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(71) Applicant: **3M INNOVATIVE PROPERTIES COMPANY** [US/US]; 3M Center, Post Office Box 33427, Saint Paul, MN 55133-3427 (US).

(72) Inventor: **MCCARTHY, Kevin, J.**; Post Office Box 33427, Saint Paul, MN 55133-3427 (US).

(74) Agents: **PATCHETT, David, B.** et al.; Office of Intellectual Property Counsel, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).

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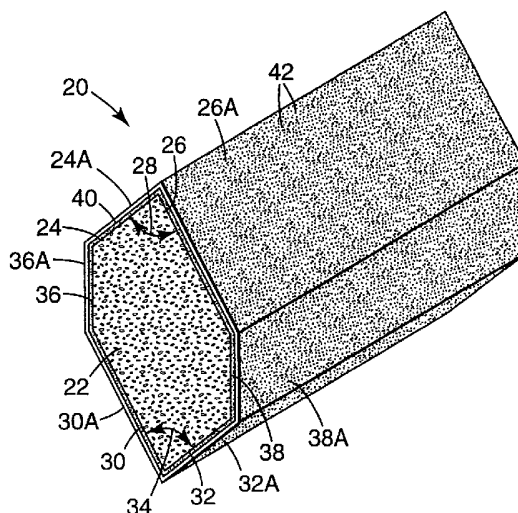
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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

[Continued on next page]

(54) Title: SANDING SPONGE



(57) Abstract: A hand held corner sanding sponge (20) includes a backing layer (22) of an open-celled foam material having first and second major surfaces (24, 26) that meet at a right angle and third and fourth major surfaces that meet at a right angle (34). The cross-sectional dimension between the intersection of the first and second major surfaces from the intersection of the third and fourth major surfaces (30, 32) is about 4 inches to about 6 inches. First and second side surfaces are located between the first and second major surface and the third and fourth major surfaces forming a generally hexagonal shape. The cross-sectional dimension between the first and second side surfaces is about 3 inches to about 4 inches. A layer of flexible adhesive (40) is adhered to at least the first and second major surfaces of the backing layer. A layer of abrasive (42) particles is adhered to the major surfaces by the flexible adhesive.



Published:

— *with international search report*

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.

CORNER SANDING SPONGE

Field Of the Invention

The present invention relates to resilient flexible abrading devices typically referred to as sanding sponges, and more particularly, to a hand-sized,
5 disposable sanding sponge for sanding a variety of surface shapes and configurations.

Background of the Invention

Common sanding jobs calling for considerable detail work or access to small confined areas, or for the sanding of contoured surfaces, will often require that
10 the surfaces be hand sanded. Heretofore, hand-held sanding devices for this purpose consist essentially of a sanding block for holding conventional sandpaper wrapped over the block. By using a sanding block as a sandpaper holder, hand-applied sanding forces on the sandpaper can be increased and more evenly distributed.

The difficulty with the above-mentioned prior sanding devices is the
15 necessity of installing or wrapping a separate piece of sandpaper around the device. This installation or wrapping process presents some inconvenience to the user. For example, if the paper is improperly installed, it is susceptible to falling off. Also, the device requires the purchase of separate sheets of sandpaper that is a further inconvenience in terms of the amount of supplies needed.

20 U.S. Patent No. 4,887,396 (Lukianoff) discloses a hand-sized sanding device that eliminates the need for a separate sheet of sandpaper. The sanding device is provided with its own integral abrasive surfaces that can be manufactured at a sufficiently low cost to be disposable. The sanding device of Lukianoff can be conveniently used off-the-shelf to hand sand a variety of standard, contoured or shaped
25 surfaces, such as trim or molding surfaces, and for projecting into exactly defined areas.

Another type of sanding device is the resilient flexible sanding sponge. Sanding sponges generally include a layer of abrasive particles adhered to a foam backing by a flexible adhesive. One such sanding sponge is commercially available
30 from Minnesota Mining and Manufacturing Company, St. Paul, Minn. under the trade

designation "Softback Sanding Sponge". Typically, a user places the backing layer against the palm of his or her hand and rubs the abrasive over a surface to be abraded. The flexible adhesive layer and the foam backing permit the layer of abrasive to conform to the surface being abraded.

5 While such sanding sponges work quite well to abrade objects having flat surfaces, the foam backing and/or the flexible adhesive layer is often torn when they are used to abrade the intersecting surfaces of projections such as the corners of a table top. Hand pressure on the sanding sponge can cause such a projection to penetrate and tear the backing layer of the sanding sponge as it is moved over the
10 projection. A sanding sponge with high tear strength backing layer is disclosed in U.S. Patent No. 6,419,573 (Lise et al.).

 One specialty sanding sponge is the corner sanding sponge is a compressible sponge of an open-celled foamed polyurethane. The sponge has first and second planar surfaces that meet at a right angle. The first and second planar surfaces
15 are coated with an abrasive material. The portion of the sponge enclosed between the first and second surfaces includes a grasping means forming an integral portion of the sponge.

