

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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División de Nuevas Creaciones

SOLICITUD

PATENTE DE INVENCION

ENTRADA EN FASE NACIONAL

07-55661

21. EXPEDIENTE No.

54. TITULO MATERIAL DE RESPALDO DE PAPEL ABRASIVO FINO Y METODO PARA HACER
EL MISMO

51. CLASIFICACION INTERNACIONAL

71. SOLICITANTE KEENAH PAPER, INC.

DOMICILIO ALPHARETTA, GEORGIA, ESTADOS UNIDOS DE AMERICA.

74. APODERADO JUAN PABLO CADENA SARMIENTO

22. SANTAFE DE BOGOTA, D.C.

FM: 30-07-2007

Industria

AS: 103.670



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Tra. 11 PATENTEIYII Eve: 378 FASENACIONALI
Act. 411 PRESENTACION Folios: 118

FORMULARIO ÚNICO DE SOLICITUD DE PATENTE
PCT
ENTRADA EN FASE NACIONAL

1. SOLICITUD DE:

☒ Patente de Invención.

☐ Patente de Modelo de Utilidad.

☒ Capítulo I.

☐ Capítulo II.

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C.E. ☐ Otro ☐

Lugar de Constitución: Estados Unidos de América

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Número 80.410.337 TP 57492

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Solicitud Internacional No. PCT/US2005/046076 Fecha 21-12-2005

Publicación Internacional No. WO 2006/073795 A3 Fecha 13-07-2006

6 Título (54): MATERIAL DE RESPALDO DE PAPEL ABRASIVO FINO Y METODO PARA HACER EL MISMO

7 Clasificación Internacional (51): B24D 3/28 ; 11/00

8 Prioridad

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US

30-12-2004

11/027.241

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Instrucciones para el diligenciamiento del presente formulario, ver reverso de esta página.

2020-F06 (01-11-15)

10

ANEXOS

2

- ☒ Comprobante de pago de la tasa de presentación de la solicitud. \$482.000
- ☒ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☒ Poderes, si fuere el caso. **Fotocopia Autenticada**
- ☒ Documento de cesión del inventor al solicitante o a su causante.
- ☐ Declaraciones
- ☒ Copia de la solicitud internacional. (Resumen, descripción, reivindicaciones, dibujos)
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- ☐ Copia del examen preliminar efectuado por la IPEA.
- ☐ Traducción del examen preliminar efectuado por la IPEA.
- ☐ De ser el caso, copia del contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico.
- ☐ Arte final 12x12.
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☒ Otros: Extracto para Publicación y Tarjeta de Archivo Temático
 - Documentos PCT
 - Tarjeta de Propietarios

11 FIGURA CARACTERÍSTICA:

12 Solicito la concesión de la patente:

NOMBRE: JUAN PABLO CADENA SARMIENTO

FIRMA:

C.C. 80410.337 de Usaquén TP 57492 del C.S.J.

Instrucciones para la presentación de los anexos, ver reverso de esta página.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT : 800176089-2

RECIBO OFICIAL DE CAJA : 07 - 23,440
FECHA : MARZO 21 DE 2007

***** CONSIGNACION *****

DEPOSITANTE	TIPO PAGO	BANCO	CUENTA	No. PAGO	FECHA PGO	Vr. PAGO
BRIGARD & CASTRO LTDA	CONSIGNACION	BANCO POPULAR	050-00110-6	57310980	21/03/2007	16,740,000.00

***** CONCEPTO *****

CANT. RENTISTICO	CONCEPTO	TOTAL CONCEPTO
1 50005-01-01 SOLICITUDES	1 TRAMITES DE SOL. DE PATENTE DE IN	482,000.00
	TOTAL :	\$ 482,000.00

SON: CUATROCIENTOS OCHENTA Y DOS MIL PESOS

RESPONSABLE :

RECIBO DE CAJA APLICADO AL EXPEDIENTE No.

From the INTERNATIONAL BUREAU

To:

PCTNOTIFICATION CONCERNING
AVAILABILITY OF THE PUBLICATION
OF THE INTERNATIONAL APPLICATIONCASSIDY, Timothy
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P.o. Box 1449
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ETATS-UNIS D'AMERIQUEJWS 4
BFC
MVPDate of mailing (day/month/year)
30 November 2006 (30.11.2006)Applicant's or agent's file reference
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PCT/US2005/046076International filing date (day/month/year)
21 December 2005 (21.12.2005)

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Priority date (day/month/year)
30 December 2004 (30.12.2004)

Applicant

NEENAH PAPER, INC. et al

The applicant is hereby notified that the International Bureau:

☐ has published the above-indicated international application on under
No. WO☒ has republished the above-indicated international application on 30 November 2006 (30.11.2006) under
No. WO 2006/073795For an explanation as to the reason for this republication of the international application, reference is made to INID codes (15), (48)
or (88) (as the case may be) on the front page of the published international application.A copy of the international application is available for viewing and downloading on WIPO's website at the following address:
<http://www.wipo.int/pctdb> (under "Query" enter the PCT or WO number).The applicant may also request a paper copy of the published international application from the International Bureau in writing from
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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

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BOYAK, Stella, May [US/US]; E9667 Woodsedge Drive,
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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AI, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
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KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV,
LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI,
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European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
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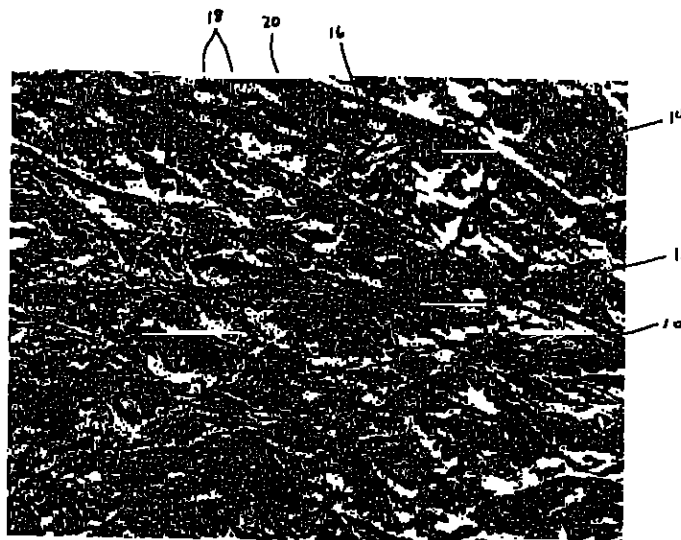
— with international search report

— before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

(88) Date of publication of the International search report:
30 November 2006

[Continued on next page]

(54) Title: FINE ABRASIVE PAPER BACKING MATERIAL AND METHOD OF MAKING THEREOF



(57) Abstract: In one embodiment is provided a method of making an abrasive backing having a smooth surface comprising the steps of providing a paper having a first paper surface and a second paper surface; applying a first synthetic polymeric layer comprising a first synthetic polymeric composition to the first paper surface; and applying a second synthetic polymeric layer comprising a second synthetic polymeric composition to the first synthetic polymeric layer. The method is used to prepare fine abrasive backings having a smooth exterior surface for preparation of fine abrasive papers.

WO 2006/073795 A3

1. I have been a member of the Communist Party for 10 years.

④



⑤

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/046076

A. CLASSIFICATION OF SUBJECT MATTER
INV. B24D3/28 B24D11/00 B24D11/02 B32B27/12

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)
B24D B32B

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	EP 0 237 784 A (KIMBERLY-CLARK CORPORATION) 23 September 1987 (1987-09-23) the whole document	1,5, 8-10,12, 17 11,13 2-4, 18-20
Y	EP 0 587 171 A (NORTON COMPANY) 16 March 1994 (1994-03-16) the whole document	11,13

☐ Further documents are listed in the continuation of Box C.

* 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

Date of the actual completion of the International search

9 June 2006

Name and mailing address of the ISA/

European Patent Office, P.O. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel: (+31-70) 340-2040, Tx. 31 051 epo nl,
Fax: (+31-70) 340 3016

Form PCT/ISA/E10 (second sheet) (April 2005)

☒ See patent family annex.

- "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.
- "A" document member of the same patent family

Date of mailing of the International search report

06.10.2006

Authorized officer

Zeckau, Jochen

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/046076

Box II Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5, 8-20

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5,8-20

Method of making a backing having a smooth surface for the application of an abrasive layer; backing having a smooth surface for the application of an abrasive layer; abrasive article comprising such a backing

2. claims: 6,7

Method of providing an abrasive backing with an antislip layer

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2005/046076

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0237784	A	23-09-1987	AU 590669 B2	09-11-1989
			AU 6862787 A	13-08-1987
			CA 1336152 C	04-07-1995
			DE 3770958 D1	01-08-1991
			JP 62203769 A	08-09-1987
			MX 170977 B	23-09-1993
			PT 84274 A	01-03-1987
EP 0587171	A	16-03-1994	AT 139166 T	15-06-1996
			CA 2103929 A1	11-03-1994
			DE 69303130 D1	18-07-1996
			DE 69303130 T2	05-12-1996
			JP 6170737 A	21-06-1994
			US 5286541 A	15-02-1994

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JUL 24 2006

DORITY AND MANNING PCT

NOTIFICATION CONCERNING
AVAILABILITY OF THE PUBLICATION
OF THE INTERNATIONAL APPLICATION

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

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21 December 2005 (21.12.2005)

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Applicant

NEENAH PAPER, INC. et al

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No. WO 2006/073795

☐ has republished the above-indicated international application on under
No. WO
For an explanation as to the reason for this republication of the international application, reference is made to INID codes (15), (48)
or (88) (as the case may be) on the front page of the published international application.

A copy of the international application is available for viewing and downloading on WIPO's website at the following address:
<http://www.wipo.int/pctdb> (under "Query" enter the PCT or WO number).

The applicant may also request a paper copy of the published international application from the International Bureau in writing from
pct.products@wipo.int or the contact details provided below.

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(71) Applicant (for all designated States except US): NEENAH PAPER, INC. (US/US); 3460 PRESTON RIDGE ROAD, Suite 600, Alpharetta, Georgia 30005 (US).

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

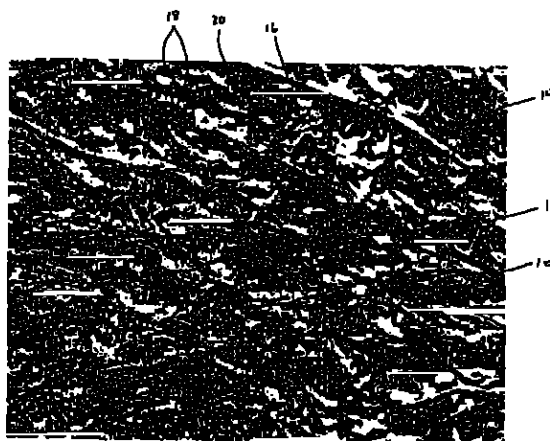
(72) Inventors; and
(75) Inventors/Applicants (for US only): LINDQUIST, Gunnard, Michael (US/US); P.O. Box 366, N7994 Grand Island Landing Road, Munising, Michigan 49862 (US). BOYAK, Stella, May (US/US); E9667 Woodsedge Drive, Wetmore, Michigan 49895 (US).

Published:
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(74) Agent: CASSIDY, Timothy; DORITY & MANNING, P.A., P.O. Box 1449, Greenville, South Carolina 29602 (US).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FINE ABRASIVE PAPER BACKING MATERIAL AND METHOD OF MAKING THEREOF



(57) Abstract: In one embodiment is provided a method of making an abrasive backing having a smooth surface comprising the steps of providing a paper having a first paper surface and a second paper surface; applying a first synthetic polymeric layer comprising a first synthetic polymeric composition to the first paper surface; and applying a second synthetic polymeric layer comprising a second synthetic polymeric composition to the first synthetic polymeric layer. The method is used to prepare fine abrasive backings having a smooth exterior surface for preparation of fine abrasive papers.

WO 2006/073795 A2

FINE ABRASIVE PAPER BACKING MATERIAL AND METHOD OF MAKING
THEREOF

BACKGROUND OF THE INVENTION

Abrasive sheet materials are widely used for a variety of applications and include, by way of illustration only, sandpapers, emery cloths, sanding discs for rotary sanders, and sanding strips for orbital and belt sanders. Abrasive sheet materials most often comprise a layer of an abrasive, i.e., abrasive particles or grit, which is attached to a substrate or base of varying thickness and basis weight by means of an adhesive. By utilizing very fine or super fine abrasive materials (less than 6 microns in average diameter), abrasive sheet materials also can be produced and used for fine sanding and polishing operations.

- 10 The reinforcement of paper by latex polymer impregnation (commonly referred to as latex saturation) is a long-established practice. The polymer employed typically is a synthetic material, most often a latex, and the paper may consist solely of cellulosic fibers or of a mixture of cellulosic and noncellulosic fibers. Polymer reinforcement may be employed to improve one or more of such
- 15 properties as dimensional stability, resistance to chemical and environmental degradation, resistance to tearing, embossability, resiliency, conformability, moisture and vapor transmission, and abrasion resistance, among others.

- Latex polymer barrier coatings may also be used to provide a smooth surface for the application of adhesive and abrasive particles. However, during the drying of
- 20 latex polymer barrier coatings, small holes can appear in the latex layer. The holes appear due to the release of water vapor during drying and contraction of the dried film during curing. These holes are small, 10 – 30 microns in average diameter and are referred to as pinholes. Pinholes do not become a problem for fine size grit particles as used in the abrasive industry such as from grit 320 to
- 25 600 (35 – 16 microns in average size). However, in super fine grit applications, i.e., grit 800 to 1200 and finer (12 to 1.2 microns), the presence of pinholes affects the quality of the final abrasive paper product. For example, pinholes can allow super fine particles to become trapped or lodged in the holes. Such



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trapping of particles can result in a clump of abrasive particles on the final product surface. Such clumping creates an uneven surface that results in poor sanding quality.

Therefore, there exists a need in the art for a superfine abrasive paper backing
5 that results in improved uniformity of grit particles on the surface thereof and a method of making thereof.

SUMMARY OF THE INVENTION

In response to the discussed difficulties and problems encountered in the prior art, new abrasive backings, and methods of making such abrasive backings, have
10 been discovered. In one embodiment, a method of making an abrasive backing having a smooth surface includes the steps of: i) providing a paper having a first paper surface and a second paper surface; ii) applying a first synthetic polymeric layer including a first synthetic polymeric composition to the first paper surface; and iii) applying a second synthetic polymeric layer including a second synthetic
15 polymeric composition to the first synthetic polymeric layer. The method may further include the step of supercalendering the abrasive backing after application of the second synthetic polymeric layer to form a smooth surface on the second synthetic polymeric layer. Desirably, the smooth surface exhibits a Bekk Smoothness greater than about 100, and more desirably the smooth
20 surface exhibits a Bekk Smoothness greater than about 1000.

In one aspect, the method may further include the step of applying an amorphous, rubbery polymer film layer to the second paper surface. The amorphous rubbery polymer film layer may be produced, for example, from melt-extrusion, extrusion casting or a preformed film. Desirably, the amorphous
25 rubbery polymer is selected from the group consisting of polyester elastomers and amorphous rubbery polypropylene. More desirably, the amorphous rubbery polymer film layer may demonstrate antislip properties when either dry or wet, and even more desirably the abrasive backing is curl-resistant upon exposure to liquid water.

The paper may be a polymer-reinforced paper. Desirably, the paper may be saturated with a styrene-butadiene and/or a nitrile-butadiene rubber latex.

In another aspect, the method may further include the step of applying a layer of uniformly distributed abrasive particles to the second synthetic polymer layer.

- 5 The abrasive particles desirably average less than about 6 microns in size. Desirably, the layer of abrasive particles is bonded to the second synthetic polymeric composition by means of a layer of an adhesive. In a further embodiment, the layer of abrasive particles may be coated with a layer of an adhesive.
- 10 In a further aspect, the first and/or second synthetic polymeric compositions may include, for example, nitrile and/or polyvinyl chloride lattices. Desirably, the basis weight of the second layer is less than about half the basis weight of the first layer.

- In another embodiment, a coated abrasive backing for use in fabricating fine grit abrasive paper includes a paper having first and second surfaces, a first layer including a first synthetic polymer composition contacting the first surface of the paper, a second layer including a second synthetic polymer composition, the second layer contacting the first layer and including a smooth exterior surface. Desirably, the smooth exterior surface exhibits a Bekk Smoothness greater than about 100. More desirably, the smooth surface exhibits a Bekk Smoothness greater than about 1000.
- 15
- 20

- In a further embodiment, a fine grit abrasive paper includes an abrasive backing including a paper having first and second surfaces, a first layer including a first synthetic polymer composition contacting the first surface of the paper, a second layer including a second synthetic polymer composition, wherein the second layer contacts the first layer and includes a smooth exterior surface exhibiting a Bekk Smoothness greater than about 1000, and a layer of fine grit abrasive particles having an average particle size less than about 6 microns.
- 25

- Other features and aspects of the present invention are discussed in greater detail below.
- 30

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a photomicrograph of the coated surface of a single coated abrasive backing; and

5 FIG. 2 is a photomicrograph of the coated surface of a double coated abrasive backing.

DEFINITIONS

Within the context of this specification, each term or phrase below will include the following meaning or meanings.

10 The term "abrasive backing" is used herein to mean a paper, typically a polymer-reinforced paper, which is intended to be provided with a layer of abrasive particles. The term "abrasive paper" refers to the combination of an abrasive backing and a layer of abrasive particles.

As used herein, the term "paper" is meant to include any web or sheet-like material which contains at least about 50 percent by weight of cellulosic fibers. 15 In addition to cellulosic fibers, the web may contain other natural fibers, synthetic fibers, or mixtures thereof. Cellulosic nonwoven webs may be prepared by air laying or wet laying relatively short fibers to form a web or sheet. Thus, the term includes sheets prepared from a papermaking furnish. Such furnish may include only cellulose fibers or a mixture of cellulose fibers with other natural fibers 20 and/or synthetic fibers. The furnish also may contain additives and other materials, such as fillers, e.g., clay and titanium dioxide, surfactants, antifoaming agents, and the like, as is well known in the papermaking art.

As used herein, the term "backside layer" refers to a layer or coating on the backside of an abrasive paper, i.e., the side of the abrasive paper which does not 25 have the layer of abrasive particles thereon.

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, the term "comprising" encompasses the more restrictive terms "consisting essentially of" and "consisting of."

DETAILED DESCRIPTION OF THE INVENTION

In accordance with the invention, a paper having first and second surfaces is
5 coated on the first surface with a first synthetic polymer layer, followed by overlaying the first synthetic polymer layer with a second synthetic polymer layer to form a coated paper, followed by supercalendering of the coated paper to form a smooth abrasive backing.

The abrasive backing or paper of the present invention may be prepared from a
10 latex-impregnated paper. By way of illustration only, the latex-impregnated paper may be a water leaf sheet of wood pulp fibers or alpha pulp fibers impregnated with a reactive acrylic polymer latex such as Rhoplex® B-15 available from RohmNova Company, Philadelphia, Pennsylvania. However, any of a number of other latexes may be used, if desired, some examples of which include, but are
15 not limited to, polyacrylates, including Hycar® 26083, 26084, 26120, 26104, 26106, and 26322, available from Noveon, Cleveland, Ohio, Rhoplex® HA-8, HA-12, and NW-1715, available from RohmNova Company, and Carboset® XL-52, available from Noveon, Cleveland, Ohio, styrene-butadiene copolymers, including Butofan® NS 278, available from BASF Corporation, Charlotte, North
20 Carolina, and DL-219, and DL-283, available from Dow Chemical Company, Midland, Michigan, ethylene-vinyl acetate copolymers, including Dur-O-Set® E-666, E-646, and E-669, available from National Starch & Chemical Co., Bridgewater, New Jersey, nitrile rubbers, including Hycar® 1572, 1577, and 1570x55, available from Noveon, poly(vinyl chloride), including Vycar® 352,
25 available from Noveon, poly(vinyl acetate), including Vinac® XX-210, available from Air Products and Chemicals, Inc., Naperville, Illinois, ethylene-acrylate copolymers, including Michem® Prime 4990, available from Michelman, Inc., Cincinnati, Ohio and Adcote 56220, available from Morton Thiokol, Inc., Chicago, Illinois.

