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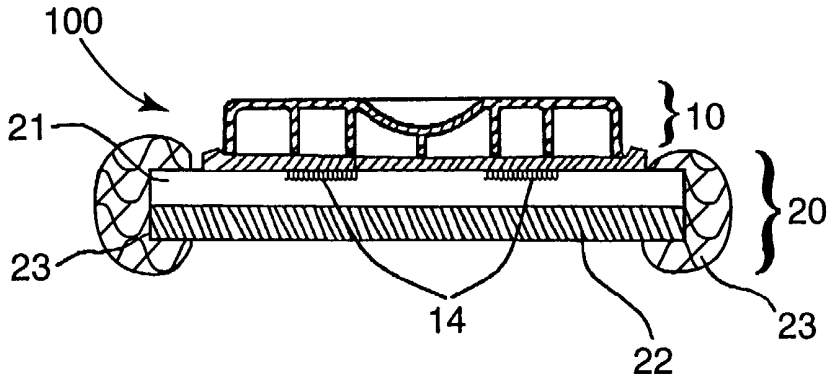
(54) Title: DOUBLE-SIDED CLEANING IMPLEMENT



(57) Abstract: A cleaning implement (100) comprising a cleaning support member (10), the cleaning support member (10) having a substantially flat bottom surface (13) and comprising fastening hooks (14) on the bottom surface (13); and a reversible cleaning pad (20) releasably attached to the bottom surface (13) of cleaning support member (10). The reversible cleaning pad (20) includes first and second sides, the first side of the cleaning pad (20) comprises a first cleaning web material (21) and the second side of the cleaning pad (20) comprises a second cleaning web material (22), both web materials (21, 22) being directly attachable to fastening hooks (14).

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Double-Sided Cleaning Implement

Field of the Invention

The present invention relates to a cleaning implement comprising a double-sided, reversible cleaning pad as well as a kit comprising such a cleaning pad and a cleaning support member. The present invention also relates to a method of cleaning a surface and to the use of a reversible cleaning pad for attachment onto fastening hooks.

Background of the Invention

Conventional cleaning implements, such as mops, have been in existence for many years and have been designed in various ways for different uses.

For example, WO 94/23634 discloses a mop with a flat-head mop support having a foam rubber plate fixed on its underside and a mop cloth releasably connected to the mop support via connection flaps fixed by means of clips found on the topside of the mop support. The mop cloth of WO 94/23634 is disclosed to be reversible, having along one of its surface treatment surfaces a cleaning material, which is suited for damp or wet cleaning, and along the opposite surface, a wiping material, which is suited for dry wiping and exhibits a fluid absorbing function. The mop cloth includes a frame textile to support both cleaning materials and the frame textile extends in every direction from the cleaning materials to form connection flaps. The connection flaps are used to wrap the mop cloth over the sides of the support and are fixed by means of clips, which squeeze in the wrapped-over flaps into grooves of the topside of the mop support.

The mop disclosed in WO 94/23634 is disadvantageous in that the detachment and reattachment of the mop cloth to the mop support is tedious and time-consuming. Also during wet cleaning, the detachment and reattachment of the mop cloth is difficult. In the wet state the mop cloth with its textile frame/connection flaps distorts easily, making it difficult to squeeze the connection flaps into the grooves on the topside of the support and at the same time get a snug fit on the bottom surface of support. Furthermore, although flat-headed mops are typically advantageous in that they provide

a large contact area between the wiping surface and the surface to be cleaned, such mops typically exhibit an undesirable high drag during wet cleaning. It is to be appreciated that for the user, wet cleaning or mopping with a mop or a cleaning implement exhibiting high drag is particularly disadvantageous. For every push and pull movement the user makes with the mop or cleaning implement, the user must exert extra effort or force to overcome the drag at the contact area, and when the drag is high he must exert correspondingly more effort or force. Thus wet cleaning or mopping large surface areas with a mop or cleaning implement exhibiting high drag can quickly become exhausting for the user.

As another example, DE 295 20 193 discloses a mop cover for wet and damp mopping, which can be mounted on a mop holder. The mop cover, having pocket-like means for attachment, has two surfaces made of textile layers, which at least one is suitable for cleaning. Each textile layer shows two transverse slits; each slit for introducing the end of the mop holder between the two textile layers into the pocket-like space. Similar to the mop cloth disclosed in WO 94/23624, the mop cover of DE 295 20 193, is disadvantageous in that the detachment and reattachment of the mop cloth to the mop holder is tedious, time-consuming as well as difficult in the wet state. Here too, it is difficult, if at all possible, to get a snug fit to the support and the mop cover exhibits a tendency to slip during cleaning.

Summary of the Invention

Thus, there is an ongoing need for cleaning implements having reversible cleaning pads which are more convenient to use and allow quicker detachment and (re)attachment of the cleaning pad. There is further a desire to provide a cleaning implement, which can be manufactured efficiently and economically. It is preferred that the cleaning implement exhibits a desirably low drag during wet cleaning, while still maintaining the large contact area for cleaning advantageous of flat-headed cleaning implements. It is also preferred that the cleaning implement exhibits increased versatility.

It has been found that convenience in use as well as quick and easy detachment and (re)attachment of the reversible cleaning pad can be realized by providing a cleaning

implement with a cleaning support member comprising fastening hooks on the bottom surface and a reversible cleaning pad, wherein one side of the pad comprises a first cleaning web material and the other side a second cleaning web material and both web materials are directly, releasably attachable to the fastening hooks.

Accordingly, the present invention provides a cleaning implement comprising:

a cleaning support member, said cleaning support member having a substantially flat bottom surface and comprising fastening hooks on said bottom surface; and

a reversible cleaning pad releasably attached to said bottom surface of cleaning support member, wherein said cleaning pad includes first and second sides, wherein said first side of said cleaning pad comprises a first cleaning web material and said second side of said cleaning pad comprises a second cleaning web material, both web materials being directly attachable to fastening hooks.

Cleaning implements and/or mops comprising a flat-headed support member having fastening hooks on the bottom surface thereof are known from US 6,119,297; US 5,419,015; DE 24 19 215; US 5,419,015; WO 98/23199 and US 3,991,432. Said documents relate, however, exclusively to cleaning implements and/or mops with a single-sided cleaning pad. Said prior art documents are silent with respect to reversible cleaning pads as well as double-sided, reversible pads comprising on both sides of the pad cleaning web materials, which are directly, releasably attached to fastening hooks of the support.

Because the first web material and second cleaning web material of the cleaning pad can be directly, releasably attached to the fastening hooks on the cleaning support member, the cleaning pad can be attached to the support member without the absolute need for extra connection flaps or other additional fastener materials. Furthermore, the cleaning pad can be easily and quickly removed and turned over for use of the other side during cleaning, in dry, damp or wet state, as desired.

