0.3 and 0.6 osy, but desirably in the range of about 0.35 to 0.4 osy. In one particular embodiment, the elastic component B, which comprises the filament array and the first meltblown layer, is desirably a styrenic block copolymer blend, such as elastic styrenic block copolymers available from Kraton, Septon, Dexco or Dynasol. Desirably, such polymeric blend also includes a KRATON G polymeric compounded blend such as KRATON G 2760 or KRATON G 2755 in the filaments, and either the same polymeric blend in the first meltblown layer or a second G polymer blend in the first meltblown layer. The filaments to meltblown weight ratio may be in a 90:10 ratio, or other suitable ratio. The nonblocking agent/layer C desirably comprises a lightly applied meltblown layer of polypropylene (such as Basell PF-015) or alternatively, a non-tackified elastomeric blend of meltblown, such as for example a blend of 70 percent SEPTON 2004 with 30 percent EPOLENE C-10 wax, either applied at less than 1 gsm (basis weight at the calender or nip rolls). In another particular embodiment, the elastic components B and C, which desirably comprise the filament array and the elastic meltblown layer, desirably include an elastic polyolefin-based polymer, such as VISTAMAXX available from ExxonMobil. Such polymeric blend may also include a KRATON G polymeric compounded blend in the filaments, and either the same polymeric blend in the elastic meltblown layer or a second G polymer blend in the meltblown layer. Again, the filaments to meltblown weight ratio may be in a 90:10 ratio, or other suitable ratio.

[00107] In certain embodiments, an extensible or semi-elastic facing layer 85 is bonded to an elastic or semi-elastic film 92 having a basis weight of about 50 grams per square meter (gsm) or less, or between about 35 to about 45 gsm, or between about 38 and about 42 gsm, as illustrated in Figure 5. The facing layer 85 is lower in extension tension than the film 92. Consequently, the laminate 80 displays greater retraction than comparable laminates having two conventional facing layers. This substantial amount of elastic recovery may be attributable to the reinforcing, material mass, and distribution of the extensible or semi-elastic facing layer 85. More particularly, because the force required to cause permanent deformation of the facing layer 85 is not exceeded, an increase in recovery force is possible. Furthermore, when stretched, these laminates perform as a mono-component material instead of a multi-component constructed laminate.

[00108] The extensible or semi-elastic facing layer 85 may include the elastic polyolefin-based polymer, described in detail above, and may be meltblown, spunbond,

hydroentangled, or any other type of nonwoven material, also described in detail above. Furthermore, the laminate 80 may include a second extensible facing layer 94, the same as or different than the first facing layer 85 bonded to a surface of the film 92 opposite the first facing layer 85, as illustrated in Figure 6. The laminate 80 may also include a plurality of elastomeric strands, if desired. The incorporation of the elastic polyolefin-based polymer into one or more facing layers aids in the reduction of extension force and permits the use of a lower basis weight elastic or semi-elastic film. Additionally or alternatively, the film 92 may include an elastic polyolefin-based polymer. Examples of other suitable film materials include any of the elastomeric polymers described herein, particularly those described with respect to the elastic layer in previous embodiments, provided the film has a basis weight of about 50 gsm or less, or between about 35 to about 45 gsm, or between about 38 and about 42 gsm.

[00109] In manufacturing the material for examples, the following conditions were employed. The first extrusion bank that extruded continuous filaments, extruded either KRATON G2760 or alternatively, where noted, KRATON G2755. The elastic meltblown bank, which followed the filament bank downstream, extruded KRATON G2755. The nonblocking agent meltblown bank extruded BASELL PF-015 where noted. Generally such banks extruded filament and meltblown polymers in a basis weight of between 9 and 16 gsm, with the elastic filament/elastic meltblown basis weight ratio of 90:10. The wire to calender speed ratio was between 0.18 and 0.19. The facing basis weight, which was a polypropylene spunbond nonwoven, was between 0.4 and 0.5 osy.

[00110] The extrusion temperature of the continuous filament extrusion die system was between about 400 and 460 ° F. There was no primary air on this continuous filament system and the polymer was extruded out onto the forming wire from the filament die. The extrusion temperature of the elastic meltblown layer that was placed on top of the filaments was between 350 and 500° F with the higher temperatures primarily in the die. The primary air in the elastic meltblown bank was between about 1.4 and 1.6 psi. The extrusion temperature of the nonblocking agent meltblown die system was between about 350 and 570 ° F, with the die itself having a temperature of about 500 ° F. The primary air in that die was about 5 psi. The materials were calendered in a nip with the calender rolls yielding a surface temperature of ambient to 110 ° F and under a pressure of about 250 pounds per linear inch on the roll.

[00111] The materials were produced having the composition and manufacturing results as reflected in Table 1 below.

Table 1

Sample Number	Elastic Filament Type	Elastic Meltblown	Nonblocking agent	Facing Layer
1 Worked	KRATON G 2760	KRATON G 2755	70% SEPTON 2004, 30 % EPOLENE C-10 wax	PP 0.4-0.5 osy
2 Experienced Calender Buildup of meltblown and filaments	KRATON G 2760	KRATON G 2755	No nonblocking Agent	PP 0.4-0.5 osy
3 Worked	KRATON G2760	KRATON G 2755	BASELL PF-015 Polypropylene	PP 0.4-0.5 osy
4 Worked	KRATON G2755	KRATON G 2755	BASELL PF-015 Polypropylene	PP 0.4-0.5 osy

[00112] As can be seen from the examples, the lack of a nonblocking agent layer led to manufacturing difficulties, whereas the presence of a nonblocking agent layer simplified the manufacturing process. The peel strength (as described in the test method section) was then tested on the above sample 4 with a polypropylene nonblocking agent. The following test data indicates nonblocking performance in at least some samples from each internal section of a roll.

Table 2

	Peel Test Data	
Top Sections	Sample Number	Peel Force in Grams
Avg. Peel Force 43 g	1	49.6
	2	36
	3	42
	4	53
	5	33.4
	6	62.2
	7	36.7
	8	34
Middle Sections	1	77.4
Avg. Peel Force 101 g	2	114.3
	3	149.9
	4	73.4
	5	100.1
	6	77.5
	7	84
	8	128.2
Core Sections	1	402.3
Avg. Peel Force 359 g	2	425.1
	3	485.5
	4	430.8
	5	544.9
	6	199.1
	7	240.1
	8	144.9

[00113] In manufacturing material for additional examples, the following conditions were employed. The first extrusion bank that extruded continuous filaments, extruded KRATON G2760 at 26 lbs/hr. The stretch-to-stop (rSTS) of the filaments for each sample is indicated in Table 3. The elastic meltblown bank, which followed the filament bank downstream, extruded either BASELL PF-015 polypropylene/nonblocking agent, or VISTAMAXX 2210 (VM) elastic polyolefin-based polymer available from ExxonMobil, at either a low (2.5 gsm) or high (4.9 gsm) add-on. The wire to calender speed ratio was between 0.17 and 0.19, inclusive. When an adhesive was used, the adhesive add-on was 1.5 gsm at the nip. The meltblown pounds per inch per hour (PIH) is the rate at which the polymer was applied in the CD across the width of the filament die, and is indicated in Table 3 for each applicable sample.

[00114] The extrusion temperature of the continuous filament extrusion die system was between about 440 and 500° F. There was no primary air on this continuous filament

system and the polymer was extruded out onto the forming wire from the filament die. The extrusion temperature of the elastic meltblown layer that was placed on top of the filaments was 451° F. The primary air in the elastic meltblown bank was between about 0.8 and 1 psi at about 475° F. The extrusion temperature of the nonblocking agent meltblown die system was between about 350 and 500° F, with the die itself having a temperature of about 450° F. The primary air in that die was about 0.8 to 1 psi. The facing basis weight, which was a polypropylene spunbond nonwoven, was 0.4 osy. The facing was unwound near the stretch zone and laminated with the meltblown and strand composite. The materials were calendered in a nip with the calender rolls yielding a surface temperature of ambient to 70 to 85° F and under a pressure of about 250 pounds per linear inch on the roll. The entire laminate was allowed to retract and wound onto a 3-inch core.

[00115] The materials were slabbed off of each roll and cut into 4-inch by 6-inch samples and then put in a hydraulic press overnight to simulate forces in the roll. The Roll Blocking Test Method, described in detail below, was used at a 180 degree angle at room temperature to determine inter-layer peel strength and to quantify blocking potential. One sample of each laminate was tested in 10 repetitions, and the average was converted from grams per 4-inch width to grams per 3-inch width based on the essentially linear relationship between the inter-layer peel strength and the width of the roll.

Table 3

Sample	RSTS	MB Add-on (gsm)	MB Type	Winder (fpm)	MB PIH	Adh. (RPM)	Inter-Layer Peel Strength (grams per 3-inch width)
1	60	2.5	PF-015	94	NA	NA	126
2	60	2.5	PF-015	94	NA	8.3	170
3	120	4.9	PF-015	74	NA	6.6	116
4	120	4.9	PF-015	74	NA	NA	155
5	60	4.9	VM	94	0.75	6.6	35
6	120	4.9	VM	74	0.75	6.6	47
7	60	4.9	VM	94	0.75	NA	14
8	120	4.9	VM	74	0.75	NA	13
9	60	2.5	VM	94	0.38	NA	29
10	120	2.5	VM	74	0.38	6.6	47
11	120	4.9	VM	74	0.75	6.6	47
12	60	2.5	VM	94	0.38	8.3	47

[00116] The test data provided in Table 3 indicates the elastic meltblown facing using VISTAMAXX does not roll block. More particularly, the VISTAMAXX samples

had significantly lower inter-layer peel strength, around 13-47 grams per 3-inch width versus 116-170 grams per 3-inch width without VISTAMAXX. This demonstrates that samples made with VISTAMAXX have less probability of roll blocking.

[00117] In a second alternative embodiment of a method for making a single side facing stretch bonded laminate, a vertical oriented extrusion platform may be used to extrude an elastic continuous filament array. However, rather than employing a "meltblown" nonblocking agent that could encompass a variety of materials, a non-tacky adhesive bonding method may be employed to bond the elastic continuous filament array to the facing material.

[00118] Figures 7A and 7B each schematically illustrate a vertical filament laminate manufacturing process 100 for the manufacture of elastic laminates 170 produced from an elastic composition. Referring to Figures 7A and 7B, at least one molten elastomeric material 105, i.e. a styrenic block co-polymer material, is extruded from a die extruder 110 through spinning holes as a plurality of substantially continuous elastomeric filaments. The extruder may be extruding at temperatures between about 360 and 500° F. A film die for producing sheets or ribbons may also be used in alternative embodiments. The filaments 105 are quenched and solidified by passing the filaments 105 over a first chill roll 120. Any number of chill rolls can be used. Suitably, chill rolls may have a temperature of between about 40°F to about 80° F.

[00119] The die of the extruder 110 may be positioned with respect to the first roll so that the continuous filaments meet this first roll 120 at a predetermined angle 130. This strand extrusion geometry is particularly advantageous for depositing a melt extrudate onto a rotating roll or drum. An angled, or canted orientation provides an opportunity for the filaments to emerge from the die at a right angle to the roll tangent point, resulting in improved spinning, more efficient energy transfer, and generally longer die life. This configuration allows the filaments to emerge at an angle from the die and follow a relatively straight path to contact the tangent point on the roll surface. The angle 130 between the die exit of the extruder 110 and the vertical axis (or the horizontal axis of the first roll, depending on which angle is measured) may be as little as a few degrees or as much as 90 degrees. For example, a 90 degree extrudate exit to roll angle could be achieved by positioning the extruder 110 directly above the downstream edge of the first roll 120 and having a side exit die tip on the extruder. Moreover, angles such as about 20 degrees, about 35 degrees, or about 45 degrees, away from vertical may be utilized. It has

been found that, when utilizing a 12-filament/inch spinplate hole density, an approximately 45 degree angle (shown in Figures 7A and 7B) allows the system to operate effectively. The optimum angle, however, may vary as a function of extrudate exit velocity, roll speed, vertical distance from the die to the roll, and horizontal distance from the die centerline to the top dead center of the roller. Optimal performance can be achieved by employing various geometries to result in improved spinning efficiency and reduced filament breakage.

[00120] After the filaments 105 are quenched and solidified they are stretched or elongated using a first series of stretch rolls 140. The first series of stretch rolls may comprise one or more individual stretch rolls 145, 150 which rotate at a speed greater than a speed at which chill roll 120 rotates, thereby stretching the filaments 105.

[00121] In one embodiment of this invention, each successive roll rotates at a speed greater than the speed of the previous roll. For example, referring to Figures 7A and 7B, if the chill roll 120 rotates at a speed "x"; stretch roll 145 rotates at a still greater speed, for example about 1.15x; second stretch roll 150 rotates at a still greater speed, for example about 1.25x to about 7x. As a result, the filaments 105 may be stretched by about 100% to about 800% of an initial pre-stretched length.

[00122] After the filaments 105 are stretched, the filament 105 or both the filaments 105 and the meltblown layer 152 are laminated to a facing material 155 (when filaments are still in a stretched condition, as similarly described in the horizontal platform previously) by an adhesive process as exemplified by the illustrated adhesive distribution unit 160, shown as applying adhesive to the facing material 155. The meltblown layer 152 may be applied to the filaments from extrusion bank 153 between the facing material 155 and the filaments 105, as shown in Figure 7B.

[00123] The facing material 155 is unwound from a roll 154 and laminated to a first side of the filaments 105. Before the facing material 155 is laminated to the filaments, it may be necked by additional rolls (not shown). As previously described, the facing material may be a nonwoven material, or laminates thereof, according to the present invention. The laminate material is then passed through nip rolls 165 to bond the elastic filaments 105 and (optionally) the meltblown layer 152 to the facing 155 by adhesion. The nip rolls 165, may alternatively be used in place of, or in addition to, the stretch rolls 145, 150 to achieve stretching. The laminate material is then allowed to relax thereby allowing the retracting elastomeric filaments to form gathers in the laminate material, as with the

previously described horizontal manufacturing platform. It should be noted that in an alternative embodiment, additional relatively low open time adhesive (or nonblocking agent) 161 can be applied following the exit of the bonded elastic layer and facing from a nip 165, such than an additional layer of non-tacky material is deposited on the elastic layer on a side opposite to that of the facing layer, desirably while such laminate is in the stretched condition (as in relevant examples which follow).

[00124] The nip rollers may be designed to provide a patterned roller which may yield certain benefits such as increased bulk or stretching of the laminate and may be used where the strength of the contact adhesion between the facing and the strands is not unduly affected. The calender rolls can be heated to a degree below the melting/softening points of the various laminate components, or may be ambient, or chilled.

[00125] As can be seen in Figure 8, a cross-sectional view of such a laminate 180 is illustrated in which a single side facing material 182 is adhesively bonded 184 to a continuous filament array 186.

[00126] In a following set of examples describing this embodiment, a polypropylene adhesive is used to directly bond stretched elastic filaments or film onto a necked on non-necked spunbond facing. Desirably, the polypropylene adhesive demonstrates an open time of about 1 second. For the purposes of this application, the term "open" time shall be used to mean the time during which the adhesive remains tacky. Such adhesive provides necessary adhesion in a molten state as a bonding agent for the continuous filaments and/or film to bond to a nonwoven material (such as a spunbond), but that would be non-tacky after lamination. The laminate can be immediately wound without a roll blocking issue.

[00127] The elastic strands, films, or ribbons of such a stretch bonded laminate can be pre-made strands, films or ribbons, such as LYCRA or GLOSPAN strands that are introduced into a laminate from a supply roll or drum, or alternatively, those brought in-line by extrusion, such as from the vertical extrusion platform described above. Specific examples of the material made in accordance with the above methods are described below. Materials were initially made using bonded LYCRA strands to a single facing of 0.6 osy spunbond using the polypropylene based adhesive blend described above. The LYCRA strands of 940 denier were elongated 250 percent and then coated with adhesive using an adhesive spray application system, at an add on of adhesive of between about 5.0-7.0 gsm of adhesive. The adhesive coated strands were passed through a nip under tension, with the

polypropylene spunbond and immediately rewound. The resulting single faced laminate was nontacky and resulted in no blocking when unwound at a speed of between about 1000-1500 fpm, or less. The resulting single sided faced stretch bonded laminate demonstrated a high level of stretch to stop elastic performance as well.

[00128] Additional examples of material made in accordance with the previously described extrusion methods are described in the following Table 4. For the materials generated in Table 4, the following conditions were used. Filament/strand die A consisted of one row of extrusion holes of 12 holes/inch (0.030 inches wide) for 10 inches of die. Die B consisted of two rows of extrusion holes. Row 1 consisted of 12 holes per inch (0.030 inch wide) for the die of 10 inches, and row 2 consisted of 10 holes (1/4 inch gap over 1 inch wide per side (0.050 inch wide) and a flap having 4 holes (2 holes 3/4 inch spaced/2 edge holes 1/4 inch gap; 0.050 inch wide). The adhesive used was the same polypropylene adhesive described above, which was meltblown at between 3-4 gsm across the entire facing web prior to entering the lamination nip.

Table 4

Sample #	Basis Wt. Elastic gsm	Strand Polymer	Die	% Stretch of laminate STS	Basis Wt. Facing osy	Adhesive gsm
1	8	KRATON G6610	A	470	0.4 NSB	3
2	5.23	KRATON G6610	A	470	0.4 NSB	3
3	4	KRATON G6610	A	470	0.4 NSB	3
4	6	KRATON G6610	B	470	0.4 NSB	4
5	8	KRATON G6610	B	470	0.4 NSB	4
6	4	KRATON G6610	B	470	0.4 NSB	4
7	6	KRATON G6610	B	300	0.4 NSB	4

[00129] For the purposes of these examples, the term KRATON G6610 refers to a Kraton G polymer having tackifier, the stretch to stop was determined using the test previously described, and the abbreviation NSB, refers to necked polypropylene spunbond which has been necked approximately 60 percent prior to bonding with the elastic layer.

[00130] The extrusion examples above exhibited no blocking of the laminate roll when rolled for storage, nor did adhesive build up occur on the nip rollers. The corrugated

laminate was non-tacky and exhibited a soft hand, with the difference in tackiness between the strand side and the facing side being nearly undiscernible through both visual inspection and feel of hand. The material also demonstrated stretch capability of greater than 50 up to 400 percent in the machine direction and greater than 50 up to 120 percent in the cross-machine direction. Additionally, the material demonstrated less than between about 10 percent strand creep in accordance with the "creep test method", previously described after aging at 100° F for 90 minutes. Such result demonstrates strong adherence of the filaments to the facing layer.

[00131] In a further alternative embodiment of the inventive single sided facing stretch bonded material, and process for making such, an adhesive is meltblown or sprayed onto an elastic material just prior to it entering a lamination roller nip arrangement, as well as immediately after the laminate exits such nip, but before it is wound for storage on a roll. Such double application of an adhesive results in a material with reduced tackiness (if the strands, web or film elastic layer include any tackifiers), reduced strand creep, if filaments or strands are used in the elastic layer, and improved bonding.

[00132] In an example of such an alternative process, materials produced by this method are shown in Table 5. Each used hot melt polypropylene-based adhesive as previously described.

Table 5

Sample #	Basis Wt. Elastic gsm	Strand Polymer	Elongation of Filaments	Facing Material osy	Pre-nip adhesive gsm	Post-nip adhesive gsm
1	10.2	KRATON G 6610	4X	60 percent Neck SB	4	0
2	10.2	KRATON G 6610	4X	60 percent Neck SB	2	2
3	10.2	KRATON G 6610	4X	60 percent Neck SB	3	3
4	10.2	KRATON G 6610	4X	60 percent Neck SB	4	4
5	7.25	G6610/ SIS (60/40 blend)	5.6X	0.4 osy SB	4	0
6	7.25	G6610/ SIS (60/40 blend)	5.6X	0.4 osy SB	2	2
7	7.25	G6610/ SIS (60/40 blend)	5.6X	0.4 osy SB	3	3
8	7.25	G6610/ SIS (60/40 blend)	5.6X	0.4 osy SB	4	4

[00133] It should be noted that the 60/40 blend described in the above table consisted of about 60 percent KRATON G6610, about 20 percent VECTOR 4411 (Dexco Polymers), about 16 percent VECTOR 4111, and about 4 percent ESCOREZ 5320 (from ExxonMobil). In this blend and the other formulations in the table, a trace amount of titanium dioxide coloring agent in an SIS was used to color the polymer. It should be noted that for Tables 4 and 5, the basis weight of the elastic component is off of the chill roll following extrusion, but before stretching.

Creep Test Performance Table 6

Code Number	% Creep
5	Approx. 45
6	Approx. 40
7	Approx. 14
8	Approx. 8

[00134] As can be seen in Table 6, while Sample 5 demonstrated only a few strands bonding well, the remaining samples demonstrated more uniform bonding of strands throughout. Additionally, a roll blocking test was performed on material 4

identified above. The material was placed in an oven at 130° F for 48 hours and allowed to condition at room temperature for 2 weeks. The sample was then unwound at 250 feet per minute with no blocking issues.

[00135] In still a further alternative embodiment of the invention, a single sided facing stretch bonded laminate may be produced using either of the previously described nonblocking agent or nontacky adhesive application methods with a film-based elastic component. For example, an elastomer resin composition may be processed into a film via known melt pump and film die technology. The film may either be cast or blown. The extruded film may be either a single layer film or part of a multi-layer film, which can include one or more skin layers (such as in an ABA structure) immediately adjacent a core layer. If multilayer films are to be produced, such additional layers may be produced by a lamination process or by coextrusion with the core layer. Such film would be stretched and then further attached through adhesive lamination using a nontacky adhesive to an additional sheet material, such as a nonwoven material (i.e. spunbond, meltblown, coform, airlaid, bonded carded web layers), scrims, foam, additional films or various combinations of each to form a film/sheet material laminate. The film may be sprayed with the nonblocking agent or adhesive on either or each side depending on the film formulation. The resulting film/sheet material laminate would then be allowed to retract. Such films may be apertured or slit and yet the use of a nonblocking agent or nontacky adhesive would prevent roll blocking of such film if it would need to be stored for later usage.

[00136] As is illustrated in Figure 9, which shows a cross-sectional view of an alternative stretch bonded laminate 190 in accordance with the invention, the laminate includes a perforated (perforations 196) film 195 that has been laminated via the non-tacky adhesive 198 to a nonwoven sheet material 200. Such a film material may be stored in roll form, without risk that the adhesive will cause roll blocking during the laminate storage.

[00137] It should be recognized that while each of the various cross sections of the previous figures illustrate a relatively flat facing layer material, such nonwoven facing layer materials are actually gathered between where they are bonded to the respective elastic layers (either the strands, film, or webs), but for stylistic purposes, such web is shown in a relatively flat configuration.

[00138] Such single sided facing stretch bonded laminate materials have particular effectiveness for use in personal care products to provide elastic attributes to such products. Such single sided facing materials can provide higher extensibility in either the MD or CD

direction than a laminate with facings applied to two opposing surfaces of an elastic layer, and can also provide a highly corrugated appearance and a softer feel.

[00139] Such material may be useful in providing elastic waist, leg cuff/gasketing, stretchable ear, side panel or stretchable outer cover applications. While not intending to be limiting, Figure 10 is presented to illustrate the various components of a personal care product, such as a diaper, that may take advantage of such elastic materials. Other examples of personal care products that may incorporate such materials are training pants (such as in side panel materials) and feminine care products. By way of illustration only, training pants suitable for use with the present invention and various materials and methods for constructing the training pants are disclosed in PCT Patent Application WO 00/37009 published June 29, 2000 by A. Fletcher et al; U.S. Patent 4,940,464 issued July 10, 1990 to Van Gompel et al.; U.S. Patent 5,766,389 issued June 16, 1998 to Brandon et al.; and U.S. Patent 6,645,190 issued November 11, 2003 to Olson et al., which are each incorporated herein by reference in its entirety.

[00140] With reference to Figure 10, the disposable diaper 250 generally defines a front waist section 255, a rear waist section 260, and an intermediate section 265 which interconnects the front and rear waist sections. The front and rear waist sections 255 and 260 include the general portions of the diaper which are constructed to extend substantially over the wearer's front and rear abdominal regions, respectively, during use. The intermediate section 265 of the diaper includes the general portion of the diaper that is constructed to extend through the wearer's crotch region between the legs. Thus, the intermediate section 265 is an area where repeated liquid surges typically occur in the diaper.

[00141] The diaper 250 includes, without limitation, an outer cover, or backsheet 270, a liquid permeable bodyside liner, or topsheet, 275 positioned in facing relation with the backsheet 270, and an absorbent core body, or liquid retention structure, 280, such as an absorbent pad, which is located between the backsheet 270 and the topsheet 275. The backsheet 270 defines a length, or longitudinal direction 286, and a width, or lateral direction 285 which, in the illustrated embodiment, coincide with the length and width of the diaper 250. The liquid retention structure 280 generally has a length and width that are less than the length and width of the backsheet 270, respectively. Thus, marginal portions of the diaper 250, such as marginal sections of the backsheet 270 may extend past the terminal edges of the liquid retention structure 280. In the illustrated embodiments, for

example, the backsheet 270 extends outwardly beyond the terminal marginal edges of the liquid retention structure 280 to form side margins and end margins of the diaper 250. The topsheet 275 is generally coextensive with the backsheet 270 but may optionally cover an area which is larger or smaller than the area of the backsheet 270, as desired.

[00142] To provide improved fit and to help reduce leakage of body exudates from the diaper 250, the diaper side margins and end margins may be elasticized with suitable elastic members, as further explained below. For example, as representatively illustrated in Figure 10, the diaper 250 may include leg elastics 290 which are constructed to operably tension the side margins of the diaper 250 to provide elasticized leg bands which can closely fit around the legs of the wearer to reduce leakage and provide improved comfort and appearance. Waist elastics 295 are employed to elasticize the end margins of the diaper 250 to provide elasticized waistbands. The waist elastics 295 are configured to provide a resilient, comfortably close fit around the waist of the wearer.

[00143] The single sided stretch bonded laminates of the inventive structure and methods are suitable for use as the leg elastics 290 and waist elastics 295. Exemplary of such materials are laminate sheets which either comprise or are adhered to the backsheet, such that elastic constrictive forces are imparted to the backsheet 270.

