(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 September 2018 (13.09.2018)

WIPO | PCT

(10) International Publication Number
WO 2018/164702 A1

(51) International Patent Classification:
A41D 27/12 (2006.01) *B32B 5/08* (2006.01)
A41B 9/00 (2006.01) *D03D 11/00* (2006.01)
A41B 9/12 (2006.01) *H05K 9/00* (2006.01)

(21) International Application Number:
PCT/US2017/023327

(22) International Filing Date:
21 March 2017 (21.03.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/469,478 09 March 2017 (09.03.2017) US

(72) Inventor; and
(71) Applicant: **HARRELL, Delores** [US/US]; A Nu Trend, Inc., 3406 Spring Chase Lane, Ellenwood, GA 30294 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report (Art. 21(3))*

WO 2018/164702 A1

(54) Title: UNDERGARMENTS WITH MULTI-LAYER BARRIERS TO LESSEN EMF/EMR/EHS EMITTING FEATURES AND MOISTURE MANAGEMENT PROPERTIES

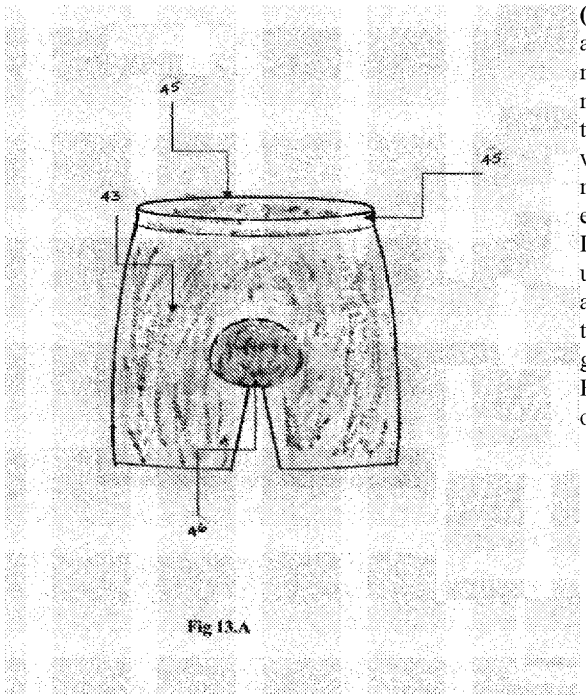


Fig 13.A

(57) Abstract: Undergarments are worn beneath other clothing articles and have direct contact to human skin and vital body organs. The rationale behind the development of this invention is to minimize electromagnetic fields/frequency (EMF); electromagnetic radiation(EMR); and electromagnetic hypersensitivity (EHS) while managing moisture production within the same. Multiple conductive barrier linings will serve as blocking measures to minimize the hazardous effects linked to various EMR/EMF emitting exposure as well as introduce moisture and absorption properties. In addition, this invention will address the problems with existing products and EMF/EMR protectors that are described as heavy, uncomfortable, and expensive to process. Furthermore, this invention will serve a three-tier purpose in aiding the consumer in the first layer of protection for their genital and upper body torso, while providing a barrier from radiated EMF/EMR energy, as well as offering a component to eliminate the production of moisture and bacteria through additional blocking features.

FIELD OF THE INVENTION

The present invention relates generally to undergarments for the upper and lower t, serving as barriers of protection from electromagnetic radiation and frequency, while also creating another layer of moisture control and bacteria blockage. More particularly, this invention relates to undergarment apparel made of composite fabrics that are considered safe for the human skin along with a moisture bacteria absorption barrier.

BACKGROUND OF THE INVENTION

The prevalence of Electromagnetic Fields and Electromagnetic Radiation (EMF/EMR) and those susceptible to exposure and a reaction to radiation levels, such as Electromagnetic Hyper Sensitive (EHS) have increased substantially in the past decade. Advances in technology and the promotion of electromagnetic currents are rampant. Prolonged and/or overexposure to electromagnetic fields and radiation can contribute to health conditions such as carcinogens or tumor growth, loss of fertility, miscarriage, low sperm production, and other reproductive issues as well as central nerve damage, and endocrine changes. Both genders are susceptible to increased risks of cardiovascular disease, breast cancer and neurodegenerative disorders. EMF/EMR can lower the intracellular defense activity contributing to the development of DNA damage, as well as lead to cognitive and neurodegenerative diseases. In young children the results could lead to slowed motor skills and learning difficulties in children as well as memory and attention issues

Prior art that was developed as a protective shield was often very uncomfortable such as the faraday cage used by safety sensitive personnel for protection against electric shock weapons, and electrical fields. In the U.S. patent publication no. 2011/0258762 composite material was considered heavy and difficult to weave and ultimately prohibited the fabric to be open and had adequate ventilation. Similarly, the U.S. patent 20140220845 was developed for heavy ballistic, and spike or stab threats, though it provided some multilayer elements and fabrics with breathable elements, its overall functions were too abrasive for any intimate apparel or undergarment wear. Other patents like U.S. 20140246609; U.S. 20160149293; and U.S. 20160149293 are body shields for portable devices and have been found to be unsafe for direct human skin contact. Another patent W01996040362 required electrical conduction and is still considered heavy material that was unflattering to direct skin contact.

In (W02016092399) the overall intent was good, however water is a compound that is difficult to move and counterproductive for consumers that are trying to steer away from heavy moisture in fabric. Studies have found that too much moisture leads to high rates of bacteria, odor, and blocks the fabric proper ventilation. In addition, the ranges and specific fabrics discussed are not conducive for intimate and/or undergarment apparel.

Additional, prior art that attempted to meet the integral needs of consumers have relied on composite materials that have lead to consumer complaints based on the quality and consistency of the fabric. Furthermore, several mechanisms in the prior applications have shown failure rates, created health -related symptoms for the consumer, poised environmental and safety risks, as well as manufacturing defects and structural integrity concerns. For example, the U.S. patent 5,932,496 contained thick composite fibers of cloth that have resin permeating between individual fibers along with embedded identification devices and chips, making this invention unparalleled to the embodiment of the invention described herein. Additionally, patent CN 103129035 was developed as an anti-radiation fabric with layers and a waterproof breathable layer, that provided some genuine intentions. However, the CN 103129035 composite material contained toxic hazards and health risks from applications of Nanosilver, which has been found to be an environmental hazard. These risks to the human body include problems in the lung, gastrointestinal track, and skin discoloration. Further health-related complications have been found as a result of Nanosilver in affecting two major body organs the liver and spleen.

Two patents by Gray, US 6,488,564 and US 6,665,877 had helpful ambitions as to creating air ions to conceal electrostatic charges at the source on the genital or breast cavity as well as in the near vicinity. This inventor further utilized animal studies to support that electrostatic fields have an influence on cells inside living tissues that might contribute to cancer growth. However, the main drawback in these inventions is its primary focus on the interaction and/or static charges created as a result of direct clothing friction, leading to generated electrostatic fields. Another drawback with these two former art(s) is that technology and production of composite matters have drastically changed in the past decade. Furthermore these studies do not specifically address the imminent risk from electromagnetic radiation and radiofrequency fields. These prior applications focused on the probable conductivity from body to surface areas and failed to include the environmental factors, and the growth of electromagnetic and radiofrequency radicals from physical and intermittent oscillating properties. Another promising invention by Gray was WO 96/40362 ; the goal of this invention was to extrapolate sweat and moisture away from the body, while blocking EMF emitting radicals from the genital and breast cavity area. In this invention, the consumer is subject to a field attenuating article that is created by friction of the clothing being in close proximity to attenuate an electrostatic field.

Another invention, US 9,210,956B2 referenced the "efficacious" properties of the brassiere, without denoting the potential health consequences and residual effects. In the claims for this invention, it was reported that the silver mesh fabric would serve as the EMF shield and that the attenuating effects could gauge up to 18 GHz The inventor further mitigates the problem of the invention by offering plural protective layers that are likely to result in prolonged skin exposure, discoloration, and risk to the breast cavity and nearby organs. This invention primarily focused on Eddy currents however there are other types of EMF that might be statically or dynamically induced. In addition, other radiating properties can be emitted through Back EMF and magnetic damping.

Based on these limitations, the novel invention was developed to overcome the aforementioned obstacles. The present invention seeks to provide a composite material having improved electromagnetic, frequency, and radiation resistant elements, as well as provide moisture absorption tolerance. Humans are at risk of EMF/EMR exposure based on their occupational work, travel through airport scanning machines, medical x-rays, microwaves, Wi-Fi and cell towers, as well as high voltage power lines. The development of undergarments/intimate apparel with embedded conductive inner linings will reduce exposure to electromagnetic and radiofrequency fields of different strengths, while further acting as a guard to block moisture and bacteria producing elements.

SUMMARY OF THE INVENTION

This novel invention will be inspired by high engineered composite fabrics with a superior success rate of applying barrier applications, from environmental EMF/EMR factors and moisture producing elements. It is further intended that this invention will address forces of static and magnetic force. Advances in technology contribute to the electromagnetic forces being on a continuous move which contributes to other electromagnetic frequencies and radiation actions. Consumers are becoming more proactive about their health and are seeking ways to minimize their risk factors. EMF/EMR are a constant health hazard but also serve a functional role in the technological advances that they provide. Targeted populations will include individuals with high levels of susceptibility to electromagnetic (EHS), and radiofrequency radiation, cancer surviving victims and high-risk subjects, as well as health conscientious consumers. Individuals that are at occupational or residential risk include those that are working or living in environments with high frequency voltage such as airports, court systems, medical facilities, high voltage and Wi-Fi towers as well as daily usage of cell phones and other technologies.

The embodiments of this invention will include hybrid knitted yarns, and/ or bamboo along with 30% silver EMF/EMR blocking attenuation effects, that are in the low frequency range and still meet the standards of shielding the consumer. In addition, all products will be safe on the human skin, eco-friendly, provide antibacterial and absorption blocking properties, as well as reduce microbial growth. The purpose of this invention is to develop undergarment(s) apparel with a conductive sheath of protecting EMF/EMR layer to lessen exposure to radiation for the reproductive organs, pelvic and breast cavity area, as well as offer a buffer of moisture absorption fabric. Intimate apparel will be designed to block moisture production, shield electromagnetic radioactive emitting exposure, and reduce the risk of damage to cells in the reproductive organs that will include genital, groin, pelvic, crotch, and breast cavity areas. The primary goal in this novel invention is to limit EMF/EMR exposure and electromagnetic radiation and reduce these risks through eco-friendly intimate apparel with moisture blocking properties. The conductive barrier will significantly reduce the amount of exposure to electromagnetic and radio-frequency hazards that have been linked to several health risks.

The following terms should be considered inter-changeable in that they all serve in functional roles of undergarments, including underwear, and intimate

apparel. Undergarments are coverings that protect and serve as the initial covering for the intricate sexual and reproductive organs in the human body, i.e. the genital, pelvic, and breast anatomy. All intimate undergarment apparel will have an embedded shield to reduce the surface area from exposure, that serves as a barrier or shield during prolonged/over exposure, while also having a moisture protection blockage. The undergarment/intimate apparel will include any of the following types that are the initial coverings on the human body, to include bras, bralettes, brassieres, sports shapewear, strapless, sports bras, pull over/slip on, nursing, and breast shielding pads; panties, low-rise hipsters, high-cut briefs, classic briefs, bikinis, boy shorts, tanga, and female boxers. Additional undergarment/intimate apparel may include corsets, camisoles, tanks, tube tops, undershirts, body slips, and bodysuits. Male underwear will include any of the following: boxers, briefs, boxer briefs, trunks, jockstrap, bikinis, tank tops, and long underwear. Further protective under coverings will be developed using the same fabrics and multi-layers to assist infants and individuals that have incontinence needs with sanitary absorption to include diapers, onesie undergarments, and toddler pull-ups, as well as gender specific briefs. Unisex undergarments will consist of thermal undershirts and regular undershirt apparel. These undergarment and intimate apparel will be worn under the primary clothing in direct contact to the physical human anatomy and some vital organs.

Undergarments/intimate apparel will be tailored for females and males with designs for young, middle, and older age spans. Designs will include fashionable lace, satin, spandex, lycra, nylon, organic cotton, non-toxic cotton, polymide, mesh, and features to compliment the product and add cosmetic appeal. The conductive fabric/material will act as an embedded barrier to reduce exposure to electromagnetic radiation and frequency for consumers that are at risk of damage to cells in the reproductive and breast cavity area. The conductive fabric/material will be interwoven into the undergarment/intimate apparel serving as a primary barrier and the moisture blocking fabric will be in closest proximity to the organs of the skin. Textile production and manufacturing have continued to evolve and many of the specific embodiments in this invention may have digital printing capability with contour seaming, seamless knitting, power paneling, and 3D warp-knitted textiles. The objective of this novel invention is to utilize engineering composite fabric designs to develop sophisticated undergarments and apparel that meets the needs of the modern day consumer and health conscientious subjects.

Keeping with the current trends and cutting edge products, this invention will utilize Swiss Shield® EMF/EMR fabric designs that are custom to having light weight, ecological unbleached, euro-white cotton and yarn fabric. The Swiss Shield® EMF/EMR comes in different fabrications, both the Naturell and Wear productions have the mechanical composition that are appropriate for undergarment apparel. Swiss Shield® yarn with hybrid yarn has shown better shielding in lower to higher frequency ranges and is a good shielding fabric from indoor and outdoor environments. These manufacturers accept as true, that improvement in shielding can be done by adding copper and nickel film as reinforcement in composite making stages.

This invention will contain inner porous and absorption properties to channel the moisture to the outer surface, helping to reduce microbial growth. Micromodal and/or mesh fabric with Polygiene® controlling elements as well as moisture blocking properties are ideal for intimate apparel based on the material softness. In Polygiene® applications, the permanent treatment is applied at the finishing stages of textile production and field/lab tests show a high level of odor control beyond the usual lifespan of a garment. This lifespan odor control is possible as the technology is bound and permanently integrated in the fabric and will not wash out. In addition, Polygiene® does not contain the nanosilver elements that have been used in prior inventions.

Due to varied technical applications this intervention may be embodied in other formats or specific forms that should not reflect a departure from the primary characteristics accordingly. The Swiss Shield ® will serve as the primary fabric based on its universal properties, endorsements, and certificates of Oko-Tex 100 (Class 1) making it a safe product for baby underwear. Soft & Safe ^{TM} will also be applied to undergarment products that are more conducive to higher attenuation ranges and promote additional safety features. The fabric may also include blending of fabrics together to reflect a more conclusive and uniform appeal as well as wear of continuity. In addition, any refinements are upgrades to these two composite barrier wearing fabrics (i.e. Swiss Shield ® and Soft & Safe ^{TM}) will be considered adaptable within the embodiments of this invention. Furthermore, these composites may continue to be subject to advancements in engineering and manufacture and will be consistent within the scope of this invention. Thus, the immediate embodiments should therefore be considered as informatory and not regulative of the scope of the invention indicated by the aforementioned claims. All the same, the foregoing description and all changes which come within the significance and compass of comparability of the claims are intended to be entwined in that respect. This invention may involve a consortium with any of the following elements to further the consistency and quality of the property: cotton, nylon, hybrid yarn, silver shielding, and bamboo fibers that are similar in nature and will not be considered mutually exclusive to the merits of this invention. In addition, this invention may include hook and loop fasteners, eco-friendly taping adhesive, clasp, clamps, elastic encasings, and threading with shielding properties. The invention may further consist of cotton, spandex, nylon, polyester, organic blends, natural fibers rayon protection, cotton dyes or other dyes that are found to be non-toxic toxic or hazardous, elastic binding, nickel -free hooks and tools for the body, underarm pits, crotch, lining, trims and side panels.

BRIEF DESCRIPTION OF THE DRAWINGS

Hereunder is illustrated , in the form of non-limiting examples for the present invention with the aid of the accompanying drawings that are not necessarily drawn to scale, the credence instead is placed upon clearly illustrating the principles of like parts in the various views. In the drawings, like reference numerals designate corresponding parts throughout the various views, and all the views are schematic in which:

Fig. 1 is a view of the articles of fabric composition types that contains EMF/EMR/EHS radiation emitting barrier material along with blocking moisture properties intertwined between two or more articles of original fabric;

Fig. 2 is a dimensional view of the fabric composition types in order that contains EMF/EMR/EHS radiation emitting barrier material coupled with blocking moisture properties intertwined between two or more articles of original fabric;

Fig. 3 is a description of the Swiss Shield® Naturell Shielding composition and performance properties that may be included in the embodiment of this invention;

Fig. 4 is a description of the Swiss Shield® Wear Shielding composition and performance properties that may be included in the embodiment of this invention;

Fig. 5 is a description of the Swiss Shield® Shielding composition that shows the interlocking yarn fibers that may be included in the embodiment of this invention;

Fig. 6 is a description of the Soft & Safe ™ Shielding composition and performance properties that may be included in the embodiment of this invention;

Fig. 7 is a description of the Microfiber blocking elements and performance properties that may be included in the embodiment of this invention;

Fig. 8 is a description of the Polygiene® blocking elements and performance properties that may be included in the embodiment of this invention;

Fig. 9 (A, B, & C) is a view of a (female) tank undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig 10 (A & B) is a view of a (male) tank undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 11 (A & B) is a view of a (unisex) shirt undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 12 (A & B) is a view of a (female) panty undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 13(A & B) is a view of a (male) brief undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 14 is a view of a (female) under bridge and siding panel base for a bra forming undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 15 is a view of a (female) breast cupping, molded, contour appearance for a bra forming undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 16 is a view of a (female) nipple shield undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 17 is a view of a (female) brassier undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 18 is a view of a (female) bralette undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 19 is a view of a (female) body slip undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 20 (A & B) is a view of a (unisex) infant onesie undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 21 (A & B) is a view of a (unisex) thermal shirt undergarment that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 22 (A & B) is a view of a (male) disposable absorption underwear that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 23 (A & B) is a view of a (female) disposable absorption underwear that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 24 is a view of the genital inner panel frame of fabric for the undergarment embodiment that will be used in the application process for adult disposal garments that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 25 is a view of genital inner panel frame for the undergarment embodiment that will be used in the application process for disposal diapers and/or training pants that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties;

Fig. 26 is a view of a infant and toddler disposable absorption diaper that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties; This embodiment may be conformed to gender specific embodiments and/or developed as a unisex pattern

Fig. 27 (A & B) is a view of a toddler disposable absorption training pant that will contain EMF/EMR/EHS barrier materials along with moisture blocking properties; This embodiment may be conformed to gender specific embodiments and/or developed as a unisex pattern

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following description includes many unambiguous details. The inclusion of such details are for the purpose of illustration only and should not be understood to limit the invention. Similarly, certain features which are well known in the art are not described in detail in order to avoid complication of the subject matter of the present invention. Additionally, it will be understood that features in one embodiment may be combined with features in other embodiments of the invention.

