

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 September 2007 (07.09.2007)

PCT

(10) International Publication Number
WO 2007/100497 A1

(51) International Patent Classification:
A47L 25/08 (2006.01) A47L 13/16 (2006.01)

(21) International Application Number:
PCT/US2007/003879

(22) International Filing Date:
14 February 2007 (14.02.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0603875.6 28 February 2006 (28.02.2006) GB

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, 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, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

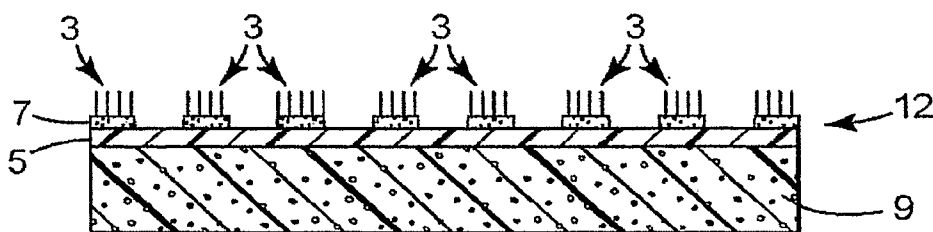
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, 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).

Published:

- 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

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: WEAR INDICATOR FOR A FLOCKED SCOURING MATERIAL



(57) Abstract: A scouring material is disclosed that comprises upstanding flock fibres secured to a substrate web material by an adhesive. The colours of the fibres and adhesive being such that the apparent colour of a flocked area of the substrate changes as the flock fibres in that area wear away.



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WEAR INDICATOR FOR A FLOCKED SCOURING MATERIAL

The present invention relates to flocked materials that are suitable for consumer use as scouring materials for cleaning surfaces in various environments, including domestic,
5 industrial, hospital and food industry environments.

Materials that provide a scouring action are widely used for cleaning in the domestic environment, being most frequently employed for cleaning cooking utensils and for cleaning surfaces in kitchens and bathrooms. Scouring materials that are already known
10 for such uses include resin-bonded non-woven webs of the type described in US-A-2 958 593. Those webs may incorporate abrasive particles to enhance their abrasive action.

It has also been proposed, in GB-A-1 539 477 and WO 02/06009, to use flocked materials for domestic cleaning and to enhance the abrasive action of the materials by
15 depositing abrasive particles (in the form of beads of resin) on the free ends of the flock fibres. Alternative products, comprising pile fabrics, which are intended to provide an enhanced abrasive action in combination with a wiping action are described in EP-A-0 632 990. Flocked materials, and processes for manufacturing them, are well known. In the conventional processes, a layer of adhesive is applied to a substrate web material and,
20 while the adhesive is still tacky, flock fibres are attracted to it electrostatically so that they become embedded at one end in the adhesive and stand up generally perpendicular to the substrate material. The material is then heated in an oven to dry and cure the adhesive layer.

25 WO 2004/021855 describes products, comprising flocked materials, that are intended to meet the growing demand from consumers for cleaning articles that (i) have a softer abrasive action but which, nevertheless, are able to remove material such as dirt, grease, burnt-on food etc. quickly and thoroughly; and (ii) are themselves easy to clean (for example, simply by rinsing after use) and retain no undesirable odours and no
30 undesirable residues (e.g. pieces of food) that could subsequently contaminate other surfaces on which they might be used.

For environmental and cost reasons, consumers wish to obtain the maximum life from cleaning articles. On the other hand, they also wish to ensure that a cleaning article is replaced on time, before it becomes ineffective. To that end, for certain cleaning articles, wear indicators have been proposed to provide the user with an indication that the article is nearing the end of its useful life. In the field of wipes, for example, WO 2001/047403 describes how an anti-microbial formulation is applied to a sanitizing wipe in combination with an indicator that changes colour when the formulation is exhausted, and WO 2005/072594 describes a wipe that is provided with an active graphic to indicate to the user when the wipe should be discarded. Wear indicators are also known outside the field of domestic cleaning articles: US-A-6 895 631, for example, describes a buffing pad comprising a mixture of long fibres of one colour and short fibres of another colour, in which the short fibres only become apparent when the long fibres have been destroyed, indicating that the pad should be replaced.