X

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The impregnating dispersion may contain clay and/or an opacifier such as titanium dioxide. Exemplary amounts of these two materials are 16 parts and 4 parts, respectively, per 100 parts of polymer on a dry weight basis.

By way of example only, the paper may have a basis weight of 50 g/m² before
5 impregnation. The paper generally may contain impregnant in a range of from about 5 to about 50 percent by weight, on a dry weight basis, although in some cases higher levels of impregnant in the paper may be suitable. As a nonlimiting illustration, the paper may contain 18 parts impregnating solids per 100 parts fiber by weight, and may have a basis weight of 58 g/m², both on a dry weight
10 basis. A suitable caliper may be 97 +/- 8 micrometers.

The first surface of the paper is first coated with a first layer of a first synthetic polymeric composition. Thereafter, the coated paper is coated with a second layer of a second synthetic polymeric composition overlaying the first layer. Any conventional synthetic polymeric composition may be utilized for the first
15 synthetic polymeric composition so long as the composition adheres or bonds well to the first surface of the paper. Suitable polymeric compositions for the first layer include, by way of illustration only, polyolefins, especially polyethylene and copolymers of ethylene and one or more of such monomers as vinyl acetate, acrylic acid, methacrylic acid, acrylic acid esters (acrylates), and methacrylic acid
20 esters (methacrylates); copolymers of ethylene with such vinyl monomers as vinyl alcohol, vinyl chloride, and vinylidene chloride; polystyrene and copolymers of styrene with butadiene and acrylonitrile; acrylonitrile-butadiene-styrene terpolymers; polyamides; polyesters, including both homopolymers and copolymers; polyurethanes; and polyether esters. The synthetic polymeric
25 composition can be a thermoplastic material or a thermosetting material. Specific examples include, but are not limited to, polyacrylates such as Hycar® 26106 available from Noveon, nitrile rubbers such as Hycar® 1572 available from Noveon, poly(vinylchloride) such as Vycar® 460X90 available from Noveon, and styrene-butadiene copolymers such as, for example, carboxylated styrene-
30 butadiene copolymer latex emulsions.

The thickness of the first layer required will vary according to the intended use for the coated paper. For example, a thicker first layer normally will be required for coarse grit abrasive products, e.g., abrasives having particle sizes of 200 mesh or greater (the term "mesh" is used herein to mean U.S. Standard Sieve mesh).

- 5 On the other hand, a thinner first layer may be used for finer grit products which are to be used for polishing or fine surface finishing. A practical minimum layer thickness is about 25 micrometers, whereas the practical maximum layer thickness is about 250 micrometers. However, thinner or thicker layers can be employed, if desired, provided that the layers are continuous. Thermoplastic
- 10 polymeric compositions which are inherently stiff will be more useful for coarse grit products, while softer or elastomeric thermoplastic polymeric compositions like ethylene-vinyl acetate copolymers and polyurethanes will be more useful for such fine grit products as fine sanding and polishing cloths.

- Any conventional synthetic polymeric composition such as described above for
- 15 the first layer may be utilized for the second synthetic polymeric composition. The synthetic polymeric composition for the first and second layers can be the same or different. Desirably, the second synthetic polymeric composition adheres or bonds well to the surface of the first layer. More desirably, the second synthetic polymeric composition flows sufficiently well to fill any pinholes
- 20 present in the first layer. For example, synthetic polymeric compositions having viscosities ranging from 30 – 50 centipoise may be expected to flow sufficiently well to substantially fill any pinholes present in the first layer. Even more desirably, the second synthetic polymeric composition used for the second layer is compatible with the particular adhesive which may be used to attach the
- 25 adhesive particles to the coated surface of the paper.

- In one embodiment, a thermoplastic polymeric composition which is inherently stiff is used for the first layer, while a softer or elastomeric thermoplastic polymeric composition like ethylene-vinyl acetate copolymer and/or polyurethane is used as the second layer for fine grit products such as fine sanding and
- 30 polishing cloths.

The first and second synthetic polymeric compositions can be applied neat, as a solution in a suitable solvent, or as a dispersion in water or other liquid by methods well known to those having ordinary skill in the art. In some embodiments, processes which apply a viscous, high solids content fluid to the surface of a paper are utilized. Such processes can utilize 100 percent solids compositions which include, by way of illustration only, ultraviolet radiation curable acrylics and liquid epoxy thermosets. Such compositions can be applied with, for example, slot die coaters and knife-over-roll coaters. In addition, thermoplastic powder coating methods can be employed, such as electrostatic coating methods. In other embodiments, processes such as hot melt coating and melt extrusion which apply a molten composition directly to the fabric are employed, particularly where the fabric is exceptionally porous and open in nature. If desired, the synthetic polymeric composition can be preformed into, for example, a film which then can be bonded to the second surface of the paper by heat or an adhesive layer.

After the first and second layers of synthetic polymer composition are applied to the first surface of the paper, the coated paper passes through a calender or supercalender to further smooth the surface of the second layer. The effect of calendaring on the surface of the abrasive backing depends upon the temperature, the pressure applied, and the duration of the pressure. For purposes herein, calendaring can be carried out at either at ambient or elevated temperatures. Suitable calendaring pressures can be from about 50 to about 2000 pounds-force per linear inch (pli), desirably from about 100 to about 1600 pli, more desirably from about 300 to about 1000 pli, and even more desirably from about 400 to about 600 pli. Suitable temperatures can be from about 20° Celsius to about 240° Celsius, desirably from about 20° Celsius to about 140° Celsius, more desirably from about 20° Celsius to about 40° Celsius, though even more desirably the temperatures are at ambient temperature. The duration of calendaring can be varied in conjunction with the nip pressure and/or the composition of the calendar rolls to produce the desired smoothness of the paper backing for the sheet. For example, softer calendar rolls such as fiber-filled rolls tend to compress to form a larger contact area in the nip, thus increasing the

duration of the calendering. Hard steel rolls compress less, thus decreasing the duration of the calendering. In one arrangement, the calender nip comprises a steel roll and a soft fiber-filled roll. In another arrangement, for example, a production supercalender stack may include more than two rolls, desirably from about nine to about 11 rolls, stacked upon each other in a vertical arrangement. Desirably the stacked rolls alternate between steel and fiber-filled rolls. With such an arrangement, the paper can be exposed to various pressures, up to about 1600 pli, and a number of nips, for example from one to about eight, in order to develop the desired smoothness level.

- 10 The resulting two-layer continuous coating provides a smooth, nonporous surface to which abrasive particles can be attached, typically by means of an adhesive coating or layer. The continuous coating also binds the abrasive backing together, giving it resistance to mechanical distortion during conversion of the coated abrasive backing to an abrasive paper and during use of the
- 15 resulting abrasive paper.

- The abrasive backing may include an amorphous, rubbery polymer film layer bonded to the second surface of the paper to reduce the tendency of the paper to curl and provide a non-slip surface. By way of example only, the amorphous, rubbery polymer may be a polyester elastomer. As another example, the
- 20 amorphous, rubbery polymer may be an amorphous, rubbery polypropylene. The amorphous, rubbery polymer film layer in general may be formed on the second surface of the paper by melt-extrusion or extrusion-casting techniques which are well known to those having ordinary skill in the art. Alternatively, a preformed film of the amorphous, rubbery polymer may be bonded to the second
- 25 side of the paper, again by known means. In general, the amorphous, rubbery polymer film layer may be of any desired thickness, depending upon the requirements of the abrasive paper. For example, the amorphous polymer film layer may have a thickness of from about 5 to about 75 micrometers. As another example, the amorphous polymer film layer may have a thickness of from about
- 30 12 to about 25 micrometers.

To attach abrasive particles to the coated surface of the abrasive backing, an adhesive is applied to the smooth, coated surface of the abrasive backing. Any of the known types of adhesives can be used to bond the abrasive particles to the second layer of synthetic polymeric composition. For example, the adhesive
5 may be thermosetting adhesive, such as, by way of illustration only, epoxy resins, epoxy esters, phenolics, polyurethanes, polyesters, and alkyds. Water-based dispersions such as an ammonia-dispersed ethylene-vinyl acetate copolymer also can be employed. The selection of adhesive typically is dictated by the end use, but the adhesive must be compatible with the synthetic polymeric coating
10 over which it is applied. Phenolics are most useful for very tough, coarse abrasive products for rough finishing or shaping, especially where the product needs to be waterproof as well. More flexible adhesives such as epoxy resins and alkyds are also waterproof and are desirable for fine-finishing products. For dry sanding products, animal glues and water based synthetic resins may be
15 used.

Any generally accepted means of applying adhesive to a sheet material can be employed, including such methods as roll, reverse roll, gravure, and Meyer rod coating. It generally is desirable to avoid placing the paper under significant tension in order to minimize paper distortion, especially when the adhesive is
20 being heat cured. Curing temperatures desirably will be kept below about 125 degree Celsius, as higher temperatures also tend to distort the paper.

In general, any of the commonly employed abrasive materials known to those having ordinary skill in the art can be used. Such materials can vary from very coarse to very fine. Exemplary abrasive materials include silicon carbide,
25 aluminum oxide, garnet, and diamond, by way of illustration only.

In one embodiment, the bonding adhesive may be dissolved or dispersed in a solvent or carrier and the mixture is then applied by a pressure coating nip to the abrasive backing. The abrasive grit particles are then deposited on the moving abrasive backing before the solvent or carrier is driven off, and while the
30 adhesive is still fluid. The grit particles may be oriented or aligned, for example by electrostatic means, to maximize abrasive or cutting properties. Desirably, no

external pressure is applied to the particles after deposition, as this may tend to destroy the alignment of particles, or bury the particles in the backing, both of which are undesirable. After the solvent or carrier is driven off, the abrasive backing carrying the adhesive and grit may be passed through an oven which
5 heats the material for times ranging from several minutes to several hours to cure the adhesive and to firmly bond the grit therein.

If desired, one or more layers of an adhesive or other material can be formed over the layer of abrasive particles. Such a layer can serve to better anchor all of the abrasive particles to the abrasive sheet material, thereby reducing abrasive
10 loss during use and increasing the life of the abrasive sheet material.

In general, any of the commonly employed abrasive materials known to those having ordinary skill in the art can be used. Such materials can vary from very coarse to very fine. Exemplary abrasive materials include silicon carbide, aluminum oxide, garnet, and diamond, by way of illustration only.

15 If desired, one or more layers of an adhesive or other material can be formed over the layer of abrasive particles. Such a layer can serve to better anchor all of the abrasive particles to the abrasive sheet material, thereby reducing abrasive loss during use and increasing the life of the abrasive sheet material. For example, after the grit is firmly bound to the backing, a "grain size" coating may
20 be applied over the layer of abrasive particles. The grain size coating may be a hard, thermosetting resin or animal glue which anchors the particles more firmly so that they remain aligned for maximum cutting ability.

TEST PROCEDURES

Representative samples of coated papers were tested under standard TAPPI
25 conditions at a relative humidity of $50 \pm 2\%$ and a temperature of $23 \pm 2^\circ\text{C}$ after conditioning for 24 hours according to the test procedures outlined below.

Basis Weight: Basis weight is a measure of the weight per unit area of the paper as described in TAPPI Test Method T-410. To determine basis weight, paper having a known area is weighed on a precision scale and the weight per unit area

expressed in grams per square meters is calculated. An A&D Model HR 60 Electronic Precision Balance manufactured in 2001 by A&D Weighing from Milpitas, CA and accurate to three decimal places was used to weigh the specimens.

- 5 Caliper: Caliper is a measure of the thickness of the paper as described in TAPPI Test Method T-411. A Series "400" Precision Micrometer manufactured by Testing Machines Incorporated (TMI) of Amityville, N.Y. was utilized to determine. A pre-conditioned sample is inserted in the instrument and a digital read-out displays the sample thickness.
- 10 Tensile: Tensile strength is a measure of the force per unit width required to break a paper specimen as described in TAPPI Test Method T-494. An EJA Tensile Tester manufactured in 1999 by Thwing-Albert of Philadelphia, PA was used to measure the tensile and stretch properties. A 15 millimeter-wide sample is inserted into the 4 inch jaw span and the sample is pulled at a jaw speed of 12
- 15 inches per minute. The peak tensile strength and stretch is displayed on a electronic readout CRT display. Test results for four samples were averaged to determine the test value.
- Stretch: Stretch is a measure of the percentage elongation at break when a specimen is subjected to a tensile test as described in TAPPI Test Method T-494. Stretch was measured as indicated above for the tensile test.
- 20
- Tear: Tear strength is a measure of the force perpendicular to the plane of the paper required to tear through a specific distance after the tear has been started using an Elmendorf Tear tester as described in TAPPI Test Method T-414. A ProTear Elmendorf Tear Tester manufactured in 1998 by Thwing-Albert was
- 25 used to measure the tear strength of the paper samples. Samples having width of exactly 63 millimeters are placed in the jaws of the tester and clamped. An initial 20 millimeter slit is made using a knife across the sample leaving a 43 millimeter long tear path. A pendulum is released which results in the sample tearing. The work done in tearing the sample is displayed on a digital read-out.
- 30 Test results for four samples were averaged to determine the test value.

Haggerty Smoothness: Haggerty smoothness is determined by measuring the airflow between a specimen and a pressurized ring that is pressed onto a coated paper as described in TAPPI Test Method T-538. The rate of flow is related to the surface roughness of the coated side of the paper. A Model 538 Paper Smoothness Tester manufactured in 1997 by Technidyne Corporation from New Albany, Indiana was used to conduct the test. A sample is inserted into the automated instrument and a digital readout expresses the flow rate of air in cubic centimeters per second.

10 Bekk Smoothness: Bekk smoothness is determined by measuring the time for 38 milliliters of air to pass through a ring pressed onto the coated paper as described in TAPPI Test Method T-479. This test is more suitable for very smooth papers. The Bekk Smoothness tester used in this study is a Model K533 manufactured by Messmer Büchel of The Netherlands in 1999. It is an electronic model which involves placing the sample onto a glass plate for testing. The test
15 instrument automatically measures the time for a fixed volume of air to pass between the glass plate and the sample. Test results for ten samples were averaged to determine the test value.

Haggerty Porosity: Haggerty porosity is a measure of the resistance of paper to passage of air through the plane of the paper as described in TAPPI Test
20 Method T-536. A Model 1 Porosity Tester manufactured by Technidyne Corporation in 2000 was used for testing the samples. The sample is placed in a slot between the base and the cabinet housing of the instrument. After running the test, a digital read-out displays the flow rate of air through the paper in cubic centimeters per second. Test results for four samples were averaged to
25 determine the test value.

EXAMPLE

The paper used in this example was a commercially available saturated paper (Blue "A" weight, Neenah Paper, Inc., Alpharetta, Georgia). Sheet size was 8.5.times.11 inches (about 22.times.28 cm). The basis weight of the paper
30 before saturation was about 62 grams per square meter (gsm). The saturant

was nitrile-butadiene rubber latex and was present at a level sufficient to give the saturated paper a basis weight of 90 gsm.

An aqueous mixture of nitrile and polyvinyl chloride lattices at a viscosity of 40 centipoise and 49% total solids was applied to the wire side of the paper with a number 18 Meyer wire-wound rod and the paper was dried in a 105 C oven. The amount of the coating applied was determined to be 13 gsm by gravimetric analysis after drying. A second layer of approximately the same coat weight was applied directly over the first in a similar manner and the paper was dried again. The paper smoothness was tested and found to be significantly smoother than that obtained on a single layer control sample as measure by Haggerty and Bekk Smoothness Instruments. Subsequent calendaring of the sample between a steel calendar roll and a fiber-filled roll at 500 pli and 23° degrees C resulted in smoothness values typically associated with that of film as measured by these instruments. FIG 1 is a photomicrograph (approximately 100x linear magnification) of a surface 12 of a single coating abrasive paper 10 made as described above. A coating 14 covering the surface 12 of the paper fibers 16 contains many pinholes 18 and gaps 20. FIG. 2 is a photomicrograph (approximately 100x linear magnification) of a surface 32 of a double coating abrasive paper 30 made as described above. A coating 34 covering the surface 32 of the paper fibers 36 contains many pinholes 38 and gaps 40. Compared to the single coating abrasive paper 10, the double coating abrasive paper 30 has a smoother appearance with fewer and smaller pin holes and gaps present in the surface of the paper. Physical property test results for the single coating and the double coating abrasive backings are provided in Table 1. Of particular note is the marked improvement in the smoothness of the double coating, supercalendered paper.

Table 1 – Physical Properties

	Single layer paper	Double layer paper
Basis Weight, gsm	115	123
30 Caliper, mm	0.167	0.145

	Dry Tensile, kg/15mm	MD	9.0	8.4
		CD	4.6	6.6
	Dry Stretch, %	MD	3.6	4.0
		CD	11.7	10.4
5	Tear, gms	MD	95	93
		CD	105	92
	Haggerty Smoothness, cc/sec.		190	27
	Bekk Smoothness, sec./38ml		45	1400
	Sheffield Porosity, cc/sec.		0	0

- 10 Other samples were prepared in a similar manner in which the first and second layer coat weights were varied. A heavier first layer coat weight, approximately 22 – 26 gsm followed by a 12 gsm top layer resulted in Bekk Smoothness values of over 12,900 second which is the upper limit of the instrument. Photomicrographs confirmed that the second layer of coating eliminated pinholes
- 15 in the abrasive backing.

- 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
- 20 embodiments may be interchanged either 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.

CLAIMS:

1. A method of making an abrasive backing having a smooth surface comprising the steps of:
 - providing a paper having a first paper surface and a second paper surface;
 - applying a first synthetic polymeric layer comprising a first synthetic polymeric composition to the first paper surface; and
 - applying a second synthetic polymeric layer comprising a second synthetic polymeric composition to the first synthetic polymeric layer.
2. The method of claim 1, further comprising the step of supercalendering the abrasive backing after application of the second synthetic polymeric layer to form a smooth surface on the second synthetic polymeric layer.
3. The method of claim 2, wherein the smooth surface exhibits a Bekk Smoothness greater than about 100.
4. The method of claim 2, wherein the smooth surface exhibits a Bekk Smoothness greater than about 1000.
5. The method of claim 1, further comprising the step of applying an amorphous, rubbery polymer film layer to the second paper surface.
6. The method of claim 5, wherein the amorphous rubbery polymer film layer is produced from melt-extrusion, extrusion casting or a preformed film and is selected from the group consisting of polyester elastomers and amorphous rubbery polypropylene.
7. The method of claim 5, and wherein amorphous rubbery polymer film layer demonstrates antislip properties when either dry or wet, and further wherein the abrasive backing is curl-resistant upon exposure to liquid water.
8. The method of claim 1, wherein the paper is a polymer-reinforced paper.

9. The method of claim 1, wherein the paper is saturated with a nitrile-butadiene rubber latex.
10. The method of claim 1, further comprising the steps of applying a layer of uniformly distributed abrasive particles to the second synthetic polymer layer.
11. The method of claim 10, wherein the abrasive particles average less than about 6 microns in size.
12. The method of claim 10, wherein the layer of abrasive particles is bonded to the second synthetic polymeric composition by means of a layer of an adhesive.
13. The method of claim 10, in which the layer of abrasive particles is coated with a layer of an adhesive.
14. The method of claim 1, wherein the first synthetic polymeric composition comprises nitrile and polyvinyl chloride lattices.
15. The method of claim 1, wherein the second synthetic polymeric composition comprises nitrile and polyvinyl chloride lattices.
16. The method of claim 1, wherein the basis weight of the second layer is less than about half the basis weight of the first layer.
17. A coated abrasive backing for use in fabricating fine grit abrasive paper, the abrasive backing comprising a paper having first and second surfaces, a first layer comprising a first synthetic polymer composition contacting the first surface of the paper, a second layer comprising a second synthetic polymer composition, the second layer contacting the first layer and comprising a smooth exterior surface.
18. The coated abrasive backing for use in fabricating fine grit abrasive paper of claim 17, wherein the smooth exterior surface exhibits a Bekk Smoothness greater than about 100.