It should further be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Furthermore, it should be understood that the terminology and phrases employed herein are for the purpose of description and should not be regarded as limiting. For example, as used herein, "properties, elements, and features" as well as, 'blocked, blocking, barrier, management, and control," may be used interchangeably throughout the description of the embodiments for the invention. Thus, it is important, therefore that the invention be regarded as including equivalent constructions to those described herein, insofar as they do not depart from the spirit and scope of the present invention.

Features and applications illustrated or described a part of one embodiment can be used on other embodiments to yield a still further embodiment. Additionally, certain features may be interchanged with similar devices or features not mentioned yet which perform the same of similar functions. It is therefore intended that such modifications and variations are included within the totality of the present invention.

In some embodiments, the present invention may encompass a dual and /or multiple layer barrier garment to block EMF/EMR/EHS emitting features, while also serving as a moisture protecting barrier, Additionally, the undergarment/intimate apparel will act as the first layer of clothing that touches the genital or upper body torso. Specifically, the present invention comprises multi-layers of undergarment applications, for example, tank tops, sports shapewear, bras, brassieres, bralettes, sports bras, strapless, pull over/slip on, nursing, corset, camisoles, breast shielding pads, classic briefs, high-cut briefs, control briefs, hipsters, bikinis, boyshorts, female boxers, tanga, briefs, and body slip, bodysuits wear, tanks, tube tops, for females, boxers, briefs, boxer briefs, trunks, jockstraps, bikinis, tank tops, and long underwear, for males, as well as unisex thermal undershirt and regular undershirt apparel, adult disposal products for both genders, as well as infant onsies, diapers, and toddler training pants.

The embodiments in this invention will comprise varying composites of the fabrics that yield a EMF/EMR/EHS blocking element safe for direct human skin contact, as well as one or more of the microfiber or antimicrobial moisture reducing properties. This invention may involve a consortium with any of the following elements to further the consistency and quality of the property: cotton, nylon, hybrid yarn, silver shielding, and bamboo fibers that are similar in nature and will not be considered mutually exclusive to the merits of this invention. Micromodal and/or mesh fabric with Polygiene® controlling elements will be used as moisture blocking properties for the embodiments in this invention. Any of the embodiments may also be tailored with appealing cosmetic effects such as satin, lace, nylon, spandex, adhesives, elastic encasing lycra, cotton, and other eco-friendly matters as found conductive to the production. The embodiments will be breathable, environmentally safe, comfortable, and provide blended elements of the invention to block emitting radiation from the body, while also yielding some moisture barrier protection from human sweat and body odor. Additional fabrics to assist in the final production of the embodiments such as hooks, clasp, snaps, buttons, bands, trims, and enclosures could include nickel free, nylon coated, and silicone plastic, cooper nickel mesh, swan, eco-friendly adhesives, non-toxic cotton, organically grown cotton, spandex, and polymide. Intimate apparel will have fashionable and cosmetic features, including lace, satin, lycra, mesh, to add to the cosmetic appeal of the product.

Undergarments will act as insulators in a three-fold method by initially protecting the genital, breast cavity, and upper torso areas, and serve as a moisture guard, as well as a protective barrier from emitting electromagnetic and radiofrequency environmental and technological radiation. In addition, some undergarments will be more suitable to the consumer that are at greater exposure risk as a result of over/prolonged exposure and need EMF/EMR/EHS attenuation at a higher level that are still deemed safe for the human skin. Thus, EMF/EMR/EHS composite fabrics will be developed based on their attenuation properties and interchangeable use of one or more of the microfiber or antimicrobial moisture reducing properties will be included.

Infant disposable diapers, toddler disposal pants, and adult disposable pants will be consist of a top sheet (outer surface) with EMF/EMR/EHS barriers, and a back sheet (outer surface) with EMF/EMR/EHS barriers to include a bridge and wall element and therein between an moisture management inner layer that will include the crotch region. The structure of the infant, toddler, and adult disposable embodiments includes having a top sheet, a back sheet, which is connected in a superposed relation, and a moisture management layer that connects the crotch, with bridge and wall elements to act as interconnecting regions. Secondary moisture management blocking element may be used to control for leakage, spoils, incontinence, and accidents, which will be placed in the crotch area. Furthermore, side seams may be in different/varying views with adhesive, sewed, sonic scaled, autogeneous, or cohesive bonds, ultrasonic or pressure welds. Embodiments for the present disclosure may include stretch tabs, leg bands, side flaps, elastic, elastane, barrier, gasketing cuffs, or fasteners as varying ways secure the embodiment and reduce leakage in the disposable absorbent embodiment.

The material may be a woven or non-woven including film material, a non-woven may include natural, cotton, and synthetic fibers, the embodiment may be necked, meltdown, spunbond that includes laminate, carded layers, hydroentangled or otherwise developed. The disposables may also have fibers such as polyolefins/polypropylene, polyamides, polyester and/or polyethylene as well as biocomponent and then composed into nonwoven sheets. Hydrophobic material and surfaces may include cellulose, sodium ploy acrylate ,silicone polymers or fluorinated polymers. Several materials may be comprised to develop layers of laminated together. Top and back sheets may include high loft nonwoven, apertured film and apertured nonwoven. Disposable embodiments may include storage cores of cellulosic airfelt material, microfiber glues, and absorbent gelling materials. The various embodiments of the disposable diaper, toddler pant, and adult disposable wear may be manufactured in different components according to the methods disclosed herein according to the present disclosure.

FIG. 1 illustrates a multi-layer view of the articles of fabric composition types that contain EMF/EMR/EHS radiation emitting blocked material coupled with microfiber or antimicrobial moisture properties intertwined between two or more articles of original fabric. This illustration displays the layout of how the multi-layer outline would depict an actual embodiment and show **1** being the human skin, **2** being an article of original fabric, such as polyester, nylon, cotton, spandex, lycra, polymide, organic cottons, or knits, **3** being a blocking moisture element, **4** being an EMF/EMR/EHS blocking fabric, and **2** being an article of original fabric, listed above in the same (no.2) description.

Fig. 2 illustrates a dimensional view of the fabric composition types in order that contain EMF/EMR/EHS radiation emitting blocked material coupled with microfiber or antimicrobial moisture properties intertwined between two or more articles of original fabric. This illustration further displays the layout of how the multi-layer outline would depict an actual embodiment and show **1** being the human skin, **2** being an article of original fabric, such as polyester, nylon, cotton, spandex, lycra, polymide, organic cottons, or knits, **3** being a blocking moisture element, **4** being an EMF/EMR/EHS blocking fabric, and **2** being an article of original fabric listed above in the same (no.2) description, with **5** showing the functional capability of the blocking moisture fabric illustrating the absorption properties, and **6** illustrating the retracting properties of the EMF/EMR/EHS fabric as these radicals are pushed outwardly away from the fabric and the body genital and torso areas.

Fig. 3 provides a written description of Swiss Shield® (Naturell) with **7** showing a 38dB attenuation with 99.98% shielding effectiveness at 1 Ghz. and **8** illustrates the dB attenuation rates chart, and **9** is a chart demonstrating the dB and shielding performance for Naturell fabric.

Fig. 4 provides a written description of Swiss Shield® (Wear) with **10** showing a 25dB attenuation with 99.5% shielding effectiveness at 1 Ghz that is capable of yielding a 29dB depending on the mechanical outcomes from blended colors and/or dyes, **11** illustrates the dB attenuation rates chart, and **12** is a chart demonstrating the dB and shielding performance for Wear fabric.

Fig. 5 is a detail view of the Swiss Shield® **13** illustrated by the twist of a metal monofilament and **14** illustrates the conductive yarn base fibers (cotton, polyester, polyamides, and aramides, and **15** shows a brief description of the Swiss Shield® yarn conductive fibers.

Fig. 6 illustrates in **16** a description of the Soft & Safe ™ shielding fabric with greater than 50dB attenuation and **17** illustrates a preview of the fabric material, and **18** is a chart to report the dB and shielding performance for the Soft & Safe ™

Fig. 7 illustrates in **19** a description of Microfibers of the synthetic fibers that are finer than one or 1.3 denier or decitex/thread as well as a listing of the characteristics of the microfibers. The illustration of **20** represents the synthetic fiber with moisture/bacteria being locked into the inner panels of the fibers. **21** shows an illustration of particles of moisture/bacteria, **22** is an illustration of synthetic fibers encased, **23** is another mode of synthetic fibers in a pinwheel design, **24** is an illustration of the fibers as they begin the absorption process, **25** is an illustration of the synthetic fibers without the casing.

Fig. 8 illustrates in **26** the benefits of the Polygiene® antimicrobial properties, and **27** is a portion of the illustration that supports the layering elements and skin as the 1st portion of the embodiment, and **28** shows the inner portion of the embodiment and demonstrates how perspiration, body odor, and bacteria, are produced from the skin. The illustration in **29** shows the Polygiene® antimicrobial properties that inhibit growth of odor causing bacteria on the fabric.

Fig. 9 (A, B, & C) shows varying views **30** front, back and side of a (female) tank with both EMF/EMR/EHS blocked emitting applications and moisture barriers. The internal viewing (female) tank **31** shows the inward application of both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **32** show the trims, ridges, extensions, and enclosures. And **33** shows a side profile with shape contouring effects with both EMF/EMR/EHS blocked emitting applications and moisture barriers.

Fig. 10 (A & B) shows the front and back views **34** of a (male) tank with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **35** show the trims, ridges, extensions, and enclosures. And **36** is an illustration of the internal views of the (male) tank that supports the inward application of both EMF/EMR/EHS blocked emitting applications and moisture barriers.

Fig. 11(A & B) provides an illustration **37** of front and back views of a (unisex) top with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **38** is an illustration of the internal views of the (unisex) top with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **39** show the trims, ridges, extensions, and enclosures.

Fig. 12 (A & B) provides an illustration **40** of front and back views of a (female) panty with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **41** show the trims, ridges, extensions, waistband, and enclosures. And **42** is an illustration of the internal views of the (female) panty with both EMF/EMR/EHS blocked emitting applications and moisture barriers.

Fig. 13 (A & B) provides an illustration **43** of front and back views of a (male) brief with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **44** is an illustration of the internal views of the (male) brief with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **45** show the trims, ridges, extensions, waistband, and enclosures. The illustration in **46** shows the crotch liner/panel of the male (brief) with both EMF/EMR/EHS blocked emitting applications and moisture barriers.

Fig. 14 provides an illustration **47** under bridge and side panel base for a bra with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **48** is an illustration of the trims, ridges, extensions, and enclosures. The illustration in **49** shows the inner folds, shaping, and under bridge with side panel base of the bra insert with both EMF/EMR/EHS blocked emitting applications and moisture barriers.

Fig. 15 provides an illustration **50** of a breast cupping. molded, contour form with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **51** show the trims, ridges, extensions, and enclosures.

Fig. 16 provides an illustration **52** of a nipple shield pad that will contain both EMF/EMR/EHS blocked emitting applications and moisture barriers, as well as eco-friendly adhesives. Illustrations in **53** show the trims, ridges, contouring effects, and enclosures.

Fig. 17 provides an illustration **54** of a (female) brassier with both EMF/EMR/EHS blocked emitting applications and moisture barriers. In **55** the views show the under bridge and side panel base for the brassier with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **56** is an illustration of the trims, ridges, extensions, and enclosures. **57** shows a viewing of the brassiere's straps and **58** is an illustration of the brassiere clasp side panel with both EMF/EMR/EHS blockedemitting applications and moisture barriers.

Fig. 18 provides an illustration **59** of a (female) bralette with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **60** is the under bridge base for the bralette with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **61** shows the trims, ridges, contouring effects, and enclosures. **62** shows a viewing of the bralette's straps and **63** is an illustration of the bralette contouring side panel with both EMF/EMR/EHS blocked emitting applications and moisture barriers.

Fig. 19 provides an illustration **64** of a (female) body slip with both EMF/EMR/EHS blocked emitting applications and moisture barriers. The views in **65** illustrate the body contouring and shapewear with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **66** shows the trims, ridges, extensions, and enclosures. The views in **67** show the body slip straps.

Fig. 20 (A & B) provides an illustrations **68** of front and back views of a (unisex) infant onesie with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **69** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **70** shows the trims, ridges, extensions, and enclosures.

Fig. 21 (A & B) provides an illustration **71** of front and back views of a (unisex) thermal shirt with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **72** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **73** shows the trims, ridges, extensions, and enclosures.

Fig. 22 (A & B) provides an illustration **74** of front and back views of a (adult male) disposable absorption pant with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **75** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **76** is the crotch liner/panel of the disposable absorption pant with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in 77 shows the trims, ridges, extensions, waistbands, and enclosures.

Fig. 23 (A & B) provides an illustration **78** of front and back views of a (adult female) disposable absorption pant with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **79** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **80** shows the trims, ridges, extensions, waistbands, and enclosures.

Fig. 24 provides an illustration **81** of absorption properties of a inner lining panel that may be used as a portion of an embodiment for a disposable portion in the present disclosure and will include both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **82** shows the trims, ridges, extensions, and enclosures. And **83** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers.

Fig. 25 provides an illustration **84** of a infant and toddler disposable absorption of an inner lining panel for use in infant and toddler diapers and for toddler pants with both EMF/EMR/EHS blocked emitting applications and moisture barriers. And **85** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **86** shows the trims, ridges, extensions, and enclosures.

Fig. 26 provides an illustration **87** of a disposable absorption infant and toddler diaper with front and side views that will include both EMF/EMR/EHS blocked emitting applications and moisture barriers. This embodiment may be conformed to gender specific embodiments and/or developed as a unisex pattern. And **88** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **89** shows the trims, ridges, extensions, waistbands, and enclosures. And in **90** is a view of the clasp/clamp/latch elements for the embodiment of the present disclosure. Illustrations in **91** shows the adhesive/sealants for the embodiment of the present disclosure.

Fig. 27(A & B) provides an illustration **92** of a disposable absorption toddler pant with front and back views that will include both EMF/EMR/EHS blocked emitting applications and moisture barriers. This embodiment may be conformed to gender specific embodiments and/or developed as a unisex pattern. Illustrations in **93** show the crotch/liner panel with both EMF/EMR/EHS blocked emitting applications and moisture barriers. Illustrations in **94** show the trims, ridges, extensions, waistbands, and enclosures. And in **95** is an internal view of the inner portion of the embodiment with both EMF/EMR/EHS blocked emitting applications and moisture barriers.

The goal of this invention is to act as a barrier for emitting electromagnetic and radio frequency properties as well as keep the intimate body regions dry and cool with blocking fabric elements. Inner linings will include front and back panel sides and under lining sections of the product with the essential aspects of EMF/EMR/EHS blocked emitting applications and moisture barriers.. Protective barriers will be encased in the front, back, and side panels, as well as within the crotch area within the embodiments of this invention.

The present invention has been illustrated and described, it would be apparent to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention

What is claimed is

1. An undergarment with multi-layer barriers providing attenuation that will range from 25dB up to 50dB consisting of any of the following (Swiss Shield® - Naturell or Wear and/or Soft & Safe ™) composite materials and a moisture management element that includes microfiber synthetic fibers finer than 1.3 denier or decitex/thread and/or with Polygiene® - antimicrobial blocking applications.

2. It is claimed that Swiss Shield®, EMF/EMR/EHS is certified by Okeo-Tex-100 (i.e. meeting the standards of being gentle enough for baby underwear) and the following composite materials Naturell and Wear will be used in the embodiments of this invention.

3. It is claimed that Soft & Safe ™ will be used in the composition for production in embodiments where consumers require additional protection from prolonged or over exposure, thus decreasing the susceptibility and high sensitivity from adverse health effects due to persistent EMF/EMR exposure.

4. It is further claimed that consumers will have selection options in particular for safety risk, type of exposure, as well as length or over exposure, and will be informed of the specification of the attenuating effects of each embodiment of this invention.

5. It is claimed that all EMF/EMR/EHS blocking fabrics will be safe for the human skin and the manufacturing of the embodiments described for this invention

6. It is claimed that some composite fibers for EMF/EMR/EHS may be altered with safe eco-friendly and cotton blend dyes for cosmetic appeal.

7. It is claimed that embodiments will included composite fabrics that will help to channel moisture away from the surface of the skin and thus provide management and/or control of the antibacterial properties as well as may provide odor blocking elements that include either microfiber or Polygiene® antimicrobial features.

8. More specifically, it is claimed that Swiss Shield® (Naturell) will be used to develop embodiments within this invention with 38dB attenuating effects, coupled with microfiber or Polygiene® antimicrobial moisture properties intertwined between two or more articles of original fabric..

9. It is also claimed that Swiss Shield® (Wear) will be used to develop embodiments within this invention and provided moisture management properties with 25dB to 29 dB attenuating effects, coupled with microfiber or Polygiene® antimicrobial moisture properties intertwined between two or more articles of original fabric.

10. It is also claimed that Safe & Soft ™ composite material will be used to develop embodiments with this invention with 50dB attenuating effects, coupled with microfiber or Polygiene® antimicrobial moisture properties intertwined between two or more articles of original fabric.

11. A liner frame for a undergarment worn, the liner frame comprising at least one layer of a EMF/EMR/EHS barrier materials along with moisture blocking properties of claim 1;

each material configured to conform with at least part of the portion of the garment overlaying the torso area, one surface of said layer facing toward an inside portion of at least a part of said garment, and one surface of said layer facing toward at least a part of the torso area of claim 1;

at least part of the said liner comprising EMF EMF/EMR/EHS barrier materials along with moisture blocking properties of claim 1;

at least part of the said liner will protect at least part of the torso area emitting EMF/EMR/EHS barrier materials along with moisture blocking properties of claim 1;

at least part of the said liner may be composed of disposable properties for the lower torso area emitting EMF/EMR/EHS barrier materials along with moisture blocking properties of claim 1.

12. The attenuating and moisture management articles in claim 1, comprising of a (female) tank undergarment.

13. The attenuating and moisture management articles in claim 1, comprising of a (male) tank undergarment.

14. The attenuating and moisture management articles in claim 1, comprising of a (unisex) shirt undergarment.

15. The attenuating and moisture management articles in claim 1, comprising of a (female) panty undergarment.

16. The attenuating and moisture management articles in claim 1, comprising of a (male) brief undergarment.

17. The attenuating and moisture management articles in claim 1, comprising of a (female) under bridge and siding panel base for a bra forming undergarment.

18. The attenuating and moisture management articles in claim 1, comprising of a (female) breast cupping, molded, contour form for a bra forming undergarment.