[00144] As is known, fastening means, such as hook and loop fasteners, may be employed to secure the diaper 250 on a wearer. Alternatively, other fastening means, such as buttons, pins, snaps, adhesive tape fasteners, cohesives, fabric-and-loop fasteners, or the like, may be employed. In the illustrated embodiment, the diaper 250 includes a pair of side panels 300 (or ears) to which the fasteners 302, indicated as the hook portion of a hook and loop fastener, are attached. Generally, the side panels 300 are attached to the side edges of the diaper in one of the waist sections 255, 260 and extend laterally outward therefrom. The side panels 300 may be elasticized or otherwise rendered elastomeric by use of a single sided stretch bonded laminate made from the inventive structure. Examples of absorbent articles that include elasticized side panels and selectively configured fastener tabs are described in PCT Patent Application No. WO 95/16425 to Roessler; U.S. Patent No. 5,399,219 to Roessler et al.; U.S. Patent No. 5,540,796 to Fries; and U.S. Patent No. 5,595,618 to Fries each of which is hereby incorporated by reference in its entirety.

[00145] The diaper 250 may also include a surge management layer 305, located between the topsheet 275 and the liquid retention structure 280, to rapidly accept fluid exudates and distribute the fluid exudates to the liquid retention structure 280 within the

diaper 250. The diaper 250 may further include a ventilation layer (not illustrated), also called a spacer, or spacer layer, located between the liquid retention structure 280 and the backsheet 270 to insulate the backsheet 270 from the liquid retention structure 280 to reduce the dampness of the garment at the exterior surface of a breathable outer cover, or backsheet, 270. Examples of suitable surge management layers 305 are described in U.S. Patent No. 5,486,166 to Bishop and U.S. Patent No. 5,490,846 to Ellis.

[00146] As representatively illustrated in Figure 10, the disposable diaper 250 may also include a pair of containment flaps 310 which are configured to provide a barrier to the lateral flow of body exudates. The containment flaps 310 may be located along the laterally opposed side edges of the diaper adjacent the side edges of the liquid retention structure 280. Each containment flap 310 typically defines an unattached edge which is configured to maintain an upright, perpendicular configuration in at least the intermediate section 265 of the diaper 250 to form a seal against the wearer's body. The containment flaps 310 may extend longitudinally along the entire length of the liquid retention structure 280 or may only extend partially along the length of the liquid retention structure. When the containment flaps 310 are shorter in length than the liquid retention structure 280, the containment flaps 310 can be selectively positioned anywhere along the side edges of the diaper 250 in the intermediate section 265. Such containment flaps 310 are generally well known to those skilled in the art. For example, suitable constructions and arrangements for containment flaps 310 are described in U.S. Patent No. 4,704,116 to K. Enloe.

[00147] The diaper 250 may be of various suitable shapes. For example, the diaper may have an overall rectangular shape, T-shape or an approximately hour-glass shape. In the shown embodiment, the diaper 250 has a generally I-shape. Other suitable components which may be incorporated on absorbent articles of the present invention may include waist flaps and the like which are generally known to those skilled in the art. Examples of diaper configurations suitable for use in connection with the instant invention which may include other components suitable for use on diapers are described in U.S. Patent No. 4,798,603 to Meyer et al.; U.S. Patent No. 5,176,668 to Bernardin; U.S. Patent No. 5,176,672 to Bruemmer et al.; U.S. Patent No. 5,192,606 to Proxmire et al. and U.S. Patent No. 5,509,915 to Hanson et al. each of which is hereby incorporated by reference in its entirety.

[00148] The various components of the diaper 250 are assembled together employing various types of suitable attachment means, such as adhesive bonding,

ultrasonic bonding, thermal point bonding or combinations thereof. In the shown embodiment, for example, the topsheet 275 and backsheet 270 may be assembled to each other and to the liquid retention structure 280 with lines of adhesive, such as a hot melt, pressure-sensitive adhesive. Similarly, other diaper components, such as the elastic members 290 and 295, fastening members 302, and surge layer 305 may be assembled into the article by employing the above-identified attachment mechanisms.

[00149] It should be appreciated that such single side facing stretch bonded laminate materials may likewise be used in other personal care products, protective outerwear, protective coverings and the like. Further such materials can be used in bandage materials for both human and animal bandaging products. Use of such materials provide acceptable elastic performance at a lower manufacturing cost.

[00150] These and other modifications and variations to the present invention may be practiced by those of ordinary skill in the art, without departing from the spirit and scope of the present invention, which is more particularly set forth in the appended claims. In addition, it should be understood that aspects of the various embodiments may be interchanged both in whole or in part. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to limit the invention so further described in such appended claims.

Test Method Procedures

Stretch-to-Stop Test

[00151] "Stretch-to-stop" refers to a ratio determined from the difference between the unextended dimension of a stretchable laminate and the maximum extended dimension of a stretchable laminate upon the application of a specified tensioning force and dividing that difference by the unextended dimension of the stretchable laminate.

[00152] If the stretch-to-stop is expressed in percent, this ratio is multiplied by 100. For example, a stretchable laminate having an unextended length of 5 inches (12.7 cm) and a maximum extended length of 10 inches (25.4 cm) upon applying a force of 750 grams has a stretch-to-stop (at 750 grams) of 100 percent. Similarly, a stretchable laminate having an unextended length of 5 inches (12.7 cm) and a maximum extended length of 10 inches (25.4 cm) upon applying a force of 2000 grams has a stretch-to-stop (at 2000 grams) of 100 percent.

[00153] Stretch-to-stop may also be referred to as "maximum non-destructive elongation." Unless specified otherwise, stretch-to-stop values are reported herein at a load

of either 750 grams or 2000 grams. Depending upon the material being tested, a greater applied force may be more appropriate. For example, for a single faced laminate the applied force of 750 grams per 3 inch cross-directional width is typically appropriate; however, for certain laminates, particularly higher basis weight laminates, an applied force between 750 and 2000 grams per 3 inch cross-directional width may be most appropriate.

[00154] In the elongation or stretch-to-stop test, a 3-inch by 7-inch (7.62 cm by 17.78 cm) sample, with the larger dimension being the machine direction, the cross direction, or any direction in between, is placed in the jaws of a Sintech machine using a gap of 5 cm between the jaws. The sample is then pulled to a stop load of 750 gms or 2000 grams with a crosshead speed of about 20 inches/minute (50.8 cm/minute). For the stretchable laminate material of this invention, it is desirable that it demonstrate a stretch to stop value between about 30-400 percent, alternatively between about 50 and 300 percent, still in a further alternative, between about 80-250 percent. The stretch to stop test is done in the direction of extensibility (stretch).

Creep Test Method:

[00155] Before referring to data demonstrating the effect heating has on an elastic strand creep-resistance value of a continuous filament based single sided stretch bonded laminate incorporating the heated filament strands, it is advantageous to discuss certain terms. For purposes of this application, "creep resistance" or "creep- resistance value" refers to the elastic-strand holding power of a particular system for attaching one or more elastic strands to at least one base material, such as a facing layer. For example, if an adhesive is applied in liquid form to a base material, and an elastic strand or strands are then pressed against the adhesive and base material to attach the strand or strands to the base material, then creep resistance is a measure of the quality of the adhesive bond between the strand or strands and the base material.

[00156] An explanation of a test for measuring creep provides additional detail regarding this concept. As discussed below, a plurality of elastic filament strands were bonded to a base material to form a single sided stretch bonded laminate. To conduct the test for measuring creep, the sample was first fully extended by hanging the sample vertically in front of an illuminated light box. The top of the sample was clamped to the light box and a 1000-gram weight was clamped to the bottom of the sample. In this fully extended form, a template was used to mark the substrate near the opposing ends to denote a 200 millimeter length.

[00157] The weight was then removed and the sample was placed horizontally on a piece of cardboard. The sample was allowed to retract so that the marks on the substrate composite were now 175 millimeters apart. The sample was then stapled to the cardboard, with the staples located outside the 175 mm length. When the elastic strands retract, they gather facing material so that the stretch bonded laminate itself has elastomeric qualities.

[00158] The elastic strands were then cut at the length of 175 mm. Because the strands were located on top of the facing material, the facing material was partially slit when the strands were cut. After the elastic filament strands were cut, they generally retracted. About 1-2 minutes after the strands were cut, the length of the retracted strands was measured. The difference between 175 mm and the initial retracted strand length, or I (initial), was used to calculate the "initial creep" of the sample. For the present application, initial creep is calculated using the following equation:

Initial Creep, in percent = [(175 mm - I (initial) mm) / 175 mm] X 100 [Eq. 1]

[00159] After initial creep of the sample was determined, the laminate, still stapled to the cardboard, was placed in a forced-air oven pre- heated to a temperature of 100° F. After 90 minutes, the laminate and cardboard were removed from the oven. The laminate was then allowed to cool for approximately 10 minutes. The length of the strands, which had retracted further, was measured.

[00160] The difference between 175 mm and the final retracted length, or Y (final) was used to calculate the "final creep" of the sample. For the present application, final creep is calculated using the following equation:

Final Creep, in percent = [(175 mm - Y (final) mm) / 175 mm] X 100 [Eq- 2]

[00161] Creep resistance, or the creep-resistance value, for purposes of the present application, is calculated as follows:

Creep Resistance, in percent = 100 - Final Creep [Eq- 3]

[00162] For disposable absorbent articles that are worn near the body of the wearer, final creep provides a measure of performance of the article during use, since the human body temperature is about 98° F. Hypothetical situations provide more detail on the meaning of this measurement. Assume that a laminate is made in which three elastic strands are bonded to a base/facing material. Also assume that the laminate is made by attaching the strands to a base/facing material using an adhesive while the strands are in elongated form, typically at an elongation from about 200% to about 300% (see Examples below and U.S. Patent No. 5,964,973, entitled "Method and Apparatus for Making an

Elastomeric Laminate Web," which is hereby incorporated by reference in a manner consistent with the present specification, for more detail on how a laminate incorporating elastic strands is made). If, after aging at 100° F for 90 minutes, the elastic strands detach from the adhesive and base (facing) material along most of the length of each strand, and the strands retract, then final creep will be relatively high and creep resistance will be relatively low. Performance of the laminate as an elastomeric laminate will likely be poor because the detached strands, now retracted and embodying less tension, are less likely to gather the base facing material or materials in a relatively uniform fashion along the length of the laminate, if at all.

Roll-Blocking Test Method (for inter-layer peel strength of laminate layers off of a roll)

[00163] An approximately 50 inch outer diameter roll of single sided stretch bonded laminate was cut along the cross or transverse direction from the top of a roll to the core with a utility knife. Three sections of material from the top, the core and a midpoint of the radius were used as samples. Each sample was approximately 18 inches by 24 inches and contained approximately 30 undisturbed layers of laminate. From each of these samples, eight 3 inch wide by 7 inch long specimens were cut, with the 7 inch being in the machine direction. Each specimen contained 2 layers of laminate (with each laminate including an elastic layer and a single facing layer). The upper layer of one end of the specimen (a full laminate of an elastic layer and facing) was loaded into the upper jaw of a tensile testing unit (Sintech) while the lower layer of the specimen (a full laminate of an elastic layer and facing) from the same end of the specimen as used for the upper layer, was loaded into the lower jaw of the Sintech unit. Using the method described generally below, the Sintech tensile tester (manufactured by MTS Systems Corp., model Synergie 200) was used to measure the average force along the MD length of the material required to separate the two layers, at a 180 degree angle and at a strain rate of 300 mm/min. All specimens were tested in the machine direction. For the samples tested, the polymer used for the filaments in the roll (of continuous filaments) was KRATON G2755, as described above. The basis weight ratio of strands to meltblown in the elastic layer was about 90:10. Eight specimens were used and the average value of these was taken as the accepted peel value.

[00164] Essentially the test measures the force required to separate two complete layers of single sided stretch bonded laminate material from each other (simulating unwinding of laminate from a supply roll). It is considered that such force would be representative of the force necessary to pull a layer of a rolled material off of the roll.

Results are expressed in units of grams of force, with higher numbers representing a tackier fabric, which adheres to itself on a roll. For the materials of the present invention, in one embodiment, the material demonstrates a peel strength of less than 200 g. For an alternative embodiment, the material demonstrates a peel strength of less than 100 g. In still a further alternative embodiment, the material demonstrates a peel strength of less than 50 g.

[00165] In conducting the test, the individual plies of the laminate fabric (that is one single sided laminate and another) are manually separated for a distance of approximately 2-3 inches to give at least 4 inches of working direction, or separation length. One ply of the sample specimen from the same end of the specimen is clamped into each jaw of the tensile tester and the specimen is then subjected to a constant rate of extension. The edges of the sample are desirably clean cut and parallel. Desirably Sintech TestWorks software can be utilized to acquire data for the system. The grips include 1 inch by 4 inch jaw faces, where the 4 inch dimension is the width of the jaw. The tests are conducted at standard laboratory atmosphere- ambient conditions. The sample of the test should measure from about 3-4 inches in the CD and at least 6 inches in the MD. An appropriate load cell should be chosen such that the peak load value will fall between 10 and 90 percent of the full scale load, 25 lbs or less. Desirably a 5 lb load cell is used. Desirably, where possible, the measurement should be started at about 16 mm and ended up to about 170 mm of elongation. The gage length should be set at about 2 inches (distance between jaws).

WHAT IS CLAIMED IS:

1. An elastic laminate capable of being rolled for storage and unwound from said roll when needed for use, said elastic laminate comprising:

an elastic layer selected from the group consisting of an array of continuous filament strands, an array of continuous filament strands with meltblown deposited on said continuous filament strands, an array of continuous filament strands with an elastic melblown layer deposited on said continuous filament strands, and a film; and

a facing layer bonded to only one side of said elastic layer.

2. The elastic laminate of claim 1, wherein as the elastic laminate is rolled upon itself, it does not roll block, and therefore can be unwound for future use.

3. The elastic laminate of claim 1 or 2, wherein the laminate has an inter-layer peel strength of less than about 70 grams per 3 inches cross-directional width at a strain rate of 300 mm/min.

4. The elastic laminate of any one of the preceding claims, wherein the continuous filament strands comprise an elastic polyolefin-based polymer having a degree of crystallinity between about 3% and about 40%.

5. The elastic laminate of any one of the preceding claims, wherein the facing layer comprises an elastic polyolefin-based polymer having a degree of crystallinity between about 3% and about 40%.

6. The elastic laminate of claim 5, comprising an elastic or semi-elastic film layer having a basis weight of about 50 gsm or less.

7. The elastic laminate of claim 6, wherein the film layer comprises an elastic polyolefin-based polymer having a degree of crystallinity from about 3% to about 40%.

8. The elastic laminate of claim 6 or 7, further comprising an array of continuous filament strands positioned on the film layer.

9. The elastic laminate of any one of claims 6 to 8, further comprising a second extensible facing layer positioned on a surface of the film opposite the extensible facing layer.

10. The elastic laminate of any one of the preceding claims, wherein the elastic meltblown layer comprises an elastic polyolefin-based meltblown polymer having a degree of crystallinity from about 3% to about 40%.

11. The elastic laminate of any one of the preceding claims, wherein the elastic polyolefin-based meltblown polymer comprises at least one of the group consisting of polyethylene, polypropylene, butene, or octene homo- or copolymers, ethylene methacrylate, ethylene vinyl acetate, and butyl acrylate copolymers.

12. The elastic laminate of any one of the preceding claims, wherein the elastic meltblown layer comprises at least two layers, with a first layer comprising an elastic polyolefin-based meltblown polymer having a degree of crystallinity between about 3% and about 40% and a second layer comprising a styrenic block copolymer-based meltblown polymer.

13. The elastic laminate of any one of the preceding claims, further comprising either an adhesive that demonstrates a relatively short open time deposited between said elastic layer and facing layer, or an adhesive that demonstrates a relatively short open time deposited between the array of continuous filament strands and the elastic meltblown layer, or an adhesive that becomes nontacky upon solidification, said adhesive deposited between said elastic layer and facing layer, or such adhesive with a post bonding adhesive or nonblocking agent, or a nonblocking agent layer deposited on said elastic layer on a side opposite to said facing layer.

14. The elastic laminate of any one of the preceding claims, wherein said elastic laminate includes a meltblown nonblocking agent deposited on said elastic layer on a side opposite to said facing layer.

15. The elastic laminate of claim 13 or 14, wherein said meltblown nonblocking agent is selected from the group consisting of polyolefins and elastomeric polymers without tackifiers.

16. The elastic laminate of any one of the preceding claims, wherein said facing layer is selected from the group consisting of nonwoven webs, necked nonwoven webs, nonwoven web laminates, foams, scrims, netting and films, and combinations thereof.

17. A method for forming a single side facing stretch bonded laminate comprising:

providing an elastic layer having two sides;

applying a meltblown nonblocking agent to one side of said elastic layer;

stretching said elastic layer;

bonding a facing layer only to said stretched elastic layer on a side opposite to said meltblown nonblocking agent while said stretched elastic layer is in a stretched condition to form a stretch bonded laminate;

allowing such stretched bonded laminate to retract.

18. The method of claim 17, wherein said elastic layer is either an array of continuous filament strands or an array of continuous filament strands with meltblown deposited thereon.

19. A method for forming a single side facing stretch bonded laminate comprising:

providing an elastic layer having two sides;

stretching said elastic layer;

bonding a single facing layer to only one side of said stretched elastic layer while said stretched elastic layer is in a stretched condition, to form a stretch bonded laminate by using an adhesive with a relatively short open time, and that is not tacky following curing; and

allowing such stretched bonded laminate to retract.

20. The method of claim 19, wherein said adhesive is applied to bond said elastic layer to said single facing layer both prior to contacting said elastic layer with said facing layer and following contacting said elastic layer with said facing layer.