19. The coated abrasive backing for use in fabricating fine grit abrasive paper of claim 17, wherein the smooth surface exhibits a Bekk Smoothness greater than about 1000.

20. A fine grit abrasive paper comprising an abrasive backing comprising a paper having first and second surfaces, a first layer comprising a first synthetic polymer composition contacting the first surface of the paper, a second layer comprising a second synthetic polymer composition, wherein the second layer contacts the first layer and comprises a smooth exterior surface exhibiting a Bekk Smoothness greater than about 1000, and a layer of fine grit abrasive particles having an average particle size less than about 6 microns.

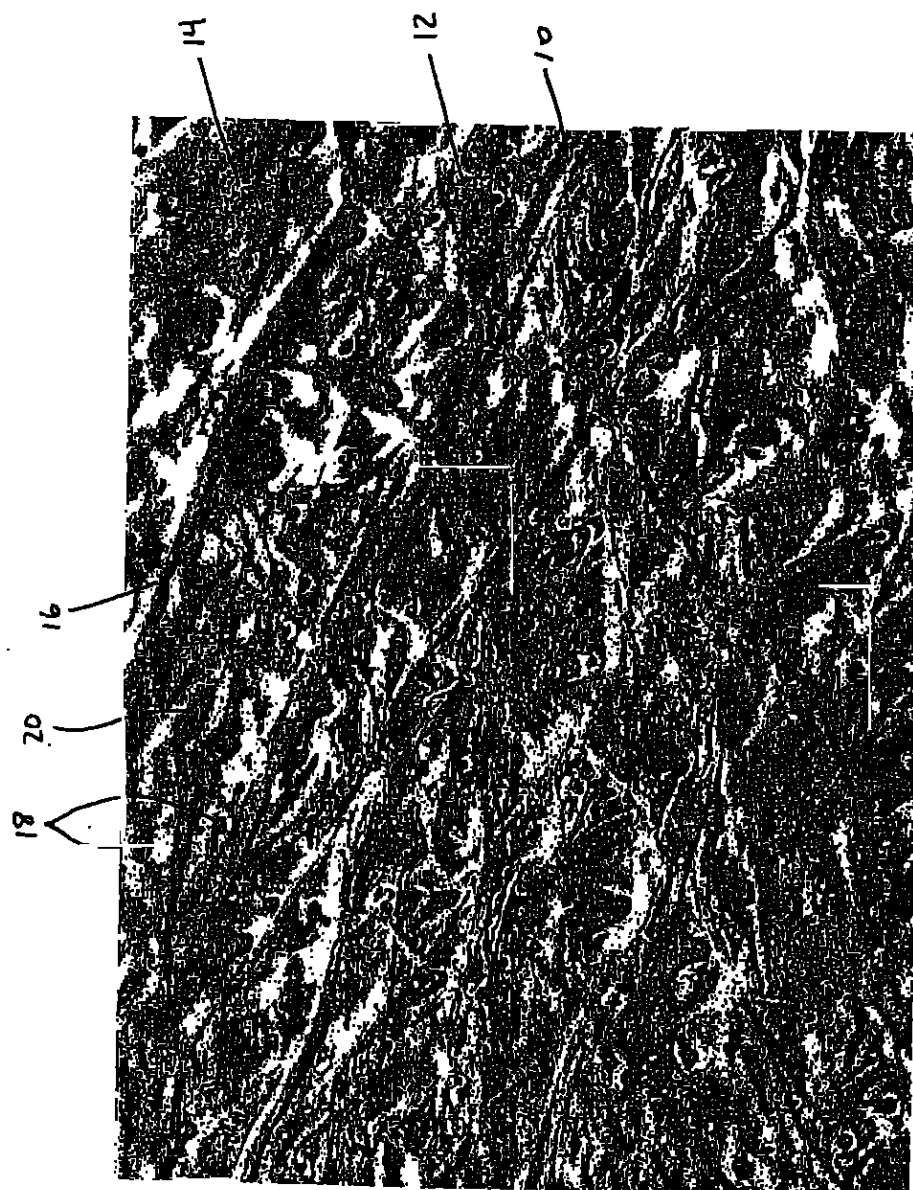


FIG. 1

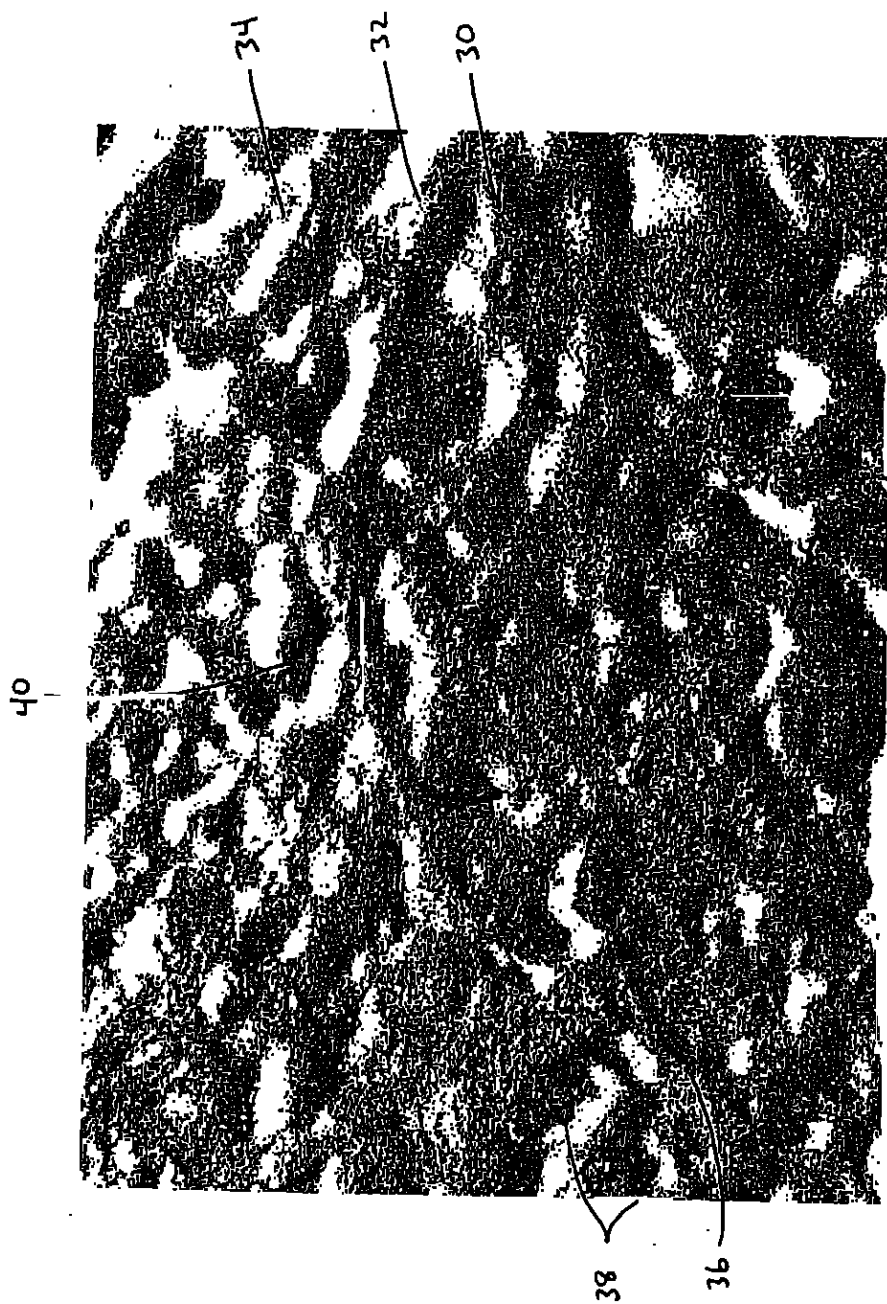


FIG. 2

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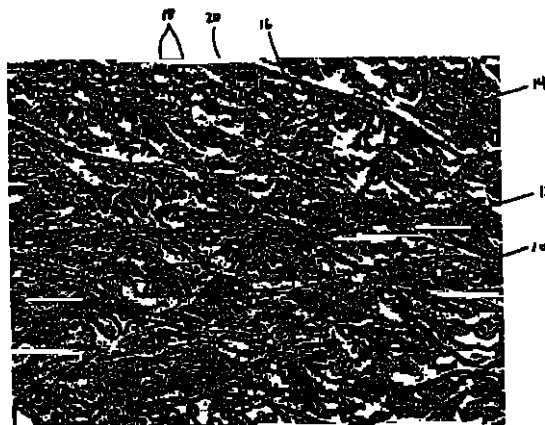
— antes del vencimiento del tiempo límite para modificar las
reivindicaciones y a ser publicado nuevamente al recibir
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Para códigos de dos letras y otras abreviaciones, referirse a
las "Notas de guía sobre Códigos y Abreviaturas" que
aparecen al comienzo de cada edición de la Gaceta del PCT.

(54) Título: MATERIAL DE RESPALDO DE PAPEL ABRASIVO FINO Y MÉTODO PARA HACER EL MISMO.



(57) Resumen: En una modalidad se proporciona un método para hacer un respaldo abrasivo con una superficie lisa que comprende los pasos para proporcionar un papel que tiene una primera superficie de papel y una segunda superficie de papel; aplicando una primera capa sintética polimérica que comprende una primera composición sintética polimérica a la primera superficie de papel; y aplicando una segunda capa sintética polimérica que comprende una segunda composición sintética polimérica a la primera capa sintética polimérica. El método se utiliza para preparar respaldos abrasivos finos con una superficie exterior lisa para la preparación de papeles finos abrasivos.

**MATERIAL DE RESPALDO DE PAPEL ABRASIVO FINO
Y MÉTODO PARA HACER EL MISMO**

ANTECEDENTES DE LA INVENCION

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Los materiales de hoja abrasiva son ampliamente usados para una variedad de aplicaciones e incluye, por vía de ilustración solamente, papeles de lija, paños de esmeril, discos para lijar para lijadoras giratorias y tiras para lijar para
10 lijadoras orbitales y de banda. Los materiales de hoja abrasiva más frecuentemente comprenden una capa de un abrasivo, por ejemplo partículas abrasivas o arenilla, la cual está sujeta a un sustrato a base de un grosor y peso base variables por medio de un adhesivo. Mediante el utilizar materiales abrasivos muy
15 finos o súper finos (de menos de 6 micras de diámetro promedio), los materiales de hoja abrasivos también pueden ser producidos y pueden ser usados para operaciones de pulido y de lijado fino.

El refuerzo de papel mediante la impregnación de
20 polímero de látex (comúnmente mencionado como saturación de látex) es una práctica establecida desde hace tiempo. El polímero empleado típicamente es un material sintético, más frecuentemente un látex, y el papel puede consistir solamente de fibras de celulosa o de una mezcla de fibras celulósicas y no

celulósicas. El refuerzo de polímero puede ser empleado para mejorar una o más de tales propiedades como estabilidad dimensional, resistencia a la degradación química y ambiental, resistencia al rasgado, grabado, elasticidad, conformación, transmisión de humedad y vapor, y resistencia a la abrasión entre otros.

Los recubrimientos de barrera de polímero de látex también pueden ser usados para proporcionar una superficie lisa para la aplicación de adhesivo y partículas de adhesivo. Sin embargo, durante el secado de los recubrimientos de barrera de polímero de látex, pueden aparecer orificios pequeños en la capa de látex. Los orificios aparecen debido a la liberación del vapor de agua durante el secado y contracción de la película secada durante el curado. Estos orificios son pequeños, de 10 - 30 micras de diámetro promedio y son mencionados como orificios de alfiler. Los orificios de alfiler no se convierten en un problema para las partículas de arenilla de tamaño fino como se usaron en la industria abrasiva tal como de desde arenilla de 320 a 600 (35 - 16 micras de tamaño promedio). Sin embargo, en las aplicaciones de arenilla súper fina, por ejemplo arenilla de 800 a 1,200 y más fina (12 a 1,2 micras), la presencia de los orificios de alfiler afecta la calidad del producto de papel abrasivo final. Por ejemplo, los orificios de alfiler pueden

permitir a las partículas súper finas el ser atrapadas o alojadas en los orificios. Tal atropamiento de las partículas puede resultar en una aglomeración de partículas abrasivas sobre la superficie del producto final. Tales aglomeraciones crean una
5 superficie dispareja que resulta en una calidad de lijado pobre.

Por tanto, existe una necesidad en el arte de un respaldo de papel abrasivo súper fino que resulte en una uniformidad mejorada de las partículas de arena sobre la
10 superficie del mismo y en un método para hacer el mismo.

SÍNTESIS DE LA INVENCION

En respuesta a las dificultades discutidas de los
15 problemas encontrados en el arte previo, se han descubierto nuevos respaldos abrasivos y métodos para hacer tales respaldos abrasivos. En una incorporación, un método para hacer un respaldo abrasivo que tiene una superficie lisa incluye los pasos de: i) proporcionar un papel que tiene una primera superficie
20 de papel y una segunda superficie de papel; ii) aplicar una primera capa polimérica sintética incluyendo una primera composición polimérica sintética a la primera superficie de papel; y iii) aplicar una segunda capa polimérica sintética incluyendo una segunda composición polimérica sintética a la

primera capa polimérica sintética. El método puede además incluir el paso de súper calandrar el respaldo abrasivo para después de la aplicación de la segunda capa polimérica sintética para formar una superficie lisa sobre la segunda capa polimérica sintética. Deseablemente, la superficie lisa exhibe una lisura Bekk mayor de alrededor de 100 y más deseablemente la superficie lisa exhibe una lisura Bekk mayor de alrededor de 1,000.

En un aspecto, el método puede además incluir el paso de aplicar una capa de película de polímero ahulado amorfo a la segunda superficie de papel. La capa de película de polímero ahulado amorfo puede ser producida, por ejemplo, de extrusión-derretido, fraguado y extrusión o de una película preformada. Deseablemente, el polímero ahulado amorfo es seleccionado del grupo que consiste de elastómeros de poliéster y polipropileno ahulado amorfo. Más deseablemente, la capa de película de polímero ahulado amorfo puede demostrar propiedades en contra del resbalado cuando esté ya sea seca o húmeda, y aún más deseablemente el respaldo abrasivo es resistente al rizado con la exposición al agua líquida.

El papel puede ser un papel reforzado con polímero. Deseablemente, el papel puede ser saturado con un látex de hule de estireno-butadieno y/o de nitrilo-butadieno.

En otro aspecto, el método puede además incluir el paso de aplicar una capa de partículas abrasivas uniformemente distribuidas a la segunda capa de polímero sintético. Las partículas abrasivas deseablemente promedian menos de alrededor de 6 micras en tamaño. Deseablemente, la capa de partículas abrasivas está unida a la segunda composición polimérica sintética por medio de una capa de un adhesivo. En una incorporación adicional, la capa de partículas abrasivas puede ser recubierta con una capa de un adhesivo.

En un aspecto adicional, las composiciones poliméricas sintéticas primera y/o segunda pueden incluir, por ejemplo, redes de cloruro de polivinilo y/o de nitrilo. Deseablemente, el peso base de la segunda capa es de menos de alrededor de la mitad del peso base de la primera capa.

En otra incorporación, un respaldo abrasivo recubierto para usarse en la fabricación de papel abrasivo de granitos de arena finos incluye un papel que tiene la superficie primera y segunda, una primera capa que incluye una primera composición de polímero sintético que hace contacto con la primera superficie del papel, una segunda capa que incluye una segunda composición de polímero sintético, la segunda capa hace

contacto con la primera capa e incluye una superficie exterior lisa. Deseablemente, la superficie exterior lisa exhibe una lisura Bekk mayor de alrededor de 100. Más deseablemente, la superficie lisa exhibe una lisura Bekk mayor de alrededor de 5 1,000.

En una incorporación adicional, un papel abrasivo de granos de arena finos incluye un respaldo abrasivo que incluye un papel que tiene las superficies primera y segunda, una primera 10 capa que incluye una primera composición de polímero sintético que hace contacto con la primera superficie del papel, una segunda capa que incluye una segunda composición de polímero sintético, en donde la segunda capa hace contacto con la primera capa e incluye una superficie exterior lisa que exhibe una lisura 15 Bekk mayor de alrededor de 1,000, y una capa de partículas abrasivas de granos de arena finos teniendo un tamaño de partícula promedio de menos de alrededor de 6 micras.

Otras características y aspectos de la presente 20 invención están discutidos en mayor detalle abajo.



BREVE DESCRIPCIÓN DE LOS DIBUJOS

La Figura 1 es una fotomicrografía de la superficie recubierta de un respaldo abrasivo recubierto único; y

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La Figura 2 es una fotomicrografía de la superficie recubierta de un respaldo abrasivo recubierto doble.

DEFINICIONES

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Dentro del contexto de ésta descripción, cada término o fase abajo incluirá el siguiente significado o significados.

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El término "respaldo abrasivo" es usado aquí para significar un papel, típicamente un papel reforzado con polímero, el cual se intenta que sea proporcionado con una capa de partículas abrasivas. El término "papel abrasivo" se refiere a la combinación de un respaldo abrasivo y una capa de partículas abrasivas.

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Como se usó aquí, el término "papel" se quiere que incluya cualquier tejido o material de tipo de hoja el cual contiene por lo menos alrededor de 50% por peso de fibras

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celulósicas. Además de las fibras celulósicas, el tejido puede contener otras fibras naturales, fibras sintéticas o mezclas de los mismos. Las telas no tejidas celulósicas pueden ser preparadas por una colocación por aire o una colocación en húmedo de fibras relativamente cortas para formar un tejido u hoja. Por tanto, el término incluye hojas preparadas de un suministro para hacer papel. Tal suministro puede incluir sólo fibras de celulosa o una mezcla de fibras de celulosa con otras fibras naturales y/o fibras sintéticas. El suministro también puede contener aditivos y otros materiales, tales como rellenos, por ejemplo, una arcilla y dióxido de titanio, surfactantes, agentes antiespumantes, y similares, así como se conoce en el arte de fabricación de papel.

Como se usó aquí, el término "capa de lado al respaldo" se refiere a una capa o recubrimiento sobre el lado de respaldo o interior de un papel abrasivo, por ejemplo el lado del papel abrasivo que no tiene la capa de partículas abrasivas sobre el mismo.

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Como se usó aquí y en las reivindicaciones, el término "comprendiendo" es inclusivo o de extremo abierto y no excluye los elementos no recitados adicionales, componentes de composición o pasos de método. Por tanto, el término

"comprendiendo" abarca los términos más restrictivos "consistiendo esencialmente de" y "consistiendo de".

DESCRIPCIÓN DETALLADA DE LA INVENCION

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De acuerdo con la invención, un papel teniendo las superficies primera y segunda está recubierto sobre la primera superficie con una primera capa de polímero sintético, seguido por la sobrecolocación de la primera capa de polímero sintético con una segunda capa de polímero sintético para formar un papel recubierto, seguido por el súper calandrado del papel recubierto para formar un respaldo abrasivo liso.