Accordingly, an additional aspect of the present invention is a method of cleaning a surface using a cleaning implement according to the invention, the method comprising the steps:

a) attaching the cleaning pad to the cleaning support member by attaching the second web cleaning material of the cleaning pad to the fastening hooks;

b) wiping the surface with the first cleaning web material of the cleaning pad;

c) detaching the cleaning pad from the cleaning support member;

d) attaching the cleaning pad to the cleaning support member by attaching the first cleaning web material of the cleaning pad to fastening hooks; and

e) wiping the surface with the second cleaning web material of the cleaning pad;

said steps being performed either in the order a), b), c), d) and e) or in the order d), e), c), a) and b).

A further aspect of the present invention is the use of a reversible cleaning pad for attachment on fastening hooks of a cleaning support member, said cleaning pad comprising first and second sides, said cleaning pad including a first cleaning web material on said first side of said cleaning pad and a second cleaning web material on said second side of said cleaning pad, both web materials being directly attachable to fastening hooks.

A reversible cleaning pad is known from WO 97/49326. However this document relates exclusively to a hand-held cleaning pad and is completely silent with respect to the use of a reversible cleaning pad with a cleaning support member as well as the use of a reversible cleaning pad for attachment onto fastening hooks of a cleaning support member.

Another aspect of the present invention is the provision of a kit comprising:

a cleaning support member, said cleaning support member having a substantially flat bottom surface and comprising fastening hooks on said bottom surface; and

a reversible cleaning pad including first and second sides, wherein said first side of said cleaning pad comprises a first cleaning web material and said second side of

said cleaning pad comprises a second cleaning web material, both web materials being directly attachable to fastening hooks of said cleaning support member.

In preferred embodiments of the invention, the second cleaning web material is a different cleaning web material than the first cleaning web material. Preferably, the first cleaning web material is suited for dry, damp and wet cleaning. The second cleaning web material is preferably suited for scouring. More particularly, it is preferred that the first cleaning web material is suited for dry, damp and wet cleaning, and the second web cleaning material is suited for scouring. Such preferred embodiments of the cleaning implement according to the invention exhibit desirably high versatility and utility, and can be advantageously used to scour surfaces besides dry, damp and wet cleaning of surfaces with one single cleaning implement.

As a cleaning web material suited for dry, damp and wet cleaning, microfiber web material is particularly preferred. Surprisingly, it has been found that microfiber web material can be effectively, directly attached to the fastening hooks, so that during cleaning or wiping, even scouring, the cleaning pad remains securely in place without detachment or slippage.

As a cleaning web material suited for scouring, an open, low density, three-dimensional nonwoven web of fibers, the fibers bonded to one another at points of mutual contact, is particularly preferred. In especially preferred embodiments, the first cleaning web material comprises a microfiber web material and the second cleaning web material comprises an open, low density, three-dimensional nonwoven web of fibers, the fibers bonded to one another at points of mutual contact. Such preferred embodiments of the cleaning implement according to the invention exhibit very desirable low drag during wet cleaning or wiping of surfaces with the cleaning pad side comprising the microfiber web material, and thus are particularly advantageous for cleaning large surface areas.

The invention, its embodiments and further advantages will be described in the following with reference to the following drawings.

Brief Description of the Drawings

Figure 1 shows a side view of a preferred embodiment of the cleaning implement.

Figure 2 shows a front view of a preferred embodiment of the cleaning implement.

Figure 3 shows an isometric view of another preferred embodiment of a cleaning implement.

Figure 4 is a top view of a cleaning support member for use in the cleaning implement.

Figure 5 is a bottom view of a cleaning support member for use in the cleaning implement.

Figure 6 is a cross-sectional view of the cleaning support member illustrated in Figure 5, taken along the line marked by VI—VI and looking in the direction of the arrows.

Figure 6a is an enlarged view of a portion of the cross-sectional view of the cleaning support member of Figure 6.

Figure 7 is a cross-sectional, side view of a preferred embodiment of the cleaning implement, showing the cleaning support member as illustrated in Figure 6 having a reversible cleaning pad attached thereto.

Figures 8 and 9 are two isometric views of a preferred reversible cleaning pad for use in the cleaning implement.

Figure 10 represents a schematic view of an experimental setup used to measure the drag of a sample.

Detailed Description of Invention

The details and embodiments of the present invention are best understood by reference to the drawings. It should be noted that the thickness of the cleaning pad and the height of the fastening hooks have been exaggerated in the figures for clarity purposes.

As illustrated by preferred embodiments of the cleaning implement shown in Figures 1 and 2, the cleaning implement of the invention **100** comprises two elements, a cleaning support member **10** and a reversible cleaning pad **20**. As shown in a preferred embodiment of the cleaning implement in Figure 3, the cleaning implement **100** preferably further comprises a handle **30** which is attached to the cleaning support member **10**.

The cleaning support member **10** and the handle **30** may be made of any suitable rigid, durable material, such as wood, metal, plastic or combinations of these materials. Plastic is preferred since it can be molded into a finished piece and thereby may be less expensive to manufacture. The length of the handle **30** will be dictated by the end-use of the implement, e.g. 1 to 2 meters for a cleaning floors and 2 to 3.5 meters for cleaning walls, windows or ceilings. Preferably the handle **30** is a telescope handle as known in the art, whereby the length of the handle can be set as desired or needed for a particular cleaning application. The handle **30** is preferably removably attached to the cleaning support member **10**. To facilitate ease of use, the cleaning support member **10** can be pivotably attached to the handle **30** using joint assemblies known in the art.

The cleaning support member **10** may be formed from a single plate **11**. Alternatively the cleaning support member **10** may be formed from two plates with a hinged member disposed between the two plates (i.e. a butterfly-type cleaning support member). The two plates of a butterfly-type cleaning support member can be squeezed against each other by appropriate levers, as known in the art.

The top surface **12** of the cleaning support member **10** typically comprises a central connection hub **15** to facilitate attachment of a handle **30**. As shown in Figures 3 and 4, the top surface **12** of the cleaning support member **10** may further comprise push-type fasteners **16**, which facilitate the use of conventional reusable and/or disposable cleaning cloths, if desired by the user, in conjunction with cleaning pad **20**.

As shown in Figures 5 and 6, the cleaning support member **10** has a substantially flat bottom surface **13** and comprises fastening hooks **14** on the bottom surface. The entire bottom surface may be covered with fastening hooks **14**. Preferably, the bottom surface **13** is covered with the fastening hooks **14** in a discontinuous manner, more preferably in the form one or more strips **17**, for example as illustrated in Figure 5, or in the form of one of more squares. Those skilled in the art will appreciate that the total area of the fastening hooks **14** should be enough to fasten cleaning pad firmly to the cleaning support member. Although larger areas of fastening hooks are applicable, this would not be cost-effective.