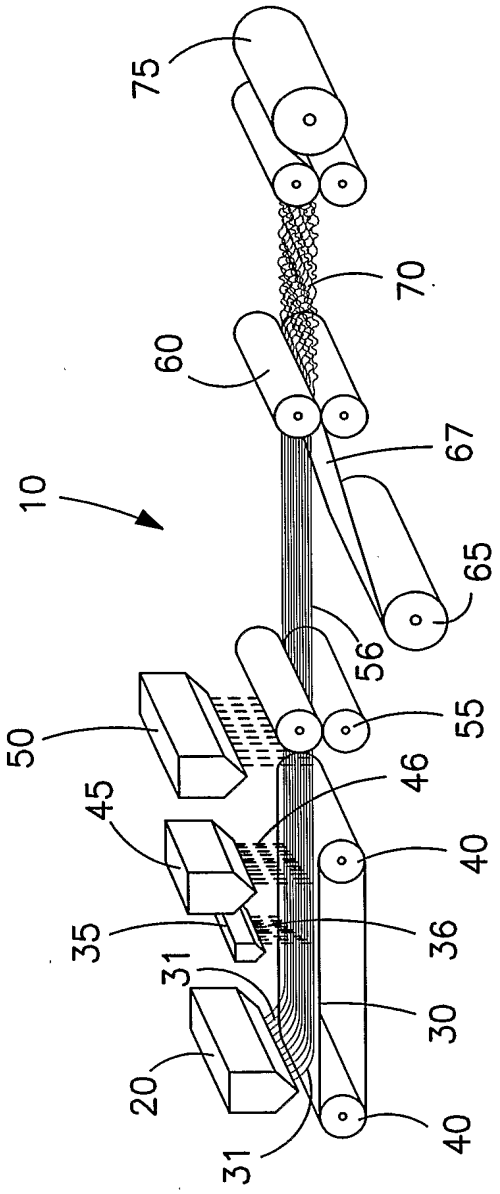

FIG. 1A

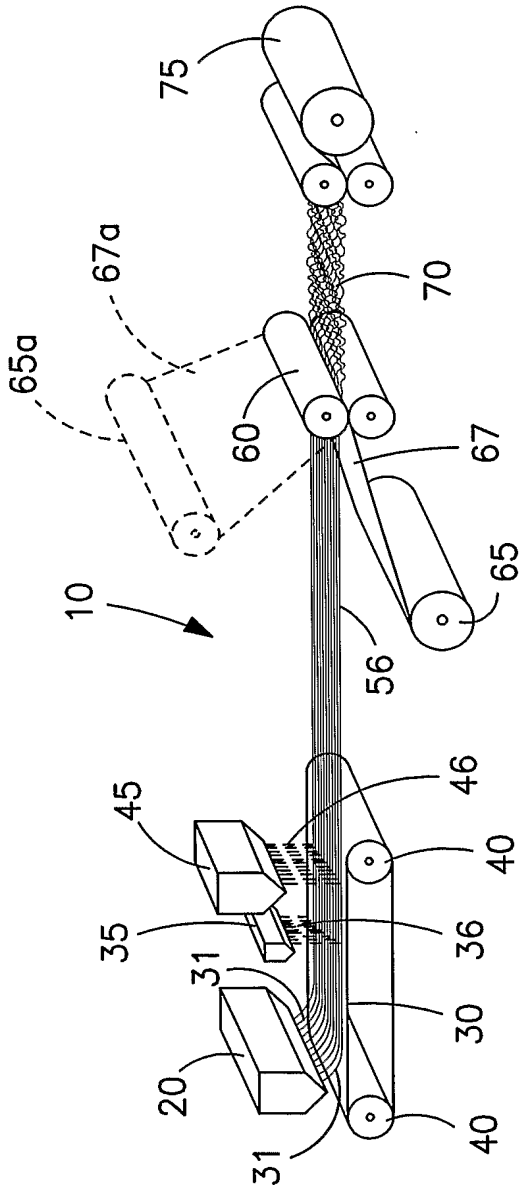

FIG. 1B

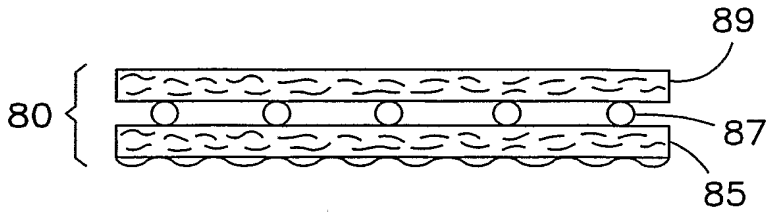

FIG. 2

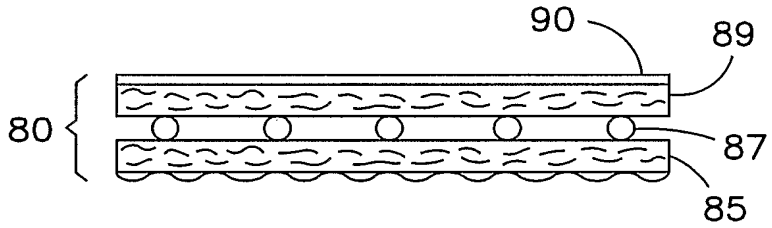

FIG. 3

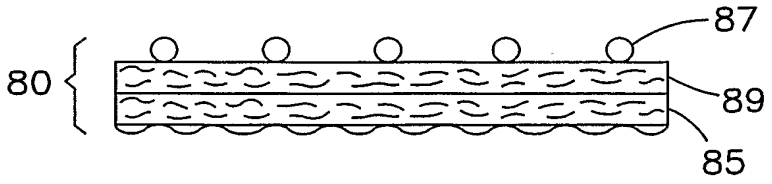

FIG. 4

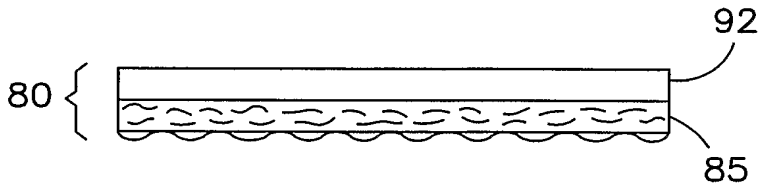

FIG. 5

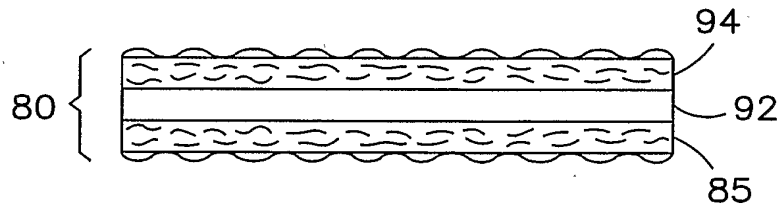

FIG. 6

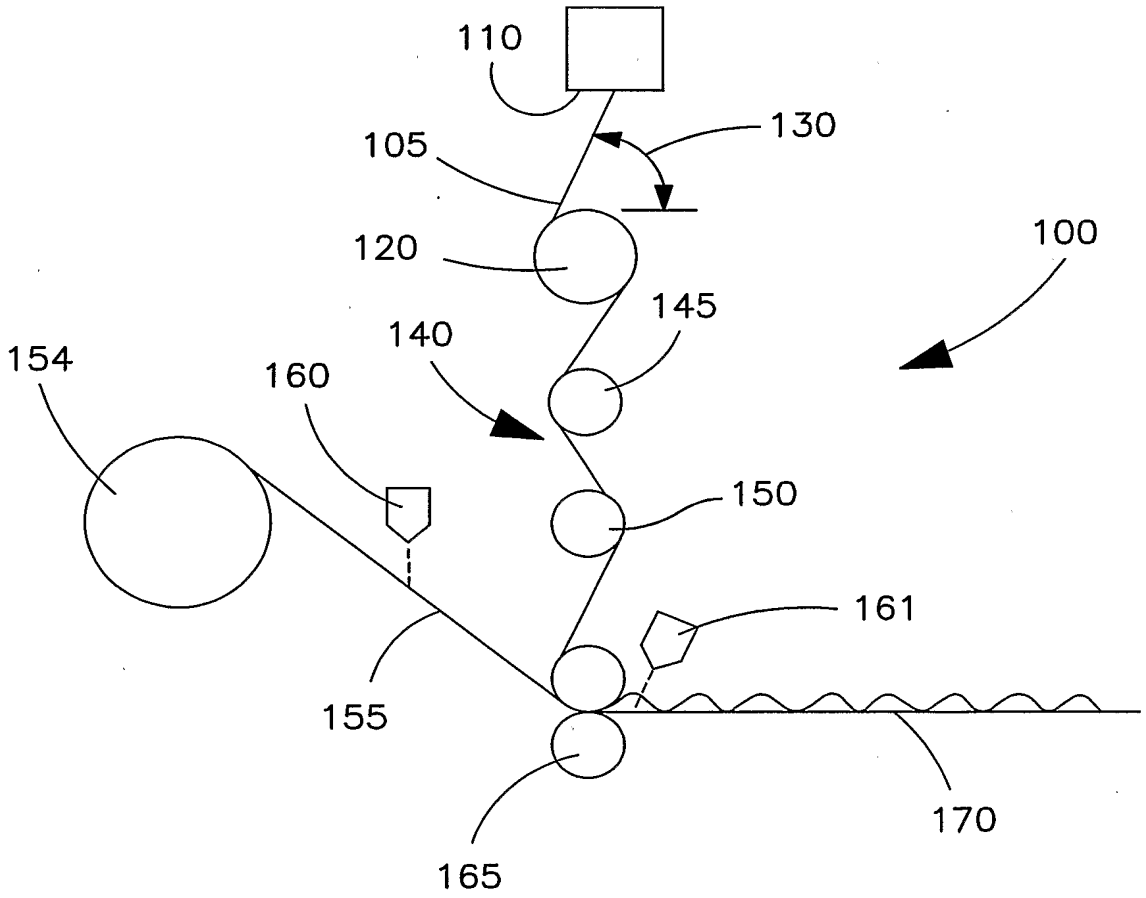

FIG. 7A

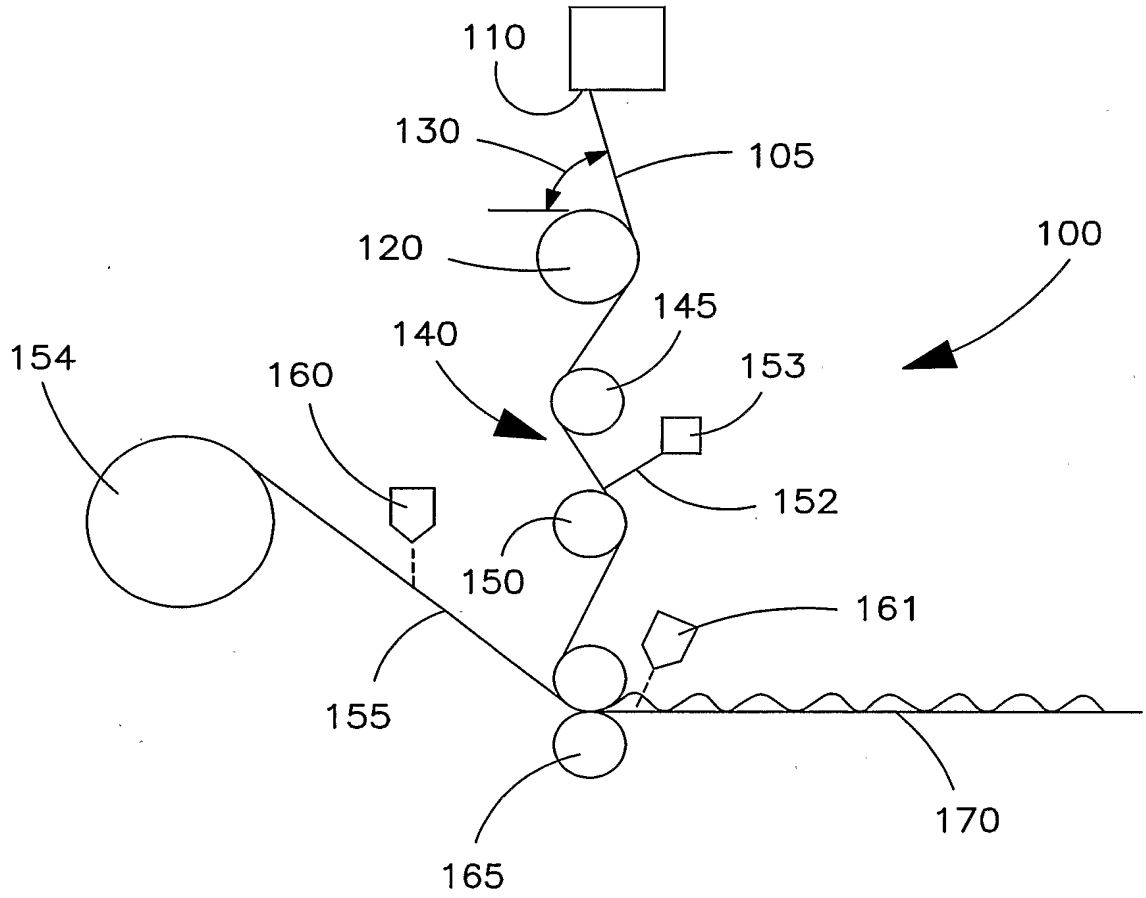

FIG. 7B

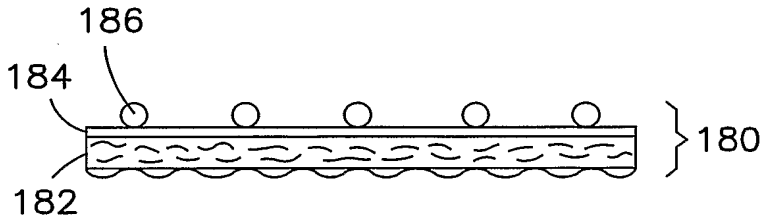

FIG. 8

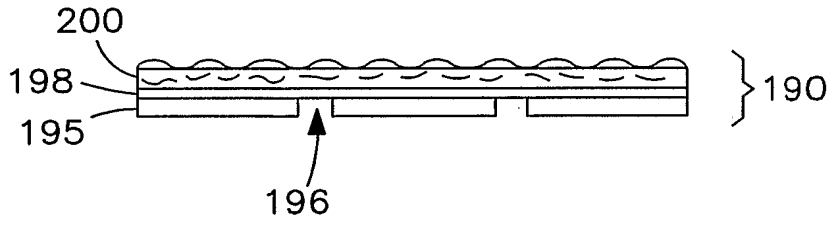

FIG. 9

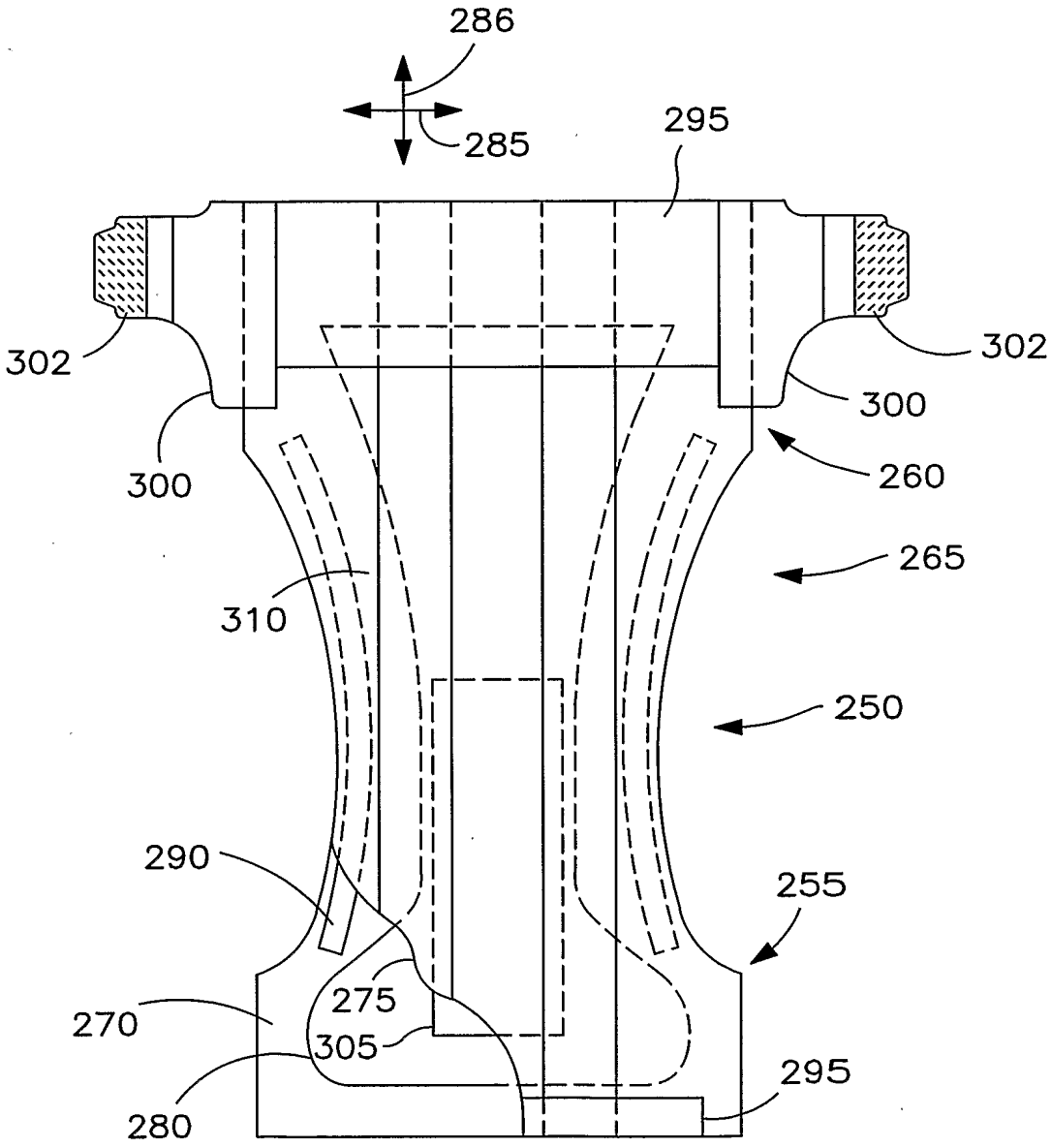
286
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FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No
[redacted]T/US2004/043380

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B32B5/10 B32B5/04 B32B5/22 B32B7/12 B32B25/04
B32B27/32 B32B31/00 A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B32B A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 001 460 A (MORMAN ET AL) 14 December 1999 (1999-12-14) column 5, line 27 - column 10, line 56; claim 27	1-3,9,16
X	US 2003/096896 A1 (WANG BAOYU ET AL) 22 May 2003 (2003-05-22) paragraphs '0026!, '0027!; examples 1-9	1,13,16, 19
X	WO 02/34512 A (KIMBERLY-CLARK WORLDWIDE, INC) 2 May 2002 (2002-05-02) claims 1,8-17,19,25-28	1
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-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 April 2005	04/05/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Lindner, T

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/043380

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 200 246 A (SABEE ET AL) 6 April 1993 (1993-04-06) column 7, lines 46-62; claims; figure 4	1,17,19
A	EP 0 548 609 A (KIMBERLY-CLARK CORPORATION; KIMBERLY-CLARK WORLDWIDE, INC) 30 June 1993 (1993-06-30) cited in the application page 7, line 30 - page 10, line 13; figure 2 claims; figure 4	1,17,19
A	US 4 910 064 A (SABEE ET AL) 20 March 1990 (1990-03-20) claims 1-131	1,17,19
A	US 6 649 548 B1 (SHAWVER SUSAN ELAINE ET AL) 18 November 2003 (2003-11-18) column 4, lines 8-28	1

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International Application No
T/US2004/043380

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	~~1794~~ 1791
Examiner Name	~~Not Yet Assigned~~
Docket Number	10589 Saeed M. Huda

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-3,954,361	05-04-1976	Page	
	2	US-4,118,531	10-03-1978	Hauser	
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EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	5	EP 0 156 649 A2	10-02-1985	Minnesota Mining & Manufacturing Co.		
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	9	WO 2005/106085 A1	11-10-2005	Biax Fiberfilm Corp.		
EXAMINER	/Saeed Huda/		DATE CONSIDERED	05/04/2009		

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	10	International Search Report, Mailed January 22, 2009	
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SHEET 1 of 2

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	~~1794~~ 1791
Examiner Name	~~Not Yet Assigned~~ Saeed M. Huda
Docket Number	10859

U. S. PATENT DOCUMENTS

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	1	US-4,100,324	07/11/1978	Anderson, et al.	
	2	US-4,604,313	08/05/1986	McFarland, et al.	
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	5	US-4,720,415	01/19/1988	Vander Wielen, et al.	
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COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	~~1794~~
Examiner Name	~~Not Yet Assigned~~
Docket Number	10859

U. S. PATENT DOCUMENTS

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	41	US-6,992028 B2	01/31/2006	Thomaschefsky, et al.	
	42	US-2003/0073367 A1	04/17/2003	Kopacz, et al.	
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	1	WO 2007/070064 A1	06/21/2007	Kimberly Clark Co		
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	4	WO 2007/098449 A1	08/30/2007	Fiber Web Simpsonville Inc		
	5	WO 2007/124866 A1	11/08/2007	Fiberweb Corovin GMBH	English Abstract	

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EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	817	264/13.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/05/01 11:29
L2	194	523/222.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2009/05/01 11:29
L3	48	("20030073367" | "20030131457" | "20030150090" | "20050148264" | "20050159065" | "4100324" | "4118531" | "4604313" | "4634621" | "4636418" | "4720415" | "4724114" | "4786550" | "4803117" | "4855179" | "4863779" | "4879170" | "4906513" | "4931355" | "4939016" | "4970104" | "5145727" | "5149576" | "5227107" | "5284703" | "5350624" | "5409768" | "5508102" | "5652048" | "5811178" | "5948710" | "5952251" | "6103061" | "6200120" | "6296936" | "6319342" | "6417120" | "6465073" | "6494974" | "6506873" | "6686303" | "6739023" | "6759356" | "6797226" | "6811638" | "6823568" | "6836937" | "6992028").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2009/05/01 11:30
S1	1	("20090023839").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:14
S2	1	("4118531").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:15
S3	1	("4773903").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:17
S4	0	("2005067732").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:17
S5	1	("20050067732").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:17
S6	2	(("6506873") or ("6177193")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 13:20

S7	0	EP-0333209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:41
S8	0	EP-00333209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:41
S9	0	EP-033300209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:41
S10	0	EP-03330209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S11	0	EP-003330209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S12	0	EP-000333209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S13	0	EP-033300209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:42
S14	0	EP-00033300209-$.did.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/04/30 13:43
S15	2	(("4879170") or ("4939016")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2009/04/30 14:12

S16	2	S15 and (mold or die)	US-PGPUB; USPAT; USOCR	OR	ON	2009/04/30 14:30
S17	2	S6 and (mold or die)	US-PGPUB; USPAT; USOCR	OR	ON	2009/04/30 14:39

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	~~1794~~ 1791
Examiner Name	~~Not Yet Assigned~~
Docket Number	10859 Saeed M. Huda

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-2,175,045	10-03-1939	Vogel	
	2	US-6,172,276 B1	01-09-2001	Hetzler, et al.	
	3	US-6,348,133 B1	02-19-2002	Woodrum	
	4	US-6,608,236 B1	08-19-2003	Burns, et al.	
	5	US-2003/220039 A1	11-27-2003	Chen, et al.	
	6	US-2004/0181199 A1	09-16-2004	Moberg-Alehammar, et al	
	7	US-2007/063091 A1	03-22-2007	Neveu	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	FOREIGN PATENT DOCUMENT Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	8	DE 199 59 832 A1	07-12-2001	Hakle-Kimberly Deutschland GmbH	English Abstract	
	9	WO 00/11998 A1	03-09-2000	Kimberly Clark, Ltd.		
	10	WO 00/63486 A1	10-26-2000	Kimberly Clark Co.		
	11	WO 01/09023 A1	02-08-2001	Procter & Gamble		
	12	WO 03/050347 A1	06-19-2003	Suominen Nonwovens, Ltd.		
	13	WO 2006/027810 A1	03-16-2006	Perini Fabio S.p.A		
	14	WO 2007/100936 A2	09-07-2007	Clorox Co.		
	15	WO 2007/135624 A2	11-29-2007	Procter & Gamble		
	16	WO 2009/010941 A2	01-22-2009	The Procter & Gamble Co.		
EXAMINER	/Saeed Huda/			DATE CONSIDERED	05/04/2009	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 05/08 (PTO updated 05/08)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.H./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	1794
Examiner Name	Not Yet Assigned
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-2,175,045	10-03-1939	Vogel	
	2	US-6,172,276 B1	01-09-2001	Hetzler, et al.	
	3	US-6,348,133 B1	02-19-2002	Woodrum	
	4	US-6,608,236 B1	08-19-2003	Burns, et al.	
	5	US-2003/220039 A1	11-27-2003	Chen, et al.	
	6	US-2004/0181199 A1	09-16-2004	Moberg-Alehammar, et al	
	7	US-2007/063091 A1	03-22-2007	Neveu	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	FOREIGN PATENT DOCUMENT Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	8	DE 199 59 832 A1	07-12-2001	Hakle-Kimberly Deutschland GmbH	English Abstract	
	9	WO 00/11998 A1	03-09-2000	Kimberly Clark, Ltd.		
	10	WO 00/63486 A1	10-26-2000	Kimberly Clark Co.		
	11	WO 01/09023 A1	02-08-2001	Procter & Gamble		
	12	WO 03/050347 A1	06-19-2003	Suominen Nonwovens, Ltd.		
	13	WO 2006/027810 A1	03-16-2006	Perini Fabio S.p.A		
	14	WO 2007/100936 A2	09-07-2007	Clorox Co.		
	15	WO 2007/135624 A2	11-29-2007	Procter & Gamble		
	16	WO 2009/010941 A2	01-22-2009	The Procter & Gamble Co.		
EXAMINER				DATE CONSIDERED		

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 05/08 (PTO updated 05/08)

Electronic Acknowledgement Receipt

EFS ID:	5234055
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	28-APR-2009
Filing Date:	10-JUL-2008
Time Stamp:	15:07:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS_Supp_2.pdf	97407 cf88951c7a0b8eac015352c7e55b3428af0ed51b	yes	3

	Multipart Description/PDF files in .zip description					
	Document Description		Start		End	
	Transmittal Letter		1		2	
	Information Disclosure Statement (IDS) Filed (SB/08)		3		3	
Warnings:						
Information:						
2	Foreign Reference	DE19959832A1_Eng_Abstract.pdf	65071 90605f0bb1df8d6e2c5e8af3ef2a464b56445b82	no	2	
Warnings:						
Information:						
3	Foreign Reference	WO00011998A1.pdf	748059 ecc62cf6ff52a1950e781069a36aa85f71e6aa63	no	21	
Warnings:						
Information:						
4	Foreign Reference	WO00063486A1.pdf	1979055 9e9f3c0ad2b8784edfefb6879bcabfcb58850f46	no	50	
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Information:						
5	Foreign Reference	WO00109023A1.pdf	899649 813a4f1a4d2c420951b2d4593cf3ff7b2f81771f	no	21	
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6	Foreign Reference	WO03050347A1.pdf	1128294 a47ea58c3a533a603ef85a0666aea0ba23eeea8b	no	26	
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Information:						
7	Foreign Reference	WO06027810A1.pdf	1422852 b841b6ae88143aae72d430cee3f1ab398824a089	no	29	
Warnings:						
Information:						
8	Foreign Reference	WO27100936A2.pdf	1767416 436837575ee646e72a817e3de2d77e74e78b17d6	no	38	
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Information:						

9	Foreign Reference	WO27135624A2.pdf	1834088 3248b037ca5bf74f6bb23e929da569fb31dfe16c	no	37
Warnings:					
Information:					
10	Foreign Reference	WO29010941A2.pdf	2514323 1b26185e07837cc89bbad9cbd5edf5c828392c18	no	42
Warnings:					
Information:					
			Total Files Size (in bytes):	12456214	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1794
Examiner	:	Not Yet Assigned
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, it is respectfully requested that the document(s) cited in this submission be carefully considered by the Examiner and made of record in this case. As provided in §1.97(g), no representation is made or intended that a thorough art search was made. As provided in 37 C.F.R. §1.97(h), this Information Disclosure Statement does not constitute an admission of any kind, and specifically is not an admission that the document(s) cited in this submission is (are), or is (are) considered to be, material to the patentability of the above-identified patent application, as defined in 37 C.F.R. §1.56(b).

This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(b)(3). An Office Action on the merits in the present application has not yet been received. Therefore, no fee is believed to be due. However, in the event that this paper is crossing in the mail with a first Office Action on the merits, authorization is hereby given to charge the required fee pursuant to 37 C.F.R. §1.97(c) and 37 C.F.R. §1.17(p) to Deposit Account No. 16-2480 in the name of The Procter & Gamble Company.

Additional Items to be Noted by the Examiner

In accordance with 37 C.F.R. §1.98(a)(2), a foreign patent document and/or non-patent literature is provided.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

By /C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: April 28, 2009
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1794
Examiner	:	Not Yet Assigned
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

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Additional Items to be Noted by the Examiner

In accordance with 37 C.F.R. §1.98(a)(2), a foreign patent document and/or non-patent literature is provided.

The International Search Report from the PCT/EPO is listed herein and a copy is provided.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

/C. Brant Cook/
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: March 26, 2009
Customer No. 27752
(IDS Letter.doc)
(Revised 08/11/08)

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 1

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	1794
Examiner Name	Not Yet Assigned
Docket Number	10589

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-3,954,361	05-04-1976	Page	
	2	US-4,118,531	10-03-1978	Hauser	
	3	US-5,476,616	12-19-1995	Schwarz	
	4	US-2005/0056956 A1	03-17-2005	Zhao, et al.	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	5	EP 0 156 649 A2	10-02-1985	Minnesota Mining & Manufacturing Co.		
	6	EP 0 294 137 A1	12-07-1988	The Procter & Gamble Co.; Minnesota Mining & Manufacturing Co.		
	7	GB 2,113,731 A	08-10-1983	Kimberly Clark, Ltd.		
	8	WO 03/080905 A1	10-02-2003	Nano Technics Co., Ltd.		
	9	WO 2005/106085 A1	11-10-2005	Biax Fiberfilm Corp.		
EXAMINER			DATE CONSIDERED			

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

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SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

NON PATENT LITERATURE DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	Provide relevant information to identify the Non-Patent Literature being submitted (e.g., name of the author (in CAPITAL LETTERS), title of the article, title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published, related application serial number, filing date and brief description of the papers being submitted).	T[2]
	10	International Search Report, Mailed January 22, 2009	
EXAMINER		DATE CONSIDERED	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached.

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IDS List of References.doc
Rev. 2/1909

PATENT COOPERATION TREATY

CENTRAL DOCKETING
DATE RECD
FEB 02 2009
ATTYASST CONTACT
FAX ... TITLE

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To: JCC ✓

THE PROCTER & GAMBLE COMPANY
Attn. Hughett, Eileen L.
Sycamore Building, 4th Floor
299 East Sixth Street
Cincinnati, OH 45202
ETATS-UNIS D'AMERIQUE

CBC. IB & SCAN

Date of mailing *(day/month/year)*	22/01/2009
Applicant's or agent's file reference: 10859/JC	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No.: PCT/IB2008/052889	International filing date *(day/month/year)*: 17/07/2008
Applicant: THE PROCTER & GAMBLE COMPANY	

1. [X] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Paul Faux

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims,description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1–10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43*bis*.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
10859/JC		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/IB2008/052889	17/07/2008	17/07/2007
Applicant		
THE PROCTER & GAMBLE COMPANY		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 10

[X] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[ ] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2008/052889

A. CLASSIFICATION OF SUBJECT MATTER
INV. D04H1/56 D01D4/02 D01D5/098

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D04H D01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 156 649 A (MINNESOTA MINING & MFG [US]) 2 October 1985 (1985-10-02) page 4, line 34 - page 6, line 30; figure 1	1-14
Y	US 4 118 531 A (HAUSER EDWARD R) 3 October 1978 (1978-10-03) column 4, line 8 - line 60; figure 1	1-14
Y	EP 0 294 137 A (PROCTER & GAMBLE [US]; MINNESOTA MINING & MFG [US]) 7 December 1988 (1988-12-07) page 9, line 6 - line 46; figure 1	1-14
Y	GB 2 113 731 A (KIMBERLY CLARK LTD) 10 August 1983 (1983-08-10) claim 15	1-14

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 January 2009	22/01/2009

Name and mailing address of the ISA/
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer
Elsässer Ralf

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2008/052889

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 100 324 A (ANDERSON RICHARD A ET AL) 11 July 1978 (1978-07-11) claim 1	1-14
Y	US 5 476 616 A (SCHWARZ ECKHARD C A [US]) 19 December 1995 (1995-12-19) column 2, line 46; claim 1 column 1, line 31 - line 38	1-14
A	US 3 954 361 A (PAGE ROBERT EDWARD) 4 May 1976 (1976-05-04) column 2, line 54 - line 58; figures 1,2	1-14
A	WO 03/080905 A (NANO TECHNICS CO LTD [KR]; KIM YONG MIN [KR]; SUNG YOUNG BIN [KR]; JAN) 2 October 2003 (2003-10-02) figure 2b	1-14
Y	US 2005/056956 A1 (ZHAO RONGGUO [US] ET AL) 17 March 2005 (2005-03-17) claim 1	6
A	WO 2005/106085 A (BIAX FIBERFILM CORP [US]; ZHAO RONGGUO [US]) 10 November 2005 (2005-11-10) claim 1	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2008/052889

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP 0156649 A	02-10-1985	AU	576829 B2	08-09-1988
		AU	3965085 A	03-10-1985
		BR	8501372 A	26-11-1985
		CA	1267271 A1	03-04-1990
		DE	3580930 D1	31-01-1991
		ES	285302 U	16-09-1985
		GR	850722 A1	02-05-1985
		JP	7047040 B	24-05-1995
		JP	60231802 A	18-11-1985
		MX	162635 A	07-06-1991
		NO	851027 A	30-09-1985
		ZA	8501661 A	29-10-1986
US 4118531 A	03-10-1978	AU	2745777 A	20-07-1978
		CA	1073648 A1	18-03-1980
		DE	2735063 A1	09-02-1978
		FR	2360701 A1	03-03-1978
		GB	1579568 A	19-11-1980
		HK	42281 A	28-08-1981
		JP	1370388 C	25-03-1987
		JP	53041577 A	15-04-1978
		JP	61030065 B	10-07-1986
		KR	810001760 B1	11-11-1981
		SE	7708710 A	03-02-1978
EP 0294137 A	07-12-1988	CA	1303832 C	23-06-1992
		DE	3875524 D1	03-12-1992
		DE	3875524 T2	25-03-1993
		ES	2035288 T3	16-04-1993
		GR	3006328 T3	21-06-1993
		JP	1064654 A	10-03-1989
		JP	2781179 B2	30-07-1998
		US	4773903 A	27-09-1988
GB 2113731 A	10-08-1983	AU	552214 B2	22-05-1986
		AU	1016383 A	17-06-1983
		BR	8207988 A	04-10-1983
		CA	1339486 C	07-10-1997
		DE	3278881 D1	15-09-1988
		DE	3280094 D1	08-03-1990
		EP	0080382 A2	01-06-1983
		EP	0156160 A2	02-10-1985
		WO	8301965 A1	09-06-1983
		IE	53966 B1	26-04-1989
		JP	58502005 T	24-11-1983
		MX	158206 A	16-01-1989
		PH	24253 A	04-05-1990
		ZA	8208635 A	26-10-1983
US 4100324 A	11-07-1978	AU	508579 B2	27-03-1980
		AU	2927177 A	05-04-1979
US 5476616 A	19-12-1995	NONE		
US 3954361 A	04-05-1976	NONE		
WO 03080905 A	02-10-2003	AU	2002354313 A1	08-10-2003
		CN	1511200 A	07-07-2004

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2008/052889

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 03080905 A		EP 1495170 A1	12-01-2005
		JP 4047286 B2	13-02-2008
		JP 2005520068 T	07-07-2005
		KR 20030077384 A	01-10-2003
		US 2005067732 A1	31-03-2005
US 2005056956 A1	17-03-2005	NONE	
WO 2005106085 A	10-11-2005	NONE	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IB2008/052889	17.07.2008	17.07.2007

International Patent Classification (IPC) or both national classification and IPC
INV. D04H1/56 D01D4/02 D01D5/098

Applicant
THE PROCTER & GAMBLE COMPANY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Date of completion of this opinion

see form PCT/ISA/210

Authorized Officer

Elsässer, Ralf

Telephone No. +49 89 2399-2581

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-14
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: EP-A-0 156 649 (MINNESOTA MINING & MFG [US]) 2 October 1985 (1985-10-02)
D2: US-A-4 118 531 (HAUSER EDWARD R) 3 October 1978 (1978-10-03)
D3: EP-A-0 294 137 (PROCTER & GAMBLE [US]; MINNESOTA MINING & MFG [US]) 7 December 1988 (1988-12-07)
D4: GB-A-2 113 731 (KIMBERLY CLARK LTD) 10 August 1983 (1983-08-10)
D5: US-A-4 100 324 (ANDERSON RICHARD A ET AL) 11 July 1978 (1978-07-11)
D6: US-A-5 476 616 (SCHWARZ ECKHARD C A [US]) 19 December 1995 (1995-12-19)
D7: US-A-3 954 361 (PAGE ROBERT EDWARD) 4 May 1976 (1976-05-04)
D8: WO 03/080905 A (NANO TECHNICS CO LTD [KR]; KIM YONG MIN [KR]; SUNG YOUNG BIN [KR]; JAN) 2 October 2003 (2003-10-02)
D9: US 2005/056956 A1 (ZHAO RONGGUO [US] ET AL) 17 March 2005 (2005-03-17)
D10: WO 2005/106085 A (BIAX FIBERFILM CORP [US]; ZHAO RONGGUO [US]) 10 November 2005 (2005-11-10)

1. Clarity (Article 6 PCT)

1.1 The relative term "substantially parallel" used in claim 1 has no well-recognised meaning and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

Further unclarity regarding this term is generated by the explanation given in the description (p.17), namely that the arrangement that - according to claim 1 - has to be "parallel or substantially parallel" can be set at any angle in between 0° and "less than 30°". As an arrangement forming an angle of e.g. 29° can hardly be considered to be

"substantially parallel", the meaning of the term is unclear.