El papel o respaldo abrasivo de la presente invención puede ser preparado de un papel impregnado de látex. Por vía de ilustración solamente, el papel impregnado de látex puede ser una hoja de agua de fibras de pulpa de madera o de fibras de pulpa alfa impregnadas con un látex de polímero acrílico reactivo tal como Rhoplex® B-15 disponible de RohmNova Company, de Filadelfia, Pennsylvania. Sin embargo, cualquiera de un número de otros látex pueden ser usados, si se desea, algunos ejemplos de los cuales incluyen, pero no se limitan a poliacrilatos, incluyendo Hycar® 26083, 26084, 26120, 26104, 26106 y 26322, disponibles en Noveon de Cleveland, Ohio, Rhoplex®

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HA-8, HA-12 y NW-1715, disponibles de RohmNova Company y Carbo-set® XL-52. disponible en Noveon, de Cleveland, Ohio, copolímeros de estireno-butadieno, incluyendo Butofan® NS 278, disponible de BASF Corporation, de Charlotte, Carolina del Norte, y DL-219 y DL-283, disponibles de Dow Chemical Company de Midland, Michigan, copolímeros de etileno-vinil acetato incluyendo Dur-O-Set® E-666, E-646 y E-669, disponibles de Nacional Starch & Chemical Co., de Bridgewater, New Jersey, hules de nitrilo, incluyendo Hycar® 1572, 1577 y 1570x55, disponibles de Noveon, poli(cloruro de vinilo), incluyendo Vycar® 352, disponible de Noveon, poli(vinil acetato), incluyendo Vinac® XX-210, disponible de Air Products and Chemicals, Inc., de Napierville, Illinois, copolímeros de etileno-acrilato incluyendo Michem® Prime 4990, disponibles de Michelman, Inc., de Cincinnati, Ohio y Adcote 56220, disponibles de Morton Thiokol, Inc., de Chicago, Illinois.

La dispersión impregnante puede contener arcilla y/o un opacificador tal como dióxido de titanio. Las cantidades de ejemplo de estos dos materiales son 16 partes y 4 partes, respectivamente, por 100 partes de polímero sobre una base de peso seco.

Por vía de ejemplo solamente, el papel puede tener un peso base de 50 g/m² antes de la impregnación. El papel generalmente puede contener impregnante en un rango de desde alrededor de 5 alrededor de 50 por ciento por peso, sobre una base de peso seco, aún cuando en algunos casos los niveles superiores de impregnante en el papel pueden ser adecuados. Como una ilustración no limitante, el papel puede contener 18 partes de sólidos de impregnación por 100 partes de fibra por peso, y puede tener un peso base de 58 g/m², ambos sobre la base de peso seco. Un calibre adecuado puede ser de 97 +/- 8 micrómetros.

La primera superficie del papel es primero recubierta con una primera capa de una primera composición polimérica sintética. Después, el papel recubierto es recubierto con una segunda capa de una segunda composición polimérica sintética yaciendo sobre la primera capa. Cualquier composición polimérica sintética convencional puede ser utilizada para la primera composición polimérica sintética siempre que la composición se adhiera o una bien a la primera superficie del papel. Las composiciones poliméricas adecuadas para la primera capa incluyen, por vía de ilustración solamente, poliolefinas, especialmente polietileno y copolímeros de etileno y uno o más de tales monómeros como vinil acetato, ácido acrílico, ácido metacrílico, ésteres de ácido acrílico (acrilatos), y ésteres de

ácido metacrílico (metracrilatos); copolímeros de etileno con tales monómeros de vinilo como alcohol de vinilo, cloruro de vinilo y cloruro de vinilideno; poliestireno y copolímeros de estireno como butadieno y acrilonitrilo; terpolímeros de 5 acrilonitrilo-butadieno-estireno; poliamidas; poliésteres, incluyendo ambos homopolímeros y copolímeros; poliuretanos; y esteres de poliéster. La composición polimérica sintética puede ser un material termoplástico o un material termoasentado. Los ejemplos adecuados incluyen, pero no se limitan a poliacrilatos 10 tal como Hycar® 26106 disponible de Noveon, hules de nitrilo tal como Hycar® 1572 disponible de Noveon, poli(cloruro de vinilo) tal como Vycar® 460X90 disponible de Noveon, y copolímeros de estireno-butadieno tal como, por ejemplo, emulsiones de látex de copolímero de estireno-butadieno carboxilatado.

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El grosor de la primera capa requerida variará de acuerdo al uso intentado para el papel recubierto, por ejemplo, una primera capa más gruesa normalmente requerirá productos 20 abrasivos de granitos de arena más ásperos, por ejemplo, abrasivos teniendo tamaños de partícula de 200 mallas o más (el término "mallas") es usado aquí para significar una malla de criba estándar de los Estados Unidos de América). Por el otro lado, una primera capa más delgada puede ser usada para productos de granitos de arena más finos los cuales van a ser usados para

pulir el terminado de una superficie fina. Un grosor de capa mínimo práctico es de alrededor de 25 micrómetros, mientras que el grosor de capa máximo práctico es de alrededor de 250 micrómetros, sin embargo, las capas más gruesas o más delgadas pueden ser empleadas, si se desea, siempre que las capas sean continuas. Las composiciones poliméricas termoplásticas las cuales son inherentemente más rígidas serán más útiles para productos de arenilla más áspera, mientras que las composiciones poliméricas termoplásticas elastoméricas son más suaves como los copolímeros de vinil acetato-etileno y poliuretanos sean más útiles para tales productos de arenilla fina como trapos de pulido y de lijado fino.

Cualquier composición polimérica sintética convencional, tal como se describió anteriormente para la primera capa puede ser utilizada para la segunda composición polimérica sintética. La composición polimérica sintética para las capas primera y segunda puede ser la misma o diferente. Deseablemente, la segunda composición polimérica sintética se adhiere o une bien a la superficie de la primera capa. Más deseablemente, la segunda composición polimérica sintética fluye suficientemente bien para llenar cualquier orificios de alfiler presentes en la primera capa. Por ejemplo, las composiciones poliméricas sintéticas teniendo viscosidades variando desde 30-50 centipoises

pueden ser esperadas que fluyan suficientemente bien para llenar esencialmente cualesquiera orificios de alfiler presentes en la primera capa. Aún más deseablemente, la segunda composición polimérica sintética usada para la segunda capa es compatible con
5 el adhesivo particular el cual puede ser usado para sujetar las partículas adhesivas a la superficie recubierta del papel.



En una incorporación, una composición polimérica termoplástico la cual es inherentemente rígida es usada para la
10 primera capa, mientras que una composición polimérica termoplástica elastomérica o más suave como copolímero de etileno-vinil acetato y/o poliuretano es usada como la segunda capa para los productos de granitos de arena finos tal como para los trapos de pulido y de lijado fino.

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Las composiciones poliméricas sintéticas primera y segunda pueden ser aplicadas puras, como una solución en un solvente adecuado o como una dispersión en agua u otro líquido por métodos muy conocidos por aquellos con una habilidad
20 ordinaria en el arte. En algunas incorporaciones, los procesos los cual aplican un fluido de contenido de sólidos alto, viscoso a la superficie del papel son utilizados. Tales procesos pueden utilizar 100% de composiciones de sólidos que incluyen, por vía de ilustración solamente, acrílicos curables con radiación

ultravioleta y termoasentados de epoxi líquido. Tales composiciones pueden ser aplicadas con, por ejemplo, recubridores de matriz de ranura y recubridores de cuchilla/sobre/rodillo. Además, pueden ser empleados los métodos de recubrimientos de polvo termoplástico, tal como los métodos de recubrimiento electrostático. En otras incorporaciones, los procesos tal como el recubrimiento de derretido caliente y la extrusión de derretido que aplican una composición derretida directamente a la tela son empleados, particularmente en donde la tela es excepcionalmente porosa y abierta en naturaleza. Si se desea, la composición polimérica sintética puede ser llevada a cabo en, por ejemplo, como una película la cual entonces puede ser unida a la segunda superficie del papel por calor o una capa adhesiva.

Después de que son aplicadas las capas primera y segunda de composición de polímero sintético a la primera superficie de papel, el papel recubierto pasa a través de un calandrado o súper calandrado para alisar además la superficie de la segunda capa. El efecto de calandrado sobre la superficie del respaldo abrasivo depende de la temperatura, la presión aplicada y la duración de la presión. Para propósitos aquí, el calandrado puede ya sea llevado a cabo a cualquier temperaturas ambiente o elevada. Las presiones de calandrado adecuadas pueden ser de alrededor de 50 a alrededor de 2,000 libras-fuerza por pulgada

lineal (pli) deseablemente de desde alrededor de 100 a 1,600 pli, más deseablemente de desde alrededor de 300 a alrededor de 1,000 pli, y aún más deseablemente de desde alrededor de 400 a alrededor de 600 pli. Las temperaturas adecuadas pueden ser de
5 desde alrededor de 20° C alrededor de 240° C, deseablemente de desde alrededor de 20° C a alrededor de 140° C, aún más deseablemente de desde alrededor de 20° C a alrededor de 40° C, aún cuando más deseablemente son las temperaturas a la temperatura ambiente. La duración del calandrado puede ser
10 variada en conjunción con la presión del punto de sujeción y/o la composición de los rodillos de calandrado para producir la lisura deseada del respaldo de papel para la hoja. Por ejemplo, los rodillos de calandrado más suaves, tales como los rodillos llenados con fibra tienden a comprimir para formar un área de
15 contacto más grande en el punto de sujeción, aumentando por tanto la duración del calandrado. Los rodillos de acero duros comprimen menos, disminuyendo por tanto la duración del calandrado. En un arreglo, el punto de sujeción de calandrado comprende un rodillo de acero y un rodillo llenado de fibra
20 suave. En otro arreglo, por ejemplo, una pila de súper calandrador de producción puede incluir más de dos rodillos, deseablemente de desde alrededor de nueve a alrededor de once rodillos, apilados uno sobre otro en un arreglo vertical. Deseablemente los rodillos apilados alternan entre rodillos de

acero y llenados de fibra. Con tal arreglo, el papel puede ser expuesto a varias presiones, de hasta alrededor de 1,600 pli, y un número de puntos de sujeción, por ejemplo de desde uno a alrededor de ocho, a fin de desarrollar el nivel de lisura deseado.

El recubrimiento continuo de dos capas resultante proporciona una superficie no porosa y lisa a la cual pueden ser sujetadas las partículas abrasivas, típicamente por medio de una capa o recubrimiento adhesivo. El recubrimiento continuo también aglutina el respaldo abrasivo junto, dándole resistencia a la distorsión mecánica durante la conversión del respaldo abrasivo recubierto a un papel abrasivo y durante el uso del papel abrasivo resultante.

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El respaldo abrasivo puede incluir una capa de película de polímero ahulado amorfo unida a la segunda superficie del papel para reducir la tendencia de papel para el rizado y proporcionar una superficie no resbalosa. Por vía de ejemplo solamente, el polímero ahulado amorfo puede ser un elastómero de poliéster. Como otro ejemplo, el polímero ahulado amorfo puede ser un polipropileno ahulado amorfo. La capa de película de polímero ahulado amorfo en general puede ser formada sobre la segunda superficie del papel mediante técnicas de extrusión de

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derretido o de fraguado con extrusión las cuales son muy conocidas por aquellos teniendo una habilidad ordinaria en el arte. Alternativamente, una película preformada del polímero ahulado amorfo puede ser unida al segundo lado del papel, de nuevo por medios conocidos. En general, la capa de película de polímero ahulado amorfa puede ser de cualquier grosor deseado, dependiendo de los requerimientos del papel abrasivo. Por ejemplo, la capa de película de polímero amorfo puede tener un grosor de desde alrededor de 50 a alrededor de 75 micrómetros.

10 Como otro ejemplo, la capa de película de polímero amorfo puede tener un grosor de desde alrededor de 12 a alrededor de 25 micrómetros.

Para sujetar las partículas abrasivas a la superficie de cubierta del respaldo abrasivo, es aplicado un adhesivo a la superficie recubierta lisa del respaldo abrasivo. Cualquiera de los tipos de adhesivos conocidos puede usarse para unir las partículas abrasivas a la segunda capa de composición polimérica sintética. Por ejemplo, el adhesivo puede ser un adhesivo termoasentado tal como, por vía de ilustración solamente, resinas epoxi, éteres epoxi, fenólicos, poliuretanos, poliésteres y alquids. Las dispersiones a base de agua tal como el copolímero de etileno-vinil-acetato dispersado-amoniaco también pueden ser empleadas. La solución de adhesivo

típicamente es dictada por el uso final, pero el adhesivo debe ser compatible con el recubrimiento polimérico sintético sobre el cual es aplicado. Los fenólicos son más útiles para los productos abrasivos ásperos más duros para el terminado o
5 conformado áspero, especialmente en donde el producto necesita ser a prueba de agua también. Los adhesivos más flexibles tal como las resinas epoxi y los alquids son también a prueba de agua y son deseables para productos de terminado fino. Para productos de lijado en seco, los pegamentos animales y las resinas
10 sintéticas a base de agua pueden ser usadas.

Cualquier medios generalmente aceptados para aplicar adhesivo a un material de hoja pueden ser empleados, incluyendo tales métodos como rodillo, rodillo de reversa,
15 grabado y recubrimiento de varilla Meyer. Es generalmente deseable el evitar la colocación del papel bajo una tensión significativa a fin de minimizar la distorsión de papel, especialmente cuando el adhesivo está siendo curado con calor. Las temperaturas de curado deseablemente serán mantenidas debajo
20 de alrededor de 125° C, ya que las temperaturas más altas también tienden a distorsionar el papel.

En general cualquiera de los materiales abrasivos empleados comúnmente conocidos por aquellos con una habilidad



ordinaria en el arte pueden ser usados. Tales materiales pueden variar desde muy ásperos a muy finos. Los materiales abrasivos de ejemplo incluyen carburo de silicio, óxido de aluminio, granate y diamantes, por vía de ilustración solamente.

5

En una incorporación, el adhesivo de unión puede ser disuelto o disperso en un solvente portador y la mezcla es entonces aplicada por un punto de sujeción de recubrimiento de presión al respaldo abrasivo. Las partículas de arenilla abrasivas son entonces depositadas sobre el respaldo abrasivo en movimiento antes de que el solvente o el portador sea expulsado, y mientras que el adhesivo aún está fluido. Las partículas de arena pequeña pueden ser orientadas o alineadas, por ejemplo por medios electrostáticos, para maximizar las propiedades abrasivas o de corte. Deseablemente, ninguna presión externa es aplicada a las partículas después del depósito, ya que esto puede tender a destruir la alineación de las partículas, o a enterrar las partículas en el respaldo, ambos de los cuales son indeseables. Después de que el solvente o portador es expulsado, el respaldo de abrasivo llevando el adhesivo y la arenilla puede ser pasado a través de un horno el cual calienta el material por tiempos variando desde varios minutos a varias horas para curar el adhesivo y para unir firmemente la arenilla ahí.



Sí se desea, una o más capas de un adhesivo u otro material pueden ser formadas sobre la capa de partículas abrasivas. Tal capa puede servir para anclar mejor todas las partículas abrasivas al material de hoja abrasivo, reduciendo por tanto la pérdida de abrasivo durante el uso y aumentando la vida del material de hoja abrasiva.

En general, cualquiera de los materiales abrasivos comúnmente empleados conocidos por aquellos con una habilidad ordinaria en el arte pueden ser usados. Tales materiales pueden variar desde muy ásperos a muy finos. Los materiales abrasivos de ejemplo incluyen carburo de silicio, óxido de aluminio, granate y diamante por vía de ilustración solamente.

Sí se desea una o más capas de un adhesivo u otro material pueden se formadas sobre la capa de partículas abrasivas. Tal capa puede servir para enganchar mejor todas las partículas abrasivas al material de hoja abrasivo, reduciendo por tanto la pérdida de abrasivo durante el uso y aumentando la vida del material de hoja abrasivo. Por ejemplo, después de que la arenilla es firmemente unida al respaldo, puede ser aplicado un recubrimiento de "tamaño de grano" sobre la capa de partículas abrasivas. El recubrimiento de tamaño de grano puede ser una resina termoasentada dura o goma animal la cual ancla las

✓

partículas más finamente de manera que éstas permanecen alineadas para una capacidad de corte máximo.

PROCEDIMIENTOS DE PRUEBA

5

Las muestras representativas de los papeles recubiertos fueron probadas bajo las condiciones TAPPI estándar a una humedad relativa de $50 \pm 2\%$ y a una temperatura de $23 \pm 2^\circ \text{C}$ después del acondicionamiento por 24 horas de acuerdo a los procedimientos de prueba delineados abajo.

10

Peso Base: El peso base es una medida del peso por área de unidad del papel como se describió en el método de prueba TAPPI 410. Para determinar el peso base, el papel teniendo un área conocida es pesado sobre una escala de presión y el peso por área de unidad es expresado en gramos por metro cuadrado y es calculado. Una balanza de presión electrónica modelo HR 60 A&D fabricada en 2001 por A&D Weighing de Milpitas, California y exacta a tres décimas fue usada para pesar los especímenes.

15
20

Calibre: El calibre es una medida del grosor de papel como se describió por el método de prueba T-411 de TAPPI. Una serie "400" de Precision Micrometer fabricado por Testing

Machines Incorporated (TMI) de Amityville, Nueva York fue utilizado para determinar. Una muestra acondicionada previamente es insertada en el instrumento y la lectura digital exhibe el grosor de muestra.

5

Tensión: La resistencia a la tensión es una medida de la fuerza por ancho de unidad requerida para romper un espécimen de papel como se describió en el método de prueba T-494 de TAPPI. Un probador de tensión EJA fabricado en 1999 por Thwing-Albert de Philadelphia, Pennsylvania fue usado para medir las propiedades de tensión y estiramiento. Una muestra de 15 milímetros de ancho fue insertada en la extensión de quijada de 4 pulgadas y la muestra es jalada a una velocidad de quijada de 12 pulgadas por minuto. La resistencia a la tensión pico y el estiramiento es exhibido sobre un exhibidor CRT de lectura electrónica. Los resultados de prueba para las cuatro muestras fueron promediadas para determinar el valor de prueba.

Estiramiento: El estiramiento es una medida del porcentaje de alargamiento al rompimiento cuando un espécimen es sometido a una prueba de tensión como se describió en el método T-494 de prueba de TAPPI. El estiramiento fue medido como se indicó arriba para la prueba de tensión.

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Rasgado: La resistencia al rasgado es una medida de la fuerza perpendicular al plano del papel requerido para rasgar a través de una distancia específica después de que el rasgado se ha empezado usando un probador de rasgado Elmendorf como se describió en el método de prueba T-414 de TAPPI. Un probador de rasgado Elmendorf Portear fabricado en 1998 por Thwing-Albert fue usado para medir la resistencia al rasgado de las muestras de papel. Las muestras teniendo un ancho de exactamente 63 milímetros son colocadas en las quijadas del probador y se agarran. Una hendidura de 20 milímetros iniciales se hace usando una cuchilla a través de la muestra dejando una trayectoria de rasgado de 43 milímetros de largo. Un péndulo es liberado el cual resulta en el rasgado de la muestra. El trabajo hecho en el rasgado de la muestra es exhibido sobre un lector digital. Los resultados de prueba para cuatro muestras fueron apropiadas para determinar el valor de prueba.

Lisura Haggerty: La lisura Haggerty es determinada mediante el medir el flujo de aire a través de un espécimen y un anillo presurizado que es presionado sobre un papel recubierto como se describió en el método de prueba T-538 de TAPPI. La tasa de flujo está relacionada a la aspereza de superficie del lado recubierto del papel. Un probador de lisura de papel modelo 538 fabricado en 1997 por Technidyne Corporation de New Albano,

Indiana fue usado para llevar a cabo la prueba. La muestra es insertada e el instrumento automatizado y una lectura digital expresa la tasa de flujo de aire en centímetros cúbicos por segundo.