Brief Summary of the Invention

 The present invention relates to a hand held corner sanding sponge. The
20 corner sanding sponge includes a backing layer of an open-celled foam material having first and second major surfaces that meet at a right angle and third and fourth major surfaces that meet at a right angle. The cross-sectional dimension between the intersection of the first and second major surfaces from the intersection of the third and fourth major surfaces is about 4 inches to about 6 inches. First and second side
25 surfaces are located between the first and second major surface and the third and fourth major surfaces forming a generally hexagonal shape. The cross-sectional dimension between the first and second side surfaces is about 3 inches to about 4 inches. A layer of flexible adhesive is adhered to at least the first and second major surfaces of the backing layer. A layer of abrasive particles is adhered to the major surfaces by the
30 flexible adhesive. The backing layer can optionally be a felted foam.

In one embodiment, the layer of flexible adhesive and the layer of abrasive particles extend along at least one of the first and second side surfaces. Alternatively, the layer of flexible adhesive and the layer of abrasive particles extend along both of the first and second side surfaces.

5 In another embodiment, at least one of the first and second side surfaces comprises a concave cross-sectional shape. Alternatively, the first and second side surfaces both comprise a concave cross-sectional shape.

Depending upon the open-celled foam used, the layer of flexible adhesive comprises a major portion below the major surfaces of the backing layer and
10 a minor portion comprising menisci of the adhesive around the abrasive particles, thereby exposing a high percentage of the abrasive particles for contact with a surface to be abraded.

In one embodiment, the cross-sectional dimension between the intersection of the first and second major surfaces from the intersection of the third and
15 fourth major surfaces is about 5 inches. The cross-sectional dimension for the same corner sanding sponge between the first and second side surfaces is about 3 ½ inches.

Brief Description of the Several Views of the Drawing

The present invention will be further described with reference to the
20 accompanying drawing wherein like reference numerals refer to like parts in the several views, and wherein:

Figure 1 is a perspective view of a first embodiment of a corner sanding sponge according to the present invention.

Figure 2 is a side plan view of the sanding sponge of Figure 1.

25 Figure 3 is a top plan view of the sanding sponge of Figure 1.

Figure 4 is an end plan view of the sanding sponge of Figure 1.

Figure 5 is a perspective view of a second embodiment of a corner sanding sponge according to the present invention.

Figure 6 is a side plan view of the sanding sponge of Figure 5.

30 Figure 7 is a top plan view of the sanding sponge of Figure 5.

Figure 8 is an end plan view of the sanding sponge of Figure 5.

Figure 9 is a perspective view of a third embodiment of a corner sanding sponge according to the present invention.

Figure 10 is a side plan view of the sanding sponge of Figure 9.

5 Figure 11 is a top plan view of the sanding sponge of Figure 9.

Figure 12 is an end plan view of the sanding sponge of Figure 9.

Detailed Description of the Invention

10 Figures 1-4 illustrate the first embodiment of a resilient flexible corner sanding sponge 20 according to the present invention. The corner sanding sponge 20 includes a backing layer 22 of an open celled foam material. The backing layer 22 is configured to have a first pair of major surfaces 24, 26 that meet at a right angle 28 and a second pair of major surfaces 30, 32 that meet at a right angle 34. A pair of co-planar, opposing side surfaces 36, 38 are located between the pairs of major surfaces
15 24, 26 and 30, 32, forming a generally hexagonal cross-section.

A flexible adhesive 40 is used to adhere a layer of abrasive particles 42 to at least the major surfaces 24, 26 of the backing layer 22. In the preferred embodiment, a layer of abrasive particles 42 is adhered to all four major surfaces 24, 26, 30, and 32. A layer of abrasive particles 42 can optionally be adhered to the side
20 surfaces 36, 38.

The flexible adhesive 40 must bond the layer of abrasive particles 42 to the backing layer 22 and adheres the abrasive particles 42 together and to that backing layer 22 while being sufficiently flexible to conform with the backing layer 22 to the contour of surfaces to be abraded by the sanding sponge 20. A flexible adhesive
25 formulation and method of applying it described in U.S. patent No. 6,059,850 can be used to form the layer of flexible adhesive 40.

A layer of hard anti-loading size coating can optionally extend over the flexible adhesive 40 and the abrasive particles 42 opposite the backing layer 22. A hard anti-loading size coating formulated and applied using the method described in
30 U.S. patent No. 6,059,850 is suitable for this purpose.

In some embodiments, a major portion of the flexible adhesive 40 extends below the major surfaces 24, 26, 30, 32, 36, and 38 of the backing layer 22. By "major portion" we mean that more than half the thickness of the flexible adhesive 40 is below the major surfaces 24, 26, 30, 32, 36, and 38 of the backing layer 22. We estimate from observation that about 60 to 80 percent of the thickness of the layer of flexible adhesive 40 is below the major surfaces 24, 26, 30, 32, 36, and 38 of the backing layer 22. That major portion of the layer of flexible adhesive 40 below the major surfaces 24, 26, 30, 32, 36, 38 of the backing layer 22 is firmly adhered to the cell walls of the foam backing layer 22 and has very few voids that could weaken its structural integrity. Thus, that major portion of the layer of flexible adhesive 40 below the major surfaces 24, 26, 30, 32, 36, 38 of the backing layer 22 together with the minor portion of the layer of flexible adhesive 40 above the surface 44 of the backing layer 22 provides the needed integrity so that the layer of flexible adhesive 40 will not break as it is flexed to conform to a surface as the sanding sponge 20 is used.