19. The attenuating and moisture management articles in claim 1, comprising of a (female) nipple shield undergarment.

20. The attenuating and moisture management articles in claim 1, comprising of a (female) brassier undergarment.

21. The attenuating and moisture management articles in claim 1, comprising of a (female) bralette undergarment.

22. The attenuating and moisture management articles in claim 1, comprising of a (female) body slip undergarment.

23. The attenuating and moisture management articles in claim 1, comprising of a (unisex) infant onesie undergarment.

24. The attenuating and moisture management articles in claim 1, comprising of a(unisex) thermal shirt undergarment.

25. The attenuating and moisture management articles in claim 1, comprising of a (male) disposable absorption underwear.

26. The attenuating and moisture management articles in claim 1, comprising of a (female) disposable absorption underwear.

27. The attenuating and moisture management articles in claim 1, comprising of a infant and toddler disposable absorption diaper, conformity to gender specific embodiments and/or developed as a unisex pattern will be optional.

28. The attenuating and moisture management articles in claim 1, comprising of a toddler disposable absorption training pant, conformity to gender specific embodiments and/or developed as a unisex pattern will be optional.

****

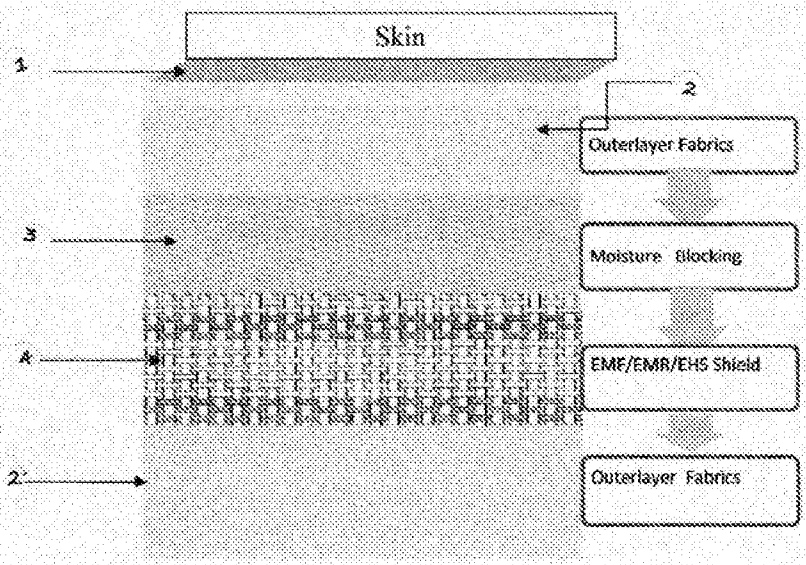

Skin
1
2
Outerlayer Fabrics
3
Moisture Blocking
4
EMF/EMR/EHS Shield
2'
Outerlayer Fabrics

Fig 1.

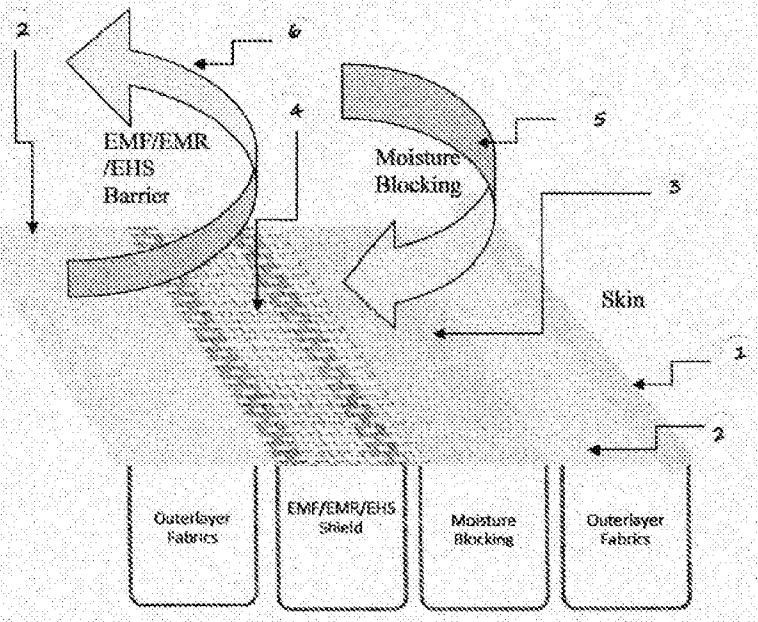

2
6
4
5
EMF/EMR
/EHS
Barrier
Moisture
Blocking
3
Skin
1
2
Outerlayer
Fabrics
EMF/EMR/EHS
Shield
Moisture
Blocking
Outerlayer
Fabrics

Fig 2.

Swiss Shield® NATURELL
Shielding
Attenuation 38 dB (99.98 % shielding effectiveness) at 1 Ghz

OKEO-TEX 100 certified to contain no harmful substances, and independently tested for shielding performance. Non-conductive surface (106 Ohm/sq), no grounding needed. Does not contain flame retardant. NATURELL is a translucent, unbleached ecological cotton fabric. ¬ Ecological cotton fabric without chemicals ¬ Highest attenuation of the 3 SwissShield materials ¬ Washable, easy to iron, cut and sew ¬ Technical data Attenuation: 38 dB at 1 GHz Color: Ecru-White Materials: 82% cotton, 17% copper, 1% silver Weight: 69 g/m² Dimension stability: 3 % Certificates: Öko-Tex 100 Class 1 (gentle enough for baby underwear)
Oeko Test 100 Class 1 (baby underwear)
STR, Swiss Textile Research Institute,
EMC Test Centre Zurich, according to MIL-STD 285 and IEEE Standard 299-1997

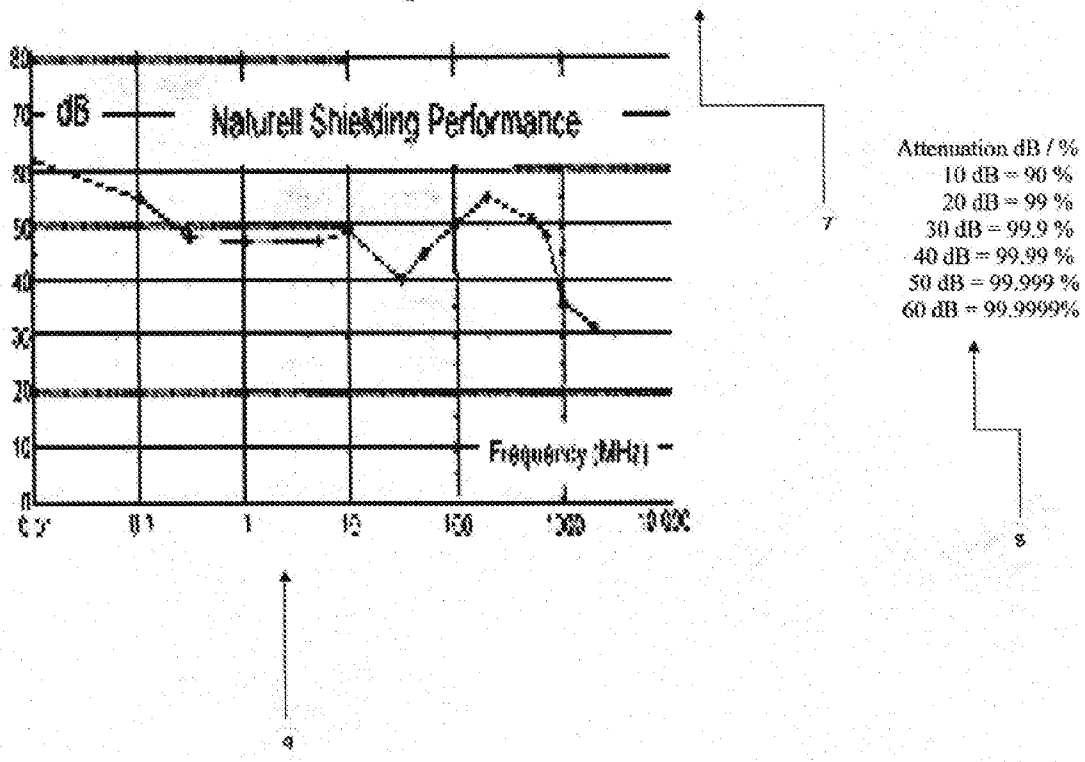


Fig 3.

Swiss Shield® WEAR

Shielding Attenuation 25 dB (99.5 % shielding effectiveness) at 1 Ghz

OKEO-TEX 100 certified to contain no harmful substances, and independently tested for shielding performance. Non-conductive surface (108 Ohm/sq), no grounding needed. Does not contain flame retardant. WEAR is a tight weave cotton fabric with an extraordinarily pleasant look and feel. Woven from cotton fiber with a gossamer-thin 0.02 mm silvered and PUcoated spun-in copper thread. Can be dyed with ordinary cotton dyes. ¬ Pleasant skin feel, cotton fabric without chemicals ¬ Washable, easy to iron, cut and sew ¬ Good shielding ¬ Attenuation: 29 dB at 900 MHz Color: White Weight: 115 g/m² Dimension stability: 3 % Materials: 90% cotton, 9.5% copper, 0.5% silver Certificates: Öko-Tex 100 Class 1 (gentle enough for baby underwear)

Oeko Test 100 Class 1 (baby underwear)

STR, Swiss Textile Research Institute,

Prof. Dipl.-Ing. P. Pauli/University of the German Federal Armed Forces Munich according to MIL-STD 285 and IEEE Standard 299-1997

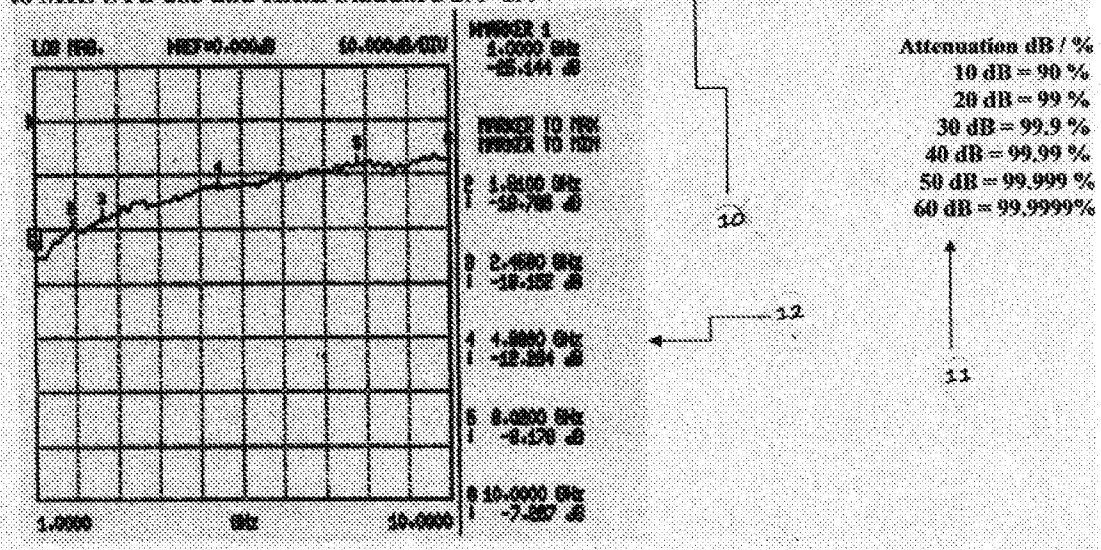
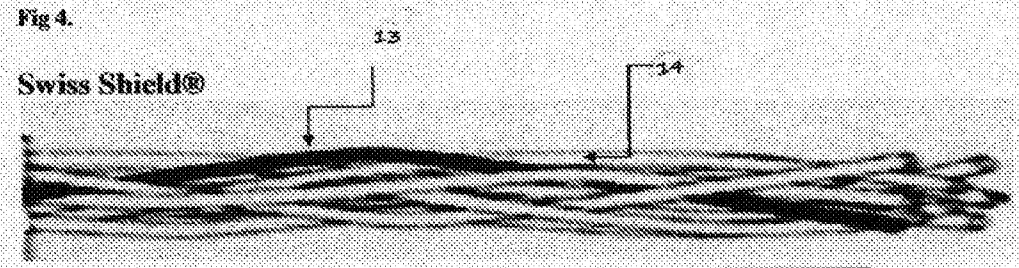


Fig 4.



Conductive yarn base fibers materials (eg. cotton, polyester, polyamides, and aramides) the darker spun in twist is a metal monofilament

15

Fig 5.

Soft & Safe ™

This fabric feels great against the skin, is hand washable, conductive, and offers exceptionally high RF shielding performance. It is perfect for making microwave shielding anti-radiation pajamas, shirts and hoods. Easy to make a ground connection because the surface has high conductivity (<1 Ohm per sq). Made with a unique blend of natural materials: 70% bamboo fiber and 30% Silver. Silver gives Soft&Safe anti-bacterial and anti-odor qualities. Greater than 50 dB attenuation too! Cuts and sews like ordinary cotton fabric. 135g/m². Pale rose color.

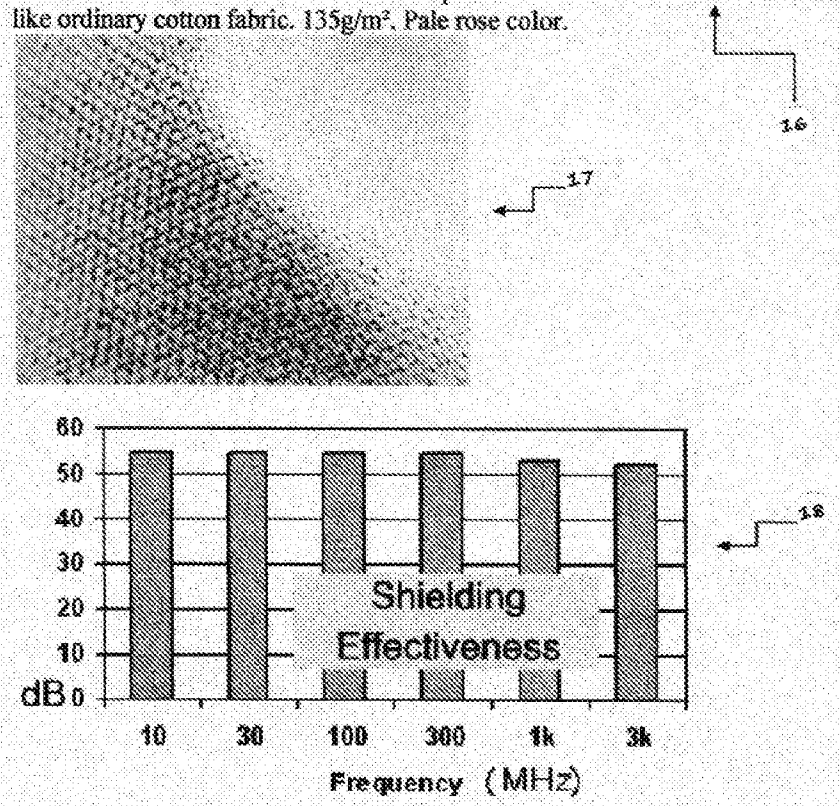


Fig 6.

Microfiber refers to synthetic fibers finer than one or 1.3 denier or decitex/thread. By comparison, microfiber is 1/100th the diameter of a string of human hair and 1/20th the diameter of a strand of silk. The most common types of microfibers are made from polyesters, polyamides or a conjugation of polyester, polyamide, and polypropylene (Prolen).
The shape, size, and combinations of synthetic fibers are selected for specific characteristics, including softness, toughness, absorption, water repellency, electrodynamics, and filtering capabilities. Fashionable apparels in microfibres have graceful flow, silk-like feel and are extremely comfortable.
Some of the outstanding characteristics of microfibers include the following:

1. Exceptional strength, although the filaments are super fine
2. Improved breathability
3. Vivid prints with more clarity and sharper contrast
4. Comfort of natural fibers
5. Durability and Ease of care
6. Appearance retention
7. Windproof and water resistant
8. Light weight

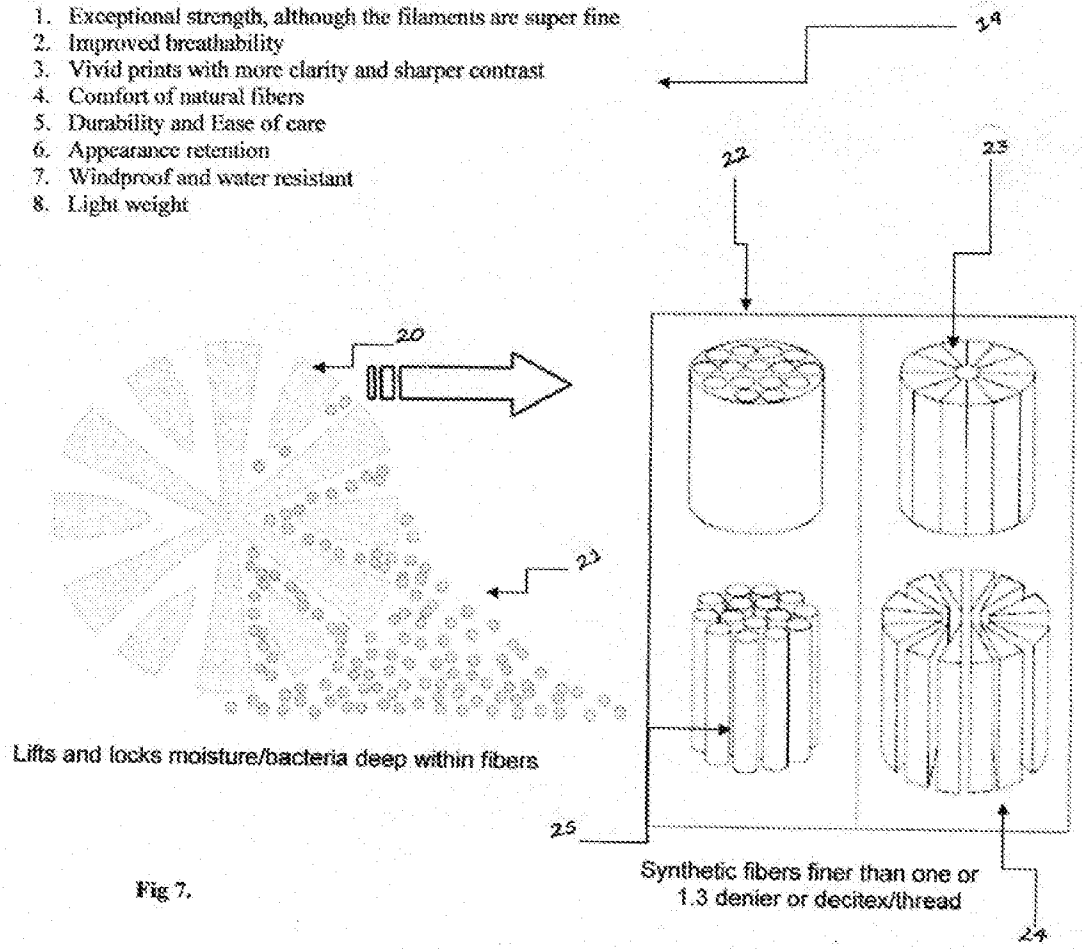


Fig 7.