The present invention is directed specifically to flocked scouring materials, and is concerned with the problem of providing a user of such a material with an indication that it is approaching the end of its useful life.

The present invention provides a scouring material comprising upstanding flock fibres secured to a substrate web material by an adhesive, the colours of the fibres and adhesive being such that the apparent colour of a flocked area of the substrate changes as the flock fibres in that area wear away.

The fibres and the adhesive may be of differing colours whereby the colour of the adhesive becomes visible as the fibres wear away. Advantageously, the colour of the adhesive contrasts with that of the substrate material.

By way of example, scouring materials in accordance with the invention will be described with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic cross-section of a piece of flocked scouring material;
Fig. 2 is a plan view of a piece of patterned flocked scouring material;

Fig. 3 is a diagrammatic cross-section of a hand pad incorporating a flocked scouring material; and

Fig. 4 is a perspective view of the hand pad of Fig. 3.

5 The flocked scouring material 1 shown in cross-section in Fig. 1 comprises flock fibres 3 arranged substantially perpendicular to a substrate web material 5, and secured to the substrate material by a layer of adhesive 7.

10 As already indicated above, flocked materials of the general type shown in Fig. 1, and processes for manufacturing them, are well known. In the conventional processes, a layer of adhesive 7 is applied to the substrate material 5 and, while the adhesive is still tacky, flock fibres 3 are attracted to it electrostatically so that they become embedded at one end in the adhesive and stand up generally perpendicular to the substrate material. The material is then heated in an oven to dry and cure the adhesive layer. If desired,
15 flock fibres can be applied to the other side of the substrate material 5 in the same manner.

The flock fibres 3 may be applied evenly over the substrate material 5 or may be applied so that they form a pattern over the surface of the substrate material. A process by which
20 a pattern of flock fibres can be achieved is well-known and involves applying the adhesive 7 to the substrate material 5 in the required pattern, usually by some form of printing process, with the result that the flock fibres 3 will be adhered to the substrate only in the areas to which the adhesive has been applied. Fig. 2, for example, shows a pattern that is achieved by applying the adhesive 7 to regularly-spaced rectangular
25 patches 11 of the substrate material 5. In this case, the flock fibres 3 will adhere to the substrate material 5 in those patches, while the substrate material 5 will remain exposed elsewhere. The size of the patches 11 can be altered to change the area of the substrate material 5 that is covered by the flock 3, and the shape of the patches 11 can also be changed.

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Through a suitable choice of the substrate material 5 and the flock fibres 3, the flocked surface can be used to scour a surface i.e. to exert an abrasive action on the surface to remove dirt that cannot be removed just by wiping the surface.

5 Cleaning articles can be formed by cutting a flocked scouring material as described above into pieces, the size of which will depend on the intended use of the articles. For use by hand in the domestic environment, a suitable size could be about 30cm by 30cm. An alternative type of scouring article can be formed by laminating the flocked scouring material to another material that may simply provide a support for the scouring material
10 or may provide an alternative cleaning action.

Figs. 3 and 4, for example, shows a cleaning article 12 that is formed by laminating flocked scouring material 1 as described above to another material, in this case a layer of foam 9, to form a hand pad. The foam 9 can be of any type known to be suitable for
15 domestic cleaning, including cellulosic foams having a density in the range of from 75 to 125 Kg/m³ and polyurethane foams having a density in the range of from 18 to 30 Kg/m³. The foam 9 can be of any suitable thickness but it has been found that thicknesses in the range of from 0.5 to 5.0 cm are particularly useful for domestic cleaning. When a thinner layer of foam is used, the laminate can be cut into hand pads
20 having a larger surface area (e.g. having dimensions of up to 20 cm by 20 cm). A thicker layer of foam may be more suitable for pads having a smaller surface area (e.g. dimensions of about 7 cm by 9 cm). It will be appreciated that the flock 3 could be applied continuously over the substrate material 5 of the scouring material 1, instead of being applied in a pattern as shown in Fig. 4.