Wicking of the flexible adhesive 40 into the foam backing 22 causes the flexible adhesive 40 to draw back from around the abrasive particles 42, while leaving menisci of the adhesive around the abrasive particles 42 to hold them in place. Consequently, a high percentage of the abrasive particles 42 are exposed for contact with a surface to be abraded. Also, that wicking of the flexible adhesive 40 into the backing layer 22 causes most of the abrasive particles 42 to become supported closely along the major surfaces 24, 26, 30, 32, 36, 38 of the backing layer 22, rather than having abrasive particles 42 supported on portions of the layer of flexible adhesive 40 of different thicknesses. Consequently, outer surfaces 24A, 26A, 30A, 32A, 36A, 38A of the sanding sponge 20 defined by the ends of the abrasive particles 42 are almost as smooth as the corresponding major surfaces 24, 26, 30, 32, 36, 38 of the backing layer 22.

In one embodiment, the backing layer 22 is constructed from a high tear strength felted urethane foam. The felted urethane foam used for the backing layer 22 is formed by compressing one or more layers of heated urethane foam (a thermoplastic foam) in a first direction to reduce the thickness of the layers and provide a desired

density for the foam. Felted polyurethane foam is available from Crest Foam Industries, Inc., Moonachie, N.J., in a range of compression ratios at least including from 2 to 10 (i.e., the compression ratio of the felted foam is the ratio of the thickness of the foam before it is compressed to the thickness of the foam after it is compressed).

5 Non-reticulated felted urethane foam having a compression ratio of 3 (e.g., felted urethane foam obtained from Crest Foam Industries, Inc., Moonachie, N.J., under the trade designation "Felt 7018 NAT N/R 0.3450/0.118.times.46.times.56") has been found to work well as the backing layer 22 of the sanding sponge 20. This non-reticulated foam provides the desired combination of softness and tear strength while
10 allowing or causing the major structurally sound portion of the flexible adhesive 40 to be formed below its surface 44, apparently by wicking the flexible adhesive 40 when it is applied as a liquid into several layers of cells below the major surfaces 24, 26, 30, 32, 36, 38 of the backing layer 22.

Felted foams having other lower or higher compression ratios (e.g., 2, 4,
15 or 5) may also be useful. Felted urethane foams with lower compression ratios are more flexible and less expensive than those with a compression ratio of 3 but offer less tear resistance and may not as readily wick in the flexible adhesive 40. Presumably the tear resistance and ability to wick in a major structurally sound portion of the flexible adhesive 40 increases for felted urethane foams with higher compression ratio
20 numbers, but such felted urethane foams also become more stiff and more expensive as their compression ratios increase. Other open cell foams suitable for the present invention are available from Mercury Foam of Clifton, NJ under product designation 912-CDS and 912-CSS.

The abrasive particles 42 can be any of the abrasive particles described
25 in U.S. patent No. 6,059,850, particularly including particles of aluminum oxide, ceramic, or silicon carbide in the range of about 36 to 400 grit.

In another embodiment, the backing layer 22 is constructed from a reinforced foam including a strong reinforcing material, such as for example separate metal or polymeric fibers (e.g., nylon) or a porous layer of attached non-woven metal
30 or polymeric fibers, or woven metal or polymeric strands (e.g., window screen) that

increases the strength and tear resistance of the foam cast around it. One such reinforced polyurethane foam, available from Fulflex, Inc., Middletown, R.I., under the trade designation "Polycryl 500" which appears to be reinforced by fine denier fibers has been found to work well as the backing layer 22 of the sanding sponge 20.

5 Sanding sponges are typically made by coating a liquid adhesive over one or more surfaces of the backing layer 22, coating a layer of the abrasive particles 42 on the adhesive coated surface of the backing layer 22, and then drying the flexible adhesive 40. When the backing layer 22 is of felted foam, more of that layer of coat flexible adhesive 40 will be wicked into and adsorbed in the backing layer 22 than
10 when the backing layer is a layer of non-felted urethane foam, apparently because of the smaller cell size and crushed cell walls of the felted foam.

 This greater adsorption of the flexible adhesive 40 has several desirable effects. First, it forms a major layer of flexible adhesive below the surface of the backing layer 22 along which the layer of abrasive particles 42 is adhered. Second,
15 wicking of the coat adhesive into the felted urethane foam backing material causes the adhesive to draw backing from around the abrasive particles 42 while leaving meniscuses of the adhesive around the abrasive particles to hold them in place. These meniscuses of adhesive expose a higher percentage of the abrasive particles for contact with a surface to be abraded than is exposed if less of the coat adhesive is wicked into
20 the backing layer. Wicking of the coat adhesive into the felted urethane foam backing material also appears to cause most of the abrasive particles 42 to become supported closely along the major surfaces 24, 26, 30, 32, 36, 38 of the backing layer 22 (rather than having some abrasive particles 42 supported on portions of the layer of flexible adhesive 40 of different thicknesses as appears to be the case with prior art sanding
25 sponges).

 The backing layer 22 preferably has a cross section of such size that fits comfortably in the palm of the user's hand with the fingers and thumb engaging the sides surfaces 36, 38. The backing layer 22 preferably has a cross-sectional dimension between side surfaces 36, 38 along minor axis 52 of about 7.62 centimeters (3 inches)

to about 10.16 centimeters (4 inches), and preferably about 8.89 centimeters (3.5 inches).