Polygiene® prevents the growth of odor-causing bacteria and fungi at the source,

Polygiene uses low concentrations of silver salt (silver chloride), which has antimicrobial properties and is naturally present in water and soil, to safely eliminate the ability for bacteria and fungi to grow.
The permanent treatment is applied at the finishing stages of textile production and field and lab tests show a high level of odor control beyond the usual lifespan of a garment. This lifespan odor control is possible as the technology is bound and permanently integrated in the fabric and will not wash out.

- Polygiene prevents the growth of odor-causing bacteria and fungi at the source
- Polygiene is only active on the textiles itself and does not interfere with the skins natural bacterial flora
- Polygiene odor control will not wash out as the technology is bound and permanently integrated in the fabric

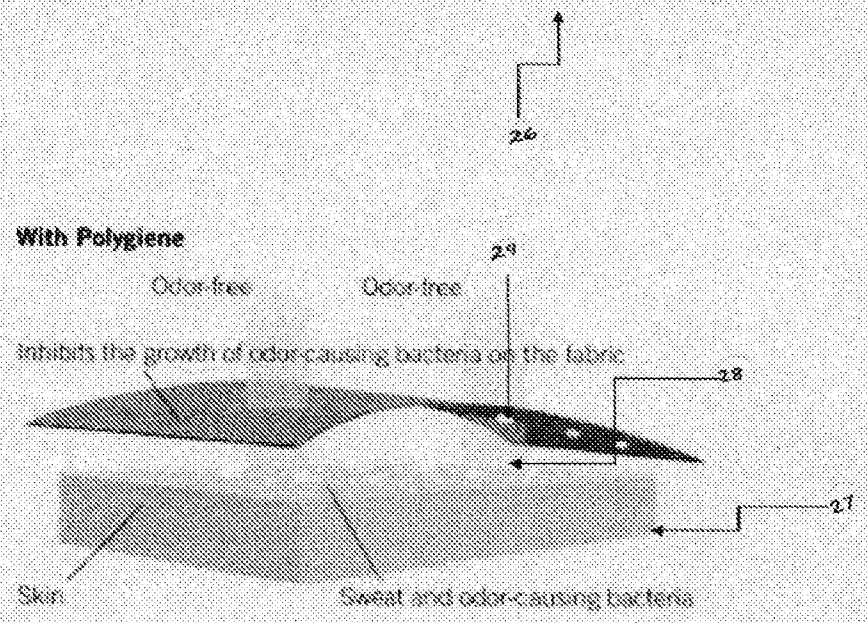


Fig 8.

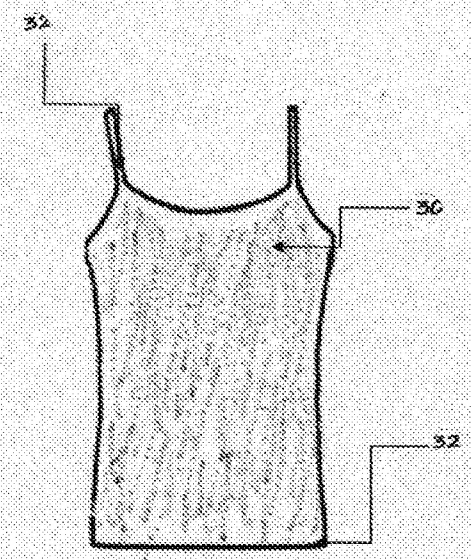


Fig 9. A

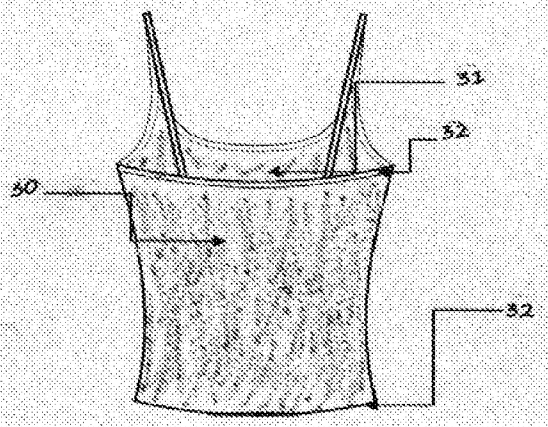


Fig 9.B

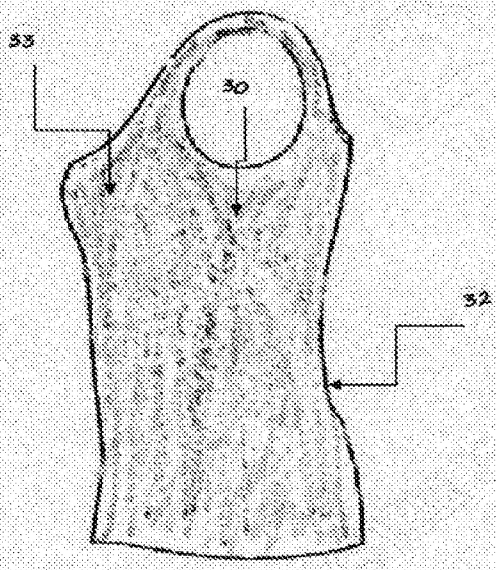


Fig 9.C

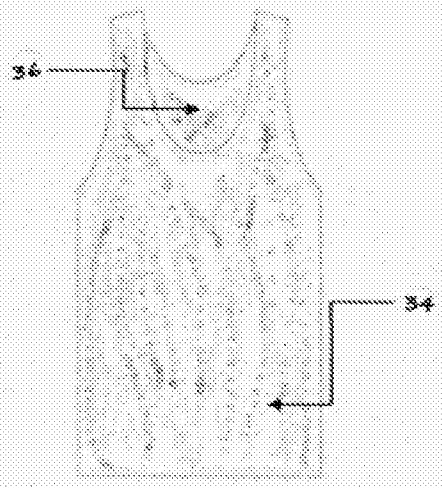


Fig 10.A

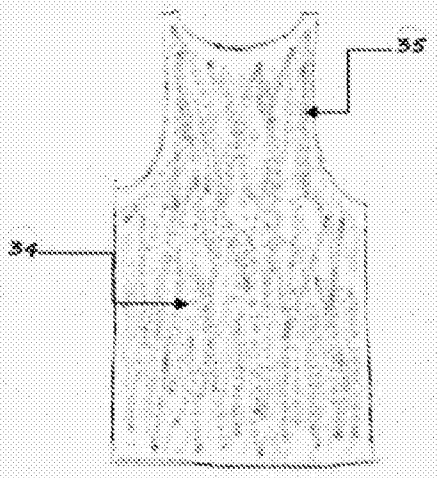


Fig 10. B

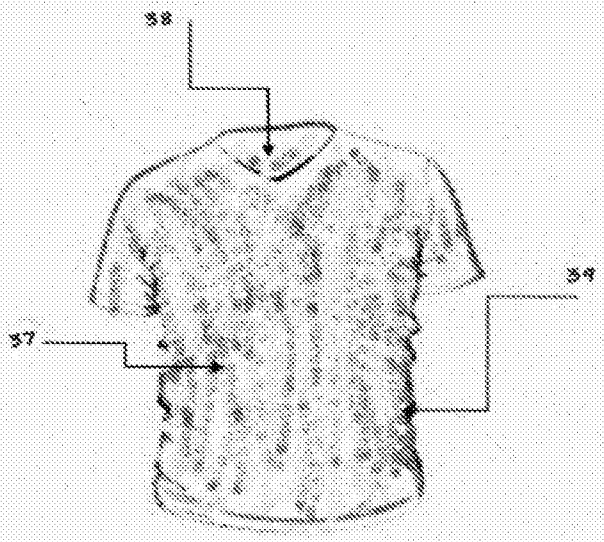


Fig 11. A

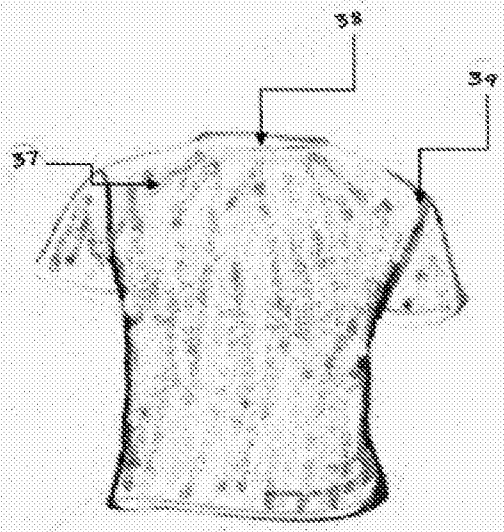


Fig 11. B

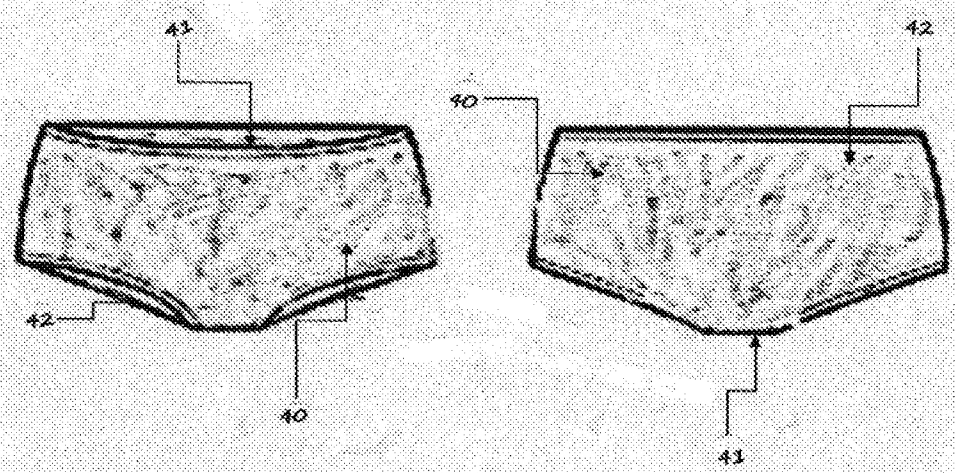


Fig 12.A

Fig 12.B

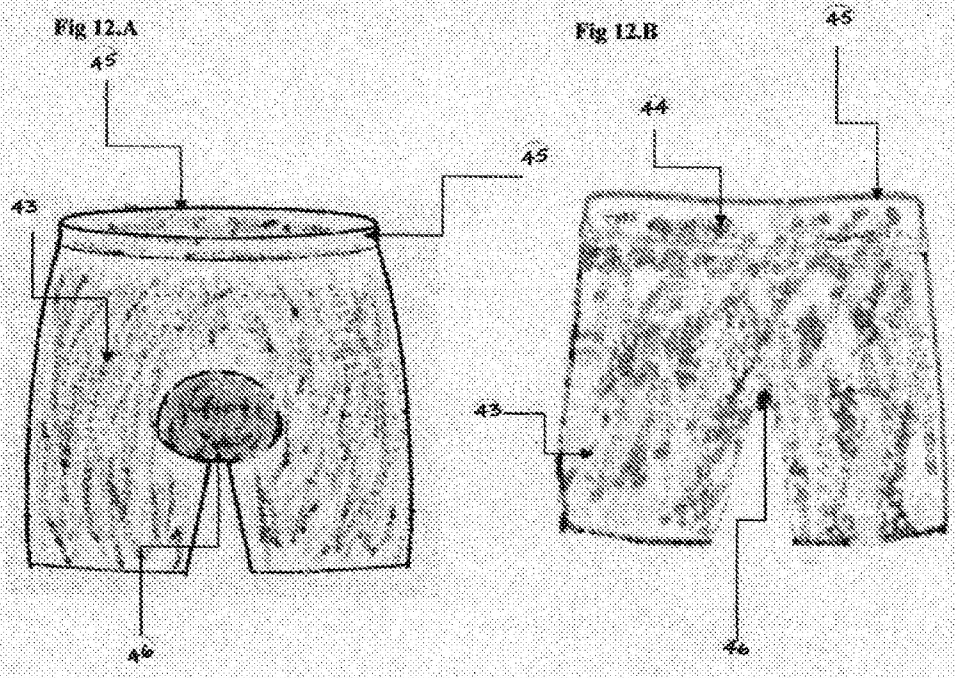


Fig 13.A

Fig 13.B

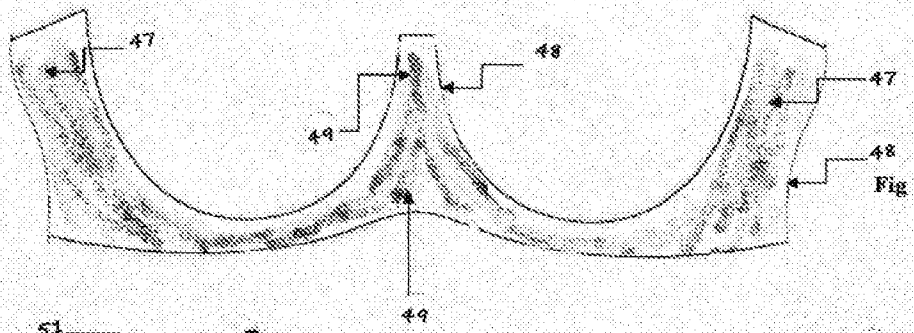


Fig 14.

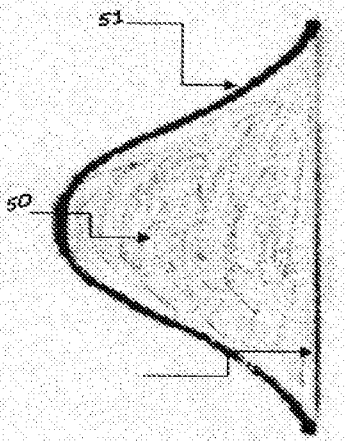


Fig 15.

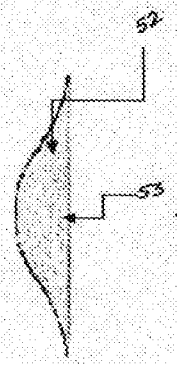


Fig 16.

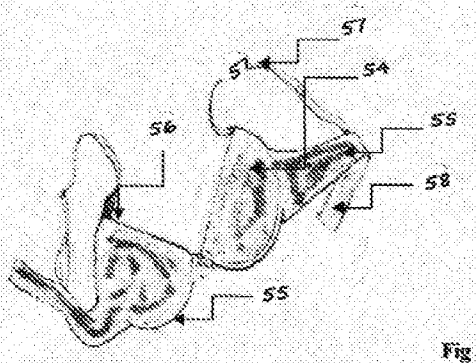


Fig 17.

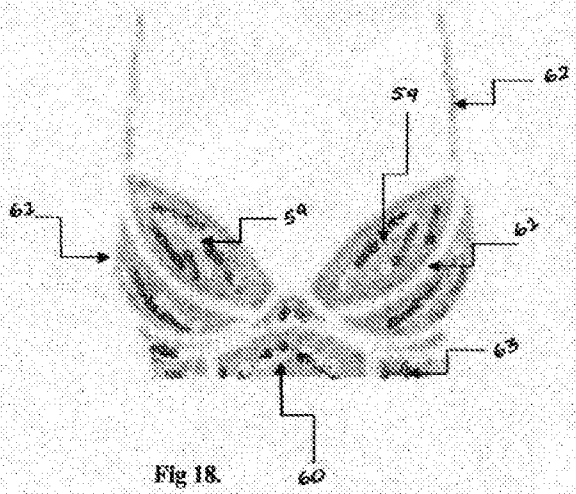


Fig 18.

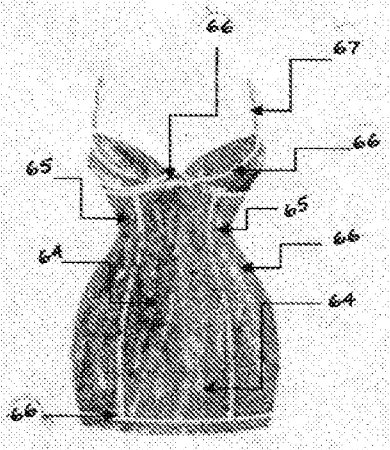


Fig 19.