The shape of the fastening hooks **14** may be any suitable mechanical fastening form known in the art, e.g. hook-shaped, mushroom-shaped or notched-pyramid. Preferably, the fastening hooks **14** are shaped as hooks, either single or double (i.e. inverted T-shaped) hooks; more preferably such hook-shaped fastening hooks are substantially parallel to the side edge of the cleaning support member, for example as illustrated in Figures 6 and 6a. The fastening hooks **14** preferably have a height of at least 0.8 mm, more preferably at least 1.0 mm, most preferably from 1.1 mm to 2.2 mm.

Suitable fastening hooks **14** include plastic, preferably nylon, hooks on a backing, referred to in the following as hook meshes. In such hook meshes, the plastic hooks may be stitched through a fabric backing, or alternatively the hooks may be profile extruded or molded types of hooks where the plastic hooks have a plastic backing.. Examples of hook meshes include nylon hook strips commercially available under the brand 3M SCOTCHMATE Reclosable Fastener, such as the types SJ-3526 hook and SJ-3419. Hook meshes are preferably attached to the bottom surface by an adhesive, which firmly affixes the backing of hook meshes to the material from which the cleaning support member is made. Hook meshes preferably have at least 30 hooks per square cm, more preferably at least 40 hooks per square cm. Alternatively, in the case that the cleaning support member **10** is made of plastic, suitable fastening hooks **14** may include integrally molded hooks provided on the bottom surface of the cleaning support member.

The plate **11** of cleaning support member **10** is preferably, substantially rectangular or substantially trapezoidal in shape. For household purposes the cleaning support member **10** is preferably at least 6 cm by 20 cm, more preferably at least 7.5 cm by 27 cm, most preferably at least about 9 cm by 35 cm. For industrial cleaning purposes, a larger size for the cleaning support member **10** is preferred, e.g. 9 cm by 55 cm. Other shapes and sizes of cleaning support member **10** may be employed, round, elliptical, triangular, or the like, as needed to accommodate a particular cleaning application or may otherwise be desired.

A reversible cleaning pad **20** is provided and used for releasable attachment onto fastening hooks **14** of a cleaning support member **10**, and thus to the bottom surface **13** of the cleaning support member. As shown in Figures 7 to 9, a first side of the reversible cleaning pad **20** comprises a first cleaning web material **21** and the second side of the cleaning pad comprises a second cleaning web material **22.** Both cleaning web materials are directly attachable to fastening hooks **14** of the cleaning support member **10.** The cleaning pad **20** preferably has a similar shape as the corresponding cleaning support member **10.** The cleaning pad **20** preferably extends a short distance in all directions beyond the perimeter of the bottom surface of the cleaning support member. Due to the advantageous properties of the embodiments of the cleaning implement of the invention, discussed above and below, the cleaning implement is particularly advantageous for cleaning large surface areas. Thus, for attachment on fastening hooks **14** of a cleaning support member **10**, it is preferred to use a reversible cleaning pad **20** comprising a wiping surface having an area greater than 110 cm^2, more preferably, greater than 200 cm^2, even more preferably greater than 300 cm^2, most preferably greater than 400 cm^2. Under the term "wiping surface" is understood the exposed surface of a cleaning web material of the cleaning pad to be positioned or positioned on a cleaning support member for application onto a surface.

As shown in Figure 7, the cleaning pad **20** preferably comprises two layers. The first layer is made of the first cleaning web material **21**, while the second layer is made of the second cleaning web material **22**. Although not preferred, the cleaning pad **20** may also be composed of three layers or more layers, wherein the first cleaning web material **21** and the second cleaning web material **22** form the outer two layers. The central layer or layers may be made of materials to provide additional support or stiffness, such as nonwoven webs of fibers or the like, or materials to increase water absorbancy, such as sponges, foamed polymers, or the like. The layers of the cleaning pad are joined together in any conventional manner known in the art, e.g. by adhesive bonding, stitching or the like. As illustrated in Figures 7 to 9, a rolled edge **23** may be provided and held in place by stitching around the perimeter of the cleaning pad **20**. Suitable materials for the rolled edge **23** include cotton or polyester.

The first and second cleaning web material **21,22** may be any selected material, which is suitable for cleaning operations and directly, releasably attachable to fastening hooks. Desirably, the second cleaning web material **22** is a different cleaning web material than the first cleaning web material **21**. Preferably, the first cleaning web material **21** is suited for dry, damp and wet cleaning. The second cleaning web material **22** is preferably suited for scouring. More preferably, it is preferred that the first cleaning web material **21** is suited for dry, damp and wet cleaning, and the second web cleaning material **22** is suited for scouring. Cleaning implements according to the invention comprising such preferred cleaning pads exhibit desirably high versatility and utility, and can be advantageously used to scour surfaces besides dry, damp and wet cleaning of surfaces with one single cleaning implement.

As a cleaning web material suited for dry, damp and wet cleaning, microfiber web material is particularly preferred. Surprisingly, it has been found that microfiber web material can be effectively, directly attached to the fastening hooks, so that during cleaning or wiping, even scouring, the cleaning pad remains securely in place without detachment or slippage.

Under the term "microfiber web material" is understood a woven cloth web comprising microfibers, more preferably microfibers of polyester and nylon. "Woven cloth" refers to a cloth prepared by interlacing and/or looping together fibers or yarns by e.g. weaving or knitting. "Microfiber" refers to a fiber having a linear density of one (1) denier or less. The microfiber web material is typically manufactured from microfiber containing yarn. Other yarns, such as ground yarns, i.e. yarns, which do not comprise microfibers and often provide structural support for microfiber containing yarns, may also be used in the manufacture of the microfiber web materials. It will be appreciated that the microfiber containing yarn is comprised of fibers wherein each such fiber is a collection of distinct microfibers, preferably nylon and/or polyester microfibers. The microfibers in the individual fibers of the yarn can be observed (e.g., microscopically) as alternating elongate layers or as wedge or pie shaped segments, for example, extending longitudinally along the lengths of the individual fibers. During the manufacture of the microfiber web material, the foregoing fiber structure tends to

delaminate or split so that the individual fiber structures, and the structures of the yarns originally made with those fibers, may no longer be observable within the web when observed under a microscope, for example. Instead of yarns of the original fibers, the individual microfibers may be seen arranged in distinct bundles woven into the cloth web and supported by the ground yarns. The bundles appear as a collection of individual microfibers arranged side by side and appearing substantially parallel to and conterminous with one another.

The microfibers in the microfiber web material are preferably present in bundles. Depending on the composition of the microfibers, the presence of bundles may render the microfiber web material hydrophilic as well as oleophilic. For preferred microfiber web materials comprising webs of polyester and nylon microfibers, each bundle preferably comprises between about 10% and 90% by weight nylon and between about 90% and 10% by weight polyester, and more preferably comprising about 70 % by weight polyester and about 30 % by weight nylon.