The backing layer 22 preferably has a cross-sectional dimension along major axis 50 such that the fingers of the user's hand will not reach to or beyond the bottom of the backing layer 22 and thereby greatly reduce the chances of the user's fingers being injured in moving the sanding sponge 20 back and forth in use. The major axis 50 extends from the intersection of the major surfaces 24, 26 to the major surfaces 30, 32. The major axis 50 is preferably about 10.16 centimeters (4 inches) to about 15.24 centimeters (6 inches) in length, and more preferably about 12.7 centimeters (5 inches) in length.

In one embodiment, the major surfaces 26, 28, 30, 32 have a cross-sectional dimension of about 6.35 centimeters (2.5 inches) and the side surfaces have a cross-sectional dimension of about 3.81 centimeters (1.5 inches). This combination of dimensions results in a major axis about 12.7 centimeters (5 inches) long and a minor axis of about 8.89 centimeters (3.5 inches).

The backing layer 22 is preferably resiliently crushable (i.e., indentable) when squeezed by the thumb and fingers of the user's hand and thus is not likely to slip from and injure the hand even if the fingers are wet or greasy. The backing layer 22 being cellular foam is somewhat resiliently axially compressible and acts as a cushion between the user's hand and the work as the sanding sponge 20 is being pushed back and forth to perform the abrading function.

Figures 5-8 illustrate a second embodiment of the corner sanding sponge 60 of the present invention. Backing layer 62 is configured to have a first pair of major surfaces 64, 66 that meet at a right angle 68 and a second pair of major surfaces 70, 72 that meet at a right angle 74. A pair of opposing side surfaces 76, 78 are located between the pairs of major surfaces 64, 66 and 70, 72 as in Figure 1, except that side surface 78 is convex. If an imaginary line is drawn between the corners 80, 82 along the edges of the side surface 78, the cross section of the sanding sponge 60 is generally hexagonal.

The flexible adhesive 40 is used to adhere the layer of abrasive particles 42 to at least the major surfaces 64, 66 of the backing layer 62. In the preferred embodiment, a layer of abrasive particles 42 is adhered to all four major surfaces 64, 66, 70, 72. A layer of abrasive particles 42 can optionally be adhered to the side surfaces 76, 78. Outer surfaces 64A, 66A, 70A, 72A, 76A, 78A of the corner sanding sponge 60 are defined by the ends of the abrasive particles 42 adhered to the corresponding surfaces 64, 66, 70, 72, 76, 78 of the backing layer 22.

If the side surface 78 is coated with abrasive particles 42, it can advantageously be used to abrade curved surfaces. The major and minor axes 50, 52 of the corner sanding sponge 60 are generally as discussed in connection with Figure 1.

Figures 9-12 illustrate a second embodiment of the corner sanding sponge 90 of the present invention. Backing layer 92 is configured to have a first pair of major surfaces 94, 96 that meet at a right angle 98 and a second pair of major surfaces 100, 102 that meet at a right angle 104. A pair of opposing side surfaces 106, 108 are located between the pairs of major surfaces 94, 96 and 100, 102 as in Figure 1, except that both side surfaces 106, 108 are convex. If an imaginary line is drawn between the corners 110A, 112A or 110B, 112B along the edges of the side surfaces 106, 108, the cross section of the sanding sponge 90 is generally hexagonal.

The flexible adhesive 40 is used to adhere the layer of abrasive particles 42 to at least the major surfaces 94, 96 of the backing layer 62. In the preferred embodiment, a layer of abrasive particles 42 is adhered to all four major surfaces 94, 96, 100, 102. A layer of abrasive particles 42 can optionally be adhered to the side surfaces 106, 108. Outer surfaces 94A, 96A, 100A, 102A, 106A, 108A of the corner sanding sponge 90 are defined by the ends of the abrasive particles 42 adhered to the corresponding surfaces 94, 96, 100, 102, 106, 108 of the backing layer 92.

If the one or more of the side surfaces 106, 108 are coated with abrasive particles 42, it can advantageously be used to abrade curved surfaces. The major and minor axes 50, 52 of the corner sanding sponge 90 are generally as discussed in connection with Figure 1.

Although specific embodiments of this invention have been shown and described herein, it is to be understood that these embodiments are merely illustrative of the many possible specific arrangements that can be devised in application of the principles of the invention. Numerous and varied other arrangements can be devised
5 in accordance with these principles by those of ordinary skill in the art without departing from the scope and spirit of the invention. Thus, the scope of the present invention should not be limited to the structures described in this application, but only by the structures described by the language of the claims and the equivalents of those structures.

10

What is claimed is:

1. A hand held sanding sponge comprising:

a backing layer of an open-celled foam material having first and second major surfaces that meet at a right angle and third and fourth major surfaces that meet at a right angle, the cross-sectional dimension between the intersection of the first and second major surfaces from the intersection of the third and fourth major surfaces being about 4 inches to about 6 inches;

first and second side surfaces located between the first and second major surface and the third and fourth major surfaces forming a generally hexagonal shape, the cross-sectional dimension between the first and second side surfaces being about 3 inches to about 4 inches;

a layer of flexible adhesive adhered to at least the first and second major surfaces of the backing layer; and

a layer of abrasive particles adhered to the major surfaces by the flexible adhesive.