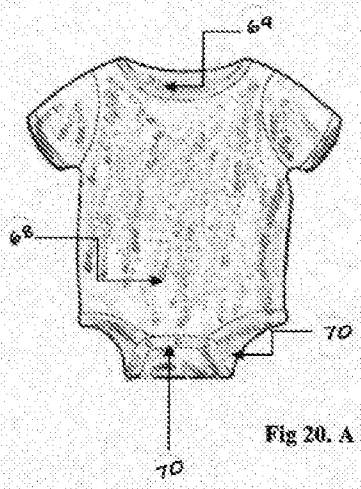


Fig 20. A

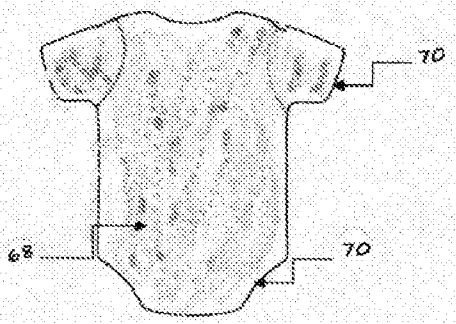


Fig. 20. B

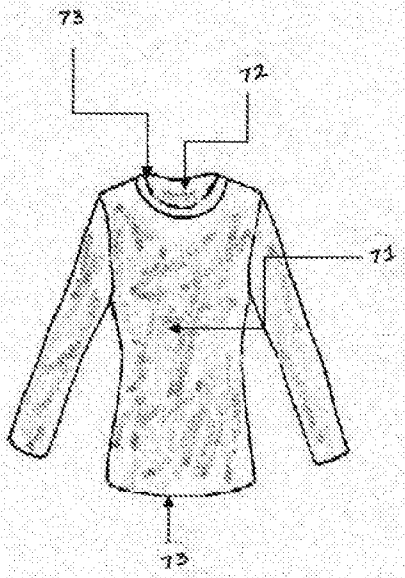


Fig 21.A

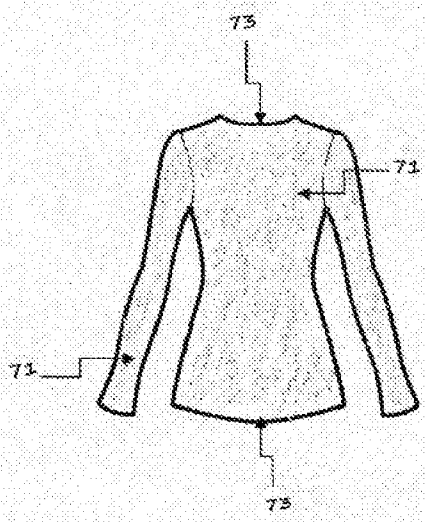


Fig. 21B

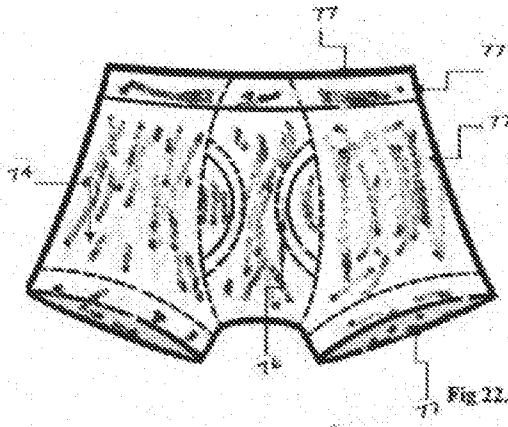


Fig 22. A

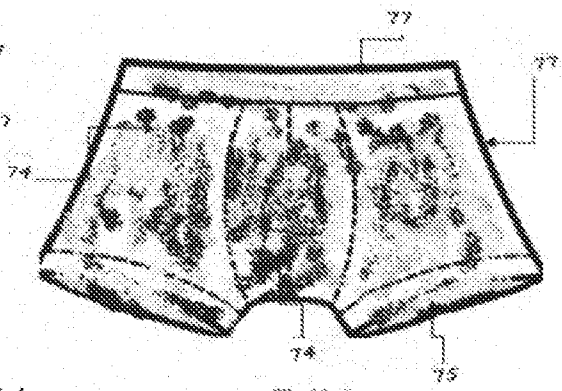


Fig 22. B

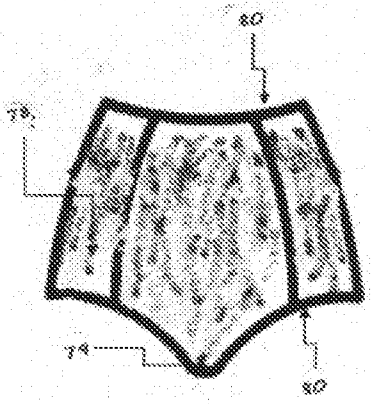


Fig. 23 A

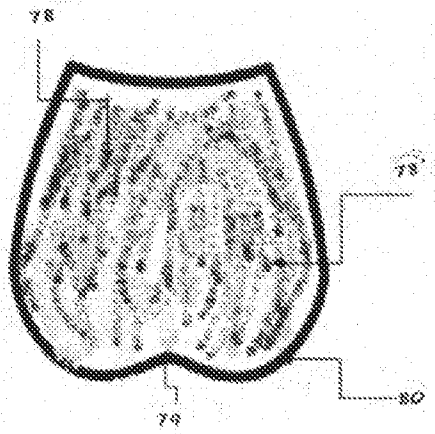


Fig 23. B

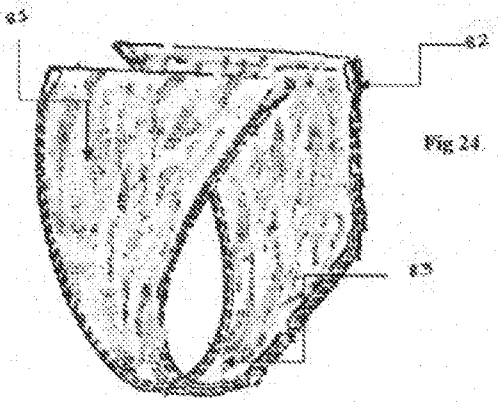


Fig 24

Fig 25.

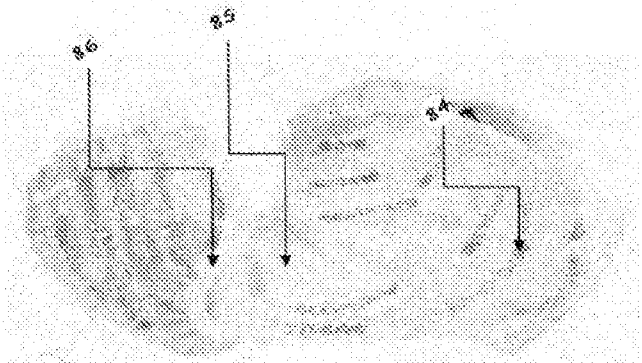
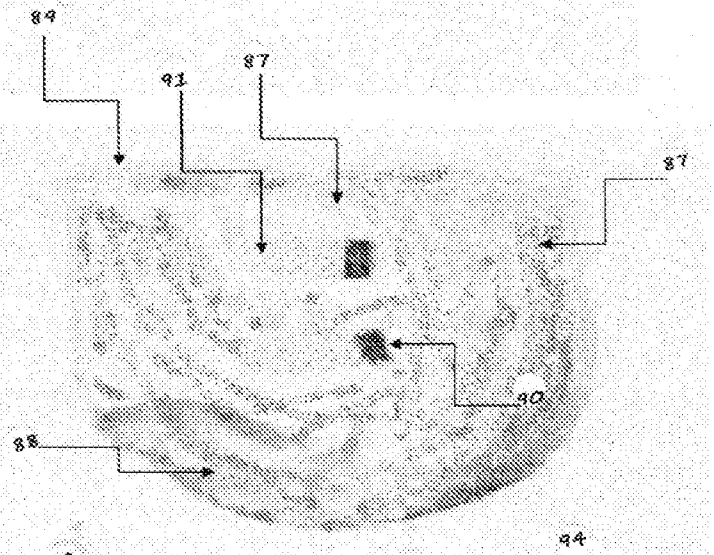


Fig26.



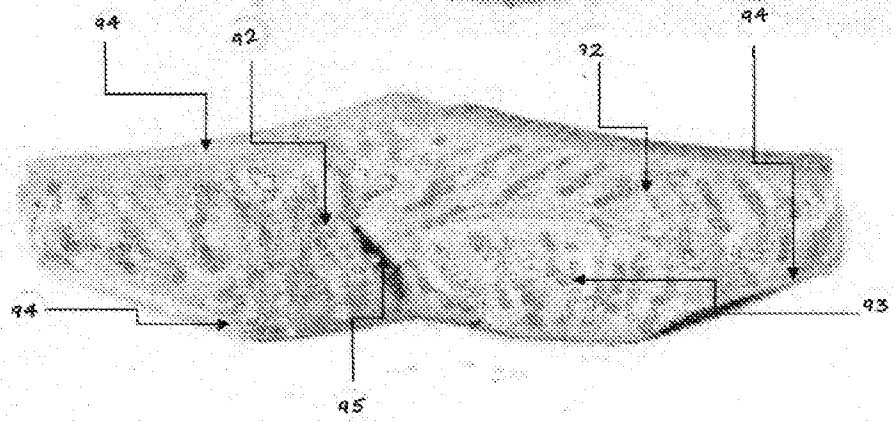


Fig 27. A Fig 27. B

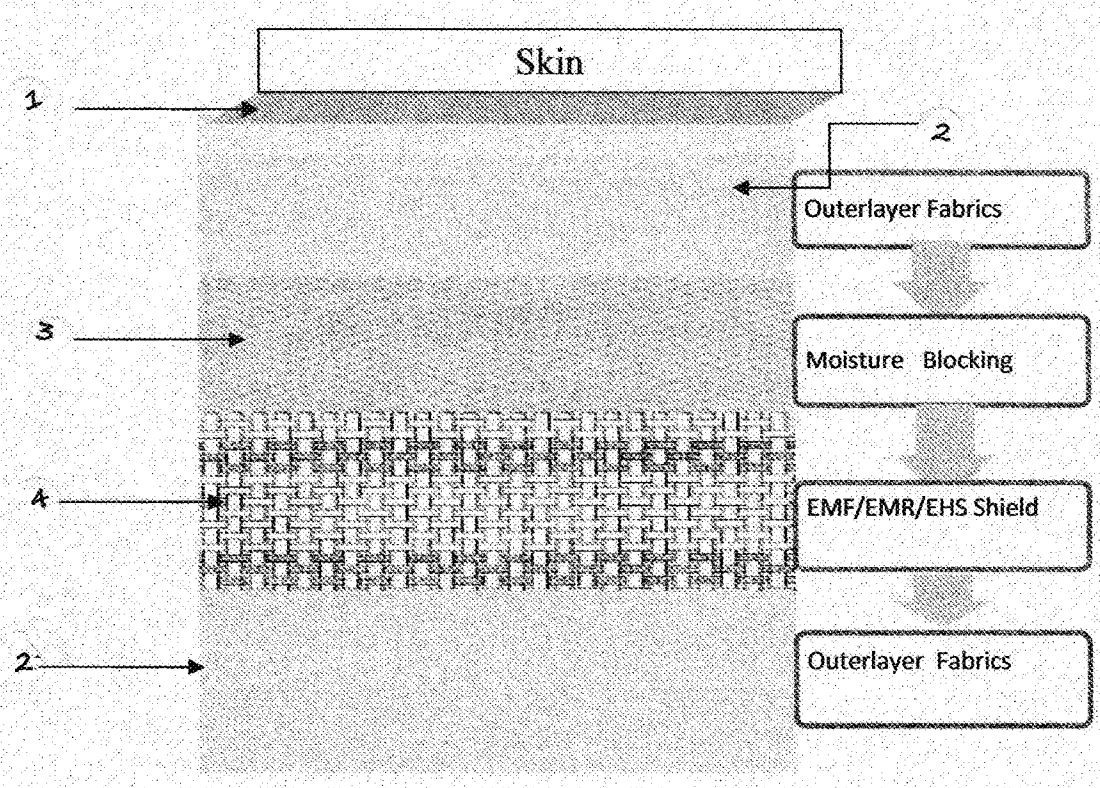

Skin
1
2
Outerlayer Fabrics
3
Moisture Blocking
4
EMF/EMR/EHS Shield
2
Outerlayer Fabrics

Fig 1.

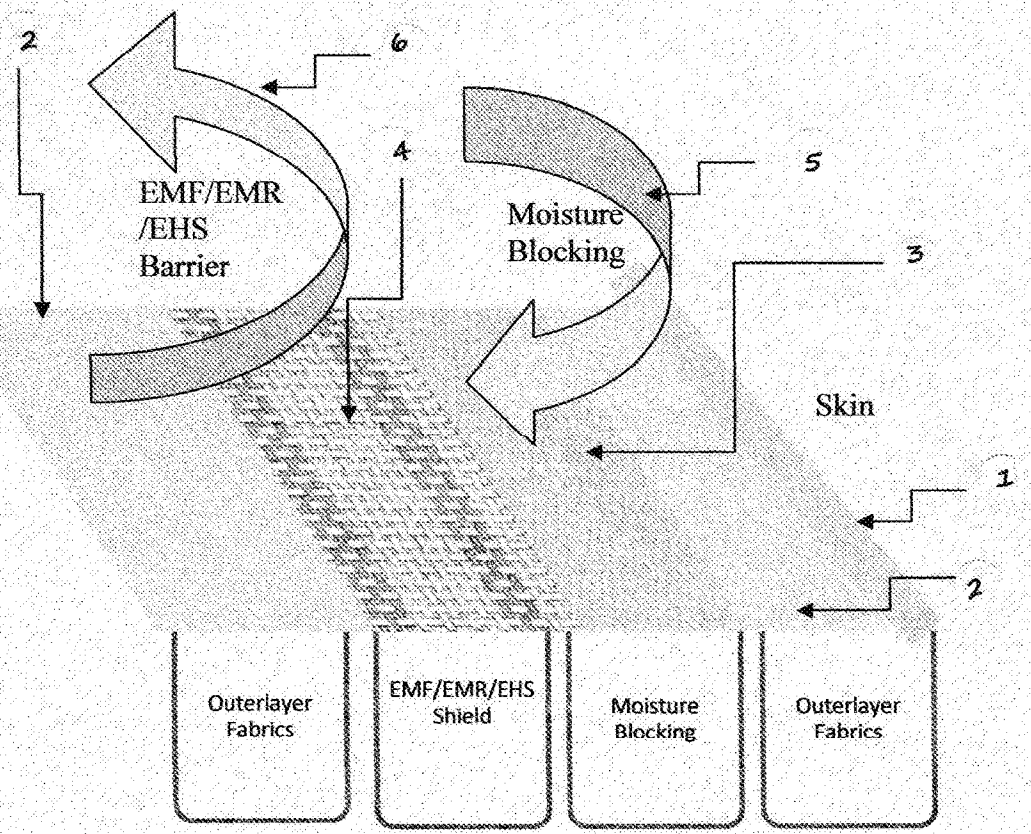

2
6
4
5
EMF/EMR
/EHS
Barrier
Moisture
Blocking
3
Skin
1
2
Outerlayer
Fabrics
EMF/EMR/EHS
Shield
Moisture
Blocking
Outerlayer
Fabrics

Fig 2.

Swiss Shield® NATURELL
Shielding
Attenuation 38 dB (99.98 % shielding effectiveness) at 1 Ghz

OKEO-TEX 100 certified to contain no harmful substances, and independently tested for shielding performance. Non-conductive surface (106 Ohm/sq), no grounding needed. Does not contain flame retardant. NATURELL is a translucent, unbleached ecological cotton fabric. ¬ Ecological cotton fabric without chemicals ¬ Highest attenuation of the 3 SwissShield materials ¬ Washable, easy to iron, cut and sew ¬ Technical data Attenuation: 38 dB at 1 GHz Color: Ecru-White Materials: 82% cotton, 17% copper, 1% silver Weight: 69 g/m² Dimension stability: 3 % Certificates: Öko-Tex 100 Class 1 (gentle enough for baby underwear)

Oeko Test 100 Class 1 (baby underwear)
STR, Swiss Textile Research Institute,
EMC Test Centre Zurich, according to MIL-STD 285 and IEEE Standard 299-1997

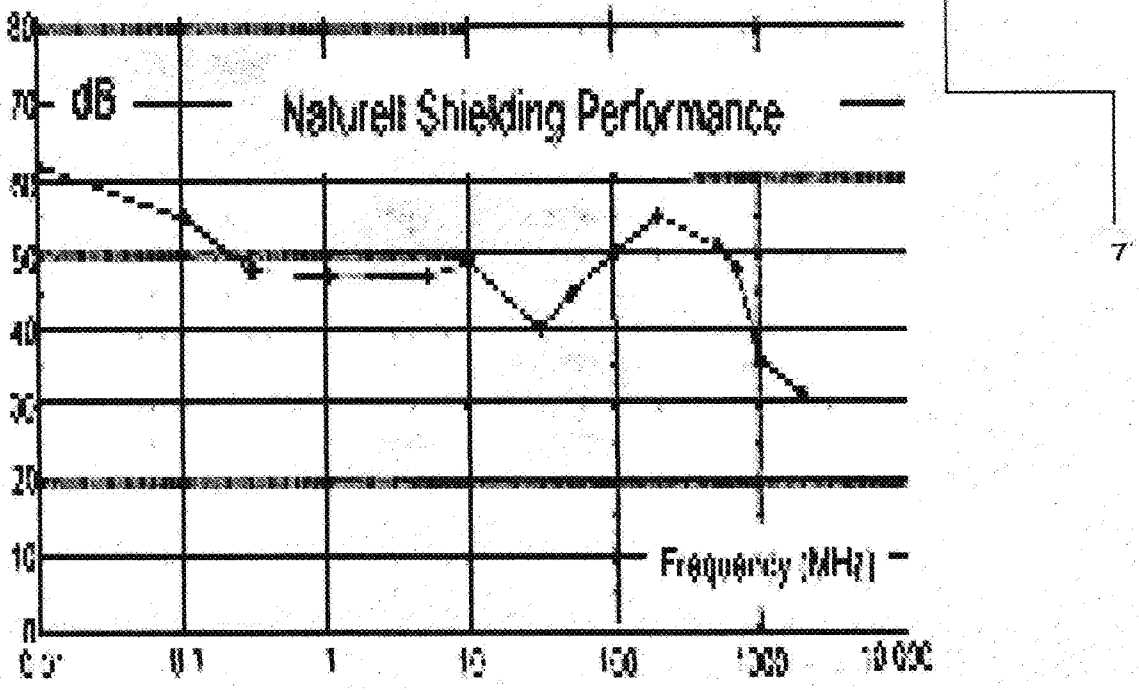


Fig 3.