25 Scouring materials and scouring articles as described above with reference to Figs. 1 to 4 are also described in WO 2004/021855. The scouring material and/or any other material to which it is laminated may, if required, be impregnated with a cleaning composition.

30 In accordance with the present invention, the adhesive 7 and the flock fibres 3 have different colours so that, as the fibres wear away, the colour of the adhesive becomes

increasingly visible until it dominates and provides an indication to the user that the scouring action of the material or article has diminished. The colours selected for the adhesive and the fibres should be such that the change in appearance of the scouring material/article is clearly visible. Suitable colour combinations will be described below.

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The substrate material

Any woven or non-woven flexible material suitable for cleaning surfaces (i.e. able to withstand, at least, hot water and cleaning fluids) can be used for the substrate material 5 depending, among other factors, on whether or not the flocked material 1 is to be used on its own as a cleaning article or is to be laminated to another material, for example a sponge.

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If the flocked material 1 is to be used on its own as a scouring article, it will typically be cut to a size of about 30cm by 30cm. The substrate material 5 may be a disposable, semi-disposable or reusable textile wipe material, in which case the flock fibres 3 are applied to the substrate so that a part of the surface of the substrate (for example, one side thereof) remains exposed and can be used to provide a wiping action as well as a scouring action to a surface that is being cleaned. The textile wipe material may be of woven, knitted or non-woven construction and will typically have a basis weight in the range of from 15 to 300 g/m², although materials having a higher basis weight could be used. Suitable non-woven wipe materials for the substrate material 5 include dry-laid, wet-laid, spun-bond and spun lace materials and may, as appropriate, be thermally-bonded, resin-bonded, ultrasonically-bonded, needle-punched, hydro-entangled, latex-coated etc. The textile wipe material may comprise natural fibres (for example cotton fibres) and/or man-made fibres (for example PET, rayon, viscose, polypropylene, polyamide, or polyester fibres). Any of the previously-mentioned substrate materials may also be used when the flocked scouring material is to be laminated to another material.

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The flock fibres

Any fibres known to be suitable for flocking and also suitable for cleaning (i.e. able to withstand, at least, hot water and cleaning fluids) can be used for the flock fibres 3, provided that they are available in a suitable colour having regard to the colour selected for the adhesive (see below). A particularly suitable material is polyamide, especially in the form of nylon 6 or nylon 6.6, but polypropylene or polyester fibres could also be used. The fibres should have a titre (mass per unit length) and length appropriate to the type of cleaning operation in which the flocked substrate will be used, in particular the aggressiveness of the scouring action required and the nature of the surface to be cleaned.

The amount of flock fibres 3 deposited on the substrate material 5 should be sufficient to obscure the adhesive 7 and should also be selected having regard to the scouring action that the substrate 1 is required to provide. WO 2004/021855, for example, describes scouring substrates in which flock fibres having a length in the range of from 0.4 to 0.8 mm and a titre in the range of from 15 to 80 dtex are applied to a substrate material in an amount of from 150 to 180 g/m².

Abrasive particles may be applied to the flock fibres 3, if required to enhance the scouring action. The abrasive particles may comprise an abrasive mineral that is adhered to the fibres 3 by a resin, or they may simply comprise beads of resin without abrasive mineral. Alternatively, as described in our WO 2004/021855, the fibres 3 themselves may provide the required scouring action.

The flocking adhesive

The adhesive 7 selected to bind the flock fibres 3 to the substrate material 5 should also be suitable for use in the conditions for which the wipe is intended (for example, able to withstand hot water and cleaning fluids). Preferably, it should not adversely affect the flexibility of the substrate material 5. Suitable adhesives are acrylic adhesives and PVC

(polyvinylchloride) resins, and are applied in an amount that will yield a very thin layer on the substrate material. A typical coating weight for the adhesive is about 90 to 140 g/m².