2. The corner sanding sponge of claim 1 wherein the layer of flexible adhesive and layer of abrasive particles extends along at least one of the first and second side surfaces.

3. The corner sanding sponge of claim 1 wherein the layer of flexible adhesive and the layer of abrasive particles extends along both of the first and second side surfaces.

4. The corner sanding sponge of claim 1 wherein at least one of the first and second side surfaces comprises a concave cross-sectional shape.

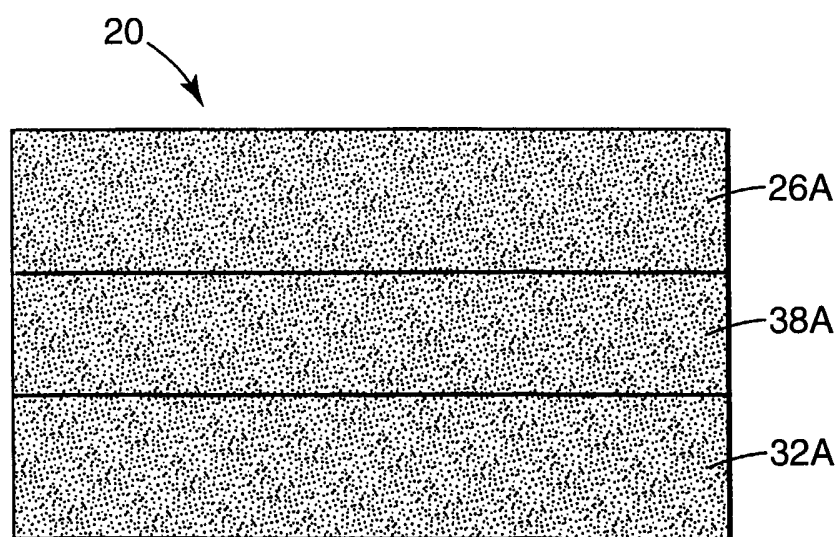
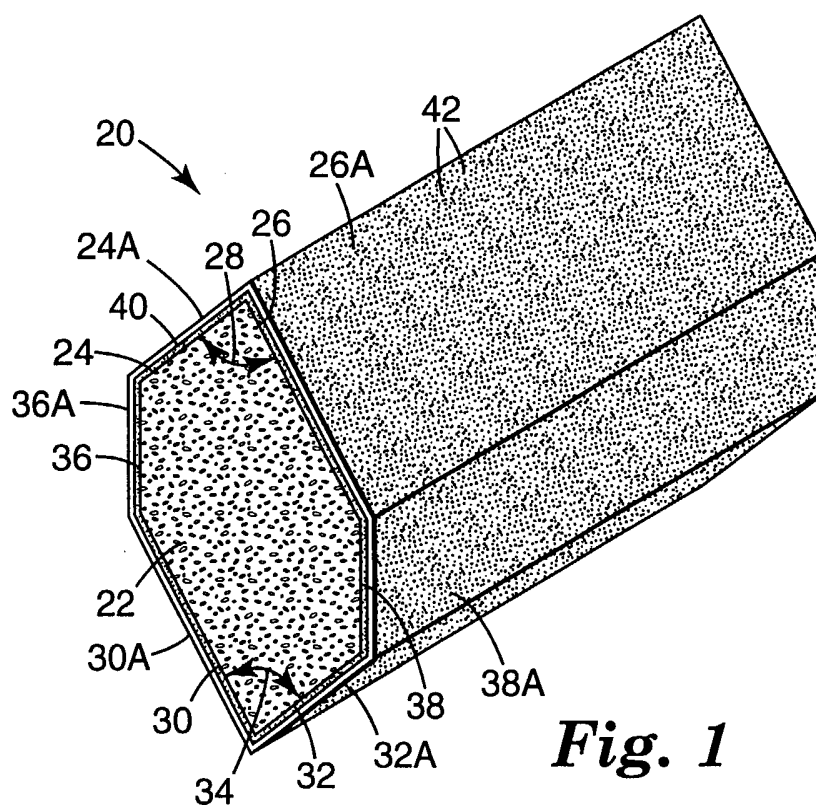
5. The corner sanding sponge of claim 1 wherein the first and second side surfaces both comprise a concave cross-sectional shape.

6. The corner sanding sponge of claim 1 wherein the layer of flexible adhesive comprises a major portion below the major surfaces of the backing layer and a minor portion comprising menisci of the adhesive around the abrasive particles, thereby exposing a high percentage of the abrasive particles for contact with
5 a surface to be abraded.

7. The corner sanding sponge of claim 1 wherein the cross-sectional dimension between the intersection of the first and second major surfaces from the intersection of the third and fourth major surfaces is about 5 inches.
10

8. The corner sanding sponge of claim 1 wherein the cross-sectional dimension between the first and second side surfaces is about 3 ½ inches.