Swiss Shield® WEAR

Shielding Attenuation 25 dB (99.5 % shielding effectiveness) at 1 Ghz

OKEO-TEX 100 certified to contain no harmful substances, and independently tested for shielding performance. Non-conductive surface (108 Ohm/sq), no grounding needed. Does not contain flame retardant. WEAR is a tight weave cotton fabric with an extraordinarily pleasant look and feel. Woven from cotton fiber with a gossamer-thin 0.02 mm silvered and PUcoated spun-in copper thread. Can be dyed with ordinary cotton dyes. ¬ Pleasant skin feel, cotton fabric without chemicals ¬ Washable, easy to iron, cut and sew ¬ Good shielding ¬ Attenuation: 29 dB at 900 MHz Color: White Weight: 115 g/m² Dimension stability: 3 % Materials: 90% cotton, 9.5% copper, 0.5% silver Certificates: Öko-Tex 100 Class 1 (gentle enough for baby underwear)

Oeko Test 100 Class 1 (baby underwear)

STR, Swiss Textile Research Institute,

Prof. Dipl.-Ing. P. Pauli/University of the German Federal Armed Forces Munich according to MIL-STD 285 and IEEE Standard 299-1997

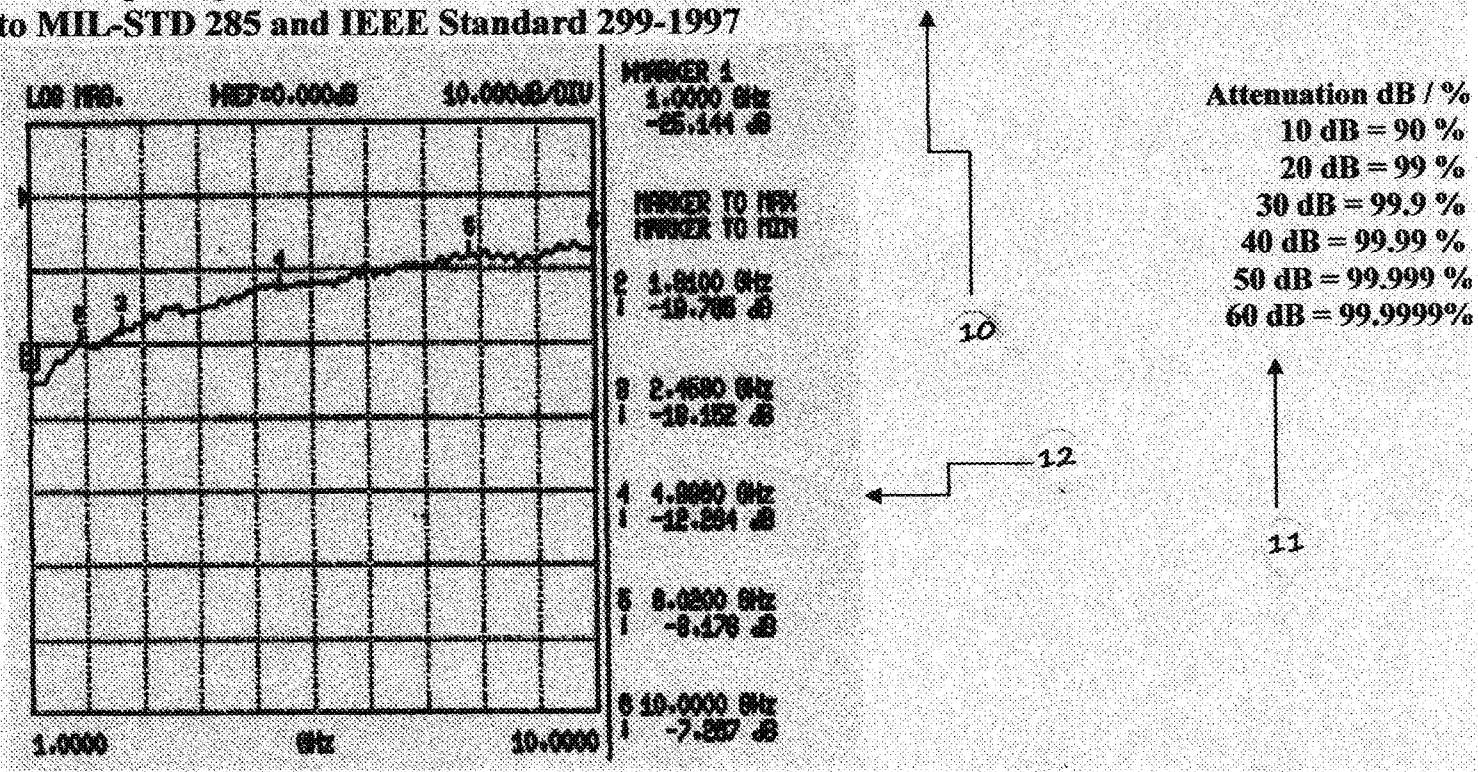
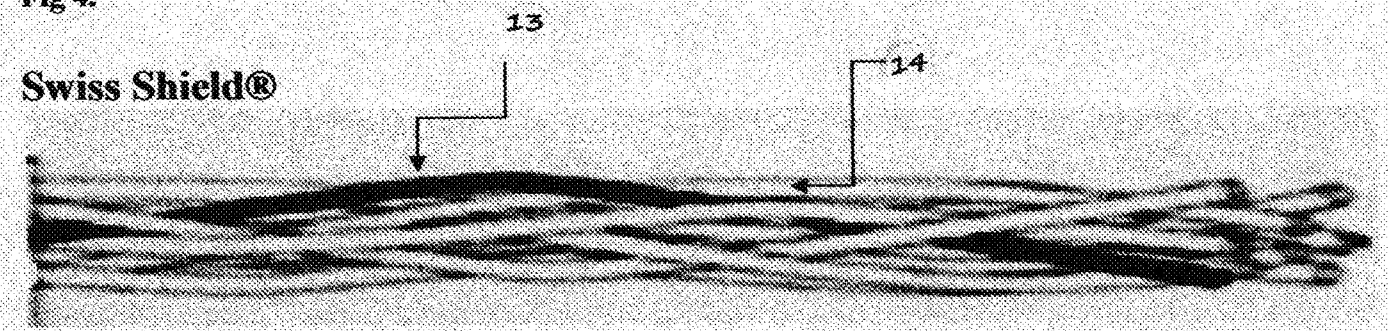


Fig 4.



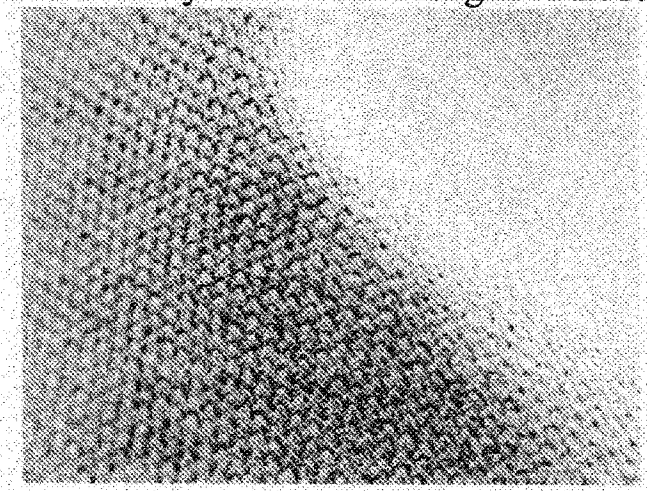
Conductive yarn base fibers materials (eg. cotton, polyester, polyamides, and aramides) the darker spun in twist is a metal monofilament

15

Fig 5.

Soft & Safe ™

This fabric feels great against the skin, is hand washable, conductive, and offers exceptionally high RF shielding performance. It is perfect for making microwave shielding anti-radiation pajamas, shirts and hoods. Easy to make a ground connection because the surface has high conductivity (<1 Ohm per sq). Made with a unique blend of natural materials: 70% bamboo fiber and 30% Silver. Silver gives Soft&Safe anti-bacterial and anti-odor qualities. Greater than 50 dB attenuation too! Cuts and sews like ordinary cotton fabric. 135g/m². Pale rose color.



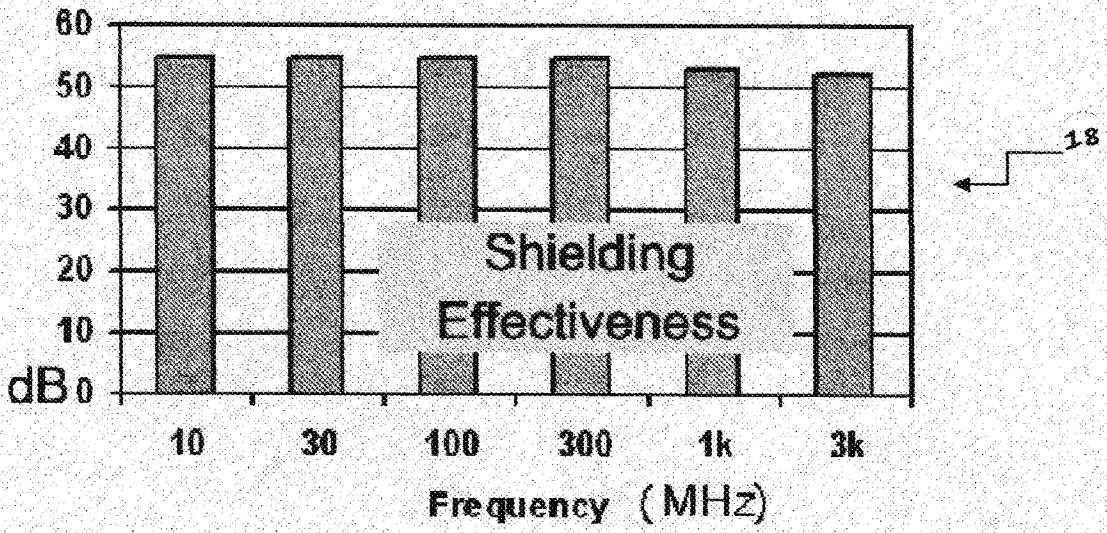


Fig 6.

Microfiber refers to synthetic fibers finer than one or 1.3 denier or decitex/thread. By comparison, microfiber is 1/100th the diameter of a string of human hair and 1/20th the diameter of a strand of silk. The most common types of microfibers are made from polyesters, polyamides or a conjugation of polyester, polyamide, and polypropylene (Prolen).

The shape, size, and combinations of synthetic fibers are selected for specific characteristics, including softness, toughness, absorption, water repellency, electrodynamics, and filtering capabilities. Fashionable apparels in microfibres have graceful flow, silk-like feel and are extremely comfortable.

Some of the outstanding characteristics of microfibers include the following:

1. Exceptional strength, although the filaments are super fine
2. Improved breathability
3. Vivid prints with more clarity and sharper contrast
4. Comfort of natural fibers
5. Durability and Ease of care
6. Appearance retention
7. Windproof and water resistant
8. Light weight

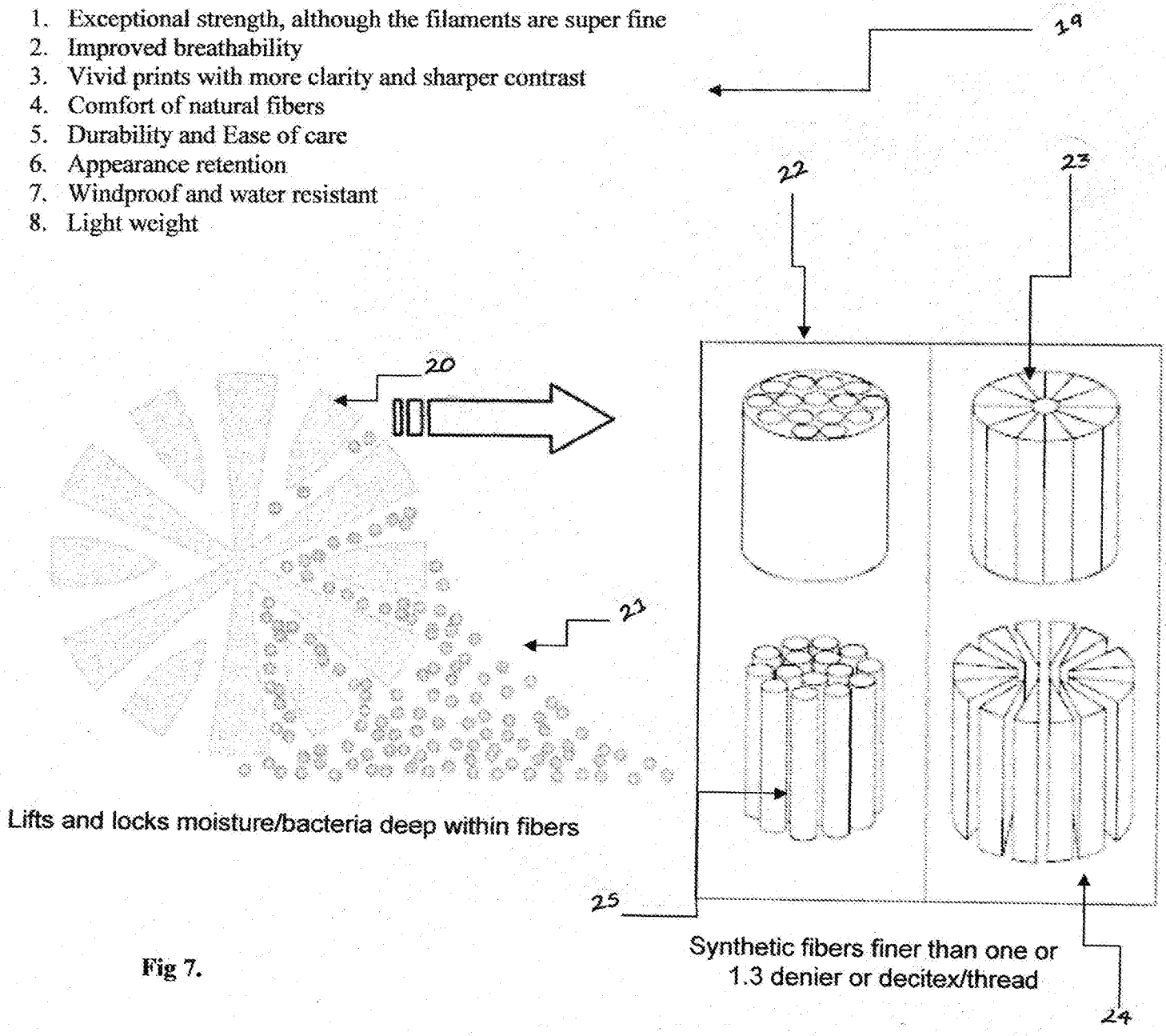


Fig 7.

Polygiene® prevents the growth of odor-causing bacteria and fungi at the source,

Polygiene uses low concentrations of silver salt (silver chloride), which has antimicrobial properties and is naturally present in water and soil, to safely eliminate the ability for bacteria and fungi to grow.
The permanent treatment is applied at the finishing stages of textile production and field and lab tests show a high level of odor control beyond the usual lifespan of a garment. This lifespan odor control is possible as the technology is bound and permanently integrated in the fabric and will not wash out.

- Polygiene prevents the growth of odor-causing bacteria and fungi at the source
- Polygiene is only active on the textiles itself and does not interfere with the skins natural bacterial flora
- Polygiene odor control will not wash out as the technology is bound and permanently integrated in the fabric

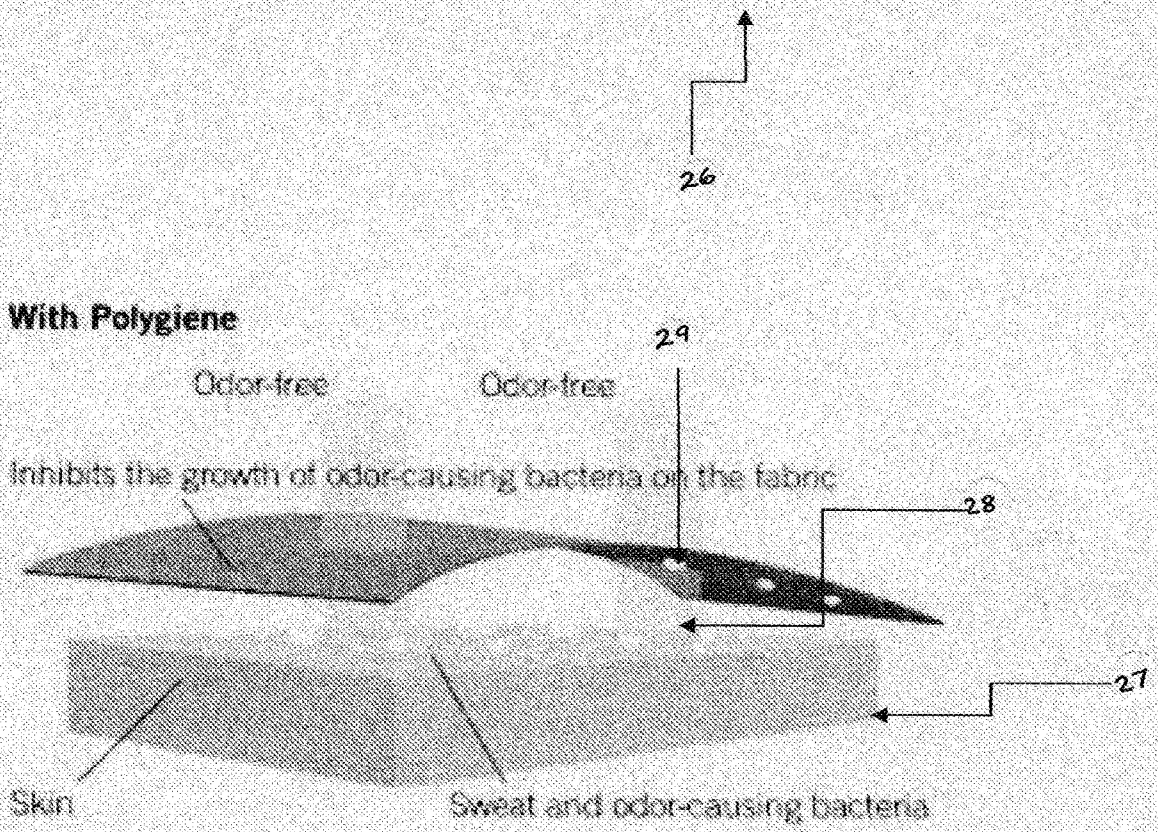


Fig 8.