5 **Colour selection for the flock fibres and the flock adhesive**

As described above, the adhesive 7 and the flock fibres 3 have different colours so that, as the fibres wear away, the colour of the adhesive becomes increasingly visible until it dominates. This colour change in the flocked areas of the material 1 indicates, to the user, that the scouring action of the material is disappearing.

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Examples of colour combinations for the adhesive 7 and the flock fibres 3 that have been found suitable for use on a light green substrate material 1 are:

(i) red adhesive and violet fibres

(ii) pink adhesive and turquoise fibres

15 (iii) violet adhesive and orange (021C /165C) fibres

where:

the red colour is PANTONE® "Warm Red";

the violet colour is reference no. 2587, 265 or 266 on the PANTONE MATCHING SYSTEM®;

20 the pink colour is reference no. 238 or 239 on the PANTONE MATCHING SYSTEM®;

the turquoise colour is reference no. 312, 313 or 3135 on the PANTONE MATCHING SYSTEM®; and

the orange colour is PANTONE® "Orange 021" or reference no. 165 on the PANTONE MATCHING SYSTEM®.

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It will be appreciated, however, that other colour combinations could be used and that the choice of colours will be influenced by the colour of the substrate material 1. In addition, although it is preferred that the adhesive 7 should be coloured so that it is visible against the substrate material 1, that is not essential. As an alternative, it is

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possible to use a transparent adhesive 7 in combination with flock fibres 3 that are of a contrasting colour to the substrate material 1: in that case, as the flock fibres wear away,

it is the colour of the underlying substrate material 1 (rather than the colour of the adhesive 7) that becomes apparent in the flocked areas.

Embodiments of the invention are described in greater detail in the following examples:

5 **Example 1 - a hand pad comprising a flocked substrate material laminated to a layer of foam.**

10 The flock fibres were polyamide fibres of a turquoise colour (see above) having a length of 0.8 mm and a titre of 44 dtex; the flocking adhesive was an acrylic adhesive of a red colour (see above), and the substrate material was a light green, coated non-woven material comprising 35% polyester and 65% cotton having a basis weight of 105 g/m².
15 The flock fibres were applied to one surface of the substrate material in shaped, spaced areas forming a repeating pattern that covered approximately 50% of the surface of the substrate material. The substrate material was laminated, on its un-flocked side, to a layer of cellulosic sponge having a thickness of 2 cm and a density (when dry) of about 29 kg/m³.

20 The hand pad was subjected to normal domestic use during which it was observed that the red colour of the adhesive in the flocked areas became increasingly apparent as the turquoise flock fibres wore away.

25 **Example 2 - a hand pad comprising a flocked substrate material laminated to a sponge cloth material.**

30 The flocked substrate material was the same as that of Example 1 above. The substrate material was laminated, on its un-flocked side, to a sponge cloth material having a thickness of 2.5 mm and a basis weight (when dry) of about 260 g/m².

35 The hand pad was subjected to normal domestic use during which it was observed that the red colour of the adhesive in the flocked areas became increasingly apparent as the turquoise flock fibres wore away.

Example 3 – a wipe comprising a flocked substrate material

The flock fibres were polyamide fibres of a dark blue colour having a length of 0.8 mm and a titre of 44 dtex; the flocking adhesive was an acrylic-styrene resin of a red colour (see above), and the substrate material was a blue reusable non-woven wipe material, specifically a viscose-polyester latex coated wipe formed by the process of carding, crosslapping and needletacking and having a basis weight of about 120 g/m². The flock fibres were applied to the substrate material in shaped, spaced areas forming a repeating pattern that covered approximately 15% of the surface of the substrate material.

The wipe was subjected to normal domestic use during which it was observed that the red colour of the adhesive in the flocked areas became increasingly apparent as the blue flock fibres wore away.