1.2 Claim 1 is not supported by the description as required by Article 6 PCT, as its scope is broader than justified by the description and drawings. The reasons therefor are the following:
Claim 1 is directed to a process of making a fibrous structure comprising the step d) "combining filaments with **solid additives**".
In the paragraph "Fibrous Structure" (description; page 8-9) it is stated that "the fibrous structures of the invention exhibit a pore volume distribution unlike pore volume distributions of other known fibrous structures". It is further stated that a "fibrous structure according to the present invention exhibiting a bi-modal pore volume distribution... ... provides beneficial absorbent capacity and absorbent rate."
However, the only example given in the description is a co-formed fibrous structure consisting of melt-blown PP-fibres and **wood pulp**.
This only example is not sufficient to support the much broader, general term "solid additives" used claim 1, since it is highly implausible that the claimed process will work with solid additives in general: The size and shape of the additives will certainly greatly influence the pore volume distribution. The absorbency (or lack of absorbency) will determine the absorbent capacity of the fibrous structure. Any convincing evidence that the process is applicable to solid additives in general is lacking in the description. Thus, claim 1 is not supported in the description as required by Article 6 PCT.

2. Inventive Step (Article 33(2) PCT)

Furthermore, the above-mentioned lack of clarity notwithstanding, the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT, and therefore the criteria of Article 33(1) PCT are not met.

The document D6 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (the references in parentheses applying to this document):

A process for making a fibrous structure
(claim 5)

the process comprising the steps of

a) providing a die comprising one or more filament forming holes,

(claim 5; fig. 1-4)

wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole

(claim 5, fig. 1-4; col.1, l. 24-28)

b) supplying at least a first polymer to the die;

(claim 5)

c) producing a plurality of filaments comprising the first polymer from the die;

(claim 5)

e) collecting the mixture on a collection device to produce a fibrous structure

(claim 5)

The subject-matter of claim 1 therefore differs from this known process in that it comprises an additional step, namely step d):

- combining the filaments with solid additives to form a mixture, e.g. creating a "co-formed" fibrous structure

The problem to be solved by the present invention may therefore be regarded as modifying the process for making a fibrous structure disclosed in D6 so that a fibrous structure with additional properties or functionalities, e.g. absorbency, can be obtained.

The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons.

The step of combining spun filaments with solid additives, e.g. particles, staple fibres or wood pulp, to form a mixture - the so-called co-forming-process - is well known to the skilled person and has been disclosed in documents D1-D5.
The skilled person is aware of the possibilities of the co-forming-process, namely to add additional properties to a spun web, i.e properties, that the spun web alone does not possess.

If faced with the problem of modifying the process for making a fibrous structure disclosed in D6 so that the process be suitable of providing fibrous structures with new properties, the skilled person would simply apply the teaching of documents D1-D5

thereby arriving at a process according to claim 1.

Hence, the subject-matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

3. Dependent claims

The dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step. The reasons are as follows:

3.1 The subject matter of claim 2 is known from D6 (claim 1).

3.2 The subject matter of claim 3 is known from D1 (Fig.1).

3.3 The subject matter of claim 4 is known from D6, (col.2, l.46; col.1, l.31-38)

3.4 The subject matter of claims 5, 8, 9, 10, 12, 13 & 14 is conventional in the art. Furthermore, the term "closely coupled" in claim 14 is not clear.

3.5 The subject matter of claim 6 is known from D9 (claim 1).

3.6 The subject matter of claim 7 is known from D4 (claim 15) or D5 (claim 1).

3.7 Claim 11 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not defined. The claim attempts to define the subject-matter in terms of the result to be achieved. Such a definition is only allowable under the conditions elaborated in the PCT-Guidelines section IV, 5.35, namely that the invention can only be defined in such terms. In this instance, however, such a formulation is not allowable because it appears possible to define the subject-matter in more concrete terms, viz. in terms of how the effect is to be achieved.

4. Miscellaneous

4.1 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1, D4, D5 & D6 is not mentioned in the description, nor are these documents identified therein.

4.2 The expression "hereby incorporated by reference" on page 5 should be deleted from the description.

4.3 The vague and imprecise statement in the description on page 27 relating to the "spirit of the invention" implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in a lack of clarity of the claims (Article 6 PCT) when the description is used to interpret the claims (see PCT Guidelines, Section IV, 5.30). This statement should therefore be amended to remove this inconsistency.

4.4 The units "°F", "inch" and "fpm" do not meet the requirements of the PCT and should be replaced by the appropriate SI units (see PCT Guidelines, Section IV, 4.24). The present expressions should, however, be retained in parentheses after the replacement expressions.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

Electronic Acknowledgement Receipt

EFS ID:	5038331
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	26-MAR-2009
Filing Date:	10-JUL-2008
Time Stamp:	11:38:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS_Supp.pdf	107073 ea41444368bf0d878828ca9d7c475b9513ab1cf3	yes	3

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Information Disclosure Statement Letter		1	2	
	Information Disclosure Statement (IDS) Filed (SB/08)		3	3	
Warnings:					
Information:					
2	Foreign Reference	EP00156649A2.pdf	988472 1068553187fc225abc9c543b1e6628f69585ff1a	no	29
Warnings:					
Information:					
3	Foreign Reference	EP00294137A1.pdf	2083772 50b29fc38ee5281a222281292e77c08e646971cd	no	36
Warnings:					
Information:					
4	Foreign Reference	GB02113731A.pdf	1804345 6288db2e8e6b5adf333922b3029aa19cd1074201	no	18
Warnings:					
Information:					
5	Foreign Reference	WO03080905A1.pdf	764812 df3f7bbd60dd8f5631af305352c763606e222ebe	no	18
Warnings:					
Information:					
6	Foreign Reference	WO05106085A1pdf.pdf	1209214 bae5b27fc1814f66507989957 85b65095d295c3d	no	25
Warnings:					
Information:					
7	NPL Documents	10859_Intl_Search_Report.pdf	784980 7b0b5b097705b47ce13e16f820f12627d2308107	no	17
Warnings:					
Information:					
		Total Files Size (in bytes):	7742668		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/170,575	07/10/2008	Steven Lee Barnholtz	10859

CONFIRMATION NO. 1328

27752
THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

PUBLICATION NOTICE

OC000000034158115

Title:PROCESS FOR MAKING FIBROUS STRUCTURES

Publication No.US-2009-0023839-A1
Publication Date:01/22/2009

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1794
Examiner	:	Not Yet Assigned
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, it is respectfully requested that the document(s) cited in this submission be carefully considered by the Examiner and made of record in this case. As provided in §1.97(g), no representation is made or intended that a thorough art search was made. As provided in 37 C.F.R. §1.97(h), this Information Disclosure Statement does not constitute an admission of any kind, and specifically is not an admission that the document(s) cited in this submission is (are), or is (are) considered to be, material to the patentability of the above-identified patent application, as defined in 37 C.F.R. §1.56(b).

This Information Disclosure Statement is being submitted under 37 C.F.R. §1.97(b)(3). An Office Action on the merits in the present application has not yet been received. Therefore, no fee is believed to be due. However, in the event that this paper is crossing in the mail with a first Office Action on the merits, authorization is hereby given to charge the required fee pursuant to 37 C.F.R. §1.97(c) and 37 C.F.R. §1.17(p) to Deposit Account No. 16-2480 in the name of The Procter & Gamble Company.

Additional Items to be Noted by the Examiner

It is respectfully requested that the Examiner consider and make of record the related unpublished pending U.S. applications listed on the attached page.

Respectfully submitted,

THE PROCTER & GAMBLE COMPANY

Signature

C. Brant Cook

Registration No. 39,151

(513) 983-1004

Date: October 29, 2008

Customer No. 27752

(IDS Letter.doc)

(Revised 12/07)

INFORMATION DISCLOSURE STATEMENT

RELATED UNPUBLISHED PENDING U.S. APPLICATION(S)

Examiners Initials	Application Serial Number	Application Filing Date (MM/DD/YYYY)	Inventor(s)	Attorney Docket Number	Copy in IFW?
	12/170,585	07/10/2008	Barnholtz, et al.	10857	Y
	12/170,578	07/10/2008	Barnholtz, et al.	10858	Y
	12/170,565	07/10/2008	Suer, et al.	10860	Y
	12/170,557	07/10/2008	Cabell, et al.	11002	Y

EXAMINER	**DATE CONSIDERED**

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 1 of 2

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	1794
Examiner Name	Not Yet Assigned
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	1	US-4,100,324	07/11/1978	Anderson, et al.	
	2	US-4,604,313	08/05/1986	McFarland, et al.	
	3	US-4,634,621	01/06/1987	Manning, et al.	
	4	US-4,636,418	01/13/1987	Kennard, et al.	
	5	US-4,720,415	01/19/1988	Vander Wielen, et al.	
	6	US-4,724,114	02/09/1988	McFarland, et al.	
	7	US-4,786,550	11/22/1988	McFarland, et al.	
	8	US-4,803,117	02/07/1989	Daponte	
	9	US-4,855,179	08/08/1989	Bourland,et al.	
	10	US-4,863,779	09/05/1989	Daponte	
	11	US-4,879,170	11/07/1989	Radwanski, et al.	
	12	US-4,906,513	03/06/1990	Kebbell,et al.	
	13	US-4,931,355	06/05/1990	Radwanski, et al.	
	14	US-4,939,016	07/03/1990	Radwanski, et al.	
	15	US-4,970,104	11/13/1990	Radwanski	
	16	US-5,145,727	09/08/1992	Potts, et al.	
	17	US-5,149,576	09/22/1992	Potts, et al.	
	18	US-5,227,107	07/13/1993	Dickenson, et al.	
	19	US-5,284,703	02/08/1994	Everhart, et al.	
	20	US-5,350,624	09/27/1994	Georger, et al.	
	21	US-5,409,768	04/25/1995	Dickenson, et al.	
	22	US-5,508,102	04/16/1996	Georger, et al.	
	23	US-5,652,048	07/29/1997	Haynes, et al.	
	24	US-5,811,178	09/22/1998	Adam, et al.	
	25	US-5,948,710	09/07/1999	Pomplun, et al.	
	26	US-5,952,251	09/14/1999	Jackson, et al.	
	27	US-6,103,061	08/15/2000	Anderson, et al.	
	28	US-6,200,120 B1	03/13/2001	Fish, et al.	
	29	US-6,296,936 B1	10/02/2001	Yahiaoui, et al.	
	30	US-6,319,342 B1	11/20/2001	Riddell	
	31	US-6,417,120 B1	07/09/2002	Mitchler, et al.	
	32	US-6,465,073 B1	10/15/2002	Morman, et al.	
	33	US-6,494,974 B2	12/17/2002	Riddell	
	34	US-6,686,303 B1	02/03/2004	Haynes, et al.	
	35	US-6,739,023 B2	05/25/2004	Vonfeldt, et al.	
	36	US-6,759,356 B1	07/06/2004	Myers,	
	37	US-6,797,226 B2	09/28/2004	Annable	
	38	US-6,811,638 B2	11/02/2004	Close, et al.	
	39	US-6,823,568 B1	11/30/2004	Kobayashi, et al.	
	40	US-6,836,937 B1	01/04/2005	Boscolo	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

SHEET 2 of 2

COMPLETE IF KNOWN	
Application Number	12/170,575
Confirmation Number	1328
Filing Date	July 10, 2008
First Named Inventor	Steven Lee Barnholtz
Art Unit	1794
Examiner Name	Not Yet Assigned
Docket Number	10859

U. S. PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	DOCUMENT NUMBER Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear
	41	US-6,992028 B2	01/31/2006	Thomaschefsky, et al.	
	42	US-2003/0073367 A1	04/17/2003	Kopacz, et al.	
	43	US-2003/0131457 A1	07/17/2003	Krautkramer, et al.	
	44	US-2003/0150090 A1	08/14/2003	Krautkramer, et al.	
	45	US-2005/0148264 A1	07/07/2005	Varona, et al.	
	46	US-2005/0159065 A1	07/21/2005	Stralin, et al.	

FOREIGN PATENT DOCUMENTS

EXAMINER INITIALS*	Cite No.[1]	FOREIGN PATENT DOCUMENT Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines Where Relevant Passages or Relevant Figures Appear	T[6]
	1	WO 2007/070064 A1	06/21/2007	Kimberly Clark Co		
	2	WO 2007/070075 A1	06/21/2007	Kimberly Clark Co		
	2	WO 2007/078344 A1	07/12/2007	Kimberly Clark Co		
	4	WO 2007/098449 A1	08/30/2007	Fiber Web Simpsonville Inc		
	5	WO 2007/124866 A1	11/08/2007	Fiberweb Corovin GMBH	English Abstract	

EXAMINER	DATE CONSIDERED

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1]Applicant's unique citation designation number (optional). [2]See Kind Codes of U.S. Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.14.

SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

IDS List of References.doc
Rev. 05/08 (PTO updated 05/08)

Electronic Acknowledgement Receipt

EFS ID:	4195675
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	29-OCT-2008
Filing Date:	10-JUL-2008
Time Stamp:	12:58:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_IDS.pdf	191344 ac4e8d288dd2ca0ffb93823e316c473169ef13b1	yes	5

	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Information Disclosure Statement Letter		1	3	
	Information Disclosure Statement (IDS) Filed (SB/08)		4	5	
Warnings:					
Information:					
2	Foreign Reference	WO27070064_A1.pdf	3171160 0c284bf339e45e58cac40e9b0fcb2a041982bc25	no	58
Warnings:					
Information:					
3	Foreign Reference	WO2007070075_A1.pdf	4168494 f202d79d0d28c63f37a81660277eb31a1b13b27e	no	55
Warnings:					
Information:					
4	Foreign Reference	WO2007078344_A1.pdf	2098112 cc259f5fa2e22b13bf871375acc1f810d83339d3	no	38
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Information:					
5	Foreign Reference	WO2007098449_A1.pdf	2207317 04204a8dbb53e0cca88c14c9685caeea24010478	no	51
Warnings:					
Information:					
6	Foreign Reference	WO27124866_A1_Abstract.pdf	65898 1d4730f190c39c6e6d83821c0a4f486d6ecdd8a8	no	1
Warnings:					
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		Total Files Size (in bytes):	11902325		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/170,575	07/10/2008	1794	1310	10859	23	2

CONFIRMATION NO. 1328

UPDATED FILING RECEIPT

27752
THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

Date Mailed: 09/08/2008

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Steven Lee Barnholtz, West Chester, OH;
Paul Dennis Trokhan, Hamilton, OH;
Michael Donald Suer, Cincinnati, OH;
Douglas Jay Barkey, Hamilton Township, OH;
Jonathan Paul Brennan, Cincinnati, OH;
Ronald Thomas Gorley, Cincinnati, OH;

Power of Attorney: The patent practitioners associated with Customer Number 27752

Domestic Priority data as claimed by applicant

This appln claims benefit of 60/959,885 07/17/2007

Foreign Applications

If Required, Foreign Filing License Granted: 07/29/2008

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/170,575**

Projected Publication Date: 01/22/2009

Non-Publication Request: No

Early Publication Request: No

Title

PROCESS FOR MAKING FIBROUS STRUCTURES

Preliminary Class

428

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/170,575	07/10/2008	Steven Lee Barnholtz	10859

CONFIRMATION NO. 1328

POA ACCEPTANCE LETTER

27752
THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

OC000000031932334

Date Mailed: 09/08/2008

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/27/2008.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/bto/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	12/170,575
Inventor(s)	:	Steven Lee Barnholtz, et al.
Filed	:	July 10, 2008
Art Unit	:	1794
Examiner	:	
Docket No.	:	10859
Confirmation No.	:	1328
Customer No.	:	27752
Title	:	PROCESS FOR MAKING FIBROUS STRUCTURES

RESPONSE TO NOTICE TO FILE MISSING PARTS OF APPLICATION OR NOTICE TO FILE CORRECTED APPLICATION PAPERS

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the Notice to File Missing Parts of Application (PTO-1533) mailed July 10, 2008, a copy of which is enclosed, the following items are submitted herewith:

No declaration or oath was filed. A copy of the signed Declaration, Power of Attorney and Statement Under 37 CFR 3.73(b) for this application are attached.

Authorization is hereby given to charge the surcharge set forth in 37 CFR §1.16(e) or any additional fees that may be required, or credit any overpayment, to Deposit Account No. 16-2480 in the name of The Procter & Gamble Company.

Respectfully submitted,
THE PROCTER & GAMBLE COMPANY
By _____
Signature
C. Brant Cook
Registration No. 39,151
(513) 983-1004

Date: August 27, 2008
Customer No. 27752
Missing Parts Response.doc
Rev. 12/07

FITESA/Exhibit 1013, Page 552 of 624

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 C.F.R. 1.63)	Attorney Docket No.	10859
	First Named Inventor	Steven Lee Barnholtz
	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Filing Date	July 9, 2008
	Group Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Confirmation Number	1328

I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled PROCESS FOR MAKING FIBROUS STRUCTURES

the specification of which

(check one) [] is attached hereto.

[X] was filed on 07/10/2008 (MM/DD/YYYY) as United States Application No. 12/170,575 or PCT International Application Serial No. _ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. §1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent, or §365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, or any PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed
			[]
			[]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR:			
Given Name (first and middle [if any]) Steven Lee		Family Name or Surname Barnholtz	
Inventor's Signature Steven Lee Barnholtz			Date 23 July 2008
Residence: City West Chester	State OH	Country USA	Citizenship USA
Mailing Address: 5835 Olympia Fields Court			
City West Chester	State OH	ZIP (or Postal Code) 45069	Country USA

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION
(continued)

Attorney Docket No. 10859

NAME OF SECOND INVENTOR:			
Given Name Paul Dennis (first and middle [if any])		Family Name Or Surname Trokhan	
Inventor's Signature Paul Dennis Trokhan		Date 16 JUL 2008	
Residence: | City Hamilton	State OH	Country USA	Citizenship USA
Mailing Address: 1356 Warvel Road			
City Hamilton	State OH	ZIP (or Postal Code) 45013	Country USA

NAME OF THIRD INVENTOR:			
Given Name Michael Donald (first and middle [if any])		Family Name Or Surname Suer	
Inventor's Signature Michael Donald Suer		Date 16 JUL 2008	
Residence: | City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 5470 Longlake Court			
City Cincinnati	State OH	ZIP (or Postal Code) 45247	Country USA

NAME OF FOURTH INVENTOR:			
Given Name Douglas Jay (first and middle [if any])		Family Name Or Surname Barkey	
Inventor's Signature Douglas Barkey		Date 16 July 2008	
Residence: | City Hamilton Township	State OH	Country USA	Citizenship USA
Mailing Address: 964 Airymeadows Drive			
City Maineville	State OH	ZIP (or Postal Code) 45039	Country USA

NAME OF FIFTH INVENTOR:			
Given Name Jonathan Paul (first and middle [if any])		Family Name Or Surname Brennan	
Inventor's Signature		Date	
Residence: | City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 4459 Hickory Nut Court			
City Cincinnati	State OH	ZIP (or Postal Code) 45241	Country USA

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION
(continued)

Attorney Docket No. 10859

NAME OF SIXTH INVENTOR:			
Given Name Ronald Thomas (first and middle [if any])		Family Name Gorley Or Surname	
Inventor's Signature			Date
Residence: City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 7835 New Brunswick Drive			
City Cincinnati	State OH	ZIP (or Postal Code) 45241	Country USA

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 C.F.R. 1.63)	Attorney Docket No.	10859
	First Named Inventor	Steven Lee Barnholtz
	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Filing Date	July 9, 2008
	Group Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Confirmation Number	1328

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the specification of which

(check one) [] is attached hereto.

[X] was filed on 07/10/2008 (MM/DD/YYYY) as United States Application No. 12/170,575 or PCT International Application Serial No. _ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

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I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent, or §365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, or any PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed
			[]
			[]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR:			
Given Name Steven Lee (first and middle [if any])		Family Name Or Surname Barnholtz	
Inventor's Signature			Date
Residence: City West Chester	State OH	Country USA	Citizenship USA
Mailing Address: 5835 Olympia Fields Court			
City West Chester	State OH	ZIP (or Postal Code) 45069	Country USA

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION
(continued)

Attorney Docket No. 10859

NAME OF SECOND INVENTOR:			
Given Name Paul Dennis (first and middle [if any])		Family Name Or Surname Trokhan	
Inventor's Signature		Date	
Residence: City Hamilton	State OH	Country USA	Citizenship USA
Mailing Address: 1356 Warvel Road			
City Hamilton	State OH	ZIP (or Postal Code) 45013	Country USA

NAME OF THIRD INVENTOR:			
Given Name Michael Donald (first and middle [if any])		Family Name Or Surname Suer	
Inventor's Signature		Date	
Residence: City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 5470 Longlake Court			
City Cincinnati	State OH	ZIP (or Postal Code) 45247	Country USA

NAME OF FOURTH INVENTOR:			
Given Name Douglas Jay (first and middle [if any])		Family Name Or Surname Barkey	
Inventor's Signature		Date	
Residence: City Hamilton Township	State OH	Country USA	Citizenship USA
Mailing Address: 964 Airymeadows Drive			
City Maineville	State OH	ZIP (or Postal Code) 45039	Country USA

NAME OF FIFTH INVENTOR:			
Given Name Jonathan Paul (first and middle [if any])		Family Name Or Surname Brennan	
Inventor's Signature Jonathan Paul Brennan		Date 07/17/2008	
Residence: City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 4459 Hickory Nut Court			
City Cincinnati	State OH	ZIP (or Postal Code) 45241	Country USA

NAME OF SIXTH INVENTOR:			
Given Name Ronald Thomas (first and middle [if any])		Family Name Or Surname Gorley	
Inventor's Signature		Date	
Residence: City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 7835 New Brunswick Drive			
City Cincinnati	State OH	ZIP (or Postal Code) 45241	Country USA

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 C.F.R. 1.63)		
	Attorney Docket No.	10859
	First Named Inventor	Steven Lee Barnholtz
	COMPLETE IF KNOWN	
	Application Number	12/170,575
	Filing Date	July 9, 2008
	Group Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Confirmation Number	1328

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the specification of which

(check one) [] is attached hereto.

[X] was filed on 07/10/2008 (MM/DD/YYYY) as United States Application No. 12/170,575 or PCT International Application Serial No. _ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

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Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed
			[]
			[]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Mailing Address: 5835 Olympia Fields Court			
City West Chester	State OH	ZIP (or Postal Code) 45069	Country USA

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION
(continued)

Attorney Docket No. 10859

NAME OF SECOND INVENTOR:			
Given Name Paul Dennis (first and middle [if any])		Family Name Or Surname Trokhan	
Inventor's Signature		Date	
Residence: | City Hamilton	State OH	Country USA	Citizenship USA
Mailing Address: 1356 Warvel Road			
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Inventor's Signature		Date	
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Mailing Address: 964 Airymeadows Drive			
City Maineville	State OH	ZIP (or Postal Code) 45039	Country USA

NAME OF FIFTH INVENTOR:			
Given Name Jonathan Paul (first and middle [if any])		Family Name Or Surname Brennan	
Inventor's Signature		Date	
Residence: | City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 4459 Hickory Nut Court			
City Cincinnati	State OH	ZIP (or Postal Code) 45241	Country USA

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION
(continued)

Attorney Docket No. 10859

NAME OF SIXTH INVENTOR:			
Given Name Ronald Thomas (first and middle [if any])		Family Name Or Surname Gorley	
Inventor's Signature Ronald Thomas Gorley		Date 16 July 2008	
Residence: City Cincinnati	State OH	Country USA	Citizenship USA
Mailing Address: 7835 New Brunswick Drive			
City Cincinnati	State OH	ZIP (or Postal Code) 45241	Country USA

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: The Procter & Gamble Company Docket Number: 10859

Application No./Patent No.: 12/170,575 Filed/Issue Date: July 10, 2008

Entitled: PROCESS FOR MAKING FIBROUS STRUCTURES

The Procter & Gamble Company, a Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, etc.)

states that it is:

1. [X] the assignee of the entire right, title, and interest; or

2. [ ] an assignee of less than the entire right, title and interest. The extent (by percentage) of its ownership interest is _%.

in the patent application/patent identified above by virtue of either:

A. [X] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 121381, Frame 0089.

OR

B. [ ] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____, Frame _____, or for which a copy thereof is attached.
2. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____, Frame _____, or for which a copy thereof is attached.
3. From: _____ To: _____
   The document was recorded in the United States Patent and Trademark Office at
   Reel _____, Frame _____, or for which a copy thereof is attached.