9. The corner sanding sponge of claim 1 wherein the backing layer
15 comprises a felted foam.



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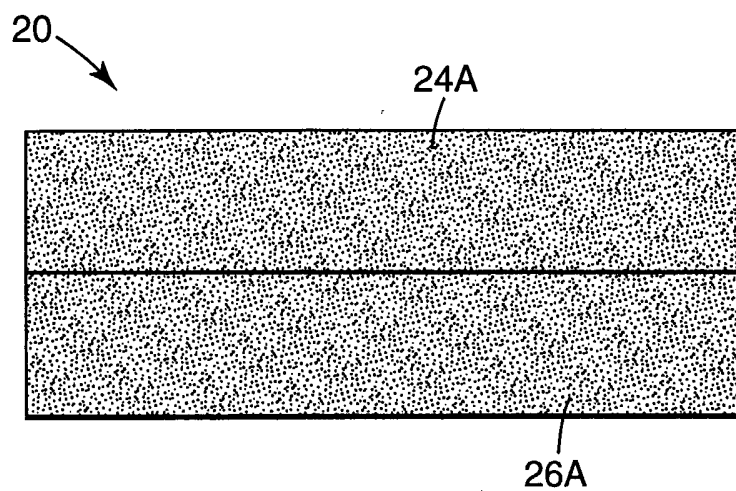


Fig. 3

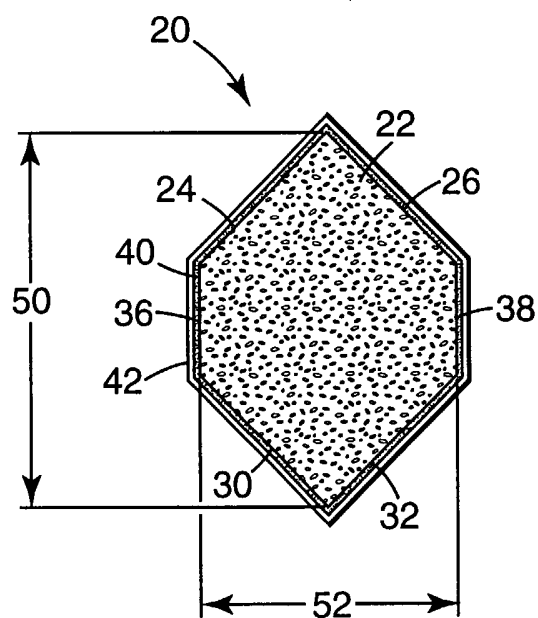
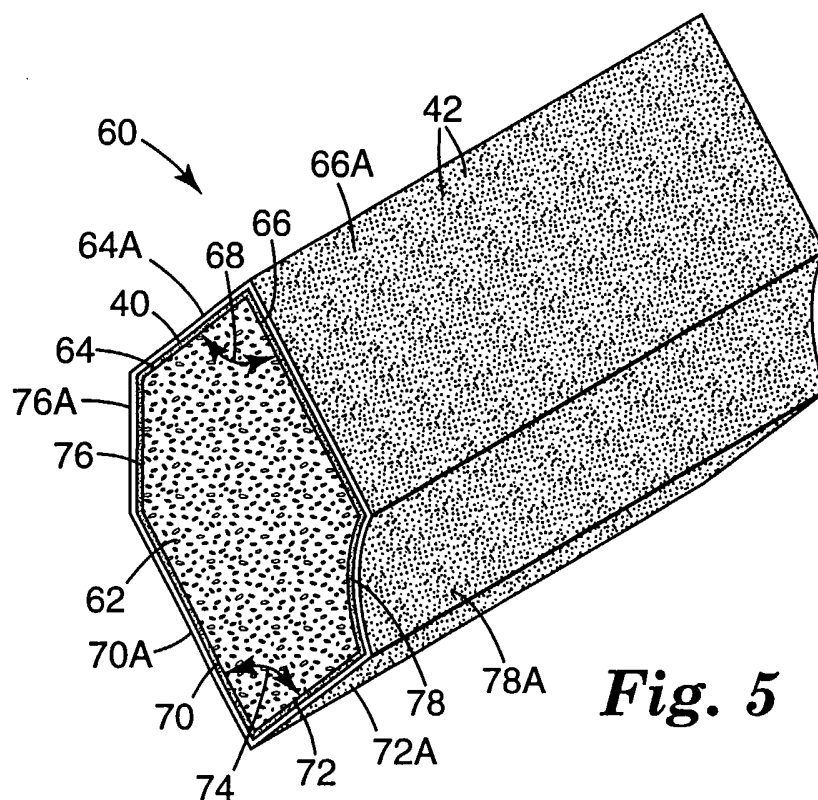
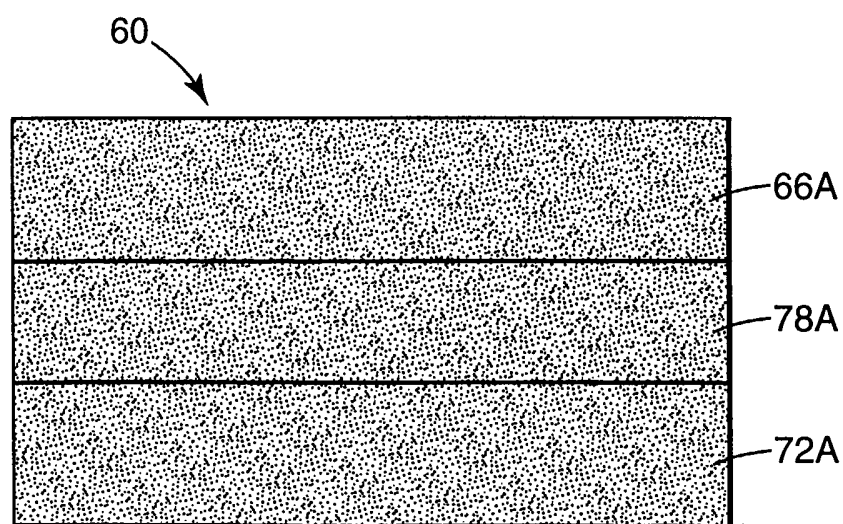