5

Lisura Bekk: La lisura Bekk que es determinada mediante el medir el tiempo por 38 mililitros de aire para a través de un anillo prensado sobre el papel recubierto como se describe en el método de prueba T-479 de TAPPI. Esta prueba es más adecuada para papeles muy lisos. El probador de lisura Bekk usado en éste estudio de un modelo K533 fabricado por Messmer Büchel de Holanda en 1999. Este es un modelo electrónico que involucra el colocar la muestra sobre una placa de vidrio para la prueba. El instrumento de prueba automáticamente mide el tiempo para un volumen fijo de aire para pasare entre la placa de vidrio y la muestra. Los resultados de prueba para diez muestras fueron promediados para determinar el valor de prueba.

Porosidad Haggerty: La porosidad Haggerty es una medida de la resistencia del papel al paso del aire a través del plano del papel como se describió en el método de prueba T-536 de TAPPI. Un modelo de probador de porosidad 1 fabricado por Technidyne Corporation en 2000 fue usado para probar las muestras. La muestra es colocada en una ranura entre la base y



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la caja de gabinete del instrumento. Después de correr la prueba, un lector digital exhibe la tasa de flujo de aire a través del papel en centímetros cúbicos por segundo. Los resultados de prueba para las cuatro muestras fueron promediados para determinar el valore de prueba.

EJEMPLO

El papel usado en éste ejemplo fue un papel saturado comercialmente disponible (Azul "A" peso, de Neenah Paper, Inc., de Alpharetta, Georgia). El tamaño de hoja fue de 8,5 veces ,11 pulgadas (alrededor de 22 veces ,28 centímetros). El peso base del papel antes de la saturación fue de alrededor de 62 gramos por metro cuadrado (gsm). El saturante fue látex de hule de nitrilo-butadieno y estuvo presente a un nivel suficiente para dar al papel saturado un peso base de 90 gramos por metro cuadrado.

Una mezcla acuosa de redes de nitrilo y de cloruro de polivinilo a una viscosidad de 40 centipoises y 49% de sólidos totales fue aplicada al lado de alambre de papel con una varilla de enrollado de alambre Meyer número 18 y el papel fue secado en un horno a 105° C. La cantidad de recubrimiento aplicada fue determinada como siendo de 13 gramos por metro cuadrado por

análisis gravimétrico después del secado. Una segunda capa de aproximadamente el mismo peso de recubrimiento fue aplicada directamente sobre la primera en una manera similar y el papel fue secado de nuevo. La lisura de papel fue probada y se

5 encontró que fue significativamente más liso que aquel obtenido sobre una muestra de control de capa única como se midió por los instrumentos de lisura Haggerty y Bekk. El calandrado subsecuente de la muestra entre el rodillo de calandrado de acero y el rodillo llenado de fibra a 500 pli y 23° C resultó en

10 valores de lisura típicos asociados con aquellos de una película como se midió por éstos instrumentos. La figura 1 es una fotomicrografía (de aproximadamente de una amplificación de 100x lineal) de una superficie 12 de un papel abrasivo de recubrimiento único 10 hecho como se describió anteriormente. Un

15 recubrimiento 14 que cubre la superficie 12 de las fibras de papel 16 contiene muchos orificios de alfiler 18 y separaciones 20. La figura 2 es una fotomicrografía (de aproximadamente 100x de amplificación lineal) de una superficie 32 de un papel abrasivo de recubrimiento doble 30 hecho como se describió

20 anteriormente. Un recubrimiento 34 que cubre la superficie 32 de las fibras de papel 36 contiene muchos orificios de alfiler 38 y las separaciones 40. En comparación al papel de abrasivo de recubrimiento único 10, el papel abrasivo de recubrimiento doble 30 tiene una apariencia más lisa con menos y más pequeños

orificios de alfiler y separaciones presentes en la superficie del papel. Los resultados de la prueba de propiedad física para el recubrimiento único y los respaldos de abrasivo de recubrimiento doble se proporcionan en la Tabla 1. Es de notarse la mejora marcada en la lisura del papel súper calandrado de recubrimiento doble.

Tabla 1 - Propiedades Físicas

		Papel de capa única	Papel de capa doble
Peso Base, gsm		115	123
Calibre, mm		0,167	0,145
Tensión en seco, kg/15 mm	MD	9,0	8,4
	CD	4,6	6,6
Estiramiento en seco %	MD	3,6	4,0
	CD	11,7	10,4
Rasgado, gms	MD	95	93
	CD	105	92
Lisura Haggerty, cc/seg		190	27
Lisura Bekk, seg/38 ml		45	1400
Porosidad Sheffield, cc/seg		0	0

Otras muestras fueron preparadas en una manera similar en la cual los pesos de recubrimiento de capa primera y segunda fueron variados. Un peso de recubrimiento de primera

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capa más pesado, de aproximadamente 22-26 gramos por metro cuadrado seguido por una capa superior de 12 gramos por metro cuadrado resultó en valores de lisura Bekk de sobre 12,900 segundos lo cual es el límite superior del instrumento. Las
5 fotomicrografías confirmaron que la segunda capa del recubrimiento eliminó los orificios de alfiler en el respaldo abrasivo.

Estas y otras modificaciones y variaciones a la
10 presente invención pueden ser practicadas por aquellos con una habilidad ordinaria en el arte, sin departir del espíritu y alcance de la presente invención la cual está más particularmente establecida en las reivindicaciones anexas. Además, deberá entenderse que los aspectos de las varias incorporaciones pueden
15 ser intercambiados ya sea en todo o en parte. Además, aquellos con un habilidad ordinaria en el arte apreciarán que la descripción anterior es por vía de ejemplo solamente y que no se intenta el limitar la invención hasta aquí descrita en tales reivindicaciones anexas.

R E I V I N D I C A C I O N E S

1. Un método para hacer un respaldo abrasivo que tiene una superficie lisa que comprende los pasos de:

5

proporcionar un papel que tiene una primera superficie de papel y una segunda superficie de papel;

aplicar una primera capa polimérica sintética que



10 comprende una primera composición polimérica sintética a la primera superficie de papel; y

aplicar una segunda capa polimérica sintética que

comprende una segunda composición polimérica sintética a la

15 primera capa polimérica sintética.

2. El método tal y como se reivindica en la

cláusula 1, caracterizado además porque comprende el paso de súper calandrar el respaldo abrasivo después de la aplicación de



20 la segunda capa polimérica sintética para formar una superficie lisa sobre la segunda capa polimérica sintética.

[X]

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3. El método tal y como se reivindica en la cláusula 2, caracterizado porque la superficie lisa exhibe una lisura Bekk mayor de alrededor de 100.

5 4. El método tal y como se reivindica en la cláusula 2, caracterizado porque la superficie lisa exhibe una lisura Bekk mayor de alrededor de 1000.

10 5. El método tal y como se reivindica en la cláusula 1, caracterizado además porque comprende el paso de aplicar una capa de película de polímero ahulado amorfo a la segunda superficie de papel.

15 6. El método tal y como se reivindica en la cláusula 5, caracterizado porque la capa de película de polímero ahulado amorfo se produce de un fraguado de extrusión, extrusión de derretido o una película formada previamente y se selecciona del grupo que consiste de elastómeros de poliéster y polipropileno ahulado amorfo.

20

7. El método tal y como se reivindica en la cláusula 5, caracterizado porque la capa de película de polímero ahulado amorfo demuestra las propiedades antiresbalado cuando

8/

está húmeda o seca y además en donde el respaldo abrasivo es resistente al rizado con la exposición al agua líquida.

8. El método tal y como se reivindica en la
5 cláusula 1, caracterizado porque el papel es un papel reforzado con polímero.

9. El método tal y como se reivindica en la
cláusula 1, caracterizado porque el papel está saturado con un
10 látex de hule de nitrilo-butadieno.

10. El método tal y como se reivindica en la
cláusula 1, caracterizado además porque comprende los pasos de
aplicar una capa de partículas abrasivas uniformemente
15 distribuidas a la segunda capa de polímero sintético.

11. El método tal y como se reivindica en la
cláusula 10, caracterizado porque las partículas abrasivas
promedian menos de alrededor de 6 micras en tamaño.

20

12. El método tal y como se reivindica en la
cláusula 10, caracterizado porque la capa de partículas abrasivas
está unida a la segunda composición polimérica sintética por
medio de una capa de un adhesivo.

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13. El método tal y como se reivindica en la cláusula 10, caracterizado porque la capa de partículas abrasivas está recubierta con una capa de un adhesivo.

5

14. El método tal y como se reivindica en la cláusula 1, caracterizado porque la primera composición polimérica sintética comprende redes de nitrilo y cloruro de polivinilo.

10

15. El método tal y como se reivindica en la cláusula 1, caracterizado porque la composición polimérica sintética segunda comprende de desde nitrilo y cloruro de polivinilo.

15

16. El método tal y como se reivindica en la cláusula 1, caracterizado porque el peso base de la segunda caspa es menor de alrededor de la mitad del peso base de la primera capa.

20

17. Un respaldo abrasivo recubierto para usarse en la fabricación de un papel abrasivo de arenilla fina, el respaldo abrasivo comprende un papel que tiene las superficies primeras y segunda, una primera capa que comprende una primera

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composición de polímero sintético que contiene la primera superficie de papel, una segunda capa que comprende una segunda composición de polímero sintético, la segunda capa hace contacto con la primera capa y comprende una superficie exterior lisa.

5

18. El respaldo abrasivo recubierto para usarse en la fabricación de papel abrasivo de arenilla fina tal y como se reivindica en la cláusula 17, caracterizado porque la superficie exterior lisa exhibe una lisura Bekk mayor de
10 alrededor de 100.

19. El respaldo abrasivo recubierto para usarse en la fabricación de papel abrasivo de arenilla fina tal y como se reivindica en la cláusula 17, caracterizado porque la
15 superficie exterior lisa exhibe una lisura Bekk mayor de alrededor de 1000.

20. Un papel abrasivo de arenilla fina que comprende un respaldo abrasivo que comprende un papel que tiene
20 las superficies primera y segunda, una primera capa que comprende una primera composición de polímero sintético que hace contacto con la primera superficie del papel, una segunda capa que comprende una segunda composición de polímero sintético, en donde la segunda capa hace contacto con la primera capa y comprende una

superficie exterior lisa que exhibe una lisura Bekk mayor de alrededor de 1000, y una capa de partículas abrasivas de arenilla fina teniendo un tamaño de partícula promedio de menos de alrededor de 6 micras.

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R E S U M E N

En una incorporación se proporciona un método para hacer un respaldo abrasivo teniendo una superficie lisa que comprende los pasos de proporcionar un papel que tiene una primera superficie de papel y una segunda superficie de papel; aplicar una primera capa polimérica sintética que comprende una primera composición polimérica sintética a la primera superficie de papel; y aplicar una segunda capa polimérica sintética que comprende una segunda composición polimérica sintética a la primera capa polimérica sintética. El método es usado para preparar los respaldos abrasivos finos que tienen una superficie exterior lisa para la preparación de los papeles abrasivos.

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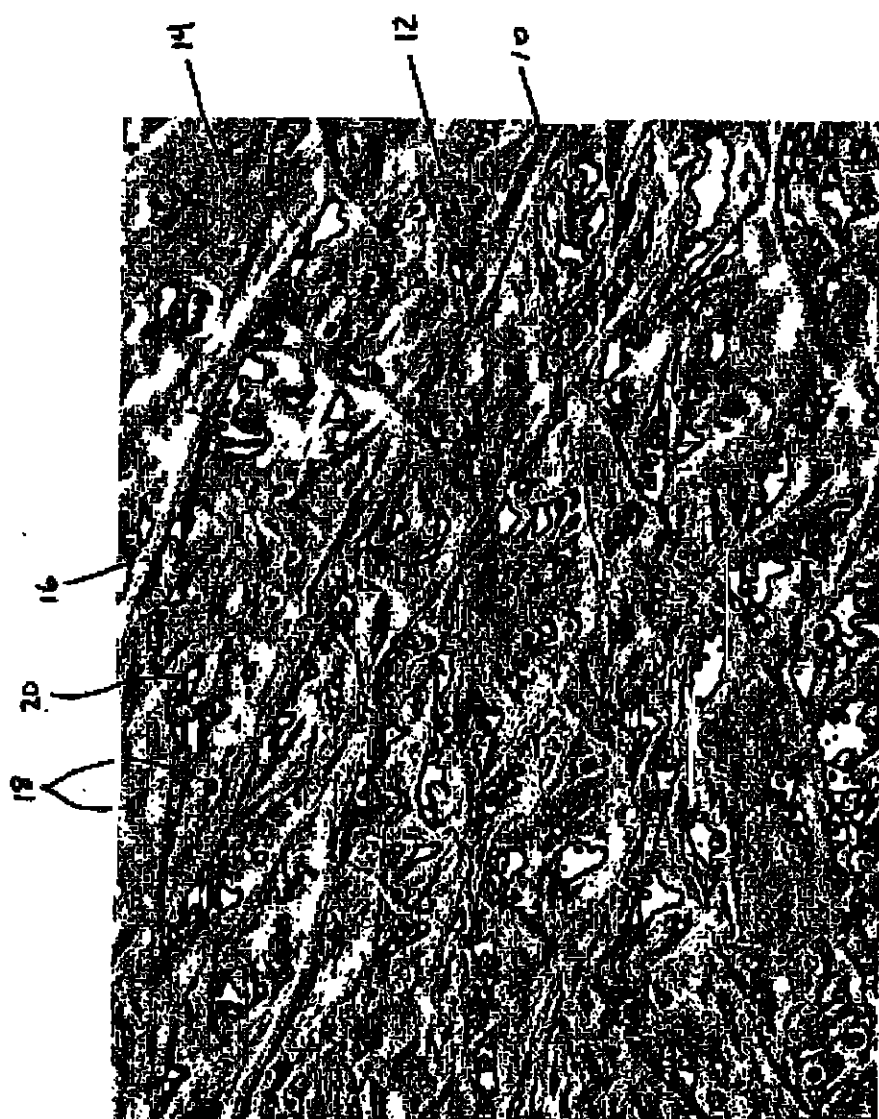


FIG. 1

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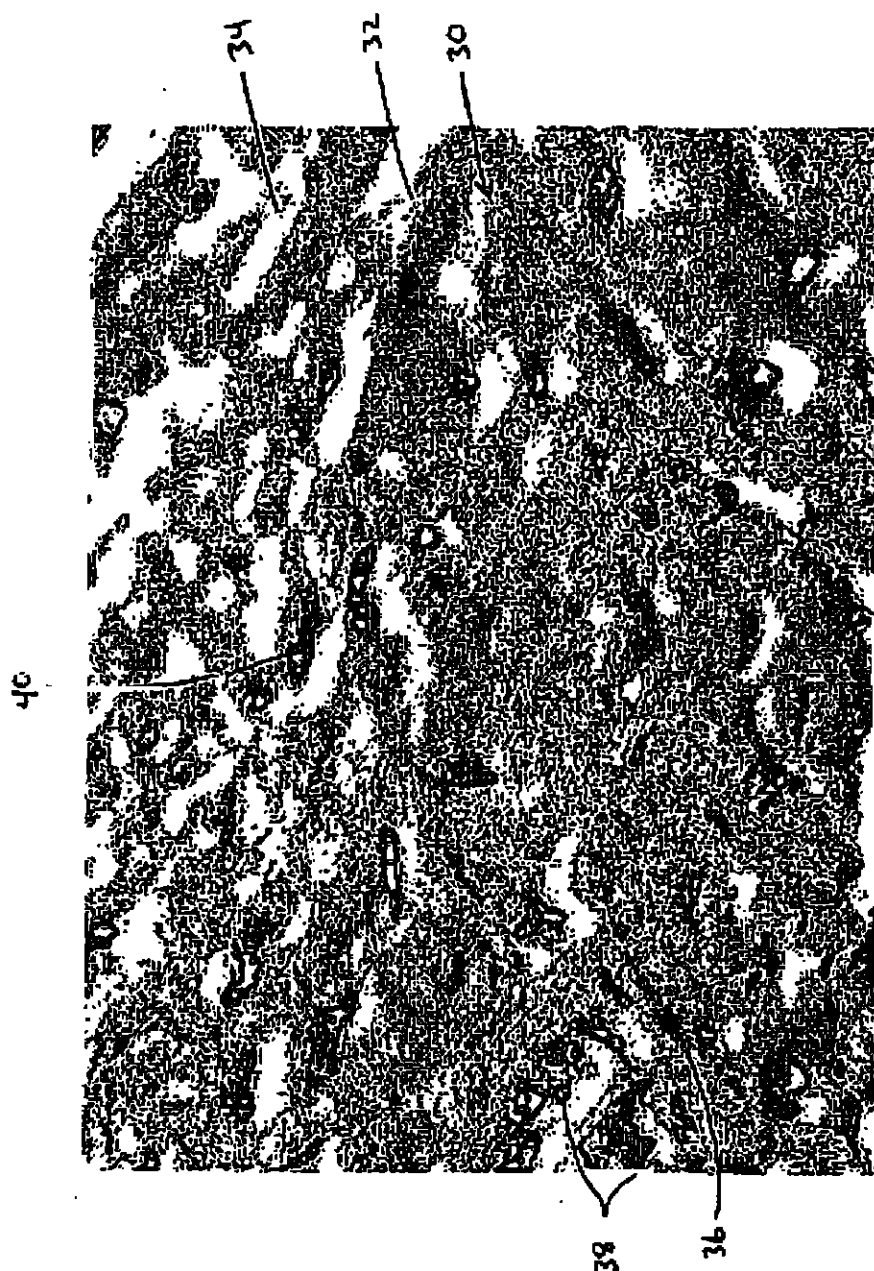


FIG. 2

PATENT COOPERATION TREATY

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OCT 12 2005

PCT DORITY AND MANNING

From the INTERNATIONAL SEARCHING AUTHORITY

To:

DORITY & MANNING, PA
P.O. Box 1449
Greenville, South Carolina 29602
ETATS-UNIS D'AMERIQUE

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

(20440)

Applicant's or agent's file reference

NPI-53-PCT

D & M DOCKETING

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/US2005/046076

Action Due: A19

International filing date
(day/month/year)

21/12/2005

Applicant

Date Due: 12/6/06

NEENAH PAPER, INC.

Initials: SKO

1. ☒ 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, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

D & M DOCKETING

Action Due: Opinion + IDS

Date Due: 1/6/06

Initials: SKO

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 90bis.1 and 90bis.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



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

Authorized officer

Maria Zinburgova

Form PCT/ISA/220 (October 2005)

(See notes on accompanying sheet)

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.

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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 43bis.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.

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.
NPI - 53 - PCT	International filing date (day/month/year)	(Earliest) Priority Date (day/month/year)	
International application No.			
PCT/US2005/046076	21/12/2005	30/12/2004	
Applicant			

NEENAH PAPER, 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 5 sheets.

☐ 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
☐ 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. ☐ 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,

- ☒ 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,

- ☒ 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. 2
☐ 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/US2005/046076

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Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-5, 8-20

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5,8-20

Method of making a backing having a smooth surface for the application of an abrasive layer; backing having a smooth surface for the application of an abrasive layer; abrasive article comprising such a backing

2. claims: 6,7

Method of providing an abrasive backing with an antislip layer

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/046076

7:8

A. CLASSIFICATION OF SUBJECT MATTER

INV. B24D3/28 B24D11/00 B24D11/02 B32B27/12

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)

B24D B32B

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	EP 0 237 784 A (KIMBERLY-CLARK CORPORATION) 23 September 1987 (1987-09-23) the whole document	1,5, 8-10,12, 17 11,13 2-4, 18-20
Y	EP 0 587 171 A (NORTON COMPANY) 16 March 1994 (1994-03-16) the whole document	11,13

☐ Further documents are listed in the continuation of Box C.

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

Date of the actual completion of the international search

9 June 2006

Name and mailing address of the ISA/

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

☒ See patent family annex.