[ ] Additional documents in the chain of title are listed on a supplemental sheet.

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

August 27, 2008	C. Brant Cook	39,151
Date	Typed or Printed Name	Registration No.
513-983-1004	C. Brant Cook	
Telephone Number	Signature	

Attorney of Record
Title

Send Completed form to the following address:
Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

PTO/SB/80 (01-06)
Approved for use through 12/31/2008. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

[X] Practitioners associated with the Customer Number: 27752

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

[X] The address associated with Customer Number: 27752

OR

[ ] Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

The Procter & Gamble Company
One Procter & Gamble Plaza
Cincinnati, OH 45202

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Steven W. Miller	Date	7/25/08
Name	Steven W. Miller	Telephone	513-983-7327
Title	Assistant Secretary		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	12170575
Filing Date:	10-Jul-2008
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late filing fee for oath or declaration	1051	1	130	130
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**130**

Electronic Acknowledgement Receipt

EFS ID:	3846415
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	27-AUG-2008
Filing Date:	10-JUL-2008
Time Stamp:	12:42:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$130
RAM confirmation Number	7458
Deposit Account	162480
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_Resp_to_Missing_Parts.pdf	530167 091b7b5b80432e7cfac9b6da32b161c7bd4b3f6d	yes	12

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Applicant Response to Pre-Exam Formalities Notice	1	1
Oath or Declaration filed	2	10
Assignee showing of ownership per 37 CFR 3.73(b).	11	11
Power of Attorney	12	12

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	30062 e5f281e5400c8d53a715225c1def654ac70d1e46	no	2

Warnings:

Information:

Total Files Size (in bytes):	560229

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/170,575	07/10/2008	Steven Lee Barnholtz	10859

CONFIRMATION NO. 1328

27752
THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

FORMALITIES LETTER

OC000000031260413

Date Mailed: 07/30/2008

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of $**130** for a non-small entity, must be submitted with the missing items identified in this notice.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is $**130** for a non-small entity
- $**130** Surcharge.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/nprasasouk/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/170,575	07/10/2008	1794	1180	10859	23	2

CONFIRMATION NO. 1328

27752
THE PROCTER & GAMBLE COMPANY
Global Legal Department - IP
Sycamore Building - 4th Floor
299 East Sixth Street
CINCINNATI, OH 45202

FILING RECEIPT

Date Mailed: 07/30/2008

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Steven Lee Barnholtz, Residence Not Provided;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 60/959,885 07/17/2007

Foreign Applications

If Required, Foreign Filing License Granted: 07/29/2008

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Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

Title

PROCESS FOR MAKING FIBROUS STRUCTURES

Preliminary Class

428

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new **nonprovisional** applications under 37 CFR 1.53(b))

Docket No.	10859
First Inventor	Steven Lee Barnholtz
Title	PROCESS FOR MAKING FIBROUS STRUCTURES

APPLICATION ELEMENTS
See MPEP Chapter 600 concerning nonprovisional utility patent application contents.

ADDRESS TO: **Commissioner for Patents**
P.O. Box 1450
Alexandria, VA 22313-1450

1. [] Fee Transmittal Form

2. [X] Specification Total Pages [32]
(Both the claims and abstract must start on a new page)
- Descriptive Title of the Invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R&D
- Reference to sequence listing, a table, or a computer program listing appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings *(if filed)*
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. [X] Drawing(s) (35 USC §113) Total Sheets [12]

4. Oath or Declaration Total pages []
a. [X] Newly executed (original or copy)
b. [] Copy from a prior application (37 CFR §1.63(d))
(for continuation/divisional with Box 17 complete
i. [] DELETION OF INVENTORS
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR §§1.63(d)(2) and 1.33(b).

5. [] Application Data Sheet. See 37 CFR §1.76

6. [] CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
[] Landscape table on CD

7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, items a. – c. are necessary)
a. [] Computer Readable Form (CRF)
b. Specification Sequence Listing on:
i. [] CD-ROM or CD-R (2 copies); or
ii. [] Paper
c. [] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [] Assignment Papers (cover sheet & document(s))

9. [] 37 CFR 3.73(b) Statement [] Power of Attorney
(when there is an assignee)

10. [] English Translation Document *(if applicable)*

11. [] Information Disclosure Statement (IDS)
[] IDS List of References
[] Copies of foreign patent documents, publications, and other information

12. [] Preliminary Amendment

13. [] Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)

14. [] Certified Copy of Priority Document(s)
(if foreign priority is claimed)

15. [] Nonpublication Request under 35 U.S.C. 122(b)(2)(B)(i).

16. [] Other: .....

17. **If a CONTINUING APPLICATION**, check appropriate box and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR §1.76:
[] Continuation [] Divisional [] Continuation-in-part (CIP) of prior application No. /
Prior application information: Examiner: _____ Art Unit: _____.

For CONTINUATION or DIVISIONAL only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference.

18. CORRESPONDENCE ADDRESS

[X] Customer Number	(Insert Customer No. here) 27752	

Name (Print/Type)	C. Brant Cook	Registration No. (Attorney/Agent)	39,151
Signature	C. Brant Cook	Date	July 10, 2008

Utility Transmittal (nonprovisional).doc
Rev. 12/07

PROCESS FOR MAKING FIBROUS STRUCTURES

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 60/959,885, filed July 17, 2007.

FIELD OF THE INVENTION

The present invention relates to processes for making fibrous structures and more particularly to processes for making fibrous structures comprising filaments.

BACKGROUND OF THE INVENTION

Processes for making fibrous structures comprising filaments are known in the art. An example of such a known process is a co-form process.

Known co-form processes utilize a knife-edge die that comprises filament-forming holes. The filaments produced by the filament-forming holes are contacted after exiting by air. The air contacts the filaments at an angle of 30° to less than 90°, not parallel to or substantially parallel to the filament produced from the filament-forming holes.

The problem with current processes for making fibrous structures, especially processes that utilize knife-edge dies, is that the fibrous structures comprise filaments having a distribution of average filament diameters that does not optimize the properties, for example absorbency properties (such as absorption capacity and/or rate of absorption) of the fibrous structures.

Accordingly, there is a need for a process for making fibrous structures, especially fibrous structure that comprise filaments, that provide improved properties compared to fibrous structures produced by known processes for making fibrous structures, especially processes that utilize knife-edge dies.

SUMMARY OF THE INVENTION

The present invention solves the problem identified above by providing a process for making fibrous structures, especially fibrous structure that comprise filaments, that exhibit improved properties compared to fibrous structure produced by known processes for making fibrous structures, especially processes that utilize knife-edge dies.

In one example of the present invention, a process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying at least a first polymer to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. combining the filaments with solid additives to form a mixture; and

e. collecting the mixture on a collection device to produce a fibrous structure;

is provided.

In another example of the present invention, a process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying a polyolefin polymer to the die;

c. producing a plurality of filaments comprising the polyolefin polymer from the die;

d. combining the filaments with wood pulp fibers to form a mixture; and

e. collecting the mixture on a collection device to produce a fibrous structure;

is provided.

In yet another example of the present invention, a fibrous structure made by a process according to the present invention is provided.

Accordingly, the present invention provides a process for making fibrous structures, especially fibrous structure that comprise filaments, that exhibit improved properties compared to fibrous structure produced by known processes for making fibrous structures, especially processes that utilize knife-edge dies.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a Pore Volume Distribution graph of various fibrous structures, including a fibrous structure according to the present invention, showing the Ending Pore Radius of from 1μm to 1000μm and the Capacity of Water in Pores;

Fig. 2 is a Pore Volume Distribution graph of various fibrous structures, including a fibrous structure according to the present invention, showing the Ending Pore Radius of from 1μm to 300μm and the Capacity of Water in Pores;

Fig. 3 is a schematic representation of an example of a fibrous structure according to the present invention;

Fig. 4 is a schematic, cross-sectional representation of Fig. 3 taken along line 4-4;

Fig. 5 is a schematic representation of another example of a fibrous structure according to the present invention;

Fig. 6 is a schematic, cross-sectional representation of another example of a fibrous structure according to the present invention;

Fig. 7 is a schematic, cross-sectional representation of another example of a fibrous structure according to the present invention;

Fig. 8 is a schematic representation of another example of a fibrous structure in roll form according to the present invention;

Fig. 9 is a schematic representation of another example of a fibrous structure;

Fig. 10 is a schematic representation of an example of a process for making a fibrous structure according to the present invention;

Fig. 11 is a schematic representation of an example of a filament-forming hole and fluid-releasing hole from a suitable die useful in making a fibrous structure according to the present invention;

Fig. 12 is a scanning electromicrograph of a fibrous structure made by a known die;

Fig. 13 is a scanning electromicrograph of a fibrous structure made by a die according to the present invention;

Fig. 14 is a schematic representation of an example of a solid additive spreader useful in the processes of the present invention;

Fig. 15 is a schematic representation of another example of a solid additive spreader useful in the processes of the present invention;

Fig. 16 is a diagram of a support rack utilized in the HFS and VFS Test Methods described herein;

Fig. 17 is a diagram of a support rack cover utilized in the HFS and VFS Test Methods described herein.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

"Fibrous structure" as used herein means a structure that comprises one or more filaments and/or fibers. In one example, a fibrous structure according to the present invention means an orderly arrangement of filaments and/or fibers within a structure in order to perform a function. Nonlimiting examples of fibrous structures of the present invention include paper, fabrics (including woven, knitted, and non-woven), and absorbent pads (for example for diapers or feminine hygiene products).

Nonlimiting examples of processes for making fibrous structures include known wet-laid papermaking processes and air-laid papermaking processes. Such processes typically include steps of preparing a fiber composition in the form of a suspension in a medium, either wet, more specifically aqueous medium, or dry, more specifically gaseous, i.e. with air as medium. The aqueous medium used for wet-laid processes is oftentimes referred to as a fiber slurry. The fibrous slurry is then used to deposit a plurality of fibers onto a forming wire or belt such that an embryonic fibrous structure is formed, after which drying and/or bonding the fibers together results in a fibrous structure. Further processing the fibrous structure may be carried out such that a finished fibrous structure is formed. For example, in typical papermaking processes, the finished fibrous structure is the fibrous structure that is wound on the reel at the end of papermaking, and may subsequently be converted into a finished product, e.g. a sanitary tissue product.

The fibrous structures of the present invention may be homogeneous or may be layered. If layered, the fibrous structures may comprise at least two and/or at least three and/or at least four and/or at least five layers.

The fibrous structures of the present invention may be co-formed fibrous structures.

"Co-formed fibrous structure" as used herein means that the fibrous structure comprises a mixture of at least two different materials wherein at least one of the materials comprises a filament, such as a polypropylene filament, and at least one other material, different from the first material, comprises a solid additive, such as a fiber and/or a particulate. In one example, a co-formed fibrous structure comprises solid additives, such as fibers, such as wood pulp fibers, and filaments, such as polypropylene filaments.

"Solid additive" as used herein means a fiber and/or a particulate.

"Particulate" as used herein means a granular substance or powder.

"Fiber" and/or "Filament" as used herein means an elongate particulate having an apparent length greatly exceeding its apparent width, i.e. a length to diameter ratio of at least

about 10. For purposes of the present invention, a "fiber" is an elongate particulate as described above that exhibits a length of less than 5.08 cm (2 in.) and a "filament" is an elongate particulate as described above that exhibits a length of greater than or equal to 5.08 cm (2 in.).

Fibers are typically considered discontinuous in nature. Nonlimiting examples of fibers include wood pulp fibers and synthetic staple fibers such as polyester fibers.

Filaments are typically considered continuous or substantially continuous in nature. Filaments are relatively longer than fibers. Nonlimiting examples of filaments include meltblown and/or spunbond filaments. Nonlimiting examples of materials that can be spun into filaments include natural polymers, such as starch, starch derivatives, cellulose and cellulose derivatives, hemicellulose, hemicellulose derivatives, and synthetic polymers including, but not limited to polyvinyl alcohol filaments and/or polyvinyl alcohol derivative filaments, and thermoplastic polymer filaments, such as polyesters, nylons, polyolefins such as polypropylene filaments, polyethylene filaments, and biodegradable or compostable thermoplastic fibers such as polylactic acid filaments, polyhydroxyalkanoate filaments and polycaprolactone filaments. The filaments may be monocomponent or multicomponent, such as bicomponent filaments.

In one example of the present invention, "fiber" refers to papermaking fibers. Papermaking fibers useful in the present invention include cellulosic fibers commonly known as wood pulp fibers. Applicable wood pulps include chemical pulps, such as Kraft, sulfite, and sulfate pulps, as well as mechanical pulps including, for example, groundwood, thermomechanical pulp and chemically modified thermomechanical pulp. Chemical pulps, however, may be preferred since they impart a superior tactile sense of softness to tissue sheets made therefrom. Pulps derived from both deciduous trees (hereinafter, also referred to as "hardwood") and coniferous trees (hereinafter, also referred to as "softwood") may be utilized. The hardwood and softwood fibers can be blended, or alternatively, can be deposited in layers to provide a stratified web. U.S. Pat. No. 4,300,981 and U.S. Pat. No. 3,994,771 are incorporated herein by reference for the purpose of disclosing layering of hardwood and softwood fibers. Also applicable to the present invention are fibers derived from recycled paper, which may contain any or all of the above categories as well as other non-fibrous materials such as fillers and adhesives used to facilitate the original papermaking.

In addition to the various wood pulp fibers, other cellulosic fibers such as cotton linters, rayon, lyocell and bagasse can be used in this invention. Other sources of cellulose in the form of fibers or capable of being spun into fibers include grasses and grain sources.

"Sanitary tissue product" as used herein means a soft, low density (i.e. < about 0.15 g/cm3) web useful as a wiping implement for post-urinary and post-bowel movement cleaning (toilet tissue), for otorhinolaryngological discharges (facial tissue), and multi-functional absorbent and cleaning uses (absorbent towels). The sanitary tissue product may be convolutedly wound upon itself about a core or without a core to form a sanitary tissue product roll.

In one example, the sanitary tissue product of the present invention comprises a fibrous structure according to the present invention.

The sanitary tissue products of the present invention may exhibit a basis weight between about 10 g/m^2 to about 120 g/m^2 and/or from about 15 g/m^2 to about 110 g/m^2 and/or from about 20 g/m^2 to about 100 g/m^2 and/or from about 30 to 90 g/m^2. In addition, the sanitary tissue product of the present invention may exhibit a basis weight between about 40 g/m^2 to about 120 g/m^2 and/or from about 50 g/m^2 to about 110 g/m^2 and/or from about 55 g/m^2 to about 105 g/m^2 and/or from about 60 to 100 g/m^2.

The sanitary tissue products of the present invention may exhibit a total dry tensile strength of greater than about 59 g/cm (150 g/in) and/or from about 78 g/cm (200 g/in) to about 394 g/cm (1000 g/in) and/or from about 98 g/cm (250 g/in) to about 335 g/cm (850 g/in). In addition, the sanitary tissue product of the present invention may exhibit a total dry tensile strength of greater than about 196 g/cm (500 g/in) and/or from about 196 g/cm (500 g/in) to about 394 g/cm (1000 g/in) and/or from about 216 g/cm (550 g/in) to about 335 g/cm (850 g/in) and/or from about 236 g/cm (600 g/in) to about 315 g/cm (800 g/in). In one example, the sanitary tissue product exhibits a total dry tensile strength of less than about 394 g/cm (1000 g/in) and/or less than about 335 g/cm (850 g/in).

In another example, the sanitary tissue products of the present invention may exhibit a total dry tensile strength of greater than about 196 g/cm (500 g/in) and/or greater than about 236 g/cm (600 g/in) and/or greater than about 276 g/cm (700 g/in) and/or greater than about 315 g/cm (800 g/in) and/or greater than about 354 g/cm (900 g/in) and/or greater than about 394 g/cm (1000 g/in) and/or from about 315 g/cm (800 g/in) to about 1968 g/cm (5000 g/in) and/or from about 354 g/cm (900 g/in) to about 1181 g/cm (3000 g/in) and/or from about 354 g/cm (900 g/in) to about 984 g/cm (2500 g/in) and/or from about 394 g/cm (1000 g/in) to about 787 g/cm (2000 g/in).

The sanitary tissue products of the present invention may exhibit an initial total wet tensile strength of less than about 78 g/cm (200 g/in) and/or less than about 59 g/cm (150 g/in) and/or less than about 39 g/cm (100 g/in) and/or less than about 29 g/cm (75 g/in).

The sanitary tissue products of the present invention may exhibit an initial total wet tensile strength of greater than about 118 g/cm (300 g/in) and/or greater than about 157 g/cm (400 g/in) and/or greater than about 196 g/cm (500 g/in) and/or greater than about 236 g/cm (600 g/in) and/or greater than about 276 g/cm (700 g/in) and/or greater than about 315 g/cm (800 g/in) and/or greater than about 354 g/cm (900 g/in) and/or greater than about 394 g/cm (1000 g/in) and/or from about 118 g/cm (300 g/in) to about 1968 g/cm (5000 g/in) and/or from about 157 g/cm (400 g/in) to about 1181 g/cm (3000 g/in) and/or from about 196 g/cm (500 g/in) to about 984 g/cm (2500 g/in) and/or from about 196 g/cm (500 g/in) to about 787 g/cm (2000 g/in) and/or from about 196 g/cm (500 g/in) to about 591 g/cm (1500 g/in).

The sanitary tissue products of the present invention may exhibit a density (measured at 95 g/in^2) of less than about 0.60 g/cm^3 and/or less than about 0.30 g/cm^3 and/or less than about 0.20 g/cm^3 and/or less than about 0.10 g/cm^3 and/or less than about 0.07 g/cm^3 and/or less than about 0.05 g/cm^3 and/or from about 0.01 g/cm^3 to about 0.20 g/cm^3 and/or from about 0.02 g/cm^3 to about 0.10 g/cm^3.

The sanitary tissue products of the present invention may exhibit a total absorptive capacity of according to the Horizontal Full Sheet (HFS) Test Method described herein of greater than about 10 g/g and/or greater than about 12 g/g and/or greater than about 15 g/g and/or from about 15 g/g to about 50 g/g and/or to about 40 g/g and/or to about 30 g/g.

The sanitary tissue products of the present invention may exhibit a Vertical Full Sheet (VFS) value as determined by the Vertical Full Sheet (VFS) Test Method described herein of greater than about 5 g/g and/or greater than about 7 g/g and/or greater than about 9 g/g and/or from about 9 g/g to about 30 g/g and/or to about 25 g/g and/or to about 20 g/g and/or to about 17 g/g.

The sanitary tissue products of the present invention may be in the form of sanitary tissue product rolls. Such sanitary tissue product rolls may comprise a plurality of connected, but perforated sheets of fibrous structure, that are separably dispensable from adjacent sheets. In one example, one or more ends of the roll of sanitary tissue product may comprise an adhesive and/or dry strength agent to mitigate the loss of fibers, especially wood pulp fibers from the ends of the roll of sanitary tissue product.

The sanitary tissue products of the present invention may comprises additives such as softening agents, temporary wet strength agents, permanent wet strength agents, bulk softening agents, lotions, silicones, wetting agents, latexes, especially surface-pattern-applied latexes, dry

strength agents such as carboxymethylcellulose and starch, and other types of additives suitable for inclusion in and/or on sanitary tissue products.

"Weight average molecular weight" as used herein means the weight average molecular weight as determined using gel permeation chromatography according to the protocol found in Colloids and Surfaces A. Physico Chemical & Engineering Aspects, Vol. 162, 2000, pg. 107-121.

"Basis Weight" as used herein is the weight per unit area of a sample reported in lbs/3000 ft^2 or g/m^2.

"Machine Direction" or "MD" as used herein means the direction parallel to the flow of the fibrous structure through the fibrous structure making machine and/or sanitary tissue product manufacturing equipment.

"Cross Machine Direction" or "CD" as used herein means the direction parallel to the width of the fibrous structure making machine and/or sanitary tissue product manufacturing equipment and perpendicular to the machine direction.

"Ply" as used herein means an individual, integral fibrous structure.

"Plies" as used herein means two or more individual, integral fibrous structures disposed in a substantially contiguous, face-to-face relationship with one another, forming a multi-ply fibrous structure and/or multi-ply sanitary tissue product. It is also contemplated that an individual, integral fibrous structure can effectively form a multi-ply fibrous structure, for example, by being folded on itself.

"Total Pore Volume" as used herein means the sum of the fluid holding void volume in each pore range from 1μm to 1000μm radii as measured according to the Pore Volume Test Method described herein.

"Pore Volume Distribution" as used herein means the distribution of fluid holding void volume as a function of pore radius. The Pore Volume Distribution of a fibrous structure is measured according to the Pore Volume Test Method described herein.

As used herein, the articles "a" and "an" when used herein, for example, "an anionic surfactant" or "a fiber" is understood to mean one or more of the material that is claimed or described.

All percentages and ratios are calculated by weight unless otherwise indicated. All percentages and ratios are calculated based on the total composition unless otherwise indicated.

Unless otherwise noted, all component or composition levels are in reference to the active level of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources.

Fibrous Structure

It has surprisingly been found that the fibrous structures of the present invention exhibit a pore volume distribution unlike pore volume distributions of other known fibrous structures.

The fibrous structures of the present invention may comprise a plurality of filaments, a plurality of solid additives, such as fibers, and a mixture of filaments and solid additives.

As shown in Figs. 1 and 2, examples of fibrous structures according to the present invention as represented by plots A and B exhibit a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121μm to about 200μm and/or greater than about 50% of the total pore volume present in the fibrous structure exists in pores of radii of from about 101μm to about 200μm. The ranges of 101μm to 200μm and 121μm to 200μm are explicitly identified on the graph of Fig. 2. It should be noted that the value for the ending pore radius for the range of 101μm to 120μm is plotted at the ending pore radius; namely, 120μm. A similar result is shown on Fig. 2 for the value for the ending pore radius for the range of 121μm to 140μm, where the value is plotted at the ending pore radius; namely, 140μm. This data is also supported by the values present in Table 1 below.

Such fibrous structures have been found to exhibit consumer-recognizable beneficial absorbent capacity. In one example, the fibrous structures comprise a plurality of solid additives, for example fibers. In another example, the fibrous structures comprise a plurality of filaments. In yet another example, the fibrous structures comprise a mixture of filaments and solid additives, such as fibers.

As shown in Fig. 2, the examples of fibrous structures according to the present invention as represented by plots A and B may exhibit a bi-modal pore volume distribution such that the fibrous structure exhibits a pore volume distribution such that the greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121μm to about 200μm and greater than about 2% and/or greater than about 5% and/or greater than about 10% of the total pore volume present in the fibrous structure exists in pores of radii of less than about 100μm and/or less than about 80μm and/or less than about 50μm and/or from about 1μm to about 100μm and/or from about 5μm to about 75μm and/or 10μm to about 50μm.

A fibrous structure according to the present invention exhibiting a bi-modal pore volume distribution as described above provides beneficial absorbent capacity and absorbent rate as a result of the larger radii pores and beneficial surface drying as a result of the smaller radii pores.

Figs. 3 and 4 show schematic representations of an example of a fibrous structure in accordance with the present invention. As shown in Figs. 3 and 4, the fibrous structure 10 may be a co-formed fibrous structure. The fibrous structure 10 comprises a plurality of filaments 12, such as polypropylene fibers, and a plurality of solid additives, such as wood pulp fibers 14. The filaments 12 may be randomly arranged as a result of the process by which they are spun and/or formed into the fibrous structure 10. The wood pulp fibers 14, may be randomly dispersed throughout the fibrous structure 10 in the x-y plane. The wood pulp fibers 14 may be non-randomly dispersed throughout the fibrous structure in the z-direction. In one example (not shown), the wood pulp fibers 14 are present at a higher concentration on one or more of the exterior, x-y plane surfaces than within the fibrous structure along the z-direction.

As shown in Fig. 5, another example of a fibrous structure in accordance with the present invention is a layered fibrous structure 10'. The layered fibrous structure 10' comprises a first layer 16 comprising a plurality of filaments 12, such as polypropylene filaments, and a plurality of solid additives, in this example wood pulp fibers 14. The layered fibrous structure 10' further comprises a second layer 18 comprising a plurality of filaments 20, such as polypropylene filaments. In one example, the first and second layers 16, 18, respectively, are sharply defined zones of concentration of the filaments and/or solid additives. The plurality of filaments 20 may be deposited directly onto a surface of the first layer 16 to form a layered fibrous structure that comprises the first and second layers 16, 18, respectively.

Further, the layered fibrous structure 10' may comprise a third layer 22, as shown in Fig. 5. The third layer 22 may comprise a plurality of filaments 24, which may be the same or different from the filaments 20 in the second and/or first layers 18, 16. As a result of the addition of the third layer 22, the first layer 16 is positioned, for example sandwiched, between the second layer 18 and the third layer 22. The plurality of filaments 24 may be deposited directly onto a surface of the first layer 16, opposite from the second layer, to form the layered fibrous structure 10' that comprises the first, second and third layers 16, 18, 22, respectively.

As shown in Fig. 6, a cross-sectional schematic representation of another example of a fibrous structure in accordance with the present invention comprising a layered fibrous structure 10" is provided. The layered fibrous structure 10" comprises a first layer 26, a second layer 28 and optionally a third layer 30. The first layer 26 comprises a plurality of filaments 12, such as

polypropylene filaments, and a plurality of solid additives, such as wood pulp fibers 14. The second layer 28 may comprise any suitable filaments, solid additives and/or polymeric films. In one example, the second layer 28 comprises a plurality of filaments 34. In one example, the filaments 34 comprise a polymer selected from the group consisting of: polysaccharides, polysaccharide derivatives, polyvinylalcohol, polyvinylalcohol derivatives and mixtures thereof.