Fig. 4

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*Fig. 5**Fig. 6*

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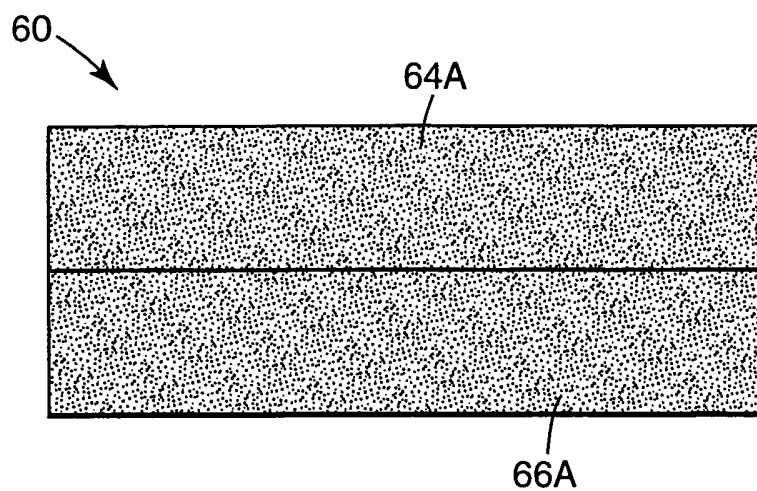