More preferably, the microfiber web material is a knitted cloth web, either single knit or double knit, preferably prepared by the circular knitting process, comprising bundles of microfibers and a ground yarn. The ground yarn in the microfiber web material, providing support for the foregoing bundles of microfibers, can comprise any of a variety of fibrous materials such as polyester (e.g., polyethylene terephthalate), nylon, rayon, cotton, and the like. Because of cost, commercial availability, and its ability to provide a web material that is desirably soft, the ground yarn preferably comprises polyester fibers, most preferably polyethylene terephthalate (PET) fibers. The ground yarn may have a linear density between about 40 and 300 denier per yarn (dpy), preferably about 150 dpy. Suitable commercially available polyester yarns include those available from DuPont of Wilmington, Delaware, comprising about 34 fibers per yarn with a linear density of about 150 dpy. "Linear density" or "fineness", in referring to yarns or to individual fibers, refers to the weight in grams of a 9,000 meter length of the fiber or yarn. The terms "fiber" or "filament" are used interchangeably to refer to a threadlike structure comprising the materials described herein.

A suitable method for the manufacture of a knitted microfiber web material is described in WO 97/49326. The preparation of a knitted web preferably comprises first knitting by a circular knitting method a greige cloth which is formed with a pile yarn comprised of microfibers of polyester and nylon; a ground yarn, preferably a polyethylene terephthalate yarn; and a water-soluble yarn, preferably comprising polyvinyl alcohol. "Greige cloth" refers to an unfinished cloth that, upon further processing, may be used as the microfiber web material of the present invention. Both the microfiber containing yarn and the water-soluble yarn are used as pile yarns in the circular knitting process. After the knitting step is completed, the water-soluble yarn is dissolved from the greige cloth by the application of hot water (e.g., greater than 60°C). The cloth is dried and may optionally be heat set (e.g. heating at temperatures within the range from about 120°C to about 240°C typically for about 30 seconds or more). The thus prepared web may then be used as a microfiber web material. Those skilled in the art will appreciate that the greige cloth can be prepared by other known knitting techniques as well as by weaving methods. Knitting is generally preferred because the resulting knitted microber web material is more elastic than a microfiber web material prepared by weaving and the knitted microfiber web material is, thus, easier to wring out when wet.

For optimal attachment of the microfiber web material to fastening hooks, the microfiber web material preferably has a weight of at least 100 g/m^2. For desirable long or medium-term durability and use of the cleaning pad, the microfiber web material preferably has a weight of at least 150 g/m^2, more preferably at least 190 g/m^2, most preferably at least 220 g/m^2.

As a cleaning web material suited for scouring, nonwoven webs of fibers are preferred. Besides providing a versatile cleaning web material for scouring, the application of such nonwoven web materials is advantageous in that nonwoven web materials generally provide stiffness to the reversible cleaning pad, thus making the use of the cleaning pad as well as the detachment and reattachment thereof in all possible cleaning states, i.e. dry damp and/or wet, even more convenient.

In general, nonwoven webs of fibers may be made of an air-laid, carded, stitch-bonded, thermobonded and/or resin-bonded construction of fibers, all as known by those skilled in the art.

Fibers suitable for use in nonwoven web materials include natural and synthetic fibers, and mixtures thereof. Synthetic fibers are preferred including those made of polyester (e.g., polyethylene terephthalate), nylon (e.g., hexamethylene adipamide, polycaprolactum), polypropylene, acrylic (formed from a polymer of acrylonitrile), rayon, cellulose acetate, polyvinylidene chloride-vinyl chloride copolymers, vinyl chloride- acrylonitrile copolymers, and so forth. Suitable natural fibers include those of cotton, wool, jute, and hemp. The fiber material can be a homogenous fiber or a composite fiber, such as bicomponent fiber (e.g., a co-spun sheath-core fiber). Nonwoven web materials may also comprise different fibers in different portions. For thermobonded nonwoven webs, the web comprises melt bondable fibers wherein the fibers are bonded to one another by melted portions of the fibers.

An especially preferred nonwoven web material is an open, low density, three-dimensional, nonwoven web of fibers, the fibers bonded to one another at points of mutual contact, referred to in the following as a "lofty, nonwoven web material". The fibers are preferably thermo-bonded and/or resin-bonded (i.e. with a hardened resin, e.g. a prebond resin) to one another at points of mutual contact; more preferably the fibers are resin-bonded to one another at points of mutual contact. Because the fibers of the web are bonded together at points of mutual contact, e.g. where they intersect and contact one another, a three-dimensional web structure of fibers is formed. The many interstices between adjacent fibers remain substantially unfilled, for example by resin, and thus an open web structure of low density having a network of many relatively large intercommunicated voids is provided. Under the term "open, low density" nonwoven web of fibers is preferably understood that the nonwoven web of fibers exhibits a void volume (i.e. percentage of total volume of voids to total volume occupied by the nonwoven web structure) of at least about 75%, more preferably at least about 80%, even more preferably at least about 85%, most preferably in the range

of from about 85% to at least about 95%. Such a lofty, nonwoven web material is described by Hoover et al. in U.S. Patent No. 2,958,593.

For resin-bonded, lofty nonwoven web material, the resin preferably comprises a coatable resinous adhesive such as a thermosetting water based phenolic resin, for example. Polyurethane resins may also be employed as well as other resins. Those skilled in the art will appreciate that the selection and amount of resin actually applied can depend on any of a variety of factors including, for example, fiber weight, fiber density, fiber type as well as the contemplated end use. Suitable synthetic fibers for production of such a web include those capable of withstanding the temperatures at which selected resins or adhesive binders are cured without deterioration.

For lofty, nonwoven web materials, suitable fibers are typically between about 20 and about 110 mm, preferably between about 40 and about 65 mm, in length and have a fineness or linear density typically ranging from about 1.5 to about 500 denier, preferably from about 1.5 to about 65 denier. Fibers of mixed denier can also be used. More preferably the web comprises polyester or nylon fibers having linear densities within the range from about 5 to about 65 denier.

Lofty, nonwoven web materials may be readily formed, e.g. air laid, for example, on a "Rando Webber" machine (commercially available from Rando Machine Company, New York) or may be formed by other conventional processes such as by carding. Useful lofty, nonwoven webs materials typically have a fiber weight per unit area of at least about 50 g/m^2, preferably between 50 and 1000 g/m^2, more preferably between 75 and 500 g/m^2. Lesser amounts of fiber within the lofty, nonwoven web materials will provide webs, which may be suitable in some applications. The foregoing fiber weights will provide a useful web having a thickness typically from about 5 to about 200 mm, preferably between 6 to 75 mm, and more preferably between 10 and 30 mm. For phenolic prebond resins applied to a lofty, nonwoven web having a fiber weight within the above ranges, the prebond resin is applied to the web in a relatively light coating, typically providing a dry add-on weight within the broad range from about 50 to 500 g/m^2.