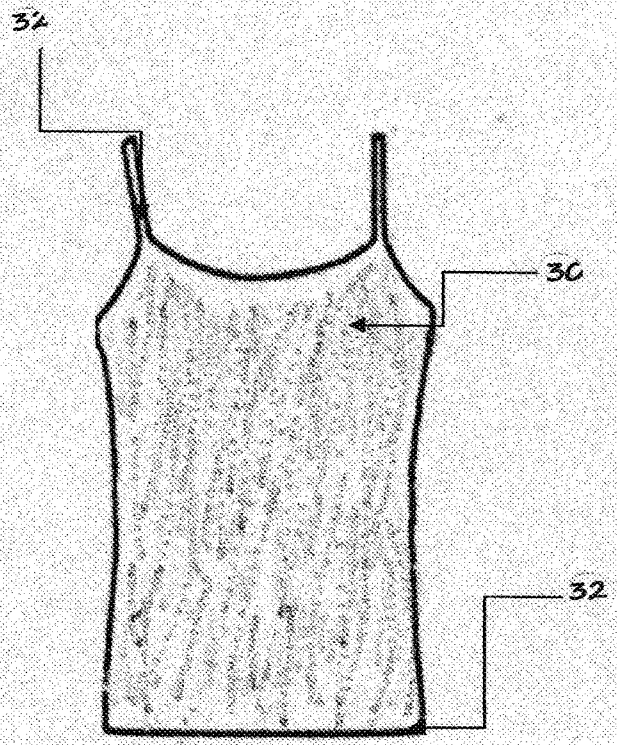


Fig 9. A

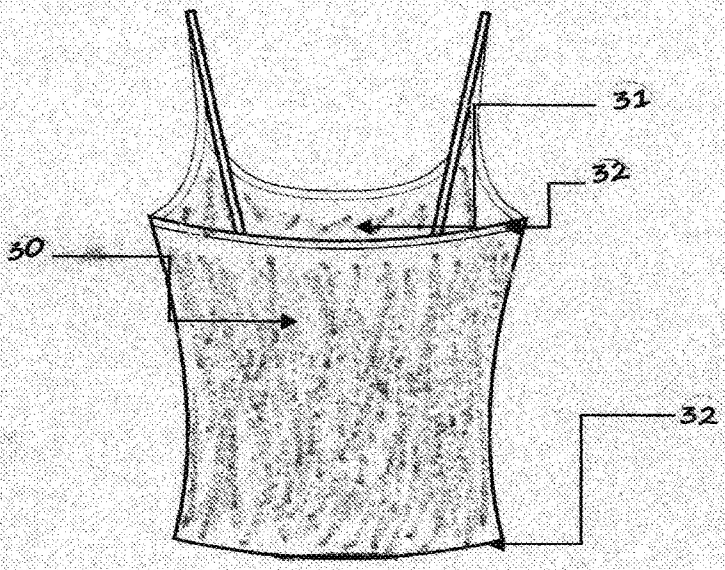


Fig 9.B

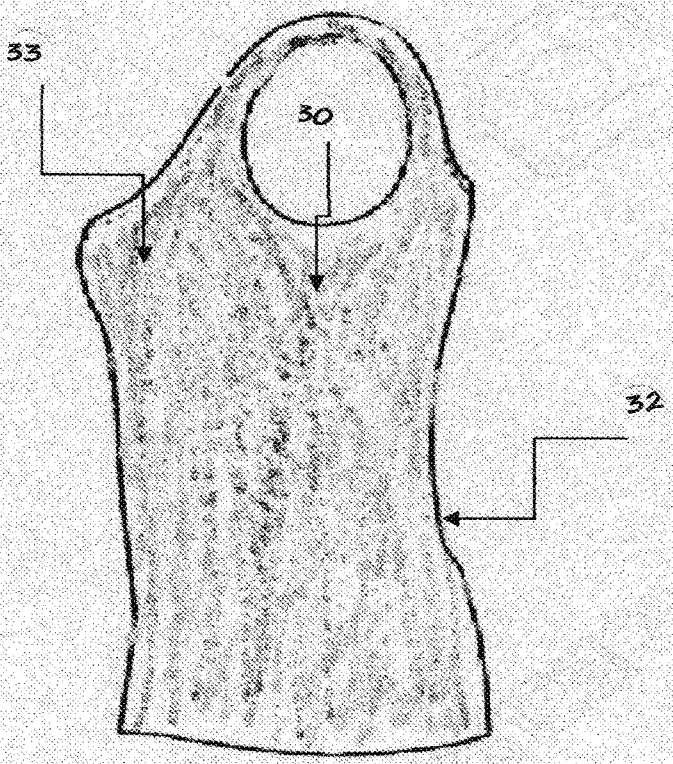


Fig 9.C

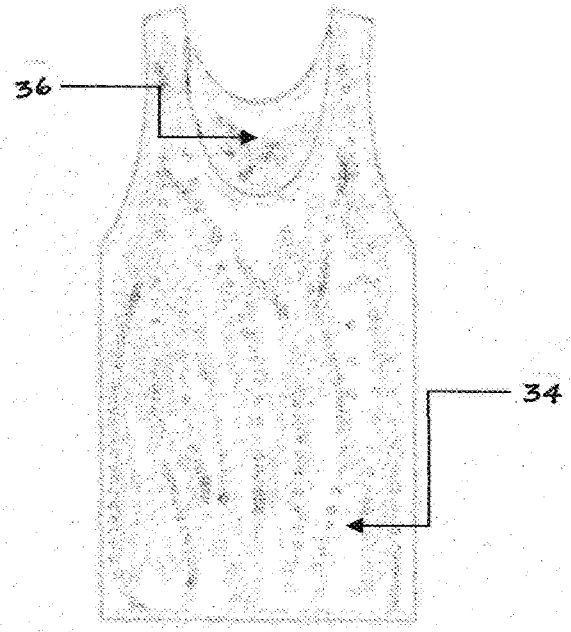


Fig 10.A

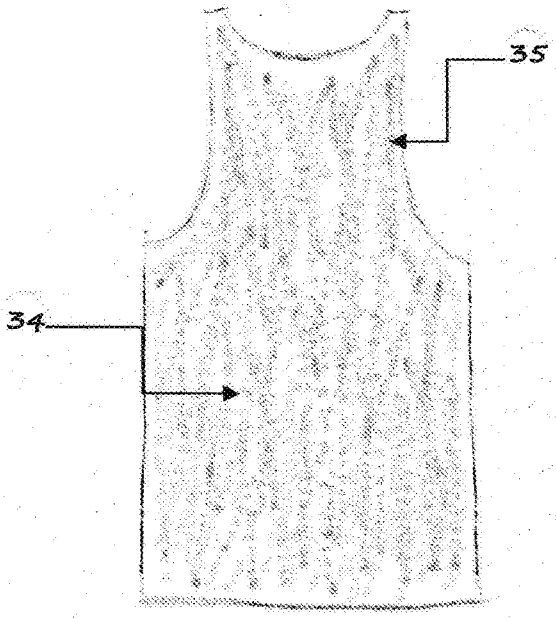


Fig 10. B

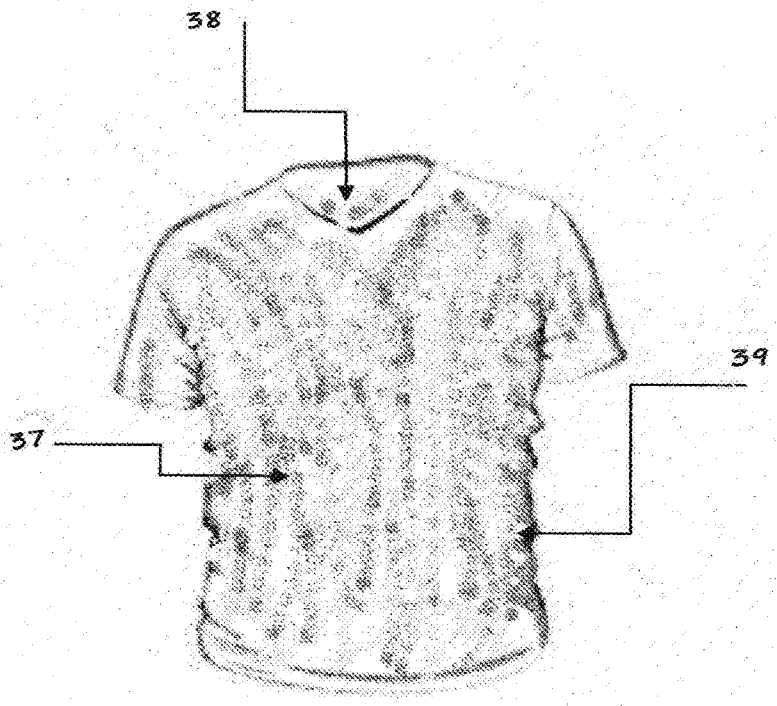


Fig 11. A

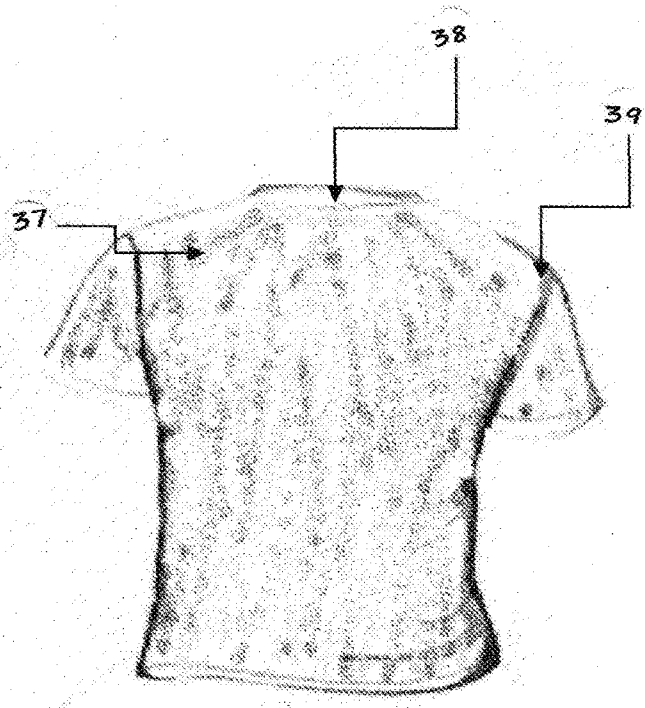


Fig 11. B

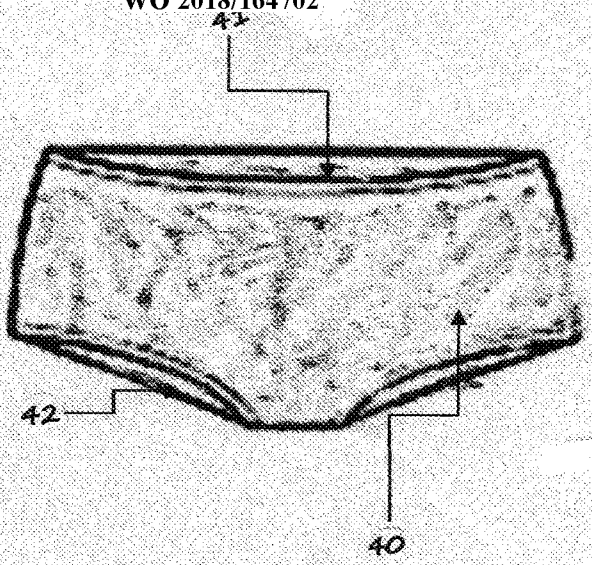


Fig 12.A

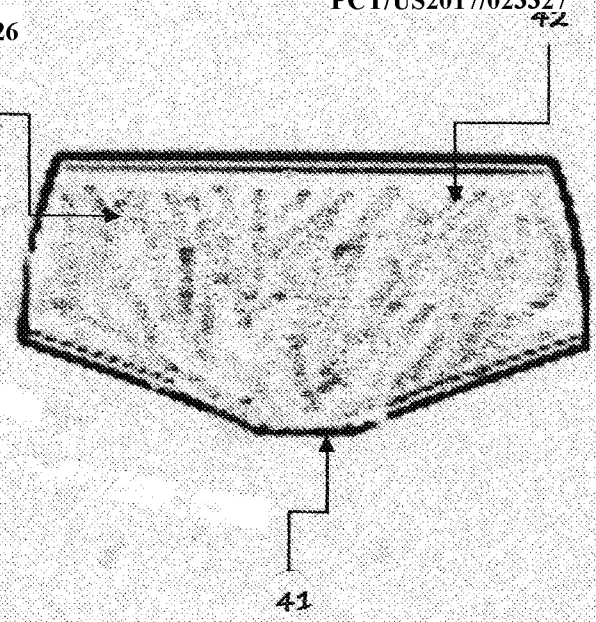


Fig 12.B

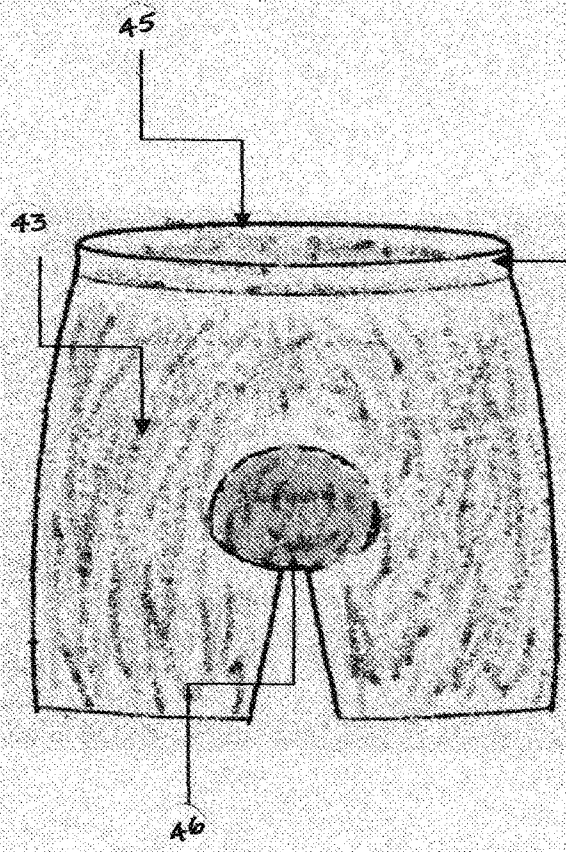


Fig 13.A

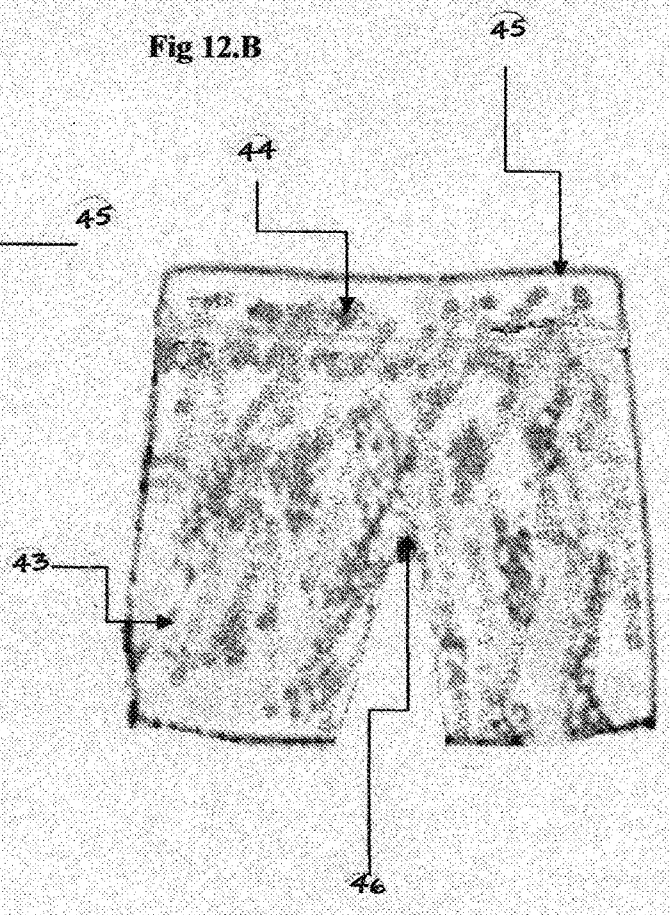


Fig 13.B

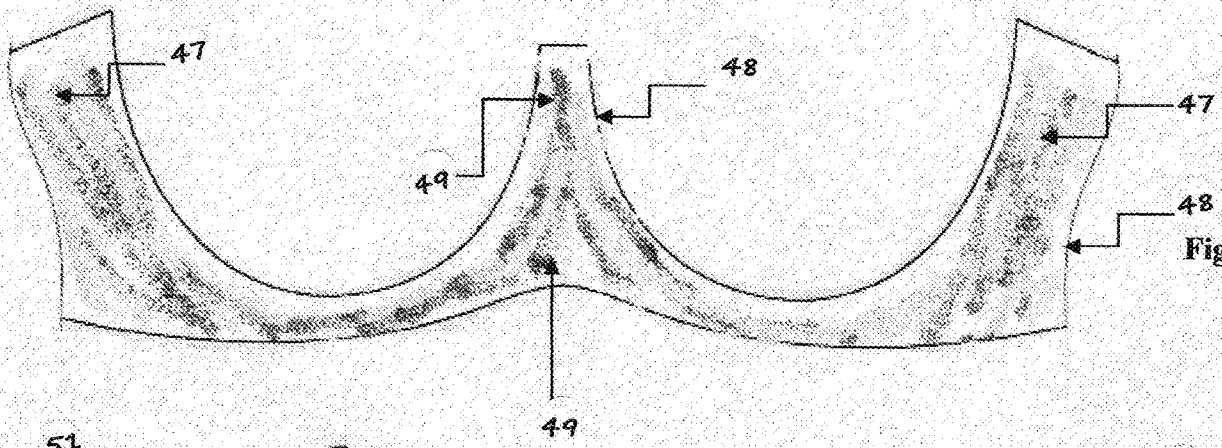


Fig 14.

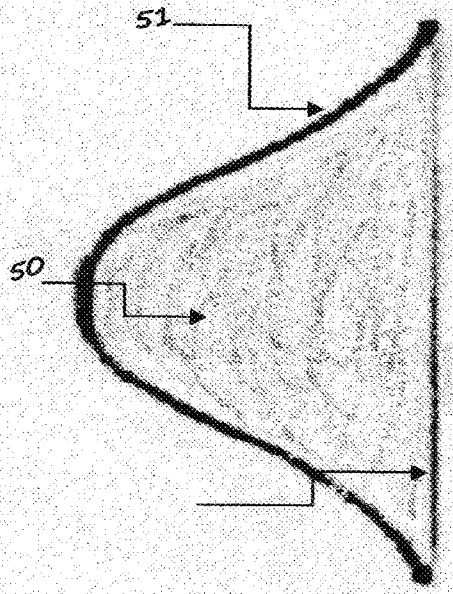


Fig 15.

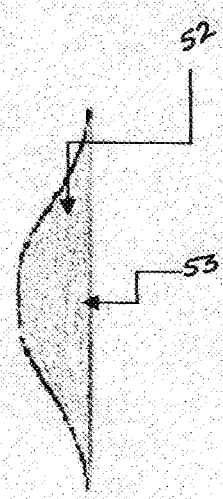


Fig 16.

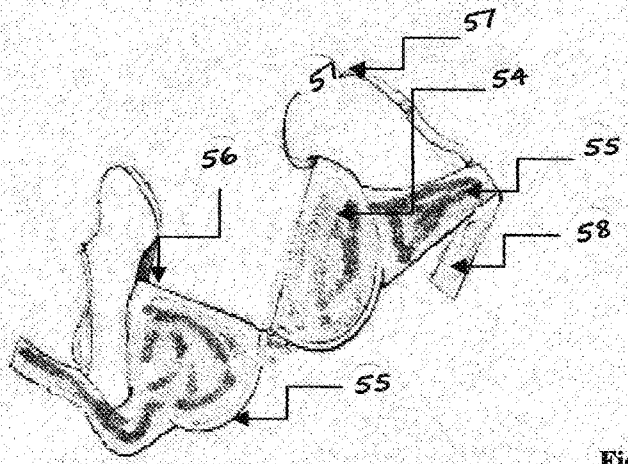


Fig 17.