Fig. 7

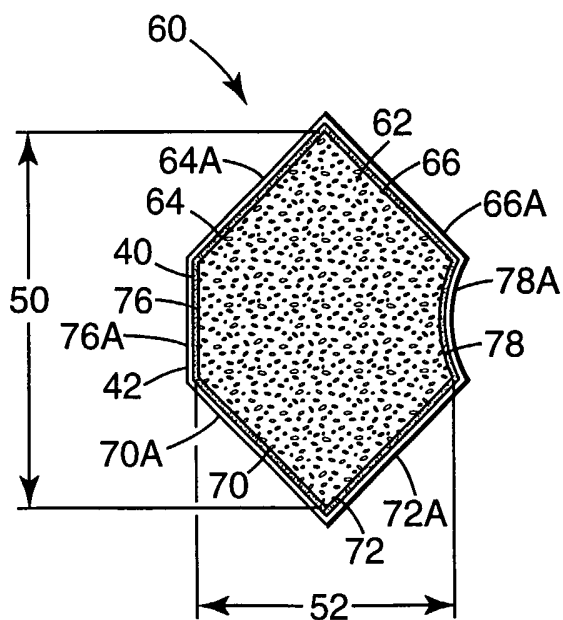
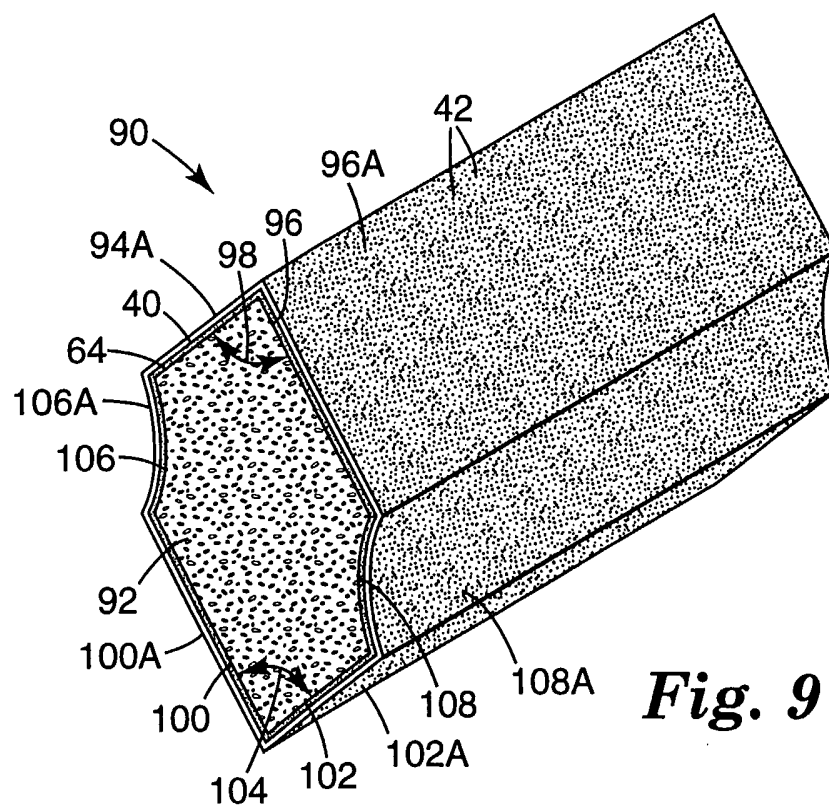
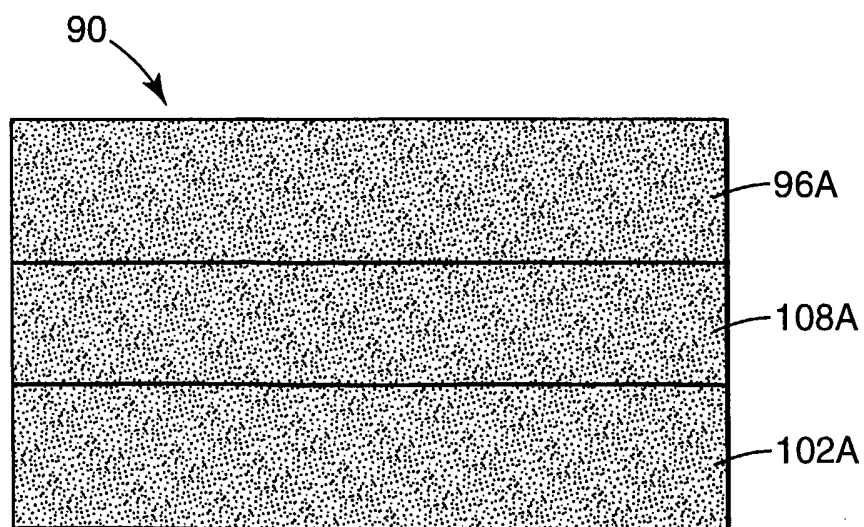
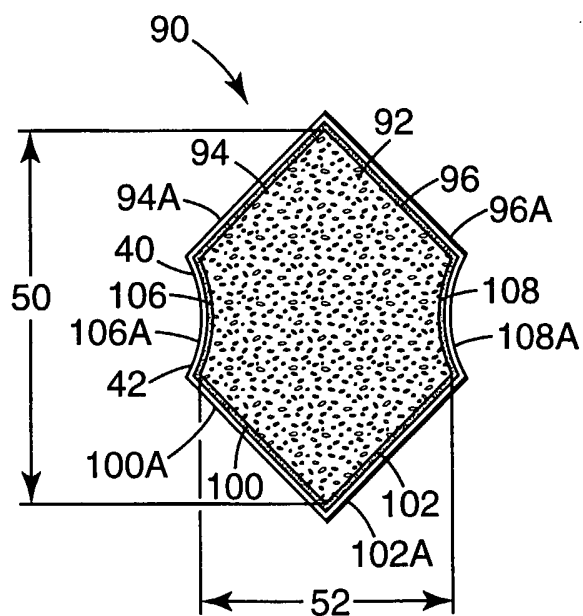
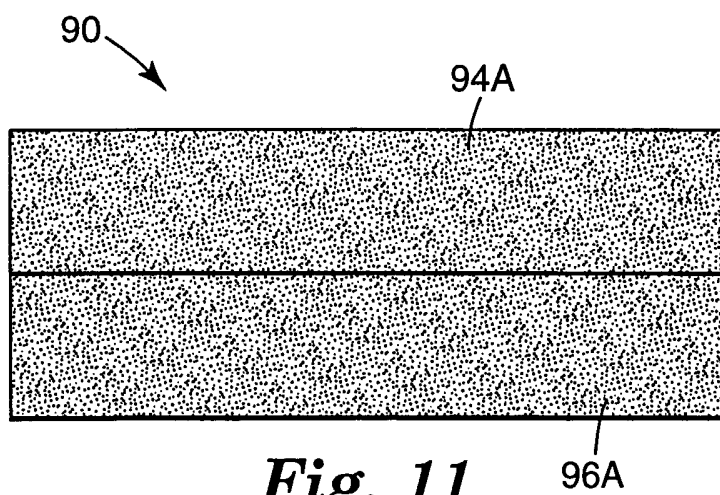


Fig. 8

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*Fig. 9**Fig. 10*

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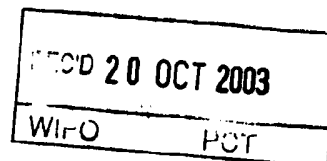
*Fig. 12*

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)



Applicant's or agent's file reference 57925W0003	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 03/ 19973	International filing date (day/month/year) 24/06/2003	(Earliest) Priority Date (day/month/year) 26/08/2002
Applicant 3M INNOVATIVE PROPERTIES COMPANY		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 03 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, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

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:

SANDING SPONGE

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 III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 03/19973

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B24D15/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B24D

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, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 887 396 A (LUKIANOFF) 19 December 1989 (1989-12-19) cited in the application column 2, line 43 -column 3, line 57; figures ---	1
A	WO 94 13435 A (CLEARFIX CORPORATION) 23 June 1994 (1994-06-23) abstract; figures ---	1
A	US 6 059 850 A (LISE ET AL.) 9 May 2000 (2000-05-09) cited in the application abstract ---	1
A	US 6 419 573 B1 (LISE ET AL.) 16 July 2002 (2002-07-16) abstract -----	1



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

13 October 2003

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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

Authorized officer

Garella, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/19973

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