- "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 mailing of the international search report

06.10.2006

Authorized officer

Zeckau, Jochen

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2005/046076

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0237784	A	23-09-1987	AU 590669 B2	09-11-1989
			AU 6862787 A	13-08-1987
			CA 1336152 C	04-07-1995
			DE 3770958 D1	01-08-1991
			JP 62203769 A	08-09-1987
			MX 170977 B	23-09-1993
			PT 84274 A	01-03-1987
EP 0587171	A	16-03-1994	AT 139166 T	15-06-1996
			CA 2103929 A1	11-03-1994
			DE 69303130 D1	18-07-1996
			DE 69303130 T2	05-12-1996
			JP 6170737 A	21-06-1994
			US 5286541 A	15-02-1994

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

80

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.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.
PCT/JS2005/046076

International filing date (day/month/year)
21.12.2005

Priority date (day/month/year)
30.12.2004

International Patent Classification (IPC) or both national classification and IPC
INV. B24D3/28 B24D11/00 B24D11/02 B32B27/12

Applicant
NEENAH PAPER, INC.

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 43bis.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 notified 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

Zeckau, Jochen

Telephone No. +49 89 2399-2358



WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2005/046076

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. 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.

3. ☐ 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.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2005/046076

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application

☒ claims Nos. 6, 7

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search (*specify*):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):

☒ no international search report has been established for the whole application or for said claims Nos. 6, 7

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13ter.1(a) or (b).

☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-bis of the Administrative Instructions, and such tables were not available to the International Searching Authority in a form and manner acceptable to it.

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.

☐ See Supplemental Box for further details

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2005/046076

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Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- ☐ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☒ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-5,8-20

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-4,11,13-16,18-20
	No: Claims	1,5,8-10,12,17
Inventive step (IS)	Yes: Claims	2-4,18-20
	No: Claims	1,5,8-17
Industrial applicability (IA)	Yes: Claims	1-5,8-20
	No: Claims	

2. Citations and explanations

see separate sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

84
International application No.

PCT/US2005/046076

Re Item IV.

The application lacks unity of invention for the reasons set out in the International Search Report.

Re Item V.

1. The subject-matter of independent claims 1 and 17 lacks novelty in view of EP-A-0 237 784 (D1) (see the International Search Report).
2. Dependent claims 5, 8-13 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 inventive step (Article 33(2) and (3) PCT), the additional features of claims 5, 8-10 and 12 being known from D1, those of claims 11 and 13 being obvious in the light of EP-A-0 587 171 (D2)

PATENT COOPERATION TREATY

From the RECEIVING OFFICE

To:

TIMOTHY A. CASSIDY
DORITY & MANNING, P.A.
P.O. BOX 1449
GREENVILLE, SOUTH CAROLINA 29602

PCT

NOTIFICATION OF THE INTERNATIONAL
APPLICATION NUMBER AND OF THE
INTERNATIONAL FILING DATE

(PCT Rule 20.5(c))

Applicant's or agent's file reference NPI-53-PCT (20440)		Date of mailing (day/month/year) 03 Mar 2006
International application No. PCT/US2005/046076	International filing date (day/month/year) 21 Dec 2005	Priority date (day/month/year) 30 Dec 2004

IMPORTANT NOTIFICATION

Applicant

NEENAH PAPER, INC.

Title of the invention

FINE ABRASIVE PAPER BACKING MATERIAL AND METHOD OF MAKING THEREOF

1. The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.

2. The applicant is further notified that the record copy of the international application:

- ☒ was transmitted to the International Bureau on 03 Mar 2006
- ☐ has not yet been transmitted to the International Bureau for the reason indicated below and a copy of this notification has been sent to the International Bureau*:
- ☐ because the necessary national security clearance has not yet been obtained.
- ☐ because (reason to be specified):

* The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/TB/301) of its receipt. Should the record copy not have been received by the expiration of 14 months from the priority date, the International Bureau will notify the applicant (Rule 22.1(c)).

3. FOREIGN TRANSMITTAL LICENSE INFORMATION

Completed by: TS

- ☐ Additional license for foreign transmittal not required. This subject matter is covered by a license already granted or the equivalent U.S. national application. Refer to that license for information concerning its scope.
- ☐ License for foreign transmittal not required. 37 CFR 5.11(e)(1) or 37 CFR 5.11(e)(2). However, a license may be required for additional subject matter. See 37 CFR 5.15(b).
- ☒ Foreign transmittal license granted. 35 U.S.C. 184; 37 CFR 5.11 on 26 Feb 2006
☐ 37 CFR 5.15(a) ☒ 37 CFR 5.15(b) (date)

Name and mailing address of the receiving Office
Mail Stop PCT, Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Authorized officer

Tyetta Staton

Facsimile No. 703-305-3230

Telephone No. 703-308-9290 EX 103

Form PCT/RO/105 (July 1992)

PCT REQUEST

1/4

Original (for SUBMISSION)

✗

86

0 For receiving Office use only
0-1 International Application No.
0-2 International Filing Date
0-3 Name of receiving Office and "PCT
International Application"

0-4 Form PCT/RO/101 PCT Request
0-4-1 Prepared Using

PCT-SAFE [EASY mode]
Version 3.50 (Build 0002.175)

0-5 Petition

The undersigned requests that the
present international application be
processed according to the Patent
Cooperation Treaty

0-6 Receiving Office (specified by the
applicant)

United States Patent and Trademark
Office (USPTO) (RO/US)

0-7 Applicant's or agent's file reference

NPI-53-PCT

I Title of Invention

FINE ABRASIVE PAPER BACKING MATERIAL AND
METHOD OF MAKING THEREOF

II Applicant

II-1 This person is

applicant only

II-2 Applicant for

all designated States except US

II-4 Name

NEENAH PAPER, INC.

II-5 Address

3460 Preston Ridge Road
Suite 600
Alpharetta, GA 30005
United States of America

II-6 State of nationality

US

II-7 State of residence

US

II-8 Telephone No.

678-518-3318

II-9 Facsimile No.

770-667-1744

PCT REQUEST

2/4

Original (for SUBMISSION)

C/O

87

III-1 Applicant and/or inventor
III-1-1 This person is applicant and inventor
III-1-2 Applicant for US only
III-1-4 Name (LAST, First) LINDQUIST, Gunnard Michael
III-1-5 Address P.O. Box 366
N7994 Grand Island Landing Road
Munising, MI 49862
United States of America
US
III-1-6 State of nationality US
III-1-7 State of residence US
III-2 Applicant and/or inventor
III-2-1 This person is applicant and inventor
III-2-2 Applicant for US only
III-2-4 Name (LAST, First) BOYAK, Stella May
III-2-5 Address E9667 Woodsedge Drive
Wetmore, MI 49895
United States of America
US
III-2-6 State of nationality US
III-2-7 State of residence US
IV-1 Agent or common representative; or
address for correspondence
The person identified below is hereby/
has been appointed to act on behalf of agent
the applicant(s) before the competent
International Authorities as:
IV-1-1 Name DORITY & MANNING, P.A.
IV-1-2 Address P.O. Box 1449
Greenville, SC 29602
United States of America
864-271-1592
864-233-7342
IV-1-3 Telephone No.
IV-1-4 Facsimile No.
V DESIGNATIONS
V-1 The filing of this request constitutes
under Rule 4.9(a), the designation of
all Contracting States bound by the
PCT on the International filing date,
for the grant of every kind of
protection available and, where
applicable, for the grant of both
regional and national patents.
VI-1 Priority claim of earlier national
application
VI-1-1 Filing date 30 December 2004 (30.12.2004)
VI-1-2 Number 11/027,241
VI-1-3 Country US

PCT REQUEST

3/4

Original (for SUBMISSION)

CA

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VI-2 Priority document request

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):

VI-1

VII-1	International Searching Authority Chosen	European Patent Office (EPO) (ISA/EP)	
VIII	Declarations	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	-	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	-	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	
IX	Check list	number of sheets	electronic file(s) attached
IX-1	Request (including declaration sheets)	4	✓
IX-2	Description	15	-
IX-3	Claims	3	-
IX-4	Abstract	1	✓
IX-5	Drawings	2	-
IX-7	TOTAL	25	
	Accompanying Items	paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-17	PCT-SAFE physical media	-	✓
IX-18	other	PCT Transmittal Form	
IX-18	other	Return Receipt Postcard	
IX-18	other	PTO Form 2038	
IX-18	other	Express Mail Certificate of Mailing	
IX-19	Figure of the drawings which should accompany the abstract	1	
IX-20	Language of filing of the international application	English	

PCT REQUEST

4/4

Original (for SUBMISSION)

HT

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X-1 Signature of applicant, agent or
common representative



X-1-1 Name

DORITY & MANNING, P.A.

X-1-2 Name of signatory

Timothy A. Cassidy

X-1-3 Capacity

Agent

FOR RECEIVING OFFICE USE ONLY

10-1 Date of actual receipt of the
purported international application

10-2 Drawings:

10-2-1 Received

10-2-2 Not received

10-3 Corrected date of actual receipt due
to later but timely received papers or
drawings completing the purported
international application

10-4 Date of timely receipt of the required
corrections under PCT Article 11(2)

10-5 International Searching Authority ISA/EP

10-6 Transmittal of search copy delayed
until search fee is paid

FOR INTERNATIONAL BUREAU USE ONLY

11-1 Date of receipt of the record copy by
the International Bureau

PCT (ANNEX - FEE CALCULATION SHEET)

1/1

Original (for SUBMISSION)

(This sheet is not part of and does not count as a sheet of the international application)

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0 For receiving Office use only
0-1 International Application No.
0-2 Date stamp of the receiving Office

0-4 Form PCT/RO/101 (Annex)
PCT Fee Calculation Sheet

0-4-1 Prepared Using

PCT-SAFE [EASY mode]

Version 3.50 (Build 0002.175)

0-9 Applicant's or agent's file reference

NPI-53-PCT

2 Applicant

NEENAH PAPER, INC.

12 Calculation of prescribed fees

fee amount/multiplier

Total amounts (USD)

12-1 Transmittal fee

T

⇒

300

12-2-1 Search fee

S

⇒

1877

12-2-2 International search to be carried out by

EP

12-3 International filing fee
(first 30 sheets)

I1

1102

12-4 Remaining sheets

0

12-5 Additional amount

(X) 0

12-6 Total additional amount

I2

0

12-7 I1 + I2 =

I

1102

12-12 EASY Filing reduction

R

-79

12-13 Total International filing fee (I-R)

I

⇒

1023

12-14 Fee for priority document

Number of priority documents
requested

1

12-15 Fee per document

(X) 20

12-16 Total priority document fee:

P

⇒

20

12-17 TOTAL FEES PAYABLE (T+S+I+P)

⇒

3220

12-18 Mode of payment

other PTO Form 2038

12-20 Deposit account instructions

The receiving Office

United States Patent and Trademark
Office (USPTO) (RO/US)12-20-2 Authorization to charge any deficiency or
credit any overpayment in the total fees
indicated above

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12-21 Deposit account No.

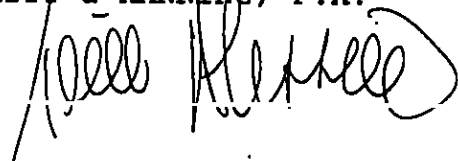
04-1403

12-22 Date

21 December 2005 (21.12.2005)

12-23 Name and signature

DORITY & MANNING, P.A.



PCT (ANNEX - FEE CALCULATION SHEET)

1/1

Original (for SUBMISSION)
(This sheet is not part of and does not count as a sheet of the International application)

Conf

91

0 For receiving Office use only
0-1 International Application No.
0-2 Date stamp of the receiving Office

0-4 Form PCT/RO/101 (Annex)
PCT Fee Calculation Sheet

0-4-1 Prepared Using

PCT-SAFE [EASY mode]

Version 3.50 (Build 0002.175)

0-9 Applicant's or agent's file reference

2 Applicant

12 Calculation of prescribed fees

12-1 Transmittal fee

12-2-1 Search fee

12-2-2 International search to be carried out by

12-3 International filing fee
(first 30 sheets)

12-4 Remaining sheets

12-5 Additional amount

12-6 Total additional amount

12-7 I1 + I2 =

12-12 EASY Filing reduction

12-13 Total international filing fee (I-R)

12-14 Fee for priority document

Number of priority documents
requested

12-15 Fee per document

12-16 Total priority document fee:

12-17 TOTAL FEES PAYABLE (T+S+I+P)

12-19 Mode of payment

12-20 Deposit account instructions

The receiving Office

NPI-53-PCT

NEENAH PAPER, INC.

fee amount/multiplier

Total amounts (USD)

⇒

300

⇒

1877

EP

1102

0

(X) 0

0

1102

-79

⇒

1023

1

(X) 20

⇒

20

⇒

3220

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United States Patent and Trademark
Office (USPTO) (RO/US)12-20-2 Authorization to charge any deficiency or
credit any overpayment in the total fees
indicated above

12-21 Deposit account No.

12-22 Date

12-23 Name and signature

04-1403

21 December 2005 (21.12.2005)

DORITY & MANNING, P.A.

[Signature]

13-2-7 Validation messages
Contents

Yellow!

The power of attorney or a copy of the
general power of attorney will need to
be furnished unless all applicants
sign the request form.

13-2-8 Validation messages
Fees

Green?

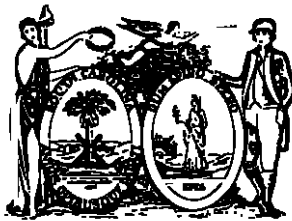
Please verify that modified fee
amounts are correct.

92

In one embodiment is provided a method of making an abrasive backing having a smooth surface comprising the steps of providing a paper having a first paper surface and a second paper surface; applying a first synthetic polymeric layer comprising a first synthetic polymeric composition to the first paper surface; and applying a second synthetic polymeric layer comprising a second synthetic polymeric composition to the first synthetic polymeric layer. The method is used to prepare fine abrasive backings having a smooth exterior surface for preparation of fine abrasive papers.

103670
HX
94

State of South Carolina
Office of the Secretary of State
The Honorable Mark Hammond



Apostille

(Convention de La Haye du 5 octobre 1961)

1. *Country* : United States of America

This public document

2. has been signed by Sandra S. Perkins
3. acting in the capacity of Notary Public for the State of South Carolina,
4. bears the seal / stamp of Sandra S. Perkins, Notary Public for the State of South Carolina

Certified

- | | |
|---|------------------------------|
| 5. At Columbia, South Carolina | 6. Wednesday, April 18, 2007 |
| 7. by the South Carolina Secretary of State | |
| 8. N°. 39538 | |
| 9. Seal/Stamp | 10. Signature |



Mark Hammond
Mark Hammond, Secretary of State

www.scsos.com

CERTIFICATION

STATE OF SOUTH CAROLINA)
COUNTY OF GREENVILLE) SS

I hereby certify that the attached papers constitute a true copy of the original of a certain worldwide Assignment to **Neenah Paper, Inc.** by Gunnard Michael Lindquist signed on January 21, 2005 and Stella May Boyak signed on January 21, 2005 of the subject matter disclosed in an application for Letters Patent of the United States entitled

FINE ABRASIVE BACKING MATERIAL AND METHOD OF MAKING THEREOF

4/17/07
Date


Jason W. Johnston, Esquire

Sworn to and subscribed before me this
17th day of April, 2007.


Sandra S. Perkins, Notary Public
My Commission Expires: 6 December 2010



RECEIVED

JUN 26 2006

UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

SCOTT AND MANNING

JUNE 16, 2006

PTAS

700270374A

700270374A

WILLIAM D. HERRICK
NEENAH PAPER, INC.
SUITE 600
3460 PRESTON RIDGE ROAD
ALPHARETTA, GEORGIA 30005

UNITED STATES PATENT AND TRADEMARK OFFICE
NOTICE OF RECORDATION OF ASSIGNMENT DOCUMENT

THE ENCLOSED DOCUMENT HAS BEEN RECORDED BY THE ASSIGNMENT DIVISION OF THE U.S. PATENT AND TRADEMARK OFFICE. A COMPLETE MICROFILM COPY IS AVAILABLE AT THE ASSIGNMENT SEARCH ROOM ON THE REEL AND FRAME NUMBER REFERENCED BELOW.

PLEASE REVIEW ALL INFORMATION CONTAINED ON THIS NOTICE. THE INFORMATION CONTAINED ON THIS RECORDATION NOTICE REFLECTS THE DATA PRESENT IN THE PATENT AND TRADEMARK ASSIGNMENT SYSTEM. IF YOU SHOULD FIND ANY ERRORS OR HAVE QUESTIONS CONCERNING THIS NOTICE, YOU MAY CONTACT THE EMPLOYEE WHOSE NAME APPEARS ON THIS NOTICE AT 571-272-3350. PLEASE SEND REQUEST FOR CORRECTION TO: U.S. PATENT AND TRADEMARK OFFICE, MAIL STOP: ASSIGNMENT SERVICES BRANCH, P.O. BOX 1450, ALEXANDRIA, VA 22313.

RECORDATION DATE: 06/14/2006

REEL/FRAME: 017792/0912

NUMBER OF PAGES: 2

BRIEF: ASSIGNMENT OF ASSIGNOR'S INTEREST (SEE DOCUMENT FOR DETAILS).

ASSIGNOR:

LINDQUIST, GUNNARD M.

DOC DATE: 01/21/2005

ASSIGNOR:

BOYAK, STELLA M.

DOC DATE: 01/21/2005

ASSIGNEE:

NEENAH PAPER, INC.
3460 PRESTON RIDGE ROAD
SUITE 600
ALPHARETTA, GEORGIA 30005

SERIAL NUMBER: 11027241

FILING DATE: 12/30/2004

PATENT NUMBER:

ISSUE DATE:

TITLE: FINE ABRASIVE PAPER BACKING MATERIAL AND METHOD OF MAKING THEREOF

~~120~~

97

017792/0912 PAGE 2

THERESA FREDERICK, EXAMINER
ASSIGNMENT SERVICES BRANCH
PUBLIC RECORDS DIVISION

06/14/2006
700270374

98

Form PTO-1595 (Rev. 07/05)
OMB No. 0651-0027 (exp. 6/30/2008)U.S. DEPARTMENT OF COMMERCE
United States Patent and Trademark OfficeRECORDATION FORM COVER SHEET
PATENTS ONLY

To the Director of the U.S. Patent and Trademark Office: Please record the attached documents or the new address(es) below.

1. Name of conveying party(ies)

Gunnard M. Lindquist
Stella M. Boyak

2. Name and address of receiving party(ies)

Name: Neenah Paper, Inc.

Internal Address: Suite 600

Additional name(s) of conveying party(ies) attached? ☐ Yes ☒ No

3. Nature of conveyance/Execution Date(s):

Execution Date(s) 1/21/05

☒ Assignment☐ Merger☐ Security Agreement☐ Change of Name☐ Joint Research Agreement☐ Government Interest Assignment☐ Executive Order 8424, Confirmatory License☐ Other

Street Address: 3460 Preston Ridge Road

City: Alpharetta

State: Georgia

Country: USA

Zip: 30005

Additional name(s) & address(es) attached? ☐ Yes ☒ No

4. Application or patent number(s):

☐ This document is being filed together with a new application.