In another example of a fibrous structure in accordance with the present invention, instead of being layers of fibrous structure 10", the material forming layers 26, 28 and 30, may be in the form of plies wherein two or more of the plies may be combined to form a fibrous structure. The plies may be bonded together, such as by thermal bonding and/or adhesive bonding, to form a multi-ply fibrous structure.

Another example of a fibrous structure of the present invention in accordance with the present invention is shown in Fig. 7. The fibrous structure 10"' may comprise two or more plies, wherein one ply 36 comprises any suitable fibrous structure in accordance with the present invention, for example fibrous structure 10 as shown and described in Figs. 3 and 4 and another ply 38 comprising any suitable fibrous structure, for example a fibrous structure comprising filaments 40, such as polypropylene filaments. The fibrous structure of ply 38 may be in the form of a net and/or mesh and/or other structure that comprises pores that expose one or more portions of the fibrous structure 10 to an external environment and/or at least to liquids that may come into contact, at least initially, with the fibrous structure of ply 38. In addition to ply 38, the fibrous structure 10"' may further comprise ply 42. Ply 42 may comprise a fibrous structure comprising filaments 44, such as polypropylene filaments, and may be the same or different from the fibrous structure of ply 38.

Two or more of the plies 36, 38 and 42 may be bonded together, such as by thermal bonding and/or adhesive bonding, to form a multi-ply fibrous structure. After a bonding operation, especially a thermal bonding operation, it may be difficult to distinguish the plies of the fibrous structure 10"' and the fibrous structure 10"' may visually and/or physically be a similar to a layered fibrous structure in that one would have difficulty separating the once individual plies from each other. In one example, ply 36 may comprise a fibrous structure that exhibits a basis weight of at least about 15 g/m^2 and/or at least about 20 g/m^2 and/or at least about 25 g/m^2 and/or at least about 30 g/m^2 up to about 120 g/m^2 and/or 100 g/m^2 and/or 80 g/m^2 and/or 60 g/m^2 and the plies 38 and 42, when present, independently and individually, may comprise fibrous structures that exhibit basis weights of less than about 10 g/m^2 and/or less than

about 7 g/m^2 and/or less than about 5 g/m^2 and/or less than about 3 g/m^2 and/or less than about 2 g/m^2 and/or to about 0 g/m^2 and/or 0.5 g/m^2.

Plies 38 and 42, when present, may help retain the solid additives, in this case the wood pulp fibers 14, on and/or within the fibrous structure of ply 36 thus reducing lint and/or dust (as compared to a single-ply fibrous structure comprising the fibrous structure of ply 36 without the plies 38 and 42) resulting from the wood pulp fibers 14 becoming free from the fibrous structure of ply 36.

The fibrous structures of the present invention may comprise any suitable amount of filaments and any suitable amount of solid additives. For example, the fibrous structures may comprise from about 10% to about 70% and/or from about 20% to about 60% and/or from about 30% to about 50% by dry weight of the fibrous structure of filaments and from about 90% to about 30% and/or from about 80% to about 40% and/or from about 70% to about 50% by dry weight of the fibrous structure of solid additives, such as wood pulp fibers.

The filaments and solid additives of the present invention may be present in fibrous structures according to the present invention at weight ratios of filaments to solid additives of from at least about 1:1 and/or at least about 1:1.5 and/or at least about 1:2 and/or at least about 1:2.5 and/or at least about 1:3 and/or at least about 1:4 and/or at least about 1:5 and/or at least about 1:7 and/or at least about 1:10.

The fibrous structures of the present invention and/or any sanitary tissue products comprising such fibrous structures may be subjected to any post-processing operations such as embossing operations, printing operations, tuft-generating operations, thermal bonding operations, ultrasonic bonding operations, perforating operations, surface treatment operations such as application of lotions, silicones and/or other materials and mixtures thereof.

Any hydrophobic or non-hydrophilic materials within the fibrous structure, such as polypropylene filaments, may be surface treated and/or melt treated with a hydrophilic modifier. Nonlimiting examples of surface treating hydrophilic modifiers include surfactants, such as Triton X-100. Nonlimiting examples of melt treating hydrophilic modifiers that are added to the melt, such as the polypropylene melt, prior to spinning filaments, include hydrophilic modifying melt additives such as VW351 commercially available from Polyvel, Inc. and Irgasurf commercially available from Ciba. The hydrophilic modifier may be associated with the hydrophobic or non-hydrophilic material at any suitable level known in the art. In one example, the hydrophilic modifier is associated with the hydrophobic or non-hydrophilic material at a level of less than about 20% and/or less than about 15% and/or less than about 10% and/or less than

about 5% and/or less than about 3% to about 0% by dry weight of the hydrophobic or non-hydrophilic material.

The fibrous structures of the present invention may include optional additives, each, when present, at individual levels of from about 0% and/or from about 0.01% and/or from about 0.1% and/or from about 1% and/or from about 2% to about 95% and/or to about 80% and/or to about 50% and/or to about 30% and/or to about 20% by dry weight of the fibrous structure. Nonlimiting examples of optional additives include permanent wet strength agents, temporary wet strength agents, dry strength agents such as carboxymethylcellulose and/or starch, softening agents, lint reducing agents, opacity increasing agents, wetting agents, odor absorbing agents, perfumes, temperature indicating agents, color agents, dyes, osmotic materials, microbial growth detection agents, antibacterial agents and mixtures thereof.

The fibrous structure of the present invention may itself be a sanitary tissue product. It may be convolutedly wound about a core to form a roll. It may be combined with one or more other fibrous structures as a ply to form a multi-ply sanitary tissue product. In one example, a co-formed fibrous structure of the present invention may be convolutedly wound about a core to form a roll of co-formed sanitary tissue product. The rolls of sanitary tissue products may also be coreless.

As shown in Fig. 8, a fibrous structure roll 46 comprising a fibrous structure, such as a fibrous structure according to the present invention, comprises end edges 48, 50. At least one of the end edges 48, 50 comprises a bond region 52. The bond region 52 may comprise a plurality of bond subregions (not shown) that are present at a frequency of at least about 10 and/or at least about 50 and/or at least about 100 and/or at least about 200 per inch, such as dots per inch (dpi). In one example, the bond region 52 may cover the entire or substantially the entire surface area of the end edge 48. In one example, the bond region 52 comprises greater than about 20% and/or greater than about 25% and/or greater than about 30% and/or greater than about 50% of the total surface area of the end edge 48. In one example, the bond region 52 is a film that comprises the entire or substantially entire total surface area of the end edge 48. In another example, the bond region 52 is present on a non-lotioned fibrous structure.

The bond region 52 may comprise a bonding agent selected from chemical agents and/or mechanical agents. Nonlimiting examples of chemical agents include dry strength agents and wet strength agents and mixtures thereof. The mechanical agents may be in the form of a liquid and/or a solid. A liquid mechanical agent may be an oil. A solid mechanical agent may be a wax.

The bond region 52 may comprise different types of bonding agents and/or bonding agents that are chemically different from the filaments and/or fibers present in the fibrous structure. In one example, the material comprises a bonding agent, such as a dry strength resin such as a polysaccharide and/or a polysaccharide derivative and temporary and permanent wet strength resins. Nonlimiting examples of suitable bonding agents include latex dispersions, polyvinyl alcohol, Parez®, Kymene®, carboxymethylcellulose and starch.

As shown in Fig. 9, a fibrous structure 54 in accordance with the present invention may comprise edges 56, 58, 60, 62. One or more of the edges 56, 58, 60, 62 may comprise a bond region 64. The bond region 64 may extend inwardly from the edge 56, for example less than about 1 cm and/or less than about 0.5 cm. Any of the edges may comprise such a bond region. The bond region 64 may comprise a plurality of bond subregions (not shown) that are present at a frequency of at least 10 and/or at least 50 and/or at least 100 and/or at least 200 per inch, such as dots per inch (dpi). The bond region 64 may comprise a material chemically different from the filaments and/or fibers present in the fibrous structure. In one example, the material comprises a bonding agent, such as a dry strength resin such as a polysaccharide and/or a polysaccharide derivative. Nonlimiting examples of suitable bonding agents include carboxymethylcellulose and starch

To further illustrate the fibrous structures of the present invention, Table 1 sets forth the average pore volume distributions of known and/or commercially available fibrous structures and a fibrous structure in accordance with the present invention.

Table 1

Pore Radius (μm)	Huggies®	Huggies® Wash Cloth	Duramax	Concert EBT.055.1010 TBAL	LBAL-DUNI embossed	Bounty®	Invention Example A	Invention Example B
1	0	0	0	0	0	0	0	0
2.5	19.25	29.6	32.4	33.65	34.4	31.1	19.55	15.85
5	11.65	16.1	17.85	18.1	18.25	17.6	12.4	7.95
10	11.7	12.6	28.5	14.4	14.75	32.8	10.35	6.45
15	7.95	7.05	101.7	8.65	8.5	52.3	6.45	3.2
20	7.15	4.65	62.7	6.45	6.4	36.7	3.8	2.45
30	31.35	6.45	91.55	9.1	9.55	54	7.1	3.65
40	110.4	5.5	82.1	26.3	127.25	47.8	6.4	3.4
50	133.05	6.5	77.35	65.95	71.4	43.6	6.5	4.6
60	200.1	96.55	70.5	74.7	59.95	38.9	7.5	6.55
70	302.45	144.85	61.65	70.25	69.05	36.3	13.85	11.3
80	336.9	132.35	56.05	102.05	95.05	33.9	150.85	63.15

90	250.9	150.8	49.3	174.05	150.1	33	137.5	128
100	160.15	162.8	48.3	293	232.9	32.2	143.35	129.25
120	172.8	394.1	95.6	693.4	464.15	64.7	359.75	306.05
140	85.1	451.7	89.5	162.55	176.45	68.5	578.8	521.95
160	54	505.45	76.6	19.35	49.6	74.8	485.85	613.35
180	37.3	509.7	63.45	10.15	24.3	78.5	257.65	243.3
200	30.15	450.95	50	8.2	18.55	89.2	108.7	69.15
225	28.2	409.15	51.6	8.5	18.95	134.4	56.15	32.55
250	22.85	245.2	44	7.5	16.25	149.8	32.3	20.6
275	22.15	144.1	40.25	2.7	14.9	157.9	22.75	13.75
300	18.4	101.3	35.95	10.05	13.75	125.7	24.6	7.9
350	29.95	153.2	60.7	10.9	25.4	145	41.95	24.45
400	24.25	141.7	59.25	9.65	26.65	52.4	40.55	17.55
500	45.6	271.15	266.45	15.75	116.85	56	51.45	31.05
600	34.3	230.95	291.9	14.5	71.3	23.9	33.45	27.95
800	46.65	261.6	162.4	24.3	34.25	34.9	45.35	32.6
1000	38.75	112.55	29.15	24.9	30.35	24.9	34.6	25.55
Total	2273.45	5158.6	2196.75	1919.05	1999.25	1770.8	2699.5	2373.55
101-200 μm	16.7%	44.8%	17.1%	46.6%	36.7%	21.2%	66.3%	73.9%
121-200 μm	9.1%	37.2%	12.7%	10.4%	13.5%	17.6%	53.0%	61.0%

The fibrous structures of the present invention may exhibit a unique combination of fibrous structure properties that do not exist in known fibrous structures. For example, the fibrous structures may exhibit a VFS of greater than about 11 g/g and/or greater than about 12 g/g and/or greater than about 13 g/g and/or greater than about 14 g/g and/or less than about 50 g/g and/or less than about 40 g/g and/or less than about 30 g/g and/or less than about 20 g/g and/or from about 11 g/g to about 50 g/g and/or from about 11 g/g to about 40 g/g and/or from about 11 g/g to about 30 g/g and/or from about 11 g/g to about 20 g/g.

In addition to the VFS property, the fibrous structures of the present invention may exhibit a Dry CD Tensile Modulus of less than about 1500 g/cm and/or less than about 1400 g/cm and/or less than about 1300 g/cm and/or less than about 1100 g/cm and/or less than about 1000 g/cm and/or less than about 800 g/cm and/or greater than about 50 g/cm and/or greater than about 100 g/cm and/or greater than about 300 g/cm and/or from about 50 g/cm to about 1500 g/cm and/or from about 100 g/cm to about 1400 g/cm and/or from about 100 g/cm to about 1300 g/cm.

In addition to the VFS property and/or the Dry CD Tensile Modulus property, the fibrous structures of the present invention may exhibit a Wet CD TEA of greater than about 35 (g · in)/in^2 and/or greater than about 50 (g · in)/in^2 and/or greater than about 75 (g · in)/in^2 and/or greater than about 90 (g · in)/in^2 and/or greater than about 150 (g · in)/in^2 and/or greater than about 175 (g · in)/in^2 and/or less than about 500 (g · in)/in^2 and/or less than about 400 (g · in)/in^2 and/or less than about 350 (g · in)/in^2 and/or less than about 300 (g · in)/in^2 and/or from about 35 (g · in)/in^2 to about 500 (g · in)/in^2 and/or from about 35 (g · in)/in^2 to about 400 (g · in)/in^2 and/or from about 50 (g · in)/in^2 to about 350 (g · in)/in^2 and/or from about 75 (g · in)/in^2 to about 300 (g · in)/in^2.

In addition to the VFS property and/or the Dry CD Tensile Modulus property and/or the Wet CD TEA, the fibrous structures of the present invention may exhibit a Wet MD TEA of greater than about 40 (g · in)/in^2 and/or greater than about 50 (g · in)/in^2 and/or greater than about 75 (g · in)/in^2 and/or greater than about 90 (g · in)/in^2 and/or greater than about 150 (g · in)/in^2 and/or greater than about 175 (g · in)/in^2 and/or less than about 500 (g · in)/in^2 and/or less than about 400 (g · in)/in^2 and/or less than about 350 (g · in)/in^2 and/or less than about 300 (g · in)/in^2 and/or from about 40 (g · in)/in^2 to about 500 (g · in)/in^2 and/or from about 35 (g · in)/in^2 to about 400 (g · in)/in^2 and/or from about 50 (g · in)/in^2 to about 350 (g · in)/in^2 and/or from about 75 (g · in)/in^2 to about 300 (g · in)/in^2.

In one example of the fibrous structures of the present invention, the fibrous structure exhibits a VFS of greater than about 11 g/g and one or more of the following: a Dry CD Tensile Modulus of less than about 1500 g/cm and/or a Wet CD TEA of greater than about 35 (g · in)/in^2 and/or a Wet MD TEA of greater than about 40 (g · in)/in^2.

The values of these properties associated with a fibrous structure are determined according to the respective test methods described herein.

To further illustrate the fibrous structures of the present invention, Table 2 sets forth certain properties of known and commercially available fibrous structures and a fibrous structure in accordance with the present invention.

Table 2

Property	Duramax®	Viva® (Wetlaid)	Viva® (Airlaid)	Bounty®	Scott®	Sparkle®	Invention Example
Wet MD TEA (g·in)/in^2	377	21.4	34.5	22.4	16.7	14.8	90

Property	Duramax®	Viva® (Wetlaid)	Viva® (Airlaid)	Bounty®	Scott®	Sparkle®	Invention Example
Wet CD TEA $(g \cdot in)/in^2$	340	22.6	31.7	18.1	8.9	8.1	209
Dry CD Tensile Modulus g/cm	728	299	660	1844	1500	5900	400
VFS g/g	5.7	10.4	10.9	9.9	8	5.6	13

Process For Making A Fibrous Structure

A nonlimiting example of a process for making a fibrous structure according to the present invention is represented in Fig. 10. The process shown in Fig. 10 comprises the step of mixing a plurality of solid additives 14 with a plurality of filaments 12. In one example, the solid additives 14 are wood pulp fibers, such as SSK fibers and/or Eucalytpus fibers, and the filaments 12 are polypropylene filaments. The solid additives 14 may be combined with the filaments 12, such as by being delivered to a stream of filaments 12 from a hammermill 66 via a solid additive spreader 67 to form a mixture of filaments 12 and solid additives 14. The filaments 12 may be created by meltblowing from a meltblow die 68. The mixture of solid additives 14 and filaments 12 are collected on a collection device, such as a belt 70 to form a fibrous structure 72. The collection device may be a patterned and/or molded belt that results in the fibrous structure exhibiting a surface pattern, such as a non-random, repeating pattern. The molded belt may have a three-dimensional pattern on it that gets imparted to the fibrous structure 72 during the process.

In one example of the present invention, the fibrous structures are made using a die comprising at least one filament-forming hole, and/or 2 or more and/or 3 or more rows of filament-forming holes from which filaments are spun. At least one row of holes contains 2 or more and/or 3 or more and/or 10 or more filament-forming holes. In addition to the filament-forming holes, the die comprises fluid-releasing holes, such as gas-releasing holes, in one example air-releasing holes, that provide attenuation to the filaments formed from the filament-forming holes. One or more fluid-releasing holes may be associated with a filament-forming hole such that the fluid exiting the fluid-releasing hole is parallel or substantially parallel (rather

than angled like a knife-edge die) to an exterior surface of a filament exiting the filament-forming hole. In one example, the fluid exiting the fluid-releasing hole contacts the exterior surface of a filament formed from a filament-forming hole at an angle of less than 30° and/or less than 20° and/or less than 10° and/or less than 5° and/or about 0°. One or more fluid releasing holes may be arranged around a filament-forming hole. In one example, one or more fluid-releasing holes are associated with a single filament-forming hole such that the fluid exiting the one or more fluid releasing holes contacts the exterior surface of a single filament formed from the single filament-forming hole. In one example, the fluid-releasing hole permits a fluid, such as a gas, for example air, to contact the exterior surface of a filament formed from a filament-forming hole rather than contacting an inner surface of a filament, such as what happens when a hollow filament is formed.

In one example, the die comprises a filament-forming hole positioned within a fluid-releasing hole. The fluid-releasing hole 74 may be concentrically or substantially concentrically positioned around a filament-forming hole 76 such as is shown in Fig. 11.

In another example, the die comprises filament-forming holes and fluid-releasing holes arranged to produce a plurality of filaments that exhibit a broader range of filament diameters than known filament-forming hole dies, such as knife-edge dies. For example, as shown in Fig. 12, a fibrous structure made by a known knife-edge die produces a fibrous structure comprising filaments having a narrower distribution of average filament diameters than a fibrous structure made by a die according to the present invention, as shown in Fig. 13. As is evidenced by Fig. 13, the fibrous structure made by a die according to the present invention may comprise filaments that exhibit an average filament diameter of less than 1μm. Such filaments are not seen in the fibrous structure made by the known knife-edge die as shown in Fig. 12.

After the fibrous structure 72 has been formed on the collection device, the fibrous structure 72 may be subjected to post-processing operations such as embossing, thermal bonding, tuft-generating operations, moisture-imparting operations, and surface treating operations to form a finished fibrous structure. One example of a surface treating operation that the fibrous structure may be subjected to is the surface application of an elastomeric binder, such as ethylene vinyl acetate (EVA), latexes, and other elastomeric binders. Such an elastomeric binder may aid in reducing the lint created from the fibrous structure during use by consumers. The elastomeric binder may be applied to one or more surfaces of the fibrous structure in a pattern, especially a non-random repeating pattern, or in a manner that covers or substantially covers the entire surface(s) of the fibrous structure.

In one example, the fibrous structure 72 and/or the finished fibrous structure may be combined with one or more other fibrous structures. For example, another fibrous structure, such as a filament-containing fibrous structure, such as a polypropylene filament fibrous structure may be associated with a surface of the fibrous structure 72 and/or the finished fibrous structure. The polypropylene filament fibrous structure may be formed by meltblowing polypropylene filaments (filaments that comprise a second polymer that may be the same or different from the polymer of the filaments in the fibrous structure 72) onto a surface of the fibrous structure 72 and/or finished fibrous structure. In another example, the polypropylene filament fibrous structure may be formed by meltblowing filaments comprising a second polymer that may be the same or different from the polymer of the filaments in the fibrous structure 72 onto a collection device to form the polypropylene filament fibrous structure. The polypropylene filament fibrous structure may then be combined with the fibrous structure 72 or the finished fibrous structure to make a two-ply fibrous structure – three-ply if the fibrous structure 72 or the finished fibrous structure is positioned between two plies of the polypropylene filament fibrous structure like that shown in Fig. 5 for example. The polypropylene filament fibrous structure may be thermally bonded to the fibrous structure 72 or the finished fibrous structure via a thermal bonding operation.

In yet another example, the fibrous structure 72 and/or finished fibrous structure may be combined with a filament-containing fibrous structure such that the filament-containing fibrous structure, such as a polysaccharide filament fibrous structure, such as a starch filament fibrous structure, is positioned between two fibrous structures 72 or two finished fibrous structures like that shown in Fig. 6 for example.

The process for making fibrous structure 72 may be close coupled (where the fibrous structure is convolutedly wound into a roll prior to proceeding to a converting operation) or directly coupled (where the fibrous structure is not convolutedly wound into a roll prior to proceeding to a converting operation) with a converting operation to emboss, print, deform, surface treat, or other post-forming operation known to those in the art. For purposes of the present invention, direct coupling means that the fibrous structure 72 can proceed directly into a converting operation rather than, for example, being convolutedly wound into a roll and then unwound to proceed through a converting operation.

The process of the present invention may include preparing individual rolls of fibrous structure and/or sanitary tissue product comprising such fibrous structure(s) that are suitable for consumer use. The fibrous structure may be contacted by a bonding agent (such as an adhesive

and/or dry strength agent), such that the ends of a roll of sanitary tissue product according to the present invention comprise such adhesive and/or dry strength agent.

The process may further comprise contacting an end edge of a roll of fibrous structure with a material that is chemically different from the filaments and fibers, to create bond regions that bond the fibers present at the end edge and reduce lint production during use. The material may be applied by any suitable process known in the art. Nonlimiting examples of suitable processes for applying the material include non-contact applications, such as spraying, and contact applications, such as gravure roll printing, extruding, surface transferring. In addition, the application of the material may occur by transfer from contact of a log saw and/or perforating blade containing the material since, for example, the perforating operation, an edge of the fibrous structure that may produce lint upon dispensing a fibrous structure sheet from an adjacent fibrous structure sheet may be created.

Nonlimiting Example of Process for Making a Fibrous Structure of the Present Invention:

A 47.5% :47.5%:5% blend of Exxon-Mobil PP3546 polypropylene : Sunoco CP200VM polypropylene : Polyvel S-1416 wetting agent is dry blended, to form a melt blend. The melt blend is heated to 475°F through a melt extruder. A 10" wide Biax 12 row spinnerette with 192 nozzles per cross-direction inch, commercially available from Biax Fiberfilm Corporation, is utilized. 32 nozzles per cross-direction inch of the 192 nozzles have a 0.018" inside diameter while the remaining nozzles are solid, i.e. there is no opening in the nozzle. Approximately 0.17 grams per hole per minute (ghm) of the melt blend is extruded from the open nozzles to form meltblown filaments from the melt blend. Approximately 200 SCFM of compressed air is heated such that the air exhibits a temperature of 395°F at the spinnerette. Approximately 175 grams / minute of Koch 4825 semi-treated SSK pulp is defibrillated through a hammermill to form SSK wood pulp fibers (solid additive). 330 SCFM of air at 85-90°F and 85% relative humidity (RH) is drawn into the hammermill and carries the pulp fibers to a solid additive spreader. The solid additive spreader turns the pulp fibers and distributes the pulp fibers in the cross-direction such that the pulp fibers are injected into the meltblown filaments in a perpendicular fashion through a 2" x 10" cross-direction (CD) slot. A forming box surrounds the area where the meltblown filaments and pulp fibers are commingled. This forming box is designed to reduce the amount of air allowed to enter or escape from this commingling area; however, there is a 2" x 12" opening in the bottom of the forming box designed to permit additional cooling air to enter. A forming vacuum pulls air through a forming fabric thus collecting the commingled meltblown filaments and pulp fibers to form a fibrous structure. The forming vacuum is adjusted until an additional

400 SCFM of room air is drawn into the slot in the forming box. The fibrous structure formed by this process comprises about 75% by dry fibrous structure weight of pulp and about 25% by dry fibrous structure weight of meltblown filaments.

As shown in Fig. 14, the solid additive spreader 78 has an inlet 80 and an exit 82. Any suitable material known in the art may be used to make the spreader 78. Nonlimiting examples of suitable materials include non-conductive materials. For example, stainless steel and/or sheet metal may be used to fabricate the spreader 78. A pulp and air mixture 84 created in the hammermill (not shown) enters the spreader 78 through a duct (not shown) connecting the hammermill and spreader 78 at greater than about 8,000 fpm velocity and/or greater than about 14,000 fpm. The inlet 80 is tilted at an angle α at approximately 5° upstream from perpendicular of the exit 82. The exit 82 of the solid additive spreader 78 has a height H in the range of about 2.54 cm (1 inch) to about 25.40 cm (10 inches). The width W of the exit 82 is from about 1.27 cm (0.5 inch) to about 10.16 cm (4 inches). Typically the width W of the exit 82 is about 5.08 cm (2 inches). The length L of the spreader 78 is from about 60.96 cm (24 inches) to about 243.84 cm (96 inches) and/or from about 91.44 cm (36 inches) to about 182.88 cm (72 inches) and/or from about 121.92 cm (48 inches) to about 152.40 cm (60 inches). A tapering of the height H of the spreader 78 occurs from the inlet end 86 to the exit end 88 to continually accelerate the pulp and air mixture 84. This tapering is from about 10.16 cm (4 inches) in height at the inlet 80 to about 5.08 cm (2 inches) in height at the exit 82. However, the spreader 78 may incorporate other similar taperings. The inlet end 86 of the spreader 78 has a semi-circular arc from the top view with a radius of from about 7.62 cm (3 inches) to about 50.80 cm (20 inches) and/or from about 12.70 cm (5 inches) to about 25.40 cm (10 inches). As shown in Fig. 15, multiple semi-circular arcs can be assembled to produce the desired spreader width. Each semi-circular arc would comprise its own inlet 80 centered in each of these semi-circular arcs.

Optionally, a meltblown layer of the meltblown filaments can be added to one or both sides of the above formed fibrous structure. This addition of the meltblown layer can help reduce the lint created from the fibrous structure during use by consumers and is preferably performed prior to any thermal bonding operation of the fibrous structure. The meltblown filaments for the exterior layers can be the same or different than the meltblown filaments used on the opposite layer or in the center layer(s).

The fibrous structure may be convolutedly wound to form a roll of fibrous structure. The end edges of the roll of fibrous structure may be contacted with a material to create bond regions.