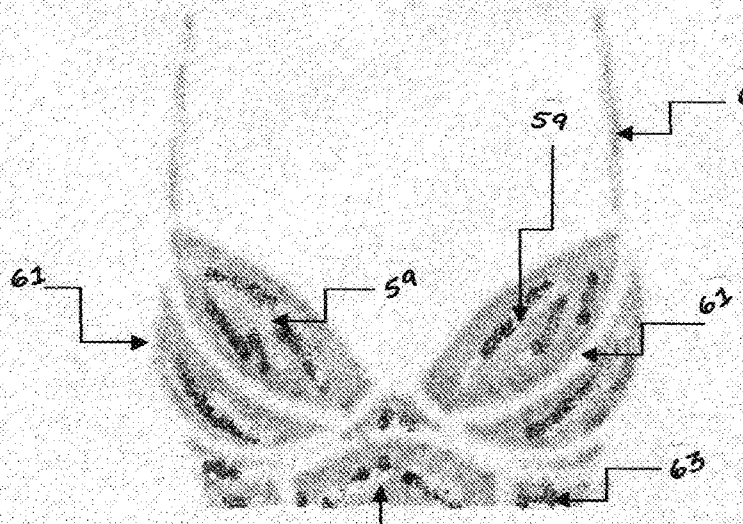


Fig 18.

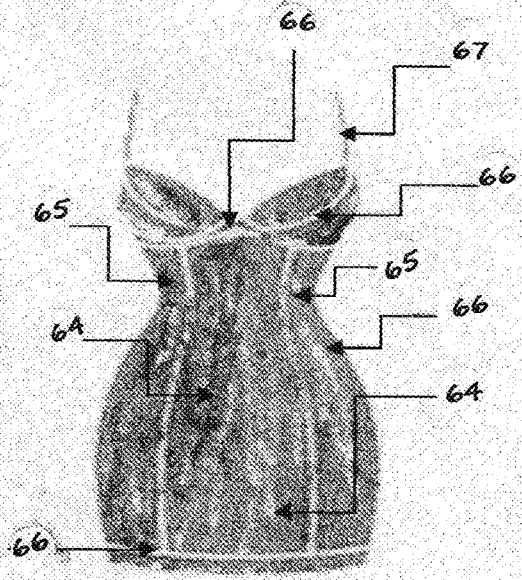


Fig 19.

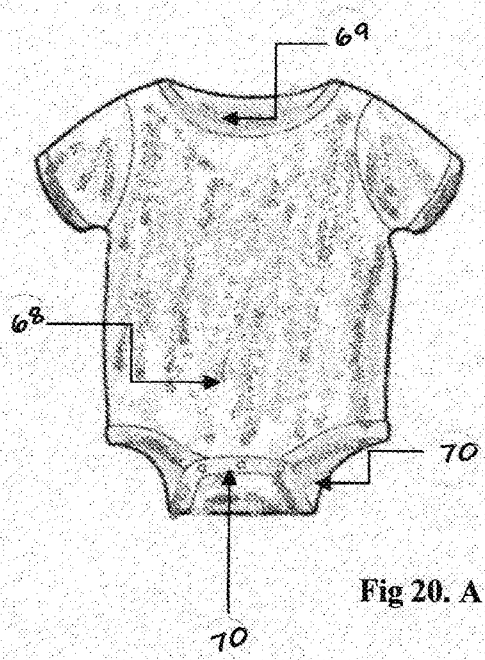


Fig 20. A

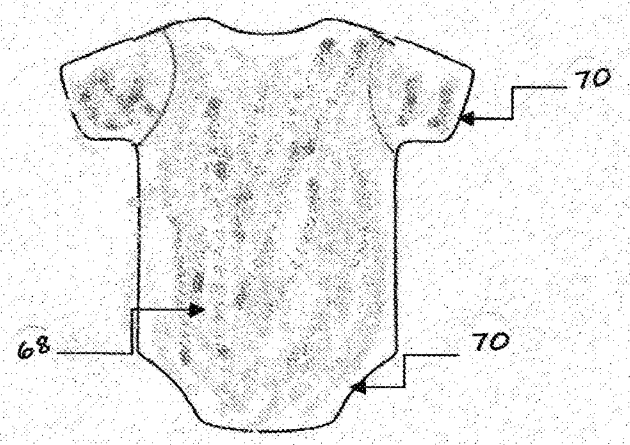


Fig. 20. B

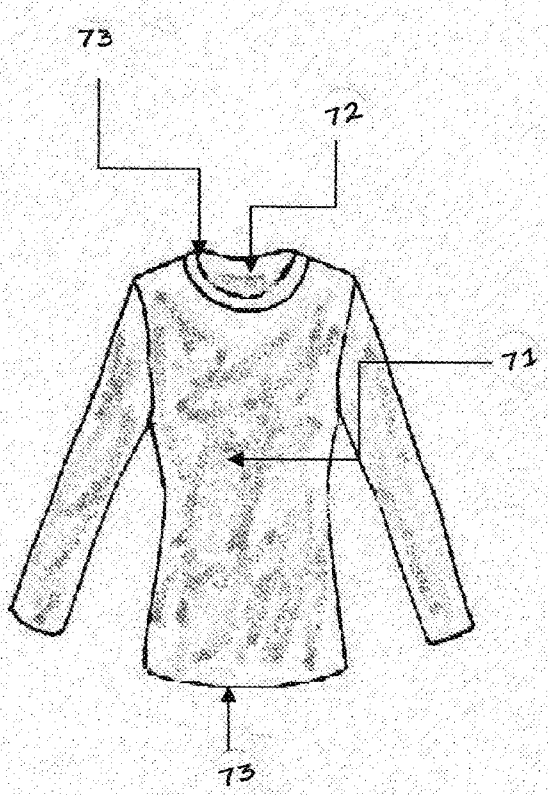


Fig 21.A

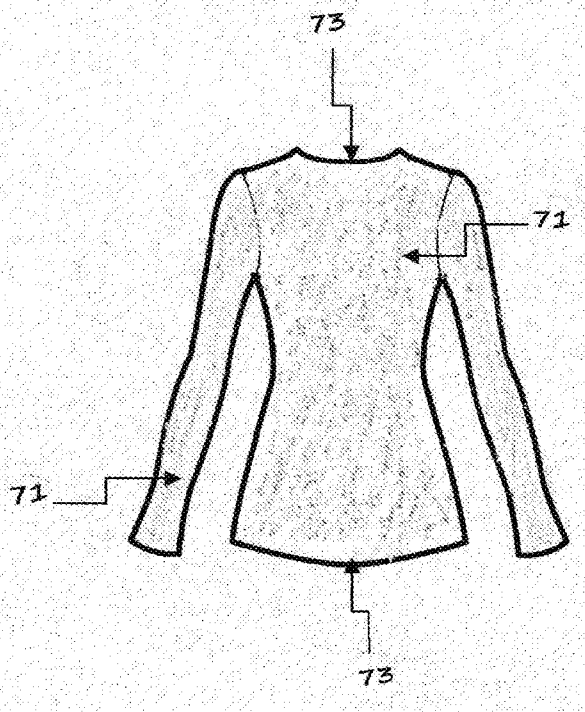


Fig. 21B

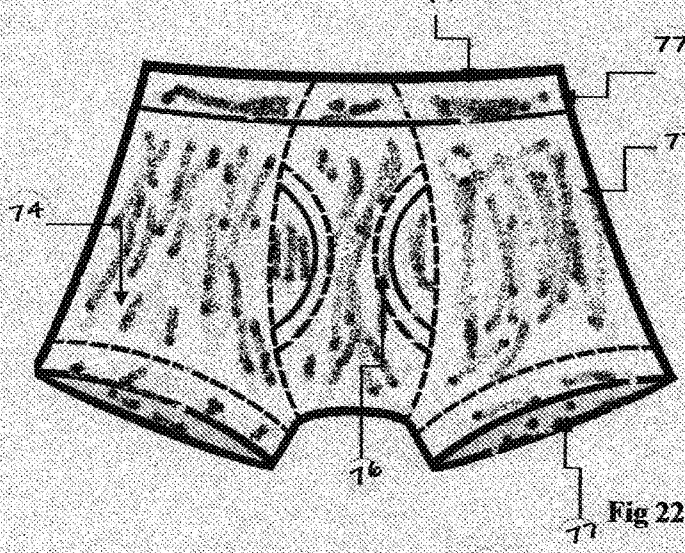


Fig 22. A

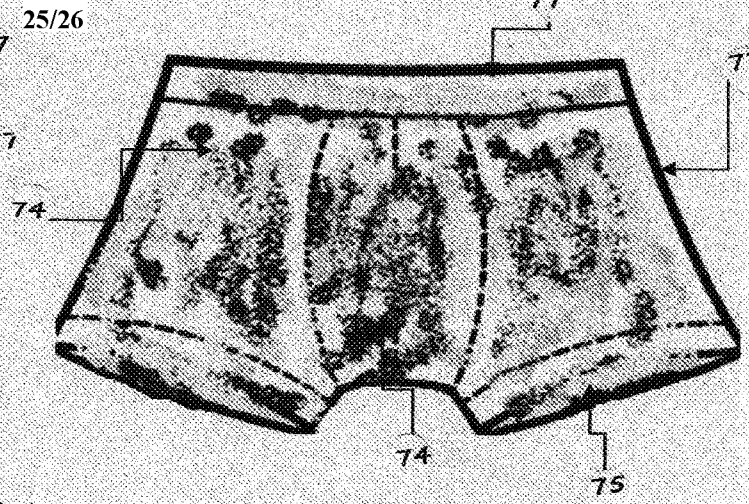


Fig 22. B

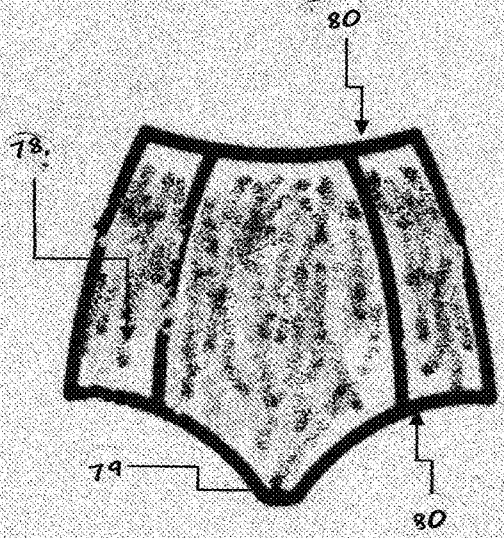


Fig. 23 A

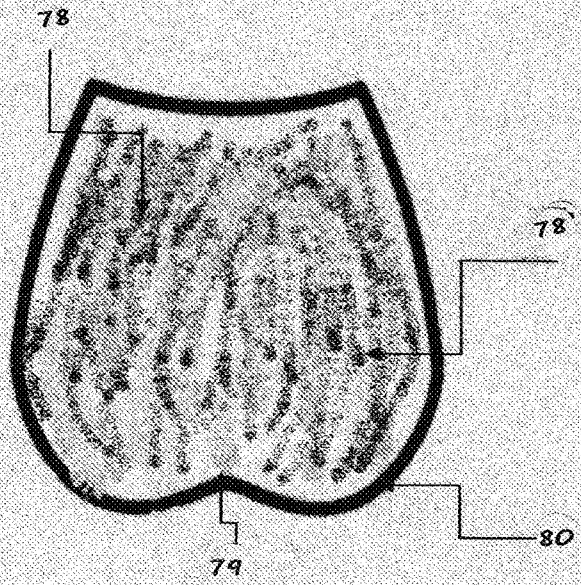


Fig 23. B

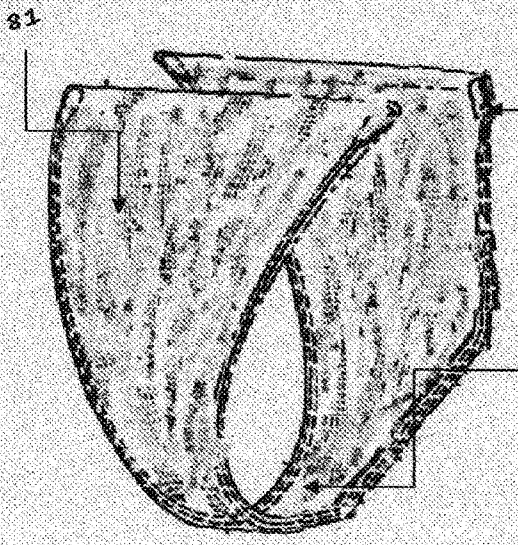


Fig 24.

Fig 25.

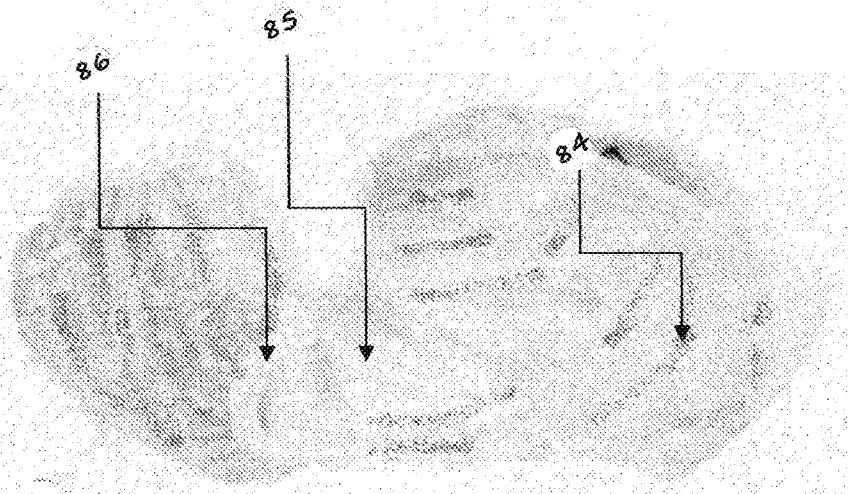
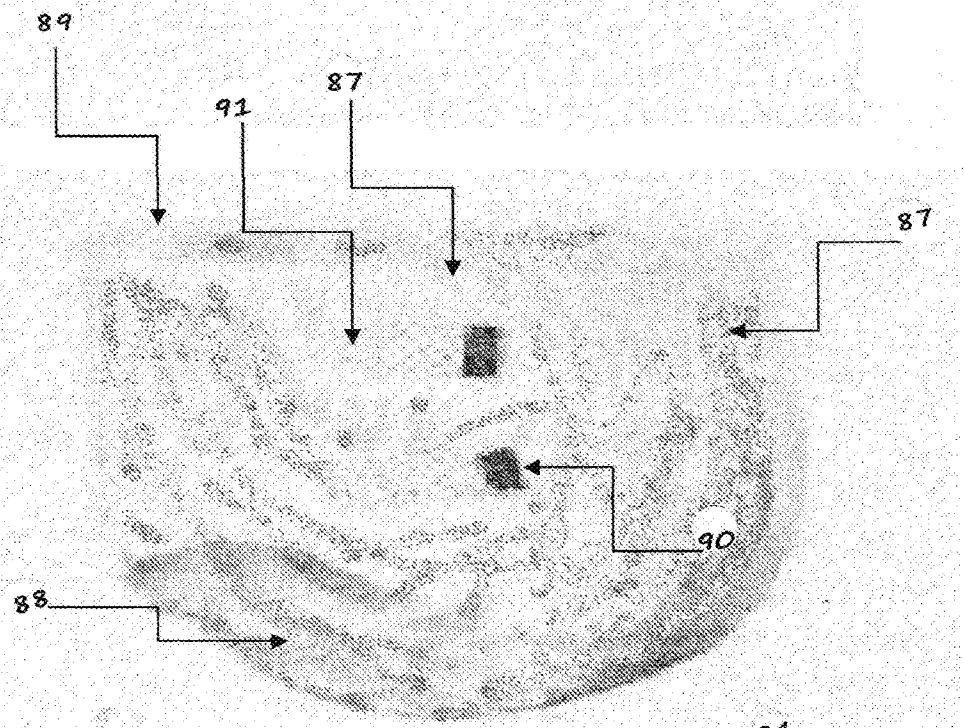


Fig26.



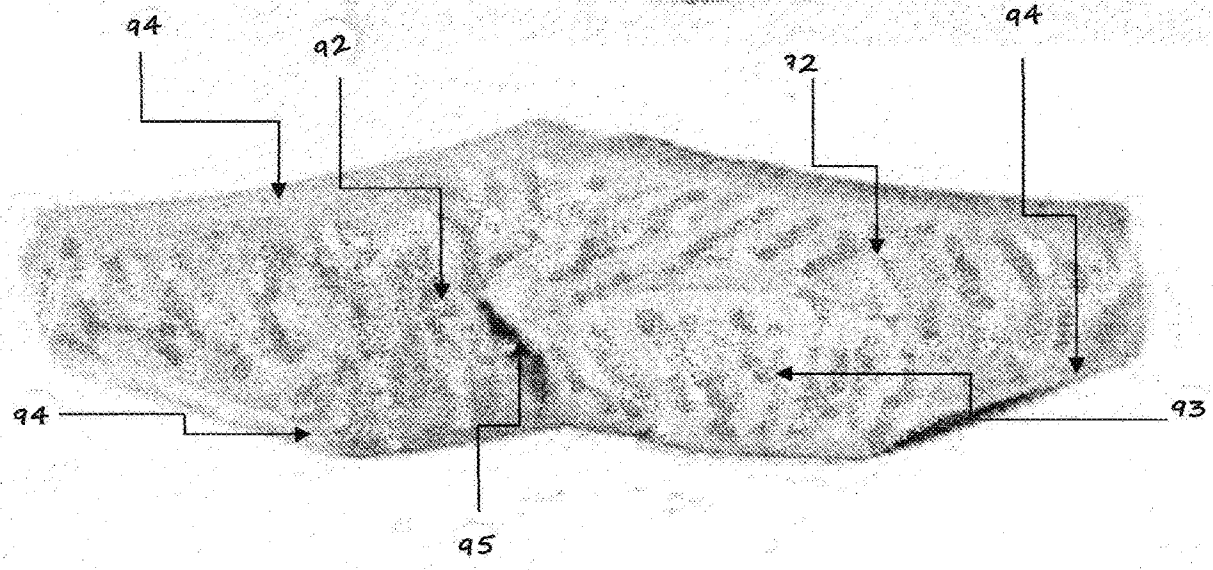


Fig 27. A

Fig 27. B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/023327

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A41D 27/12; A41B 9/00; A41B 9/12; B32B 5/08; D03D 11/00; H05K 9/00 (2017.01)
CPC - A41D 27/12; A41B 9/00; A41B 9/12; B32B 5/08; D03D 11/00; H05K 9/00 (2017.02)

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)
See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 428/85; 428/91; 428/903 (keyword delimited)

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	CA 2778854 A1 (LEE) 04 December 2013 (04.12.2013) entire document	3-6 --- 1, 2, 8-28
X --- Y	US 6,432,504 B1 (YEH) 13