A. Patent Application No.(s)

B. Patent No.(s)

11/027,241

Additional numbers attached? ☐ Yes ☒ No

5. Name and address to whom correspondence concerning document should be mailed:

Name: William D. Herrick

Internal Address: Neenah Paper, Inc.
Suite 600

Street Address: 3460 Preston Ridge Road

City: Alpharetta

State: Georgia

Zip: 30005

Phone Number: 878-518-3320

Fax Number: 770-667-1744

Email Address: william.herrick@neenahpaper.com

6. Total number of applications and patents involved: 1

7. Total fee (37 CFR 1.21(h) & 3.41) \$ 40.00

☐ Authorized to be charged by credit card☒ Authorized to be charged to deposit account☐ Enclosed☐ None required (government interest not affecting title)

8. Payment Information

a. Credit Card Last 4 Numbers
Expiration Date:

b. Deposit Account Number 50-3500

Authorized User Name William D. Herrick

9. Signature: 
Signature14-JUN-06
DateWilliam D. Herrick
Name of Person SigningTotal number of pages including cover
sheet, attachments, and documents: 2Documents to be recorded (including cover sheet) should be faxed to (877) 273-0140, or mailed to:
Mail Stop Assignment Recordation Services, Director of the USPTO, P.O. Box 1480, Alexandria, VA 22313-1480

GH#S40.00 503500 11027241

to 99

In the United States Patent and Trademark Office

Applicants: Gunnard Michael Lindquist Docket No.: 20440
Stella May Boyak
Serial No.: Group:
Confirmation No: Examiner:
Filed: December 30, 2004
For: FINE ABRASIVE PAPER BACKING MATERIAL AND METHOD OF MAKING THEREOF

Assignment – Joint Inventors

Mail Stop Assignment Recordation Services
Director of the US Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

WHEREAS Gunnard Michael Lindquist residing at PO BOX 366, N7994 Grand Island Landing Road, Munising, Michigan 49862 and Stella May Boyak residing at E9667 Woodsedge Dr., Wetmore, MI 49895 (hereinafter collectively referred to as Assignors), have made an invention and have each either (1) previously executed an application for Letters Patent of the United States of America therefor or (2) are contemporaneously executing an application for Letters Patent of the United States of America for the invention which is entitled:

FINE ABRASIVE PAPER BACKING MATERIAL AND METHOD OF MAKING THEREOF

AND WHEREAS Neenah Paper, Inc., a corporation of the State of Delaware, having offices at 3460 Preston Ridge Road, Suite 600, Alpharetta, Georgia 30005, United States of America, (hereinafter referred to as Assignee), is desirous of acquiring the entire right, title and interest in and to said invention and under said Letters Patent or similar legal protection to be obtained therefor in the United States and in any and all foreign countries.

NOW, THEREFORE, TO ALL WHOM IT MAY CONCERN: Be it known that in consideration of the payment by the Assignee to the Assignors of the sum of One U.S. Dollar (\$1.00 U.S.) and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Assignors hereby sell, assign and transfer to the Assignee the full and exclusive right, title and interest to said invention and in and to any and all Letters Patent or similar legal protection in the United States and its territorial possessions and in any and all foreign countries to be obtained for said invention by said application or any continuation, continuation-in-part, divisional, renewal, substitute, re-examination, conversion or reissue thereof, including all extensions thereof, or any legal equivalent thereof in any foreign country for the full term or terms for which the same may be granted, including any and all convention rights.

The Assignors hereby covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this assignment and sale.

The Assignors further covenant that the Assignors will promptly provide, upon written request, Assignee with all pertinent facts and documents relating to said application, said invention and said Letters Patent and legal equivalents in foreign countries as may be known and accessible to the Assignors and that they will promptly execute and deliver to Assignee or its legal representatives any and all papers, instruments or affidavits required to apply for, obtain, maintain, issue, extend and enforce said application, said invention and said Letters Patent and said equivalents thereof in any foreign country which may be necessary or desirable to carry out the purposes thereof.

IN WITNESS WHEREOF, the Assignors have executed this document on the date indicated below:

Gunnard Michael Lindquist
Gunnard Michael Lindquist

Date: 1/21/05

Stella May Boyak
Stella May Boyak

Date: 1/21/05

SP 190

TRADUCCION AL ESPAÑOL del Documento de Cesión a **NEENAH PAPER, INC.**
firmada por los cedentes y el cesionario.

ESTADO DE CAROLINA DEL SUR
Oficina del Secretario de Estado
El Honorable Mark Hammond

APOSTILLA
(Convención de la Haya de Octubre 5, 1961)

1. País: Estados Unidos de América
Este documento público
2. ha sido firmado por Sandra S. Perkins
3. actuando en capacidad de Notario Público para el Estado de Carolina del Sur
4. lleva el sello/timbre de Sandra S. Perkins, Notario Público para el Estado de Carolina del Sur

Certificado

5. En Columbia, Carolina del Sur
6. Miércoles Abril 18, 2007
7. por el Secretario de Estado de Carolina del Sur
8. No. 39538
9. Sello/Timbre
10. Firma

(firma)
Mark Hammond, Secretario
de Estado

~~COPIA~~
101

Caso #NPI-53-CO
COLOMBIA

CERTIFICACIÓN

ESTADO DE CAROLINA DEL SUR)
CONDADO DE GREENVILLE)

Por la presente certifico que los documentos adjuntos constituyen una copia verdadera del original de cierta cesión mundial a **Neenah Paper, Inc.** por Gunnard Michael Lindquist firmada el 21 de Enero, 2005 y Stella May Boyak firmada el 21 de Enero, 2005 de la materia revelada en una solicitud para Patente de los Estados Unidos titulada

MATERIAL DE PAPEL FINO ABRASIVO DE APOYO Y MÉTODO PARA SU FABRICACIÓN

4/17/07
Fecha

(firma)
Jason W. Johnston, Esq

Jurado y suscrito ante mi este
día 17 de Abril, 2007.

(firma)
Sandra S. Perkins, Notario Público
Mi Comisión Vence: **Diciembre 6, 2010**

DEPARTAMENTO DE COMERCIO DE LOS ESTADOS UNIDOS

(sello)

Oficina de Marcas y Patentes

Bajo el Secretario de Comercio para la
Propiedad Intelectual y Director de la Oficina
de Marcas y Patentes de los Estados Unidos

JUNIO 16, 2006

PTAS

WILLIAM D. HERRICK
NEENAH PAPER, INC.
SUITE 600
3460 PRESTON RIDGE ROAD
ALPHARETTA, GEORGIA 30005

OFICINA DE PATENTES Y MARCAS DE LOS ESTADOS UNIDOS
NOTA DE ESCRITURA DE DOCUMENTO DE CESIÓN

EL DOCUMENTO ADJUNTO HA SIDO CERTIFICADO POR LA DIVISIÓN DE
CESIONES DE LA OFICINA DE PATENTES Y MARCAS DE LOS ESTADOS
UNIDOS. UNA COPIA COMPLETA EN MICROFILM ESTÁ DISPONIBLE EN
EL CUARTO DE BÚSQUEDA DE CESIONES EN EL ROLLO Y CUADRO AL
LOS CUALES SE HACE REFERENCIA ABAJO.

FAVOR REVISAR TODA LA INFORMACIÓN CONTENIDA EN ESTE
DOCUMENTO. LA INFORMACIÓN CONTENIDA EN ESTE DOCUMENTO DE
ESCRITURA REFLEJA LOS DATOS PRESENTADOS EN EL SISTEMA DE
CESIÓN DE PATENTES Y MARCAS. SI ENCUENTRA CUALQUIER ERROR O
TIENE PREGUNTAS CON RESPECTO A ESTE DOCUMENTO, PUEDE
CONTACTAR AL EMPLEADO CUYO NOMBRE APARECE EN ESTE DOCUMENTO
EN EL 571-272-3350. FAVOR MANDAR LA PETICIÓN DE CORRECCIÓN
A: OFICINA DE PATENTES Y MARCAS DE E.U., PARADA DE CORREOS:
DIVISIÓN DE SERVICIOS DE CESIÓN, CASILLA POSTAL 1450,
ALEXANDRIA, VA 22313.

FECHA DE ESCRITURIZACIÓN: 06/14/2006 ROLLO/CUADRO:
017792/0912
NÚMERO DE PÁGINAS: 2

BREVE: CESIÓN DEL INTERÉS DEL CEDENTE (VER DOCUMENTO PARA
MÁS DETALLES).

CEDENTE:

LINDQUIST, GUNNARD M.

FECHA DEL DOC: 01/21/2005

CEDENTE:

BOYAK, STELLA M.

FECHA DEL DOC: 01/21/2005

CESIONARIO:

NEENAH PAPER, INC.

SUITE 600
3460 PRESTON RIDGE ROAD
ALPHARETTA, GEORGIA 30005

NÚMERO SERIAL: 11027241 FECHA DE SOLICITUD: 12/30/2004
NÚMERO DE PATENTE: FECHA DE CONSESIÓN:
TÍTULO: MATERIAL DE PAPEL FINO ABRASIVO DE APOYO Y MÉTODO
PARA SU FABRICACIÓN

017792/0912 PÁGINA 2

THERESA FREDERICK, EXAMINADOR
RAMA DE CESIÓN DE SERVICIOS
OFICINA DE REGISTROS PÚBLICOS

104

HOJA DE PORTADA DEL FORMULARIO DE REGISTRO
SOLAMENTE PATENTES

Departamento de Comercio
Oficina de Marcas y Patentes
Expediente de abogado No PR2027

Para el Director de la Oficina de Marcas y Patentes de E.U.: Por favor archive los documentos originales anexos

1. Nombre de la(s) parte(s) cedente(s):
Gunnard M. Lindquist
Stella M. Boyak
2. Nombre y dirección de la(s) parte(s) receptora(s)
Nombre: Neenah Paper, Inc.
Dirección: 3460 Preston Ridge Road

¿Se anexa(n) nombre(s) adicional(es) de parte(s) cedente(s)? _ Si ☒ No

3. Naturaleza del traspaso:
☒ Cesión Fusión
Acuerdo de Seguridad
Cambio de Nombre
Otro:
- Ciudad: Alpharetta Estado: Georgia
País: EUA ZIP: 30005
- ¿Se anexan Nombre(s) y dirección(es) adicional(es)? _ Si ☒ No

4. Numero(s) de solicitud o número(s) de patente:
Si este documento se presenta junto con una nueva solicitud, la fecha de ejecución de la solicitud es:
A. Solicitud de patente No(s).
11/027,241

B. Patente No(s).

¿Se anexa números adicionales? _ Si ☒ No

5. Nombre y dirección de la parte a quien se le debe enviar la correspondencia:
Nombre: William D. Herrick
Dirección interna: Neenah Paper, Inc.
Suite 600
Dirección: 3460 Preston Ridge Road
Ciudad: Alpharetta Estado: Georgia
ZIP: 94080-4990
Teléfono: 678-518-3320
No. de Fax: 770-667-1744
Correo Electrónico:
William.herrick@neenahpaper.com
6. Numero total de solicitudes y patentes involucradas: 1
7. Tarifa total (37 C.F.R 3.41): \$40.00
_ Autorizado para cargarla por tarjeta de crédito
☒ Autorizado para cargarla a cuenta de depósito
_ Anexo
_ No se requiere (intereses gubernamentales no afectan el título)
8. Información de Pago
a. Tarjeta de Crédito
Últimos 4 Números
Fecha de Vencimiento
b. Cuenta de Depósito Número: 50-3500
Nombre de Usuario Autorizado William D. Herrick

NO USE ESTE ESPACIO

9. Firma
William D. Herrick
Nombre de la persona que firma
- (Firma)
Firma
- Junio 14, 2006
Fecha

Número total de páginas que comprenden portada, anexos y documento: 2

105

En la Oficina de Marcas y Patentes de los Estados Unidos

Solicitantes: Gunnard Michael Lindquist
Stella May Boyak

Expediente No.: 20440

No. Serial:

Grupo:

Confirmación No:

Examinador:

Presentado: Diciembre 30, 2004

Para: MATERIAL DE PAPEL FINO ABRASIVO DE APOYO Y
MÉTODO PARA SU FABRICACIÓN

Cesión – Múltiples Inventores

Parada Postal de Servicios de Escriturización de Cesiones
Director de la Oficina de Marcas y Patentes de los Estados Unidos
Casilla Postal 1450
Alexandria, VA 22313-1450

Señor:

CONSIDERANDO QUE Gunnard Michael Lindquist residente en la Casilla Postal 366, N7994 Grand Island Landing Road, Munising, Michigan 49862 y Stella May Boyak residente en E9667 Woodserge Dr., Wetmore, MI 49895 (en adelante denominados Cedentes colectivamente), han hecho una invención y han (1) ejecutado una solicitud para Patente de los Estados Unidos previamente para las misma o (2) estan ejecutando contemporáneamente una solicitud para Patente de los Estados Unidos para la invención titulada:

**MATERIAL DE PAPEL FINO ABRASIVO DE APOYO Y MÉTODO PARA SU
FABRICACIÓN**

Y CONSIDERANDO QUE Neenah Paper, Inc., una corporación del estado de Delaware, con oficinas en 3460 Preston Ridge Road, Suite 600, Alpharetta, Georgia 30005, Estados Unidos de América, (en adelante denominado cesionario), está deseosa de adquirir el completo derecho, título e interés en y para dicha invención y bajo dichas Patentes o protección legal similar a se obtenida como resultado en los Estados unidos y en cualquiera y todos los países extranjeros.

AHORA, POR ENDE, A QUIEN LE CONCIERNA: Que se sepa que en buena y valiosa consideración del pago por parte del Cesionario a los Cedentes de la suma de Un Dólar de E.U. (\$1.00 U.S.) y para otra buena y valiosa consideración, recibo y suficiencia del cual se reconoce aquí, los Cedentes por la presente vende, ceden y transfieren al Cesionario el derecho, título e interés completo y exclusivo a dicha invención y en y para todas las Patentes o protección legal similar en los Estados Unidos y sus posesiones territoriales y en cualquiera y todos los países extranjeros a ser obtenidos para dicha invención por dicha solicitud o cualquier continuación, continuación parcial, divisional, renovación,

104, 06

sustituto, reexaminación, conversión o reexpedición de la misma, incluyendo extensiones, o cualquier equivalente legal en cualquier país extranjero para el completo término o términos para los cuales se otorgue la misma, incluyendo cualquiera y todos los derechos de convención.

Los Cedentes por la presente pactan que ninguna cesión, venta, acuerdo o transferencia se ha hecho o se hará si entra en conflicto con esta cesión y venta.

Los Cedentes además pactan que los Cedentes proporcionarán a tiempo, al pedírseles por escrito, al Cesionario todos los hechos pertinentes y los documentos relacionados con dicha solicitud, dicha invención y dichas Patentes y equivalentes legales en países extranjeros como pueda ser conocido y accesible a los Cedentes y que ejecutarán a tiempo y enviarán al Cesionario o sus representantes legales cualquier documento conocido, instrumento, o declaración juramentada requerido para solicitar, obtener, mantener, expedir, extender y hacer cumplir dicha solicitud, dicha invención y dichas Patentes y dichos equivalentes de la misma en cualquier país extranjero que pueda ser necesario o deseable llevar a cabo para el objeto de los mismos.

EN TESTIMONIO DE LO CUAL, los Cedentes han ejecutado este documento en la fecha indicada abajo:

(firma)
Gunnard Michael Lindquist

Fecha: 1/21/05

(firma)
Stella May Boyak

Fecha: 1/21/05

P.9609/5
107

APOSTILLE
(Convention de La Haye du 5 Octobre 1961)

1. Country: **UNITED STATES OF AMERICA**

2. This public document
has been signed by **CAROLYN L VAN OOSTROM**

3. acting in the capacity of **NOTARY PUBLIC, STATE OF GEORGIA**

4. bears the seal/stamp of **CAROLYN L VAN OOSTROM**
NOTARY PUBLIC
FULTON COUNTY, GEORGIA

5. at **ATLANTA, GEORGIA**

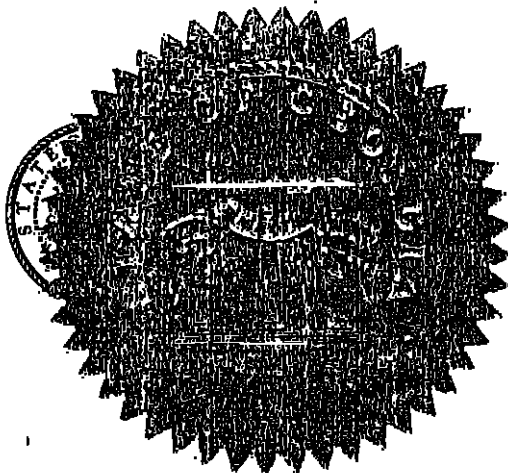
6. the **2ND DAY OF FEBRUARY, 2005**

7. by **GEORGIA SUPERIOR COURT CLERKS' COOPERATIVE AUTHORITY**

8. No. **I-118180**

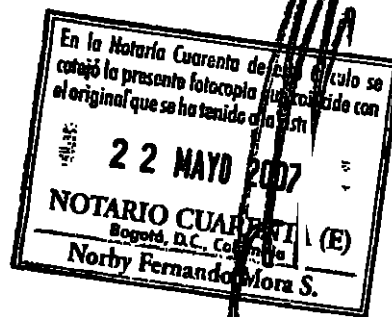
9. Seal/Stamp

10. Signature:



David R. Williams
DAVID R. WILLIAMS
EXECUTIVE DIRECTOR

NOTARY PUBLIC
(404) 327-6023



Brigard & Castro
BOGOTÁ - COLOMBIA

108

PODER

El Suscrito.....
En calidad de.....
De.....
Sociedad constituida de acuerdo con las leyes de.....
con domicilio en.....
Oficinas principales en.....

Nombro(amos) a: JUAN PABLO CADENA SARMIENTO y/o BEATRIZ JARAMILLO y/o CARLOS H. PALACIO EASTMAN y/o HECTOR GOMEZ MEJIA, de Bogotá, Colombia, apoderados verdaderos y legales con poder especial, amplio y suficiente, para recaudar de las oficinas y autoridades colombianas administrativas, judiciales y de policía, en cualquier instancia o recurso, la obtención de patentes de invención, registros de marcas, diseños industriales, modelos de utilidad, depósitos de nombres comerciales y enseñanzas, registros de derechos de autor y contratos sobre los mismos, obtención de certificados de obtentor de variedades vegetales, así como sus prórrogas, renovaciones, anotaciones de traspaso, cambios de nombre y/o domicilio; elaborar, tramitar y registrar contratos de licencia y licencias de cualesquiera clases; intervenir como demandante o como demandado en cualquier instancia y recurso ante cualquier juez, corporación, funcionario público o autoridad, en acciones judiciales, administrativas y de policía tales como: oposiciones al registro de marcas; acciones de caducidad, cancelación y nulidad; acciones reivindicatorias, acciones derivadas de la obtención o explotación de licencias; acciones de competencia desleal; demandas penales; acciones de indemnización de perjuicios, reclamos y observaciones a solicitudes de patentes, diseños industriales, modelos de utilidad, en el ejercicio de medidas cautelares y en otras acciones o medidas similares.

A este efecto, lo(s) faculto(amos) para elevar solicitudes, formular descripciones, enmiendas, protestas, declaraciones, oposiciones, cancelaciones, nulidades, apelaciones y reclamos; pagar impuestos, cuotas y gravámenes prescritos por la ley; renunciar o desistir a derechos concedidos o en curso de concesión; recibir toda clase de documentos y valores, dando el descargo respectivo, y, en general, para dar ante dichas autoridades todos los pasos necesarios al efecto indicado y tomar todas las medidas que creyeran conducentes al resguardo de mis (nuestros intereses), con todas las demás facultades legales necesarias.

Este poder comprende la facultad de ratificar o confirmar en mi (nuestro) nombre lo actuado así como la facultad de desistir, transigir, comprometer, y la de sustituirlo en todo o en parte y revocar sustituciones. Asimismo nombro(amos) a: JUAN PABLO CADENA SARMIENTO y/o BEATRIZ JARAMILLO y/o CARLOS H. PALACIO EASTMAN y/o HECTOR GOMEZ MEJIA, domiciliado(s) en la Carrera 7 No. 16-56 Piso 9, mis (nuestros) apoderados en Colombia, con facultades para recibir notificaciones y designar apoderados judiciales o extrajudiciales.

Otorgado y firmado en
Hoy.....de.....de...200.....
Firma.....
Nombre.....
Cargo.....