TEST METHODS

Unless otherwise indicated, all tests described herein including those described under the Definitions section and the following test methods are conducted on samples that have been conditioned in a conditioned room at a temperature of 73°F ± 4°F (about 23°C ± 2.2°C) and a relative humidity of 50% ± 10% for 2 hours prior to the test. Samples conditioned as described herein are considered dry samples (such as "dry fibrous structures") for purposes of this invention. Further, all tests are conducted in such conditioned room.

A. Pore Volume Distribution Test Method

Pore Volume Distribution measurements are made on a TRI/Autoporosimeter (TRI/Princeton Inc. of Princeton, NJ). The TRI/Autoporosimeter is an automated computer-controlled instrument for measuring pore volume distributions in porous materials (e.g., the volumes of different size pores within the range from 1 to 1000 μm effective pore radii). Complimentary Automated Instrument Software, Release 2000.1, and Data Treatment Software, Release 2000.1 is used to capture, analyze and output the data. More information on the TRI/Autoporosimeter, its operation and data treatments can be found in The Journal of Colloid and Interface Science 162 (1994), pgs 163-170, incorporated here by reference.

As used in this application, determining Pore Volume Distribution involves recording the increment of liquid that enters a porous material as the surrounding air pressure changes. A sample in the test chamber is exposed to precisely controlled changes in air pressure. The size (radius) of the largest pore able to hold liquid is a function of the air pressure. As the air pressure increases (decreases), different size pore groups drain (absorb) liquid. The pore volume of each group is equal to this amount of liquid, as measured by the instrument at the corresponding pressure. The effective radius of a pore is related to the pressure differential by the following relationship.

$$\text{Pressure differential} = [(2)\,\gamma \cos\Theta] / \text{effective radius}$$

where γ = liquid surface tension, and Θ = contact angle.

Typically pores are thought of in terms such as voids, holes or conduits in a porous material. It is important to note that this method uses the above equation to calculate effective pore radii based on the constants and equipment controlled pressures. The above equation assumes uniform cylindrical pores. Usually, the pores in natural and manufactured porous materials are not perfectly cylindrical, nor all uniform. Therefore, the effective radii reported here may not equate exactly to measurements of void dimensions obtained by other methods such as microscopy. However, these measurements do provide an accepted means to characterize relative differences in void structure between materials.

The equipment operates by changing the test chamber air pressure in user-specified increments, either by decreasing pressure (increasing pore size) to absorb liquid, or increasing pressure (decreasing pore size) to drain liquid. The liquid volume absorbed (drained) at each pressure increment is the cumulative volume for the group of all pores between the preceding pressure setting and the current setting.

In this application of the TRI/Autoporosimeter, the liquid is a 0.2 weight % solution of octylphenoxy polyethoxy ethanol (Triton X-100 from Union Carbide Chemical and Plastics Co. of Danbury, CT.) in distilled water. The instrument calculation constants are as follows: ρ (density) = 1 g/cm^3; γ (surface tension) = 31 dynes/cm; cosΘ = 1. A 0.22μm Millipore Glass Filter (Millipore Corporation of Bedford, MA; Catalog # GSWP09025) is employed on the test chamber's porous plate. A plexiglass plate weighing about 24 g (supplied with the instrument) is placed on the sample to ensure the sample rests flat on the Millipore Filter. No additional weight is placed on the sample.

The remaining user specified inputs are described below. The sequence of pore sizes (pressures) for this application is as follows (effective pore radius in μm): 1, 2.5, 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 120, 140, 160, 180, 200, 225, 250, 275, 300, 350, 400, 500, 600, 800, 1000. This sequence starts with the sample dry, saturates it as the pore settings increase (typically referred to with respect to the procedure and instrument as the 1st absorption).

In addition to the test materials, a blank condition (no sample between plexiglass plate and Millipore Filter) is run to account for any surface and/or edge effects within the chamber. Any pore volume measured for this blank run is subtracted from the applicable pore grouping of the test sample. This data treatment can be accomplished manually or with the available TRI/Autoporosimeter Data Treatment Software, Release 2000.1.

Percent (%)Total Pore Volume is a percentage calculated by taking the volume of fluid in the specific pore radii range divided by the Total Pore Volume. The TRI/Autoporosimeter outputs the volume of fluid within a range of pore radii. The first data obtained is for the "2.5 micron" pore radii which includes fluid absorbed between the pore sizes of 1 to 2.5 micron radius. The next data obtained is for "5 micron" pore radii, which includes fluid absorbed between the 2.5micron and 5 micron radii, and so on. Following this logic, to obtain the volume held within the range of 101-200 micron radii, one would sum the volumes obtained in the range titled "120 micron", "140 micron", "160 micron", "180 micron", and finally the "200 micron" pore radii ranges. For example, % Total Pore Volume 101-200 micron pore radii = (volume of fluid between 101-200 micron pore radii) / Total Pore Volume

B. Horizontal Full Sheet (HFS) Test Method

The Horizontal Full Sheet (HFS) test method determines the amount of distilled water absorbed and retained by a fibrous structure of the present invention. This method is performed by first weighing a sample of the fibrous structure to be tested (referred to herein as the "dry weight of the sample"), then thoroughly wetting the sample, draining the wetted sample in a

horizontal position and then reweighing (referred to herein as "wet weight of the sample"). The absorptive capacity of the sample is then computed as the amount of water retained in units of grams of water absorbed by the sample. When evaluating different fibrous structure samples, the same size of fibrous structure is used for all samples tested.

The apparatus for determining the HFS capacity of fibrous structures comprises the following:

1) An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sample tested (i.e.; a fibrous structure sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

2) A sample support rack (Fig. 16) and sample support rack cover (Fig. 17) is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid as shown in Fig. 16. The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The HFS test is performed in an environment maintained at 23± 1° C and 50± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23± 1 ° C to a depth of 3 inches (7.6 cm).

Eight samples of a fibrous structure to be tested are carefully weighed on the balance to the nearest 0.01 grams. The dry weight of each sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). One sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched between the rack and cover) is submerged in the water reservoir. After the sample is submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain horizontally for 120±5 seconds, taking care not to excessively shake or vibrate the sample. While the sample is draining, the rack cover is carefully removed and all excess water is wiped from the support rack. The wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The gram per fibrous structure sample absorptive capacity of the sample is defined as (wet weight of the sample - dry weight of the sample). The horizontal absorbent capacity (HAC)

is defined as: absorbent capacity = (wet weight of the sample - dry weight of the sample) / (dry weight of the sample) and has a unit of gram/gram.

C. Vertical Full Sheet (VFS) Test Method

The Vertical Full Sheet (VFS) test method determines the amount of distilled water absorbed and retained by a fibrous structure of the present invention. This method is performed by first weighing a sample of the fibrous structure to be tested (referred to herein as the "dry weight of the sample"), then thoroughly wetting the sample, draining the wetted sample in a vertical position and then reweighing (referred to herein as "wet weight of the sample"). The absorptive capacity of the sample is then computed as the amount of water retained in units of grams of water absorbed by the sample. When evaluating different fibrous structure samples, the same size of fibrous structure is used for all samples tested.

The apparatus for determining the VFS capacity of fibrous structures comprises the following:

1) An electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sample tested (i.e.; a fibrous structure sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

2) A sample support rack (Fig. 16) and sample support rack cover (Fig. 17) is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid as shown in Fig. 16. The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

The VFS test is performed in an environment maintained at 23± 1° C and 50± 2% relative humidity. A water reservoir or tub is filled with distilled water at 23± 1 ° C to a depth of 3 inches (7.6 cm).

Eight 19.05 cm (7.5 inch) x 19.05 cm (7.5 inch) to 27.94 cm (11 inch) x 27.94 cm (11 inch) samples of a fibrous structure to be tested are carefully weighed on the balance to the nearest 0.01 grams. The dry weight of each sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). One sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched

between the rack and cover) is submerged in the water reservoir. After the sample is submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain vertically for 60±5 seconds, taking care not to excessively shake or vibrate the sample. While the sample is draining, the rack cover is carefully removed and all excess water is wiped from the support rack. The wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01g. This is the wet weight of the sample.

The procedure is repeated for with another sample of the fibrous structure, however, the sample is positioned on the support rack such that the sample is rotated 90° compared to the position of the first sample on the support rack.

The gram per fibrous structure sample absorptive capacity of the sample is defined as (wet weight of the sample - dry weight of the sample). The calculated VFS is the average of the absorptive capacities of the two samples of the fibrous structure.

D. Wet MD TEA, Wet CD TEA, Dry CD Tensile Modulus ("Tangent Modulus") Test Methods

The Wet MD TEA, Wet CD TEA and Dry CD Tensile Modulus of a fibrous structure are all determined using a Thwing Albert EJA Tensile Tester. A 2.54 cm (1 inch) wide strip of the fibrous structure to be tested is placed in the grips of the Tensile Tester at a gauge length of 10.16 cm (4 inches). The Crosshead Speed of the Tensile Tester is set at 10.16 cm/min (4 inches/min) and the Break Sensitivity is set at 20 g. Eight (8) samples are run on the Tensile Tester and an average of the respective Wet MD TEA, Wet CD TEA values from the 8 samples is reported as the Wet MD TEA value and the Wet CD TEA. The Dry CD Tensile Modulus is reported as the average of the Dry CD Tensile Modulus from the 8 samples measured at 15 g/cm.

E. Basis Weight Test Method

Basis weight is measured by preparing one or more samples of a certain area (m^2) and weighing the sample(s) of a fibrous structure according to the present invention and/or a paper product comprising such fibrous structure on a top loading balance with a minimum resolution of 0.01 g. The balance is protected from air drafts and other disturbances using a draft shield. Weights are recorded when the readings on the balance become constant. The average weight (g) is calculated and the average area of the samples (m^2). The basis weight (g/m^2) is calculated by dividing the average weight (g) by the average area of the samples (m^2).

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range

surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention. To the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

CLAIMS

What is claimed is:

1. A process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying at least a first polymer to the die;

c. producing a plurality of filaments comprising the first polymer from the die;

d. combining the filaments with solid additives to form a mixture; and

e. collecting the mixture on a collection device to produce a fibrous structure.

2. The process according to Claim 1 wherein the die comprises two or more rows of filament-forming holes.

3. The process according to Claim 2 wherein at least one row of filament-forming holes comprises two or more filament-forming holes.

4. The process according to Claim 1 wherein more than one fluid-releasing hole are associated with a filament-forming hole.

5. The process according to Claim 1 wherein one fluid-releasing hole is concentrically positioned around one filament-forming hole.

6. The process according to Claim 1 wherein the first polymer comprises a synthetic polymer.

7. The process according to Claim 6 wherein the synthetic polymer is selected from the group consisting of: polyvinyl alcohol, polyvinyl alcohol derivatives, polyesters, nylons, polyolefins, polylactic acids, polyhydroxyalkanoates , polycaprolactones and mixtures thereof.

8. The process according to Claim 7 wherein the synthetic polymer comprises a polyolefin.

9. The process according to Claim 8 wherein the polyolefin comprises polypropylene.

10. The process according to Claim 1 wherein the first polymer comprises a natural polymer.

11. The process according to Claim 10 wherein the natural polymer is selected from the group consisting of: starch, starch derivatives, cellulose, cellulose derivatives, hemicellulose, hemicellulose derivatives and mixtures thereof.

12. The process according to Claim 1 wherein the solid additives comprise fibers.

13. The process according to Claim 12 wherein the fibers comprise wood pulp fibers.

14. The process according to Claim 1 wherein the solid additives are combined with the plurality of filaments by a solid additive spreader.

15. The process according to Claim 1 wherein the process further comprises the step of:

f. contacting a surface of the fibrous structure with a plurality of filaments comprising a second polymer.

16. The process according to Claim 15 wherein the plurality of filaments comprising the second polymer are in the form of a second fibrous structure.

17. The process according to Claim 15 wherein the second polymer is the same as the first polymer.

18. The process according to Claim 1 wherein the fluid released by the fluid-releasing holes comprises air.

19. The process according to Claim 1 wherein the fibrous structure exhibits a pore volume distribution such that greater than about 40% of the total pore volume present in the fibrous structure exists in pores of radii of from about 121μm to about 200μm.

20. The process according to Claim 1 wherein the process further comprises the step of subjecting the fibrous structure to a thermal bonding operation.

21. The process according to Claim 1 wherein the process is directly coupled to a post-processing operation.

22. The process according to Claim 1 wherein the process is closely coupled to a post-processing operation.

23. A process for making a fibrous structure, the process comprising the steps of:

a. providing a die comprising one or more filament-forming holes, wherein one or more fluid-releasing holes are associated with one filament-forming hole such that a fluid exiting the fluid-releasing hole is parallel or substantially parallel to an exterior surface of a filament exiting the filament-forming hole;

b. supplying a polyolefin polymer to the die;

c. producing a plurality of filaments comprising the polyolefin polymer from the die;

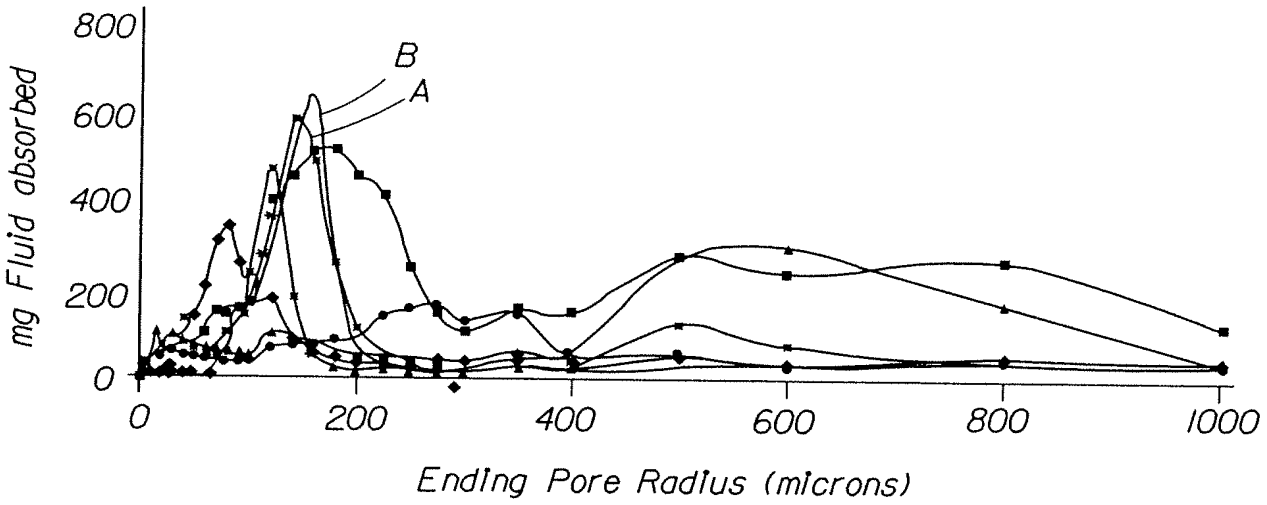
d. combining the filaments with wood pulp fibers to form a mixture; and

e. collecting the mixture on a collection device to produce a fibrous structure.

ABSTRACT

Processes for making fibrous structures and more particularly processes for making fibrous structures comprising filaments are provided.

1/12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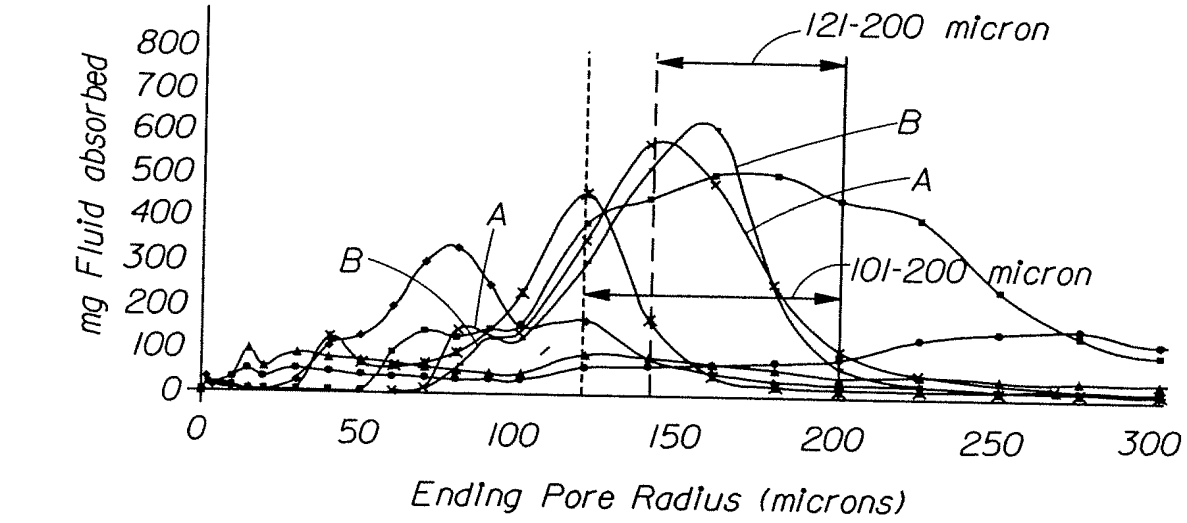
mg Fluid absorbed
B
A
0
200
400
600
800
1000
Ending Pore Radius (microns)
Huggies (coform prior art)
Duramax
LBAL-DUNI embossed
Invention Example A
Huggies Wash Cloth (coform prior art)
Concert EBT.055.1010 TBAL
Bounty
Invention Example B

Fig. 1


mg Fluid absorbed
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700
600
500
400
300
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100
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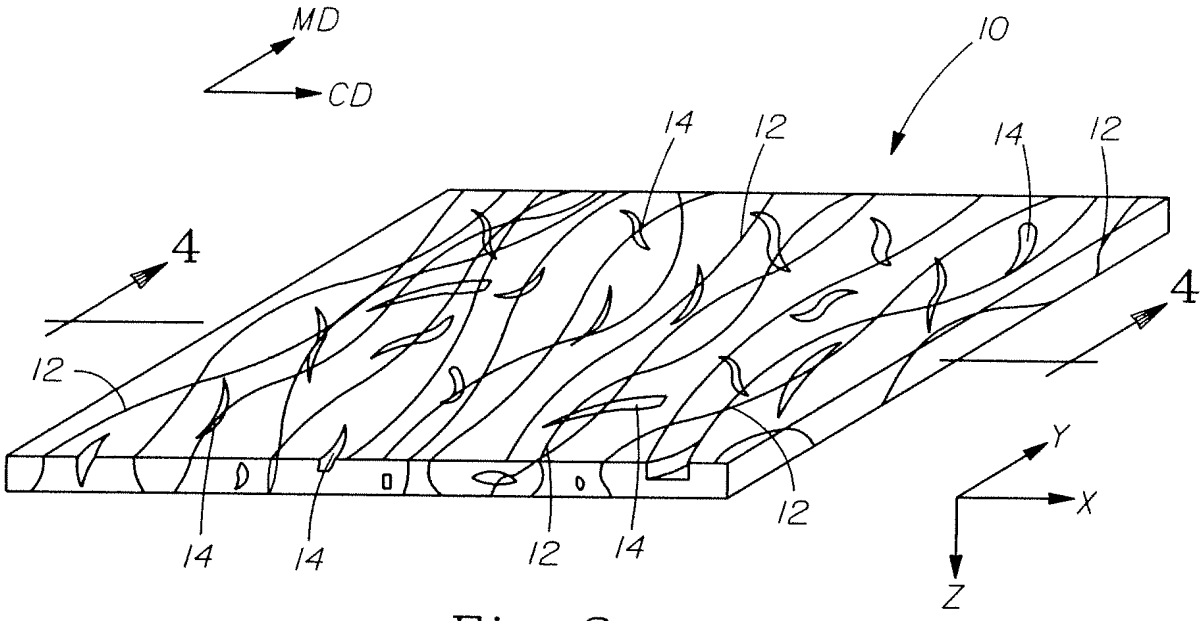
0
50
100
150
200
250
300
Ending Pore Radius (microns)
121-200 micron
101-200 micron
A
B
A
B
• Huggies (coform prior art)
▲ Duramax
× LBAL-DUNI embossed
* Invention Example A
▪ Huggies Wash Cloth (coform prior art)
– Concert EBT.055.1010 TBAL
• Bounty
– Invention Example B

Fig. 2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CD
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X
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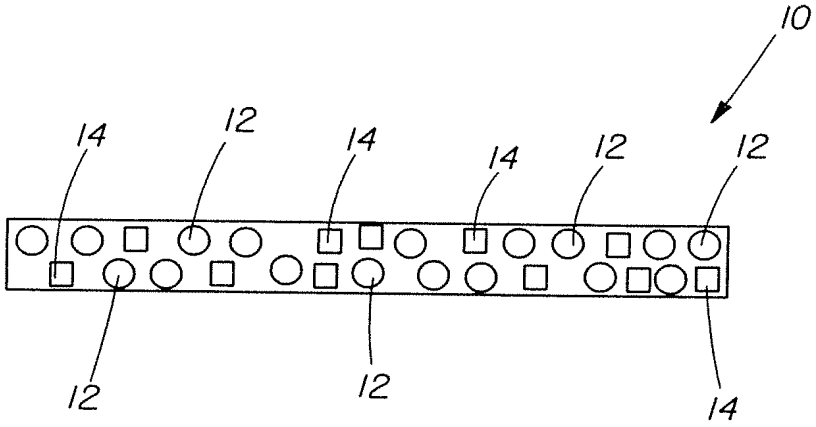
Fig. 3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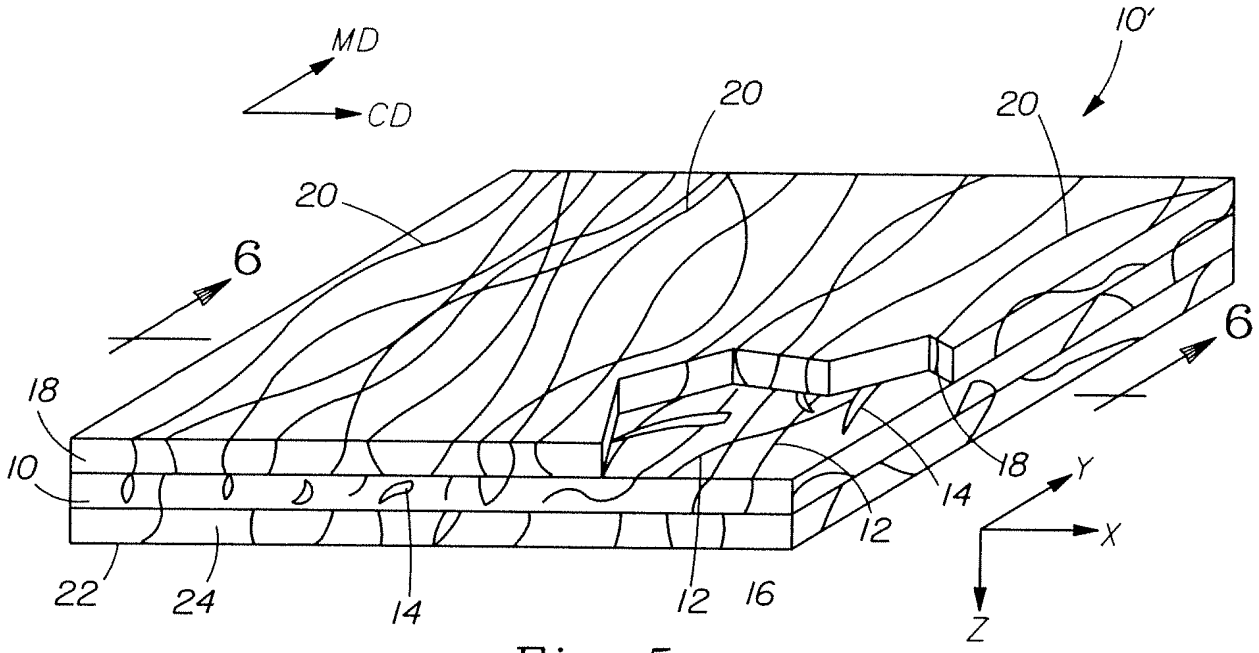
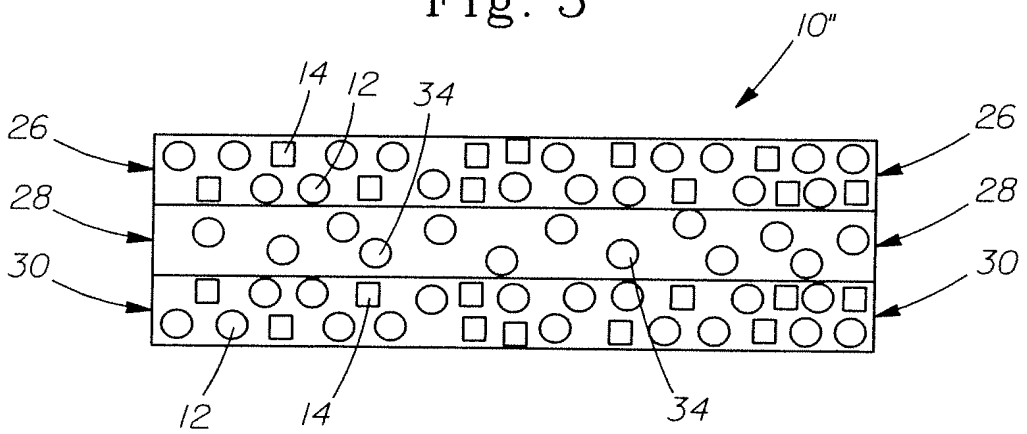


Fig. 5



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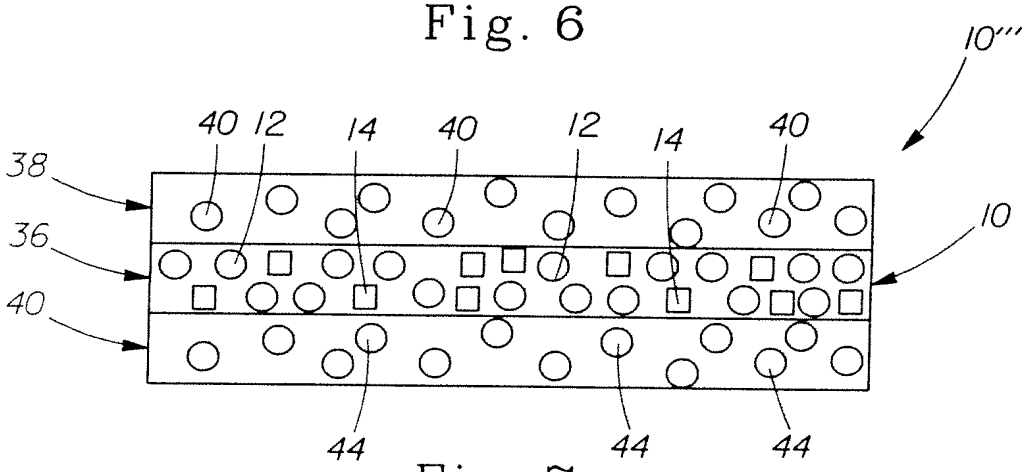