CLAIMS

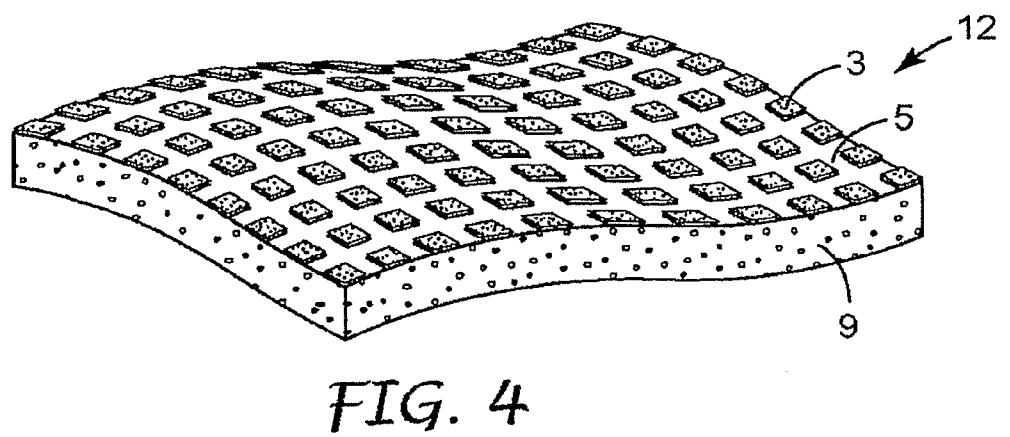
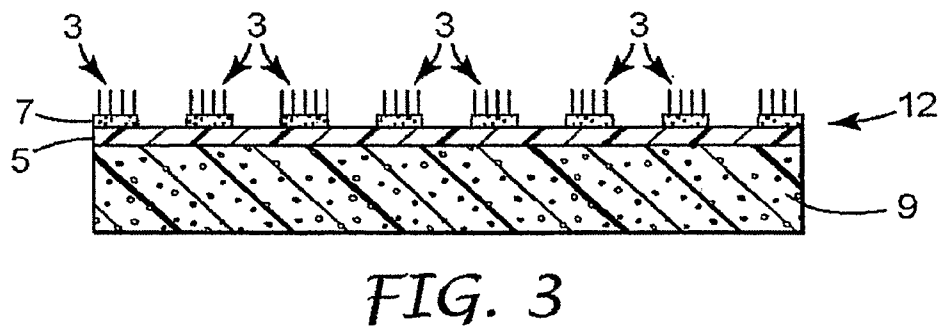
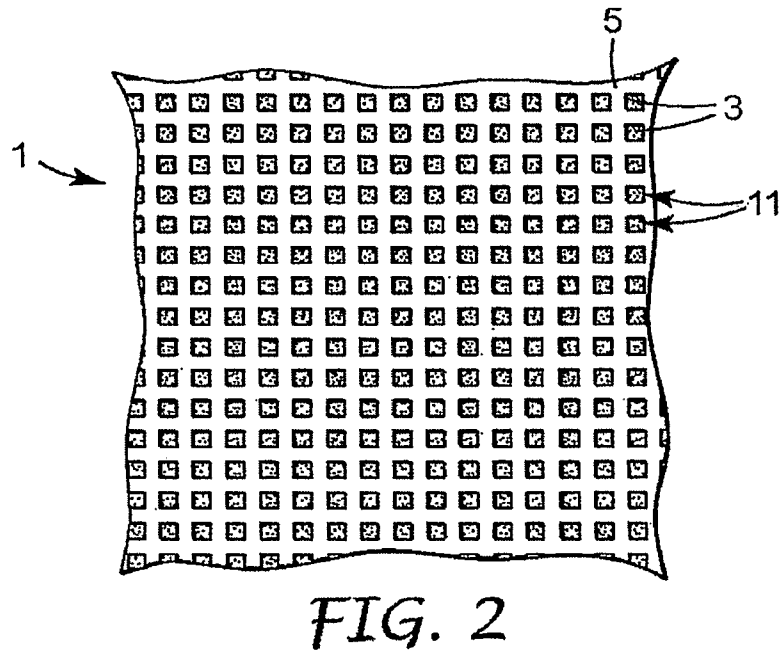
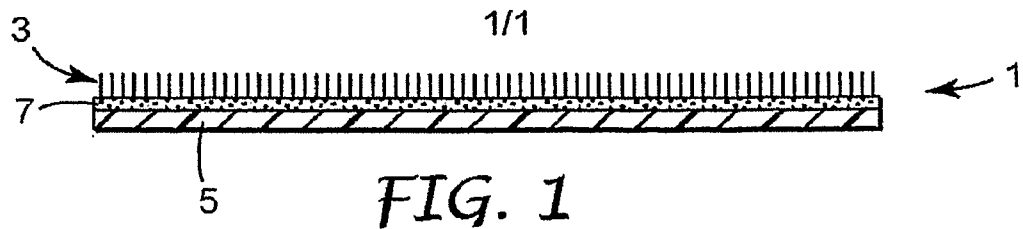
1. A scouring material comprising upstanding flock fibres secured to a substrate web material by an adhesive, the colours of the fibres and adhesive being such that the apparent colour of a flocked area of the substrate changes as the flock fibres in that area wear away.
2. A scouring material as claimed in claim 1, in which the fibres and the adhesive are of differing colours whereby the colour of the adhesive becomes visible as the fibres wear away.
3. A scouring material as claimed in claim 2, in which the colour of the adhesive contrasts with that of the substrate material.
4. A scouring material as claimed in any one of the preceding claims, in which the flock fibres are applied only to discrete areas of the substrate material, the surface of the substrate material being exposed between those discrete areas.
5. A scouring material as claimed in any one of the preceding claims, in which the flock fibres are formed of a polyamide material.
6. A scouring material as claimed in any one of the preceding claims, in which the flock fibres have a length in the range of from 0.4 to 0.8 mm.
7. A scouring material as claimed in any one of the preceding claims, in which the flock fibres have a titre in the range of from 15 to 80 dtex.
8. A scouring material as claimed in any one of the preceding claims, in which the flock fibres are applied to the substrate material in an amount sufficient to obscure the adhesive.