POWER OF ATTORNEY

The Undersigned..... Steven Heinrichs
Acting as..... Vice-President & General Counsel
Of..... NEENAH PAPER, INC.
Company incorporated as per the laws of..... state of
Delaware
domiciled in..... Alpharetta, Georgia 30005, USA
With principal offices in..... 3460 Preston Ridge Road
Alpharetta, Georgia 30005, USA

Hereby appoints JUAN PABLO CADENA SARMIENTO and/or BEATRIZ JARAMILLO and/or CARLOS H. PALACIO EASTMAN and/or HECTOR GOMEZ MEJIA, of Bogotá, Colombia, my (our) true and lawful attorneys with special, ample and sufficient power to obtain from the Colombian administrative, judicial and police offices and authorities, in any instance, privileges of patents of invention, registration of trademarks, industrial designs and utility models; registration of commercial names and emblems, registration of copyright and contracts related thereto, certificates of obtainers of vegetables varieties, as well as extensions, renewals and recordal of assignments and changes of name and domicile related to the above; to prepare, prosecute and register licenses of any kind; to act as plaintiff or defendant in any instance or recourse, and before any judge, corporation, public official or authority in judicial, administrative and police actions, such as: oppositions to the registration of trademarks; caducity, cancellation and nullity actions; claim actions derived from the obtaining or exploitation of licenses, action of unfair competition; criminal proceedings, actions for payment of damages; claims or observations on patent applications, models, industrial designs and utility models; in the exercise of preventive measures; and in other actions or similar proceedings.

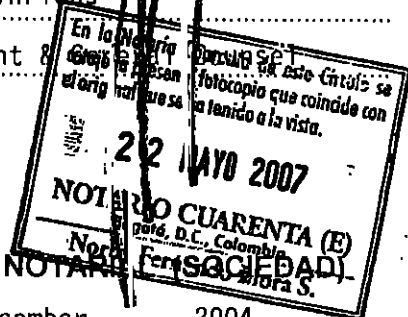
To that effect they hereby empowered to file applications, formulate descriptions, amendments, protests, declarations, oppositions, cancellations, nullities, appeals and claims; to pay taxes, quotas and assessments prescribed by law, renounce or waive the rights granted or in the process of granting; to receive all kinds of documents and valuables, giving the respective release of receipt, and, in general, to take before said authorities the necessary steps to such effect, and any measures that they may deem pertinent to the safeguard of my (our) interest(s) with all the other necessary legal powers.

This power includes the faculty to ratify or confirm desist, settle and compromise on my (our) behalf, and to substitute this power in whole or in part and to revoke substitutions. At the same time I (We) hereby appoints JUAN PABLO CADENA SARMIENTO and/or BEATRIZ JARAMILLO and/or CARLOS H. PALACIO EASTMAN and/or HECTOR GOMEZ MEJIA, domiciled in Carrera 7 No. 16-56, Piso 9, my (our) attorney(s) in fact, with powers to receive notifications and to designate judicial and extrajudicial attorneys.

Granted and signed in Alpharetta, Georgia
This 3rd day of January of 2004 2005
Signature.....
Name Steven Heinrichs
Title Vice-President

CERTIFICADO NOTARIAL

Hoy.....de.....December.....de.....2004



109

STATE OF GEORGIA
COUNTY OF FULTON

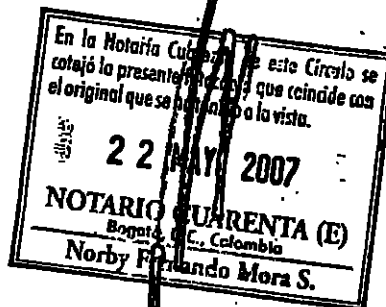
I, JUANITA HICKS, CLERK OF THE SUPERIOR COURT, FULTON COUNTY, GEORGIA, which Court is a Court of Record, do hereby certify that:
CAROLYN L VAN OOSTROM, whose commission expires on
OCTOBER 20 2008, is a duly appointed NOTARY PUBLIC in and for the State of Georgia and Fulton County, commissioned to take proof of acknowledgment of deeds and other instruments in writing and to administer oaths and affirmations in said State. I further certify that I am acquainted with the signature of said Notary.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my SEAL OF OFFICE in
FULTON COUNTY, this **20TH** day of **JANUARY** **2005**

Juanita Hicks
JUANITA HICKS, CLERK
SUPERIOR COURT OF FULTON, COUNTY, GEORGIA
BY *Cathelene Salazar*
CHIEF DEPUTY CLERK

(CLERK'S SEAL)

C. Young
NID 2000N2839



NOTARIAL CERTIFICATE (CORPORATION)

On this.....day of.....of.....

compareció ante mí.....

personally appeared before me Steven Heinrichs

a quien conozco, y de quien me consta que firmó el anterior documento, debidamente juramentado declaró y dijo que él/ella es.....

to me known, and known to me to be the person who signed the foregoing instrument who being by me duly sworn did depose and say that he (she) is the Vice-President & General Counsel

de.....

of NEENAH PAPER, INC.

Sociedad legalmente constituida para un período de duración que aún no ha terminado; que el declarante está autorizado por dicha compañía para conferir este poder; que el sello estampado por él al pie de tal poder, en nombre y representación de la expresada compañía, es el sello oficial de ella; y que el objeto para el cual se confiere este instrumento está comprendido dentro del objeto social de la sociedad.

Which is legally constituted for a term not yet expired, that deponent is authorized by said Company to confer this Power of Attorney: that the seal affixed hereunto by the deponent in the name and on behalf of said Corporation is the corporate seal thereof; and that the purpose for which this instrument is granted is included within the corporate purpose of company.

El suscrito Notario hace constar que tuvo a la vista las pruebas de la existencia de la sociedad.

The undersigned Notary Public attests that he has seen the documents that prove the existence of the company.

Estado de.....

State of Georgia

con fecha.....

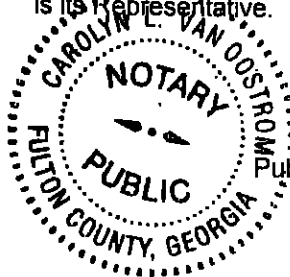
under date of January 3, 2005

y que quien confiere el presente poder es su representante.

and that he (she) who grants the present power of attorney is its representative.

Notario Público (sello)

**CERTIFICADO NOTARIAL
PERSONA NATURAL**



Public Notary (Seal)
NOTARY PUBLIC, FULTON COUNTY, GEORGIA
MY COMMISSION EXPIRES OCT. 20, 2008

**NOTARIAL CERTIFICATE
NATURAL PERSON**

Yo, ... de de compareció(eron) ante mí.....

On this..... day of..... of..... personally appeared before me.....

a quien (es) conozco y me consta que es(son) la(s) persona(s) firmante(s) del documento que precede y quien(es) declara(n) que otorgan el mismo para los fines y propósitos que en él se expresan.

who is(are) known to me and who I attest executed the foregoing document and he (they) declared he (they) grant(s) the document for the uses and purposes therein expressed.

Notario Público (sello)

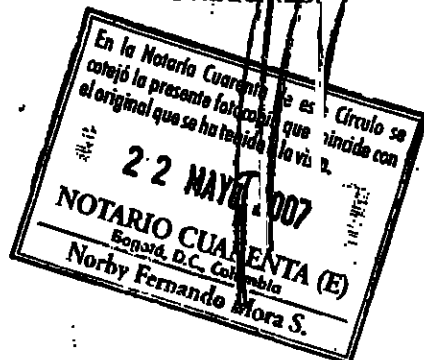
Notary Public (Seal)

LEGALIZACION POR APOSTILLA ES REQUERIDA.

LEGALIZATION BY APOSTILLE IS REQUIRED.

NOTARIAL CERTIFICATE (CORPORATION)

On this..... day of..... of.....



**SUPERIOR COURT
CLERKS' COOPERATIVE AUTHORITY**

Clerk's Division

1875 Century Boulevard, Suite 100
Atlanta, Georgia 30345

11/11 96.614/5
111

APOSTILLE
(Convention de La Haye du 5 Octobre 1961)

1. Country: **UNITED STATES OF AMERICA**

2. This public document
has been signed by **CAROLYN L VAN OOSTROM**

3. acting in the capacity of **NOTARY PUBLIC, STATE OF GEORGIA**

4. bears the seal/stamp of **CAROLYN L VAN OOSTROM
NOTARY PUBLIC
FULTON COUNTY, GEORGIA**

5. at **ATLANTA, GEORGIA**

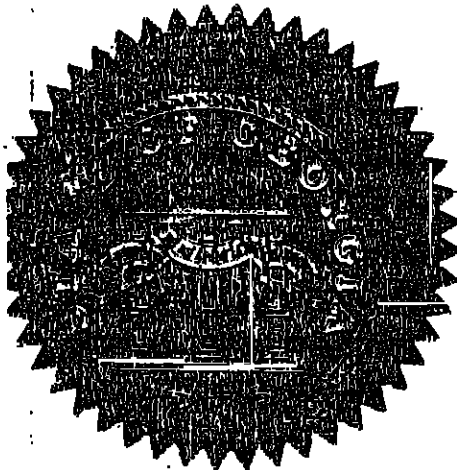
6. the **2ND DAY OF FEBRUARY, 2005**

7. by **GEORGIA SUPERIOR COURT CLERKS' COOPERATIVE AUTHORITY**

8. No. **1-118181**

9. Seal/Stamp

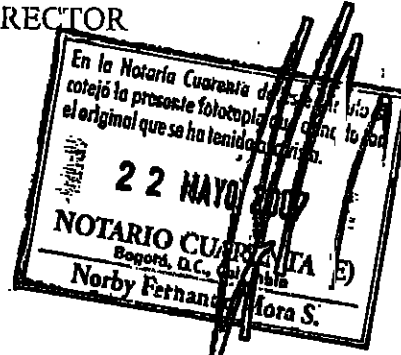
10. Signature:



David R. Williams

**DAVID R. WILLIAMS
EXECUTIVE DIRECTOR**

**NOTARY PUBLIC
(404) 327-6023**



BRIGARD & CASTRO
Abogados

DOCUMENT OF ASSIGNMENT OF
TRADEMARKS

ASSIGNMENT

The Undersigned

Nancy Lee Carter

acting as Assistant Secretary

of KIMBERLY-CLARK WORLDWIDE, INC.

with domicile in Neenah, Wisconsin USA

hereby declares that it assigns all rights of ownership as well as all rights and privileges relating thereto without exception over the following trademark registration in Colombia:

CLASSIC, Appln. No. 4 090760
CLASICO, Reg. No. 197200
design block N, Appln. 04 054684

to NEENAH PAPER, INC.

domiciled in 3460 Preston Ridge Road,
Alpharetta, Georgia 30005, USA

The assignor and the assignee sign this document as proof of their acceptance of the assignment.

Given and signed on the 31st day of
December of 2004

Nancy Lee Carter
Signature of Assignor
Nancy Lee Carter, Assistant Secretary

Steven Heinrichs
Signature of Assignee
Steven Heinrichs, Vice-President &
General Counsel

DOCUMENTO DE TRASPASO DE
MARCAS

CESION

El suscrito

en calidad de

de

con domicilio en

declara por el presente documento que cede todos los derechos de propiedad que le correspondan, así como las prerrogativas, sin excepción alguna, sobre los siguientes registros de marcas en Colombia:

a

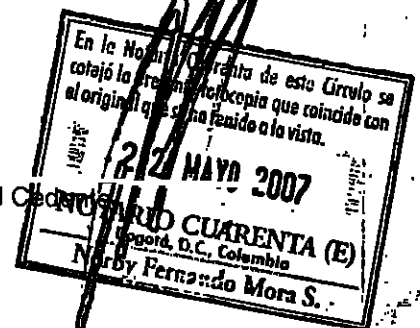
domiciliada en

El cedente y el cesionario firman este documento como prueba de su aceptación de la cesión.

Dado y firmado a los días del mes de
de 20

Firma del Cedente

Firma del Cesionario



CERTIFICADO NOTARIAL (SOCIEDAD)

STATE OF GEORGIA
COUNTY OF FULTON

113

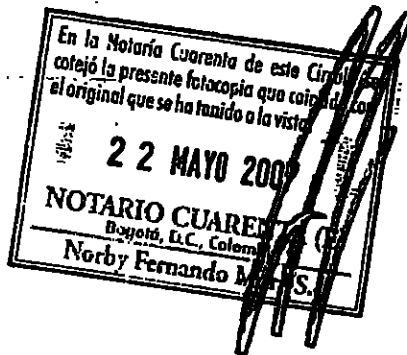
I, JUANITA HICKS, CLERK OF THE SUPERIOR COURT, FULTON COUNTY, GEORGIA, which Court is a Court of Record, do hereby certify that:
CAROLYN L VAN OOSTROM, whose commission expires on
OCTOBER 20 2008, is a duly appointed NOTARY PUBLIC in and for the State of Georgia and Fulton County, commissioned to take proof of acknowledgment of deeds and other instruments in writing and to administer oaths and affirmations in said State. I further certify that I am acquainted with the signature of said Notary.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my SEAL OF OFFICE in
FULTON COUNTY, this **20TH** day of **JANUARY** **2005**

Juanita Hicks
JUANITA HICKS, CLERK
SUPERIOR COURT OF FULTON, COUNTY, GEORGIA
BY *Catherine D. Salinas*
CHIEF DEPUTY CLERK

(CLERK'S SEAL)

C. Young
NID 200002839



Hoy de de
personalmente compareció ante mi

a quien conozco, y de quien me consta que
firmó el anterior documento, debidamente
juramentado declaró y dijo que él es

de

Sociedad legalmente constituida para un
período de duración que aún no ha
terminado; que el declarante está
autorizado por dicha compañía para
conferir este poder; que el sello estampado
por él al pie de tal poder, en nombre y
representación de la expresada compañía,
es el selló oficial de ella; y que el objeto
para el cual se confiere este instrumento
está comprendido dentro del de la
sociedad.

El suscrito Notario hace constar que tuvo a
la vista las pruebas de la existencia de la
sociedad.

Estado de
con fecha

y que quien confiere el presente poder es
su representante.

Notario Público (sello)

**CERTIFICADO NOTARIAL
PERSONA NATURAL**

Hoy de de,
compareció(eron) ante mí

a quien(es) conozco y me consta que
es(son) la(s) persona(s) firmante(s) del
documento que precede y quien(es)
declara(n) que otorgan el mismo para los
fines y propósitos que en él se expresan.

Notario Público (sello)

**LEGALIZACION POR APOSTILLA ES
REQUERIDA**

**NOTARIAL CERTIFICATE
(CORPORATION)**

On this day of December
of 2004
personally appeared before me Steven
Heinrichs
to me known, and known to me to be the
person who signed the foregoing instrument
who being by meduly sworn did depose and
say that he (she) is the Vice-President &
General Counsel

of NEENAH PAPER, INC.

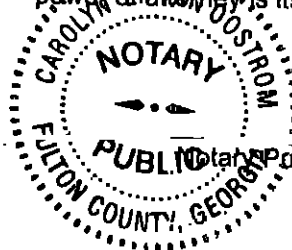
Which is legally constituted for a term not
yet expired, that deponent is authorized by
said Company to confer this Power of
Attorney; that the seal affixed hereunto by
the deponent in the name and on behalf of
said Corporation is the corporate seal
thereof; and that the purpose for which this
instrument is granted is included within the
corporate purpose of company.

The undersigned Notary Public attests that
She has seen the documents that prove the
existence of the company.

State of Georgia

under date of January 3, 2005

and that he (she) who grants the present
power of attorney is its Representative.



Carolyn L. Vundstrom

**NOTARIAL CERTIFICATE
NATURAL PERSON**

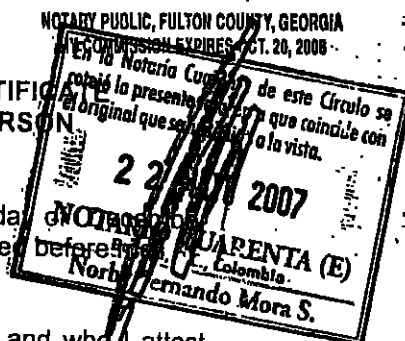
On this 31st
of 2004 personally appeared before me
Nancy Lee Carter

who is(are) known to me and who I attest
executed the foregoing document, and he
(they) declared he (they) grant(s) the
document for the uses and purposes
therein expressed.

Cheryl R. Brown
Notary Public (Seal)

My commission expires September 11, 2005

**LEGALIZATION BY APOSTILLE IS
REQUIRED**



THE STATE OF WISCONSIN

Office of the
Secretary of State

APOSTILLE

(Convention de La Haye du 5 octobre 1961)

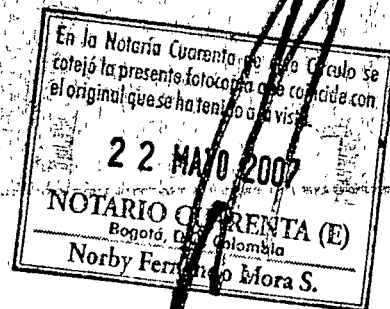
1. Country: United States of America
2. This public document has been signed by Cheryl R Gorges
3. acting in the capacity of Notary Public, State of Wisconsin
4. bears the seal/stamp of Notary Public, State of Wisconsin

CERTIFIED for Colombia

5. at Madison, Wisconsin
6. January 20, 2005
- by the Secretary of State of Wisconsin
8. No: 113876
9. Seal/stamp:
10. Signature:

Douglas La Follette

DOUGLAS LA FOLLETTE
Secretary of State





No. 07-055661- -00000-0000

Fecha: 2007-06-01 16:08:40 Dep. 2020 NUECREACIONE
Tra. 11 PATENTEIYII Evs: 378 FASENACIONALI
Act. 411 PRESENTACION Folios: 118



Industria y Comercio
SUPERINTENDENCIA

**REQUISITOS MINIMOS PARA ADMISION A TRAMITE
PCT**

PATENTE DE INVENCION

[X]

MODELO DE UTILIDAD []

- ◆ Indicación de que se solicita la concesión de una patente [X]
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud [X]
- ◆ Descripción de la invención [X]
- ◆ Dibujos de ser estos pertinentes [X]
- ◆ Comprobante de pago de las tasas establecidas [X]

COMPLETA []

INCOMPLETA []

DISEÑO INDUSTRIAL []

- ◆ Indicación de que se solicita el registro de Diseño Industrial []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []

ESQUEMA DE TRAZADO []

- ◆ Indicación de que se solicita el registro de un Esquema de Trazado []
- ◆ Datos de identificación del solicitante o de la persona que presenta la solicitud []
- ◆ Representación gráfica del esquema trazado []
- ◆ Comprobante de pago de las tasas establecidas []

COMPLETA []

INCOMPLETA []

Firma Responsable

Fecha

01 JUN. 2007

Carrera 13 No. 27-00 Piso 5, 7 y 10
Conmutador: 3 82 08 40
Fax: 350 52 20
E-mail: info@sic.gov.co
www.sic.gov.co
Bogotá, D.C., Colombia

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

117

Folio ~~120~~

2020
Bogotá D.C.,

Doctor(a)
CADENA SARMIENTO JUAN PABLO
Apoderado(a) y/o Representante de
NEENAH PAPER, INC

REFERENCIA	Radicación No.	7 55661
	Solicitud internacional	PCT/US2005/046076
	Fecha inicio fase nacional	30/07/2007
	Trámite	11
	Evento	378
	Actuación	416
	Oficio No.	3728
	Folios	1

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en la referencia, reúne los requisitos de forma establecidos en la Decisión 486 de la Comisión de la Comunidad Andina, el Tratado de Cooperación en Materia de Patentes (PCT), el Reglamento y la Circular Única de la Superintendencia de Industria y Comercio, se envía el extracto de la solicitud a la Oficina de Comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial.

Cúmplase
Dado en Bogotá DC,

28 AGO. 2007.

ALIX CARMENZA CESPEDES DE VERGEL
Jefe de la división de Nuevas Creaciones

adpa11