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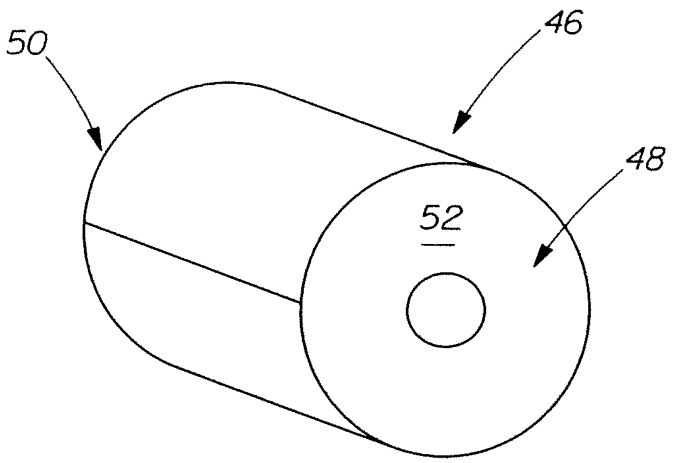

Fig. 8

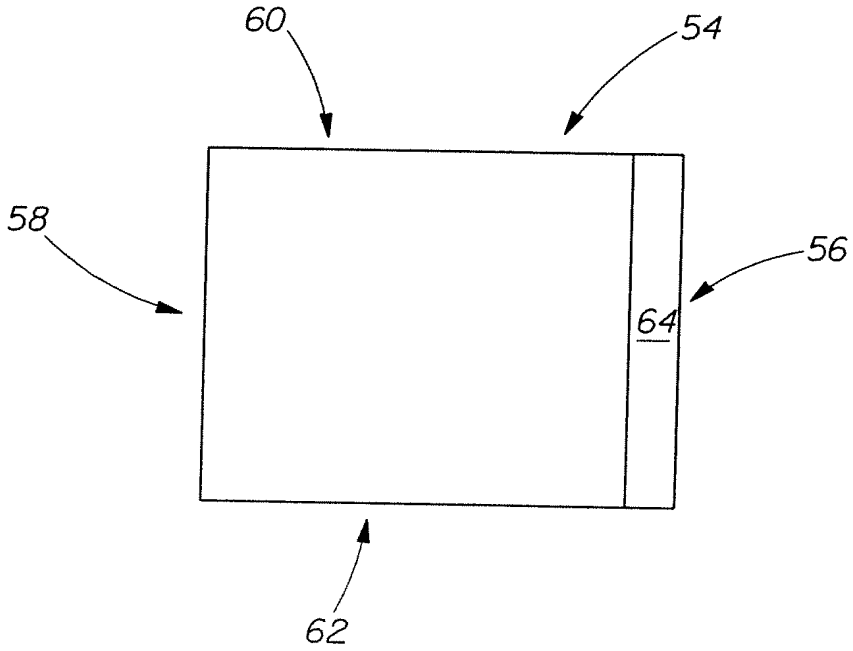

Fig. 9

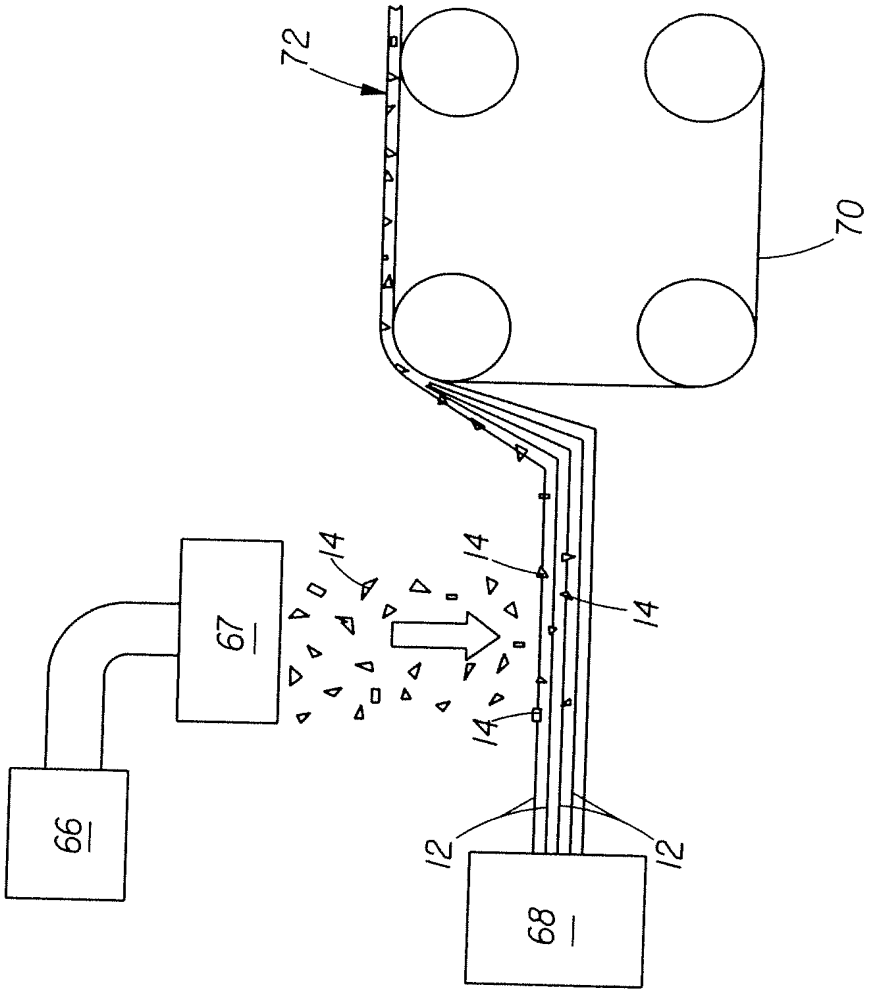

Fig. 10

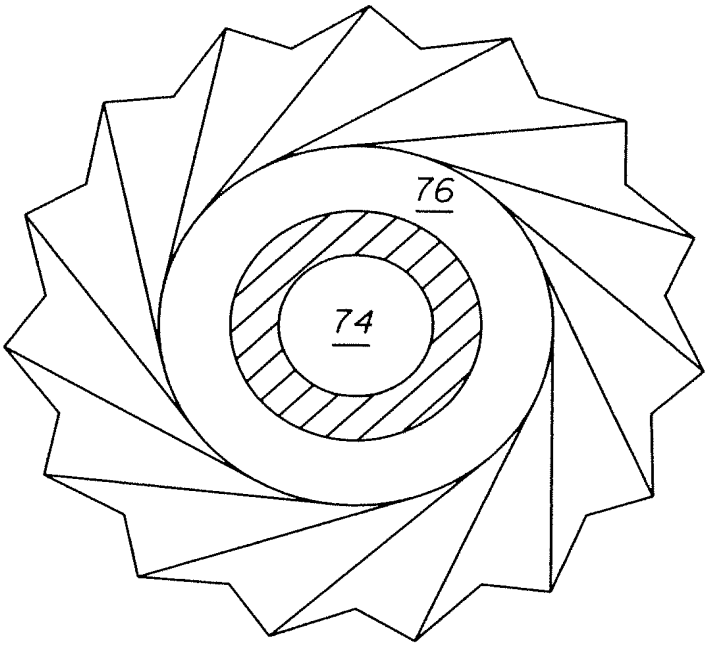

Fig. 11

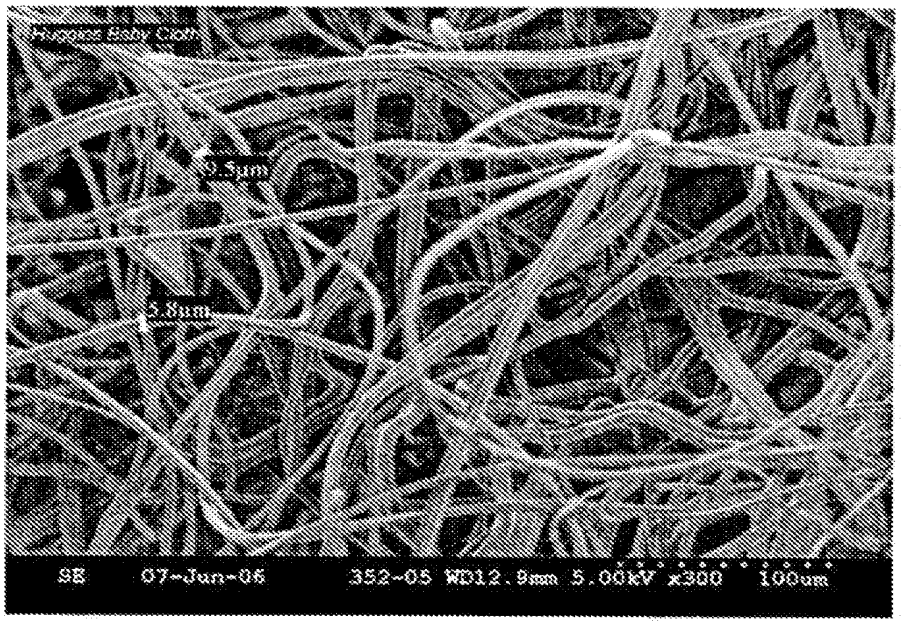
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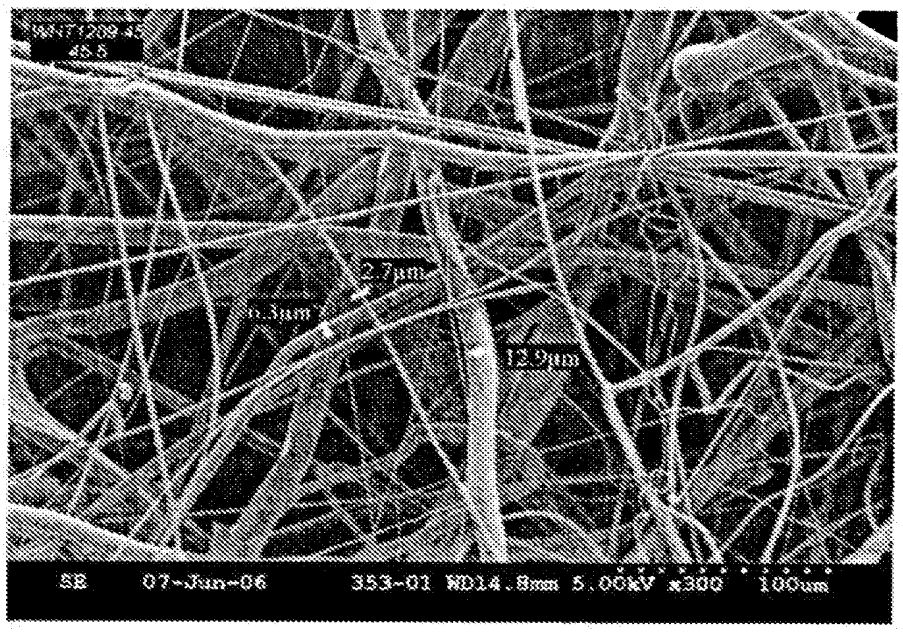
Fig. 12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12.9um
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Fig. 13

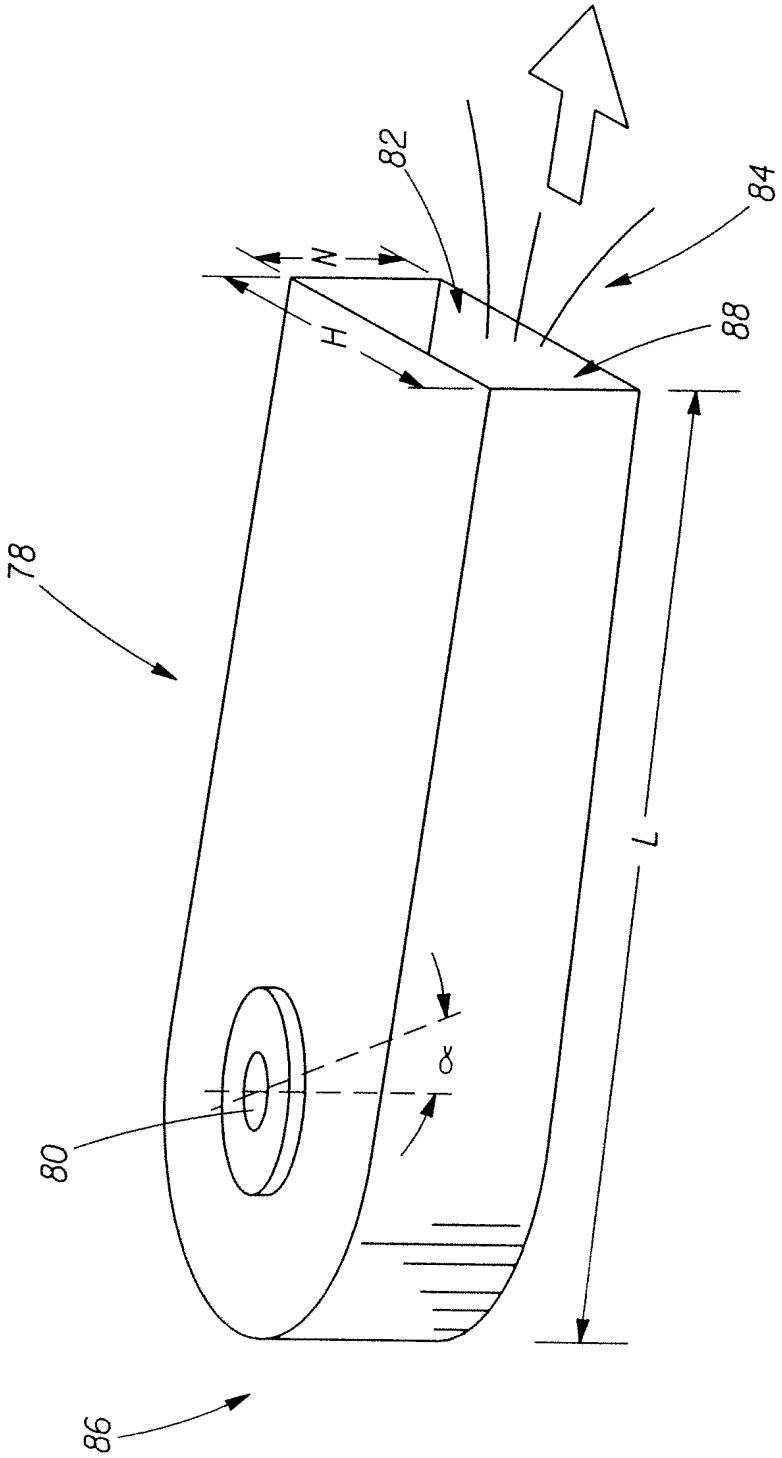

Fig. 14

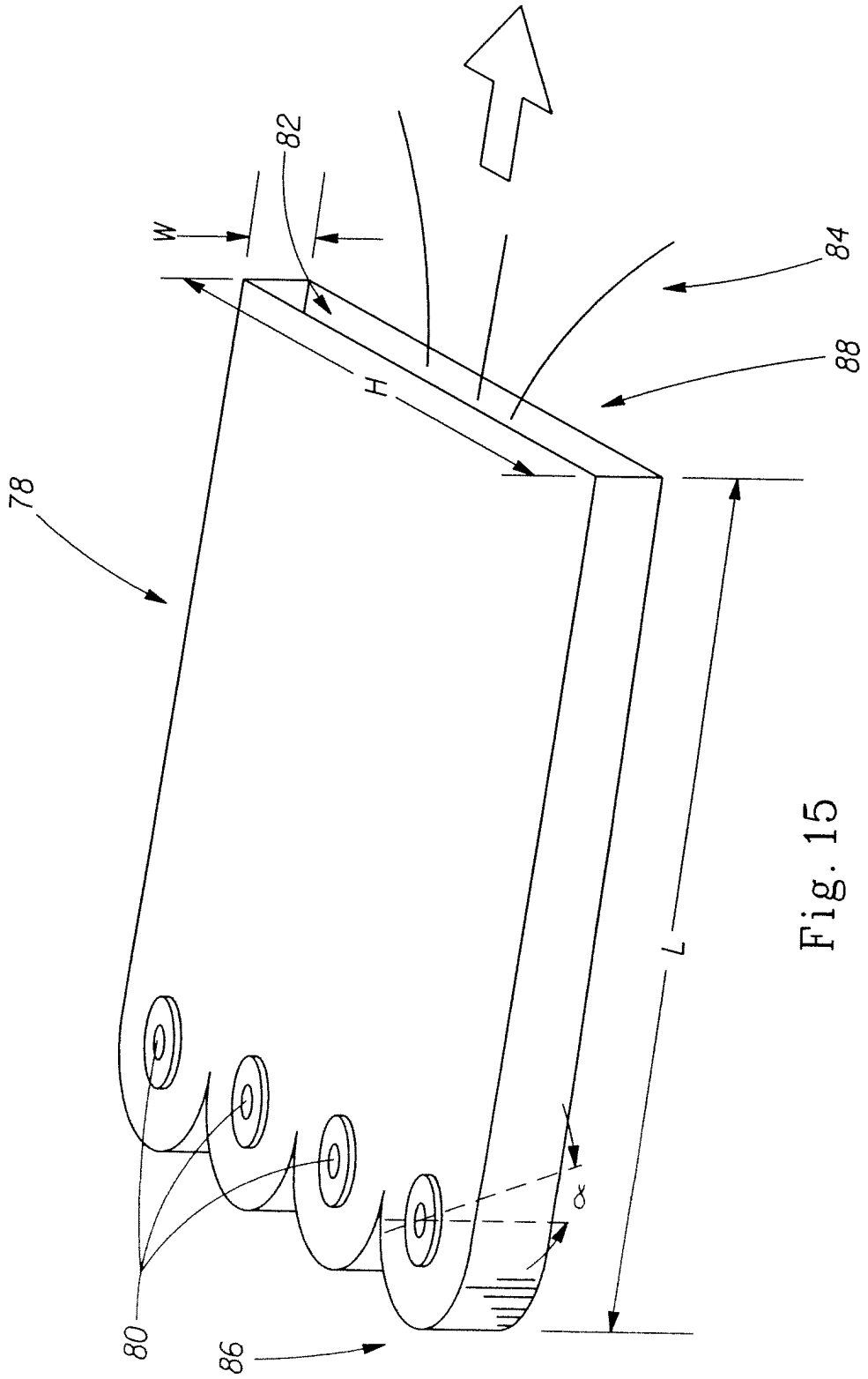

Fig. 15

Fig. 16A

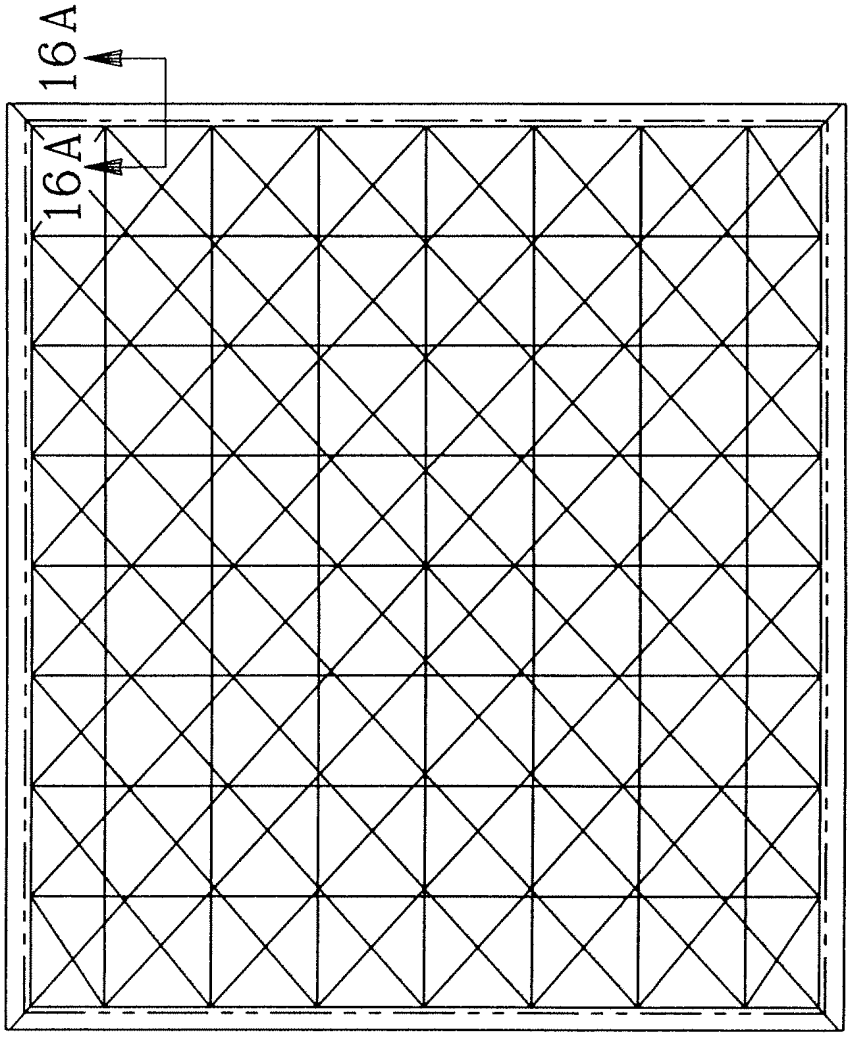

Fig. 16

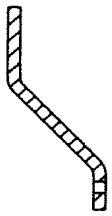

Fig. 17A

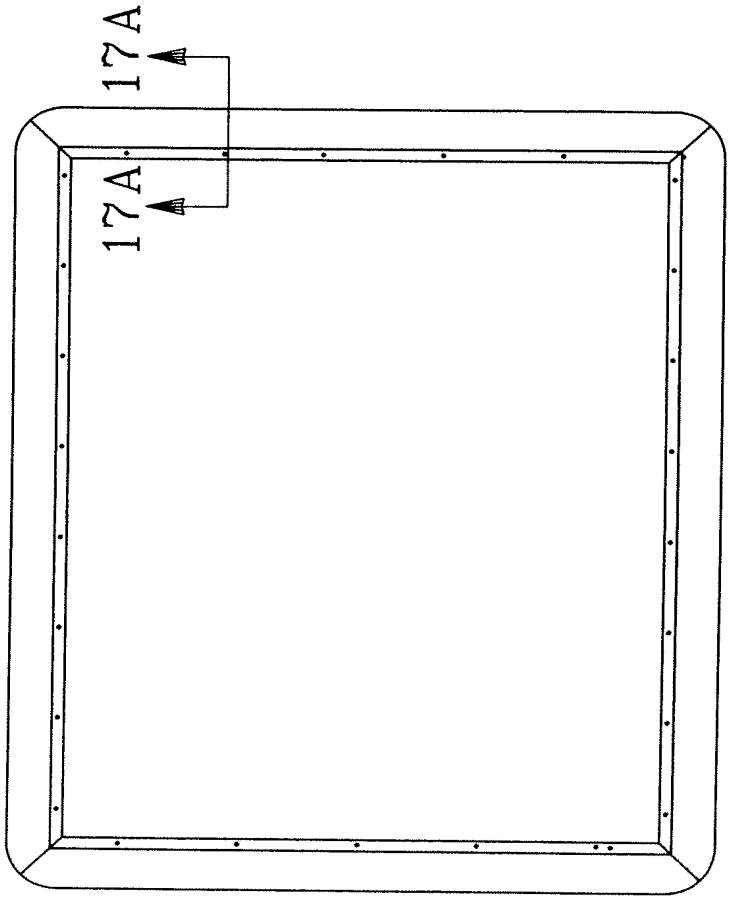

Fig. 17

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Filer:	Christopher Brant Cook/Connie Baker
Attorney Docket Number:	10859

Filed as Large Entity

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	310	310
Utility Search Fee	1111	1	510	510
Utility Examination Fee	1311	1	210	210
Pages:				
Claims:				
Claims in excess of 20	1202	3	50	150
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
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Electronic Acknowledgement Receipt

EFS ID:	3593992
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	10-JUL-2008
Filing Date:	
Time Stamp:	12:18:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1180
RAM confirmation Number	8521
Deposit Account	162480
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_NonProv_Utility_App.pdf	1853225 eea7792399a32a1593e2ca7a8a037f5b944daedd	yes	45

Multipart Description/PDF files in .zip description

Document Description	Start	End
Transmittal of New Application	1	1
Specification	2	29
Claims	30	32
Abstract	33	33
Drawings-only black and white line drawings	34	45

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	8474 b94e85a97c8e1d5334f9b6284fd267c46450907f	no	2

Warnings:

Information:

Total Files Size (in bytes):	1861699

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	3593992
Application Number:	12170575
International Application Number:	
Confirmation Number:	1328
Title of Invention:	PROCESS FOR MAKING FIBROUS STRUCTURES
First Named Inventor/Applicant Name:	Steven Lee Barnholtz
Customer Number:	27752
Filer:	Christopher Brant Cook/Connie Baker
Filer Authorized By:	Christopher Brant Cook
Attorney Docket Number:	10859
Receipt Date:	10-JUL-2008
Filing Date:	
Time Stamp:	12:18:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1180
RAM confirmation Number	8521
Deposit Account	162480
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1		10859_NonProv_Utility_App.pdf	1853225 eea7792399a32a1593e2ca7a8a037f5b944daedd	yes	45

Multipart Description/PDF files in .zip description

Document Description	Start	End
Transmittal of New Application	1	1
Specification	2	29
Claims	30	32
Abstract	33	33
Drawings-only black and white line drawings	34	45

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	8474 b94e85a97c8e1d5334f9b6284fd267c46450907f	no	2

Warnings:

Information:

Total Files Size (in bytes):	1861699

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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Filing Date: 07/10/08

Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 12/170,575

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	310
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	510
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	210
TOTAL CLAIMS (37 CFR 1.16(i))	23	3	X$ 25		OR	X$50	150
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	* 0	X$105			X$210	0
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $260 ($130 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			180			370	
			TOTAL	0		TOTAL	1180

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
						TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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