9. A scouring material as claimed in any one of the preceding claims, in which the adhesive is an acrylic adhesive or a PVC resin.

5 10. A scouring material as claimed in any one of the preceding claims, in which the substrate is a liquid-absorbent knitted, woven, or non-woven textile material.

11. A cleaning article comprising a piece of scouring material as claimed in any one of the preceding claims.

10 12. A cleaning article comprising a scouring material as claimed in any one of claims 1 to 10, laminated to a layer of foam, or a sponge cloth material, or a wipe material.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/003879**A. CLASSIFICATION OF SUBJECT MATTER***A47L 25/08(2006.01)i, A47L 13/16(2006.01)i*

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)

IPC8 A47L 25/08, 13/10, 13/16, 17/08, A63b 9/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and application for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO INTERNAL), "seour, pile, color, wear"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 05305048 A (NISHIDA, TATSUO) 19 November 1993 See the abstract and figures 4-5	1
A	US 2004-0134010 A1 (MINGCHIH M. TSENG et al) 15 July 2004 See claims 1-2, 36	1
T	US 2007-0022555 A1 (JAY H. PENZES) 1 February 2007 See the abstract and figures 1-2	11

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent 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 citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 JULY 2007 (30.07.2007)

Date of mailing of the international search report

30 JULY 2007 (30.07.2007)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2007/003879**Box No. 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.: **5-12**
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. 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:

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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2007/003879

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 05305048 A	19.11.1993	NONE	
US 20040134010 A1	15.07.2004	NONE	
US 2007-0022555 A1	01.02.2007	NONE	