The foregoing lofty, nonwoven web materials are effective for gentle scouring applications. For more intensive scouring applications, the lofty, nonwoven web materials may be provided with abrasive particles dispersed and adhered there within. The abrasive particles are adhered to the surfaces of the fibers in the lofty, nonwoven web material. The abrasive particles may include inorganic abrasive particles, organic based particles, sol gel particles or combinations thereof, all as known in the art. Examples of suitable abrasive particles as well as methods and binders for adhering abrasive particles onto the surfaces of the fibers are for example described in WO 97/49326.

Abrasive particles are typically adhered to the fibers of the nonwoven web by a hardened organic resin binder, typically the heat cured product of a thermosetting coatable resinous adhesive applied to the fibers of the nonwoven support as a "binder precursor". As used herein, "binder precursor" refers to a coatable resinous adhesive material applied to the fibers of the nonwoven web to secure abrasive particles thereto. "Binder" refers to the layer of hardened resin over the fibers of the nonwoven web formed by hardening the binder precursor. The organic resins suitable for use as a binder precursor in the nonwoven web are formed from an organic binder precursor, typically in a flowable state. During the manufacture of the nonwoven web, the binder precursor is converted to a hardened binder or make coat. The binder is typically in a solid, non-flowable state. The binder can be formed from a thermoplastic material. Alternatively, the binder can be formed from a material that is capable of being cross-linked. A mixture of a thermoplastic binder and a cross-linked binder is also useful. During the process to make the web, the binder precursor is typically mixed with the foregoing abrasive particles to form an adhesive/abrasive slurry that may be applied to the fibers of the nonwoven by any of a variety of known methods such as roll coating, knife coating, spray coating, and the like. The thus applied binder precursor is then exposed to the appropriate conditions to solidify the binder. For cross-linkable binder precursors, the binder precursor is exposed to the appropriate energy source to initiate polymerization or curing and to form the hardened binder.

The organic binder precursor is preferably an organic material that is capable of being cross-linked. The preferred binder precursors can be either a condensation curable resin or an addition polymerizable resin. The addition polymerizable resins can be ethylenically unsaturated monomers and/or oligomers. Examples of useable cross-linkable materials include phenolic resins, bis-maleimide binders, vinyl ether resins, aminoplast resins having pendant α,β-unsaturated carbonyl groups, urethane resins, epoxy resins, acrylate resins, acrylated isocyanurate resins, urea- formaldehyde resins, melamine formaldehyde resins, styrene butadiene resins, isocyanurate resins, acrylated urethane resins, acrylated epoxy resins, or mixtures thereof. The binder precursor suitable for use is a coatable, hardenable adhesive binder and may comprise one or more thermoplastic or, preferably, thermosetting resinous adhesives. Resinous adhesives suitable for use in the present invention include phenolic resins, aminoplast resins having pendant α,β-unsaturated carbonyl groups, urethane resins, epoxy resins, ethylenically unsaturated resins, acrylated isocyanurate resins, urea-formaldehyde resins, isocyanurate resins, acrylated urethane resins, acrylated epoxy resins, bismaleimide resins, fluorene-modified epoxy resins, and combinations thereof. Examples of these resins can be found in WO 97/49326. Catalysts and/or curing agents may be added to the binder precursor to initiate and/or accelerate the polymerization process.

Commercially available lofty, nonwoven web materials may be used as the second web material, such as the nonwoven web product available under the trade designation "BUF-PUF" from Minnesota Mining and Manufacturing Co., St. Paul, Minnesota, USA. This web comprises 6 denier fibers bonded at their mutual contact points with a hardened prebond resin. Another example includes the nonwoven web is that available under the trade designation "SCOTCH-BRITE Green Scouring Pad", also available from Minnesota Mining and Manufacturing Co. This nonwoven web comprises 15 denier fibers bonded at their mutual contact points with a hardened prebond resin and includes inorganic abrasive particles bonded to the fibers of the nonwoven web with a hardened resin.

As discussed above, the use of a reversible cleaning pad comprising on both sides cleaning web materials being directly attachable to fastening hooks, for releasable attachment on fastening hooks of a cleaning support member is advantageous. For example, the cleaning pad can be easily and quickly removed and turned over for use of the other side during cleaning, in dry, damp or wet state, as desired. Furthermore, through the combination of two different type of cleaning web materials, an increased cleaning versatility can be achieved, e.g. ability to perform at least two different types of cleaning of a surface with one single cleaning implement. For example, a surface can be cleaned by attaching the cleaning pad to the cleaning support member by way of attaching the second web cleaning material of the cleaning pad to the fastening hooks and then wiping the surface with the first cleaning web material of the cleaning pad. If during cleaning, the user desires to clean or wipe the surface with the second cleaning web material, the cleaning pad can be detached from the cleaning support member and reattached to the cleaning support member by way of attaching the first cleaning web material of the cleaning pad to fastening hooks. Subsequently, the surface can be wiped with the second cleaning web material of the cleaning pad. Alternatively, the surface can be first wiped with the second cleaning web material and then subsequently wiped with the first cleaning web material, for example as desired by the user.

In a more preferred method of cleaning a surface, using a preferred embodiment of the cleaning implement comprising a reversible cleaning pad having a first cleaning web material suited for dry, damp and wet cleaning and a second cleaning web material suited for scouring, the step of wiping the surface with the second cleaning web material includes scouring the surface. The step of wiping the surface with the first cleaning web material preferably includes dry, damp or wet wiping of the surface.

Particularly preferred embodiments of the cleaning implement according to the invention comprising a reversible cleaning pad having a first cleaning web material comprising a microfiber web material and a second cleaning web material comprising a lofty, nonwoven web material, exhibit very desirable low drag during wet cleaning or wet wiping of surfaces with the cleaning pad side comprising the microfiber web

material. Due to the desirably low drag, such embodiments of the cleaning implement are particularly advantageous for cleaning of large surface areas.

The cleaning implement can be advantageously constructed from a kit comprising a cleaning support member and a reversible cleaning pad. The kit preferably further comprises a handle, which is attachable to the cleaning support member. The construction and the materials of the cleaning support member, the reversible cleaning pad as well as the handle for use in a kit are the same as the construction and the materials for the corresponding element of the various foregoing embodiments of the cleaning implement.

Test method for determination of drag

As illustrated in Figure 10, drag was measured by determining the force needed to drag a sample **90** over a glass surface **91** at set speed and displacement using a Instron Dynamometer Model 1011(from Instron SA, Parc Ariane, F-78280 Guyancourt) **92** equipped with a traction system **93** using a pulley **94** plus a load range cell of 0.50 kN **95** and equipped with a data processor **96**.

H-shaped samples, i.e. 120 mm by 190 mm rectangles having 40 mm by 40 mm exclusions centered on the two narrow sides, were prepared. A sample was dipped in water and the excess water was removed with a squeeze roller in order to obtain a constant level of water from one sample to another. The wet sample was then mounted on a flat test support **97** (made of polyacrylate); the dimensions of the bottom of support was 108 by 118 mm. The mounted sample was then weighed down using weight(s) **98** to yield a total weight of 685 g for the sample and support. After calibration of the load step with 5 kg and 1 kg weights and attachment of the test support to the traction system, the sample was then dragged over a displacement of 150 mm at a crosshead speed of 400 mm/min. The force necessary to drag the sample was measured and computed in units of N. Each sample was measured twice and the results averaged.

Materials used

Microfiber web material, product available under the trade designation "SCOTCH-BRITE High Performance Cloth" from Minnesota Mining and Manufacturing Co., St. Paul, Minnesota, USA, - a knitted cloth web comprising microfibers of polyester and nylon as well as a ground yarn of polyester with a linear density of 150 denier; the microfibers are arranged in bundles. The microfiber web material has a weight of 245 g/m^2.

Lofty, nonwoven web material, used in the product available under the trade designation "SCOTCH-BRITE Cellulosic Bathroom Laminate" from Minnesota Mining and Manufacturing Co., St. Paul, Minnesota, USA (referred to here as "White Scour") - comprises fibers with a linear density of 15 denier, fibers bonded at their mutual contact points with hardened prebond resin. This web includes no abrasive particles.

Lofty, nonwoven web material, used in a product available under the trade designation "SCOTCH-BRITE Cellulosic Non-Scratch Laminate" from Minnesota Mining and Manufacturing Co., St. Paul, Minnesota, USA (referred to in the following as "Blue Scour") - comprises fibers with a linear density of 15 denier, fibers bonded at their mutual contact points with hardened prebond resin and includes organic abrasive particles bonded to the fibers of the nonwoven web with hardened resin.

Lofty, nonwoven web, used in a product available under the trade designation "SCOTCH-BRITE Cellulosic Heavy Duty Red Laminate" from Minnesota Mining and Manufacturing Co., St. Paul, Minnesota, USA (referred to in the following as "Red Scour") - comprises fibers with a linear density of 15 deniers (50%) and fibers with a linear density of 60 deniers (50%), fibers bonded at their mutual contact points with hardened prebond resin. The lofty, nonwoven web also includes inorganic abrasive particles bonded to fibers of the nonwoven web with hardened resin.

Test samples for the drag measurements were prepared by attaching (stitching and trimming) appropriately sized pieces of White Scour, Blue Scour and Red Scour web

material, respectively, onto correspondingly sized pieces of the above-described microfiber web material. Two series of measurements were performed, in each case determining the force needed to drag the microfiber web material over the test surface as described above, with two different sets of samples. The results are reported in the following Table:

Sample	Drag value (N)	
	First Series	Second Series
Microfiber web material	3.33	2.83
Microfiber web material + White Scour	1.50	2.06
Microfiber web material +Blue Scour	1.25	1.75
Microfiber web material +Red Scour	1.66	1.33

The drag results show that in comparison to a cleaning material comprising only microfiber web material, the application of a scouring web material, e.g. a lofty nonwoven web material, in conjunction with the microfiber web material, allowed a significant decrease in the drag, when said scouring web material was located between the microfiber web material and the support.

Claims

1. A cleaning implement comprising:

a cleaning support member, said cleaning support member having a substantially flat bottom surface and comprising fastening hooks on said bottom surface; and

a reversible cleaning pad releasably attached to said bottom surface of cleaning support member, wherein said cleaning pad includes first and second sides, wherein said first side of said cleaning pad comprises a first cleaning web material and said second side of said cleaning pad comprises a second cleaning web material, both web materials being directly attachable to fastening hooks.

2. A cleaning implement according to claim 1, wherein said first cleaning web material is suited for dry, damp and wet cleaning.

3. A cleaning implement according to claim 2, wherein said first cleaning web material comprises a microfiber web material.

4. A cleaning implement according to any one of claims 1 to 3, wherein said second cleaning web material is suited for scouring.

5. A cleaning implement according to claim 4, wherein said second cleaning web material comprises a nonwoven web of fibers.

6. A cleaning implement according to claim 5, wherein said second cleaning web material comprises an open, low density, three-dimensional nonwoven web of fibers, said fibers bonded to one another at points of mutual contact.

7. A method of cleaning a surface using a cleaning implement according to any one of claims 1 to 6, the method comprising the steps of:

a) attaching the cleaning pad to the cleaning support member by attaching the second web cleaning material of the cleaning pad to the fastening hooks;

b) wiping the surface with the first cleaning web material of the cleaning pad;

c) detaching the cleaning pad from the cleaning support member;

d) attaching the cleaning pad to the cleaning support member by attaching the first cleaning web material of the cleaning pad to fastening hooks; and

e) wiping the surface with the second cleaning web material of the cleaning pad;

said steps being performed either in the order a), b), c), d) and e) or in the order d), e), c), a) and b).

8. Use of a reversible cleaning pad for attachment on fastening hooks of a cleaning support member, said cleaning pad comprising first and second sides, said cleaning pad including a first cleaning web material on said first side of said cleaning pad and a second cleaning web material on said second side of said cleaning pad, both web materials being directly attachable to fastening hooks.

9. Use of a reversible cleaning pad according to claim 8, wherein said cleaning pad comprises a wiping surface having an area greater than 110 cm^2.

10. Use of a reversible cleaning pad according to claim 8 or 9, wherein said first cleaning web material is suited for dry, damp and wet cleaning.

11. Use of a reversible cleaning pad according to claim 10, wherein said first cleaning web material comprises a microfiber web material.

12. Use of a reversible cleaning pad according to any one of claims 8 to 11, wherein said second cleaning web material is suited for scouring.

13. Use of a reversible cleaning pad according to claim 12, wherein said second cleaning web material comprises a nonwoven web of fibers.

14. Use of a reversible cleaning pad according to claim 13, wherein said second cleaning web material comprises an open, low density, three-dimensional nonwoven web of fibers, said fibers bonded to one another at points of mutual contact.

15. A kit comprising:

a cleaning support member, said cleaning support member having a substantially flat bottom surface and comprising fastening hooks on said bottom surface; and

a reversible cleaning pad including first and second sides, wherein said first side of said cleaning pad comprises a first cleaning web material and said second side of said cleaning pad comprises a second cleaning web material, both web materials being directly attachable to fastening hooks of said cleaning support member.

16. A kit according to claim 15, wherein said first cleaning web material is suited for dry, damp and wet cleaning.

17. A kit according to claim 16, wherein said first cleaning web material comprises a microfiber web material.

18. A kit according to any one of claims 15 to 17, wherein said second cleaning web material is suited for scouring.

19. A kit according to claim 18, wherein said second cleaning web material comprises a nonwoven web of fibers.

20. A kit according to claim 19, wherein said second cleaning web material comprises an open, low density, three-dimensional nonwoven web of fibers, said fibers bonded to one another at points of mutual contact.

FIG. 1

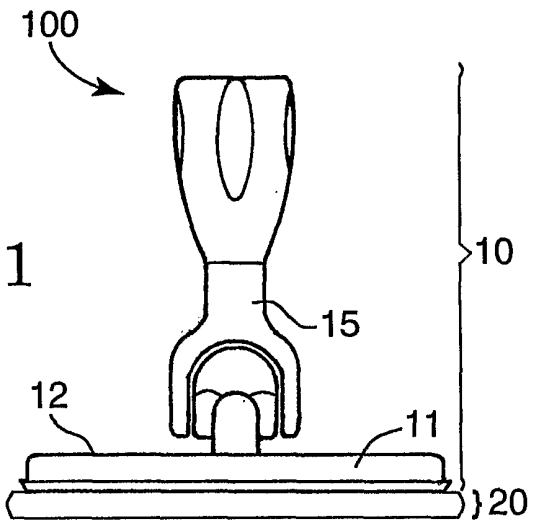
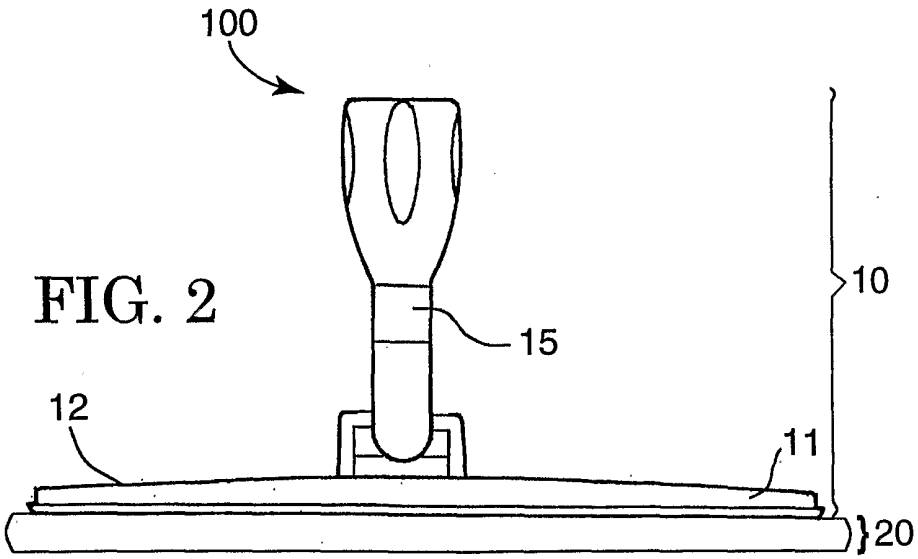
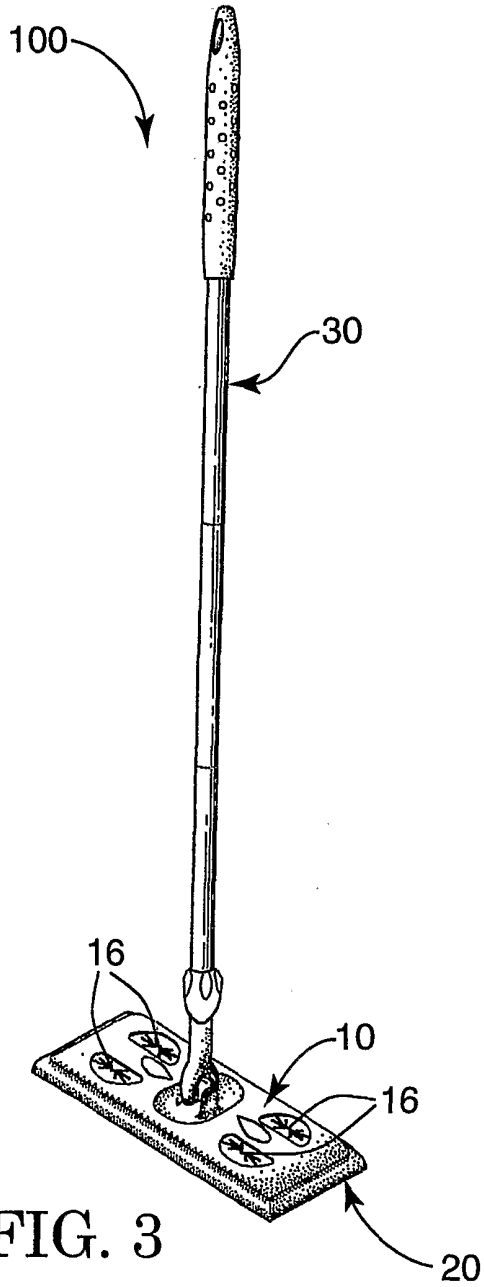


FIG. 2





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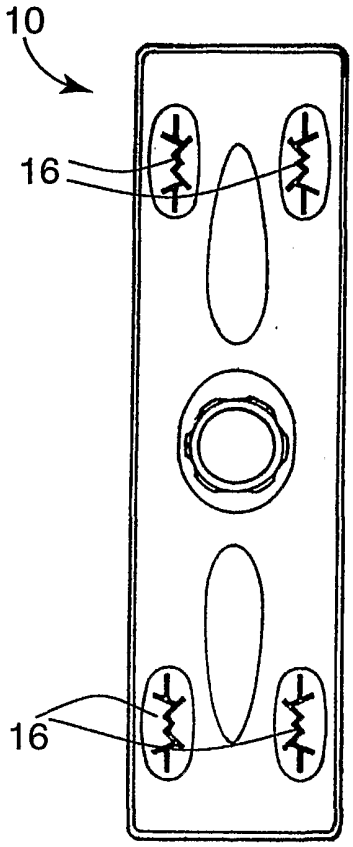

FIG. 4

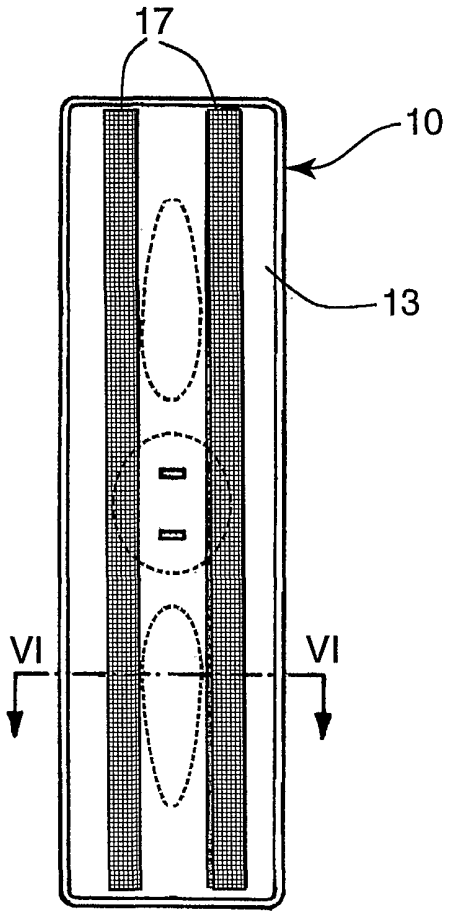

FIG. 5

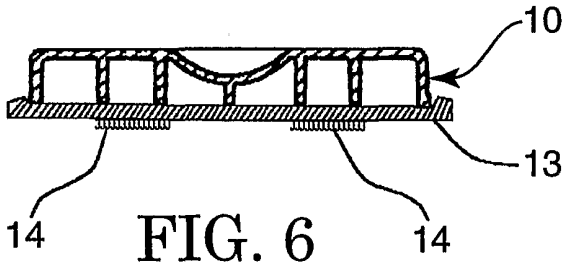

FIG. 6

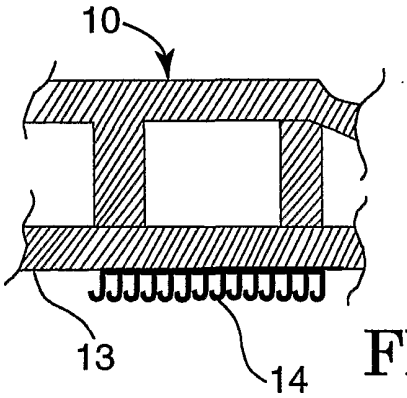

FIG. 6a

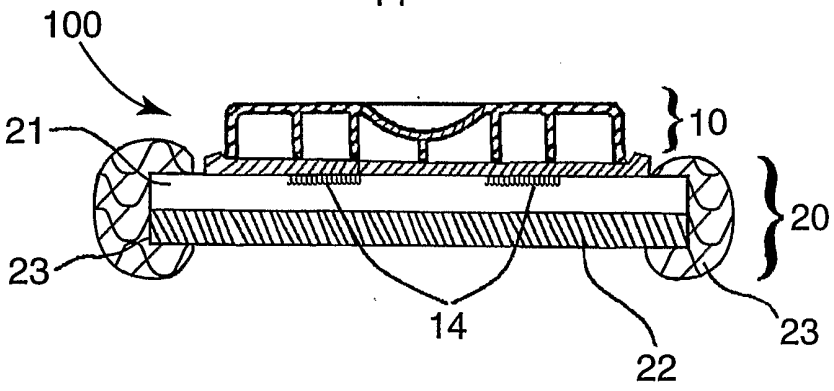

FIG. 7

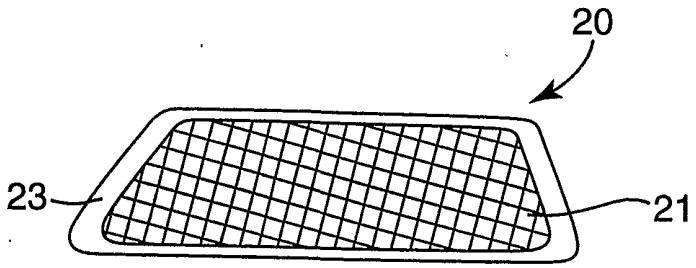

FIG. 8

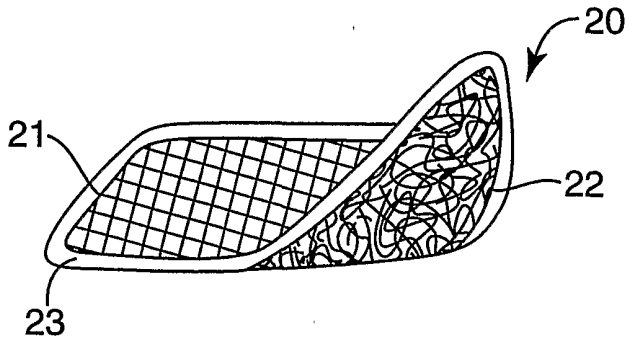

FIG. 9

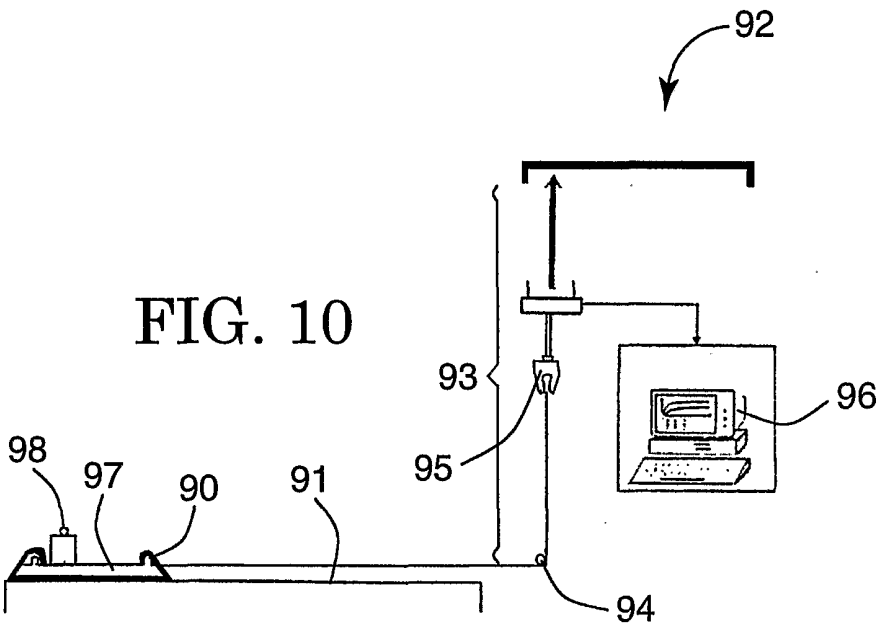

FIG. 10

INTERNATIONAL SEARCH REPORT

Inter[illegible]al Application No
PC[illegible]/US 02/05467

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47L13/20

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 A47L

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 295 20 193 U (VERMOP SALMON GMBH) 22 February 1996 (1996-02-22) cited in the application page 2, line 30 -page 3, line 24 page 4, line 5 - line 26 page 5, line 11 - line 15 page 7, line 13 - line 25 page 8, line 5 - line 15 page 9, line 8 - line 32 figures	1,2,4,7, 8,10,12, 15,16,18
A		3,5,6, 11,13, 14,17, 19,20

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 July 2002	17/07/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Bourseau, A-M

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Interna al Application No
PCT/US 02/05467

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 419 015 A (T. GARCIA) 30 May 1995 (1995-05-30) cited in the application abstract; figures column 2, line 52 -column 3, line 68	1,2,4,7, 8,10,12, 15,16,18
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INTERNATIONAL SEARCH REPORT

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Inter ial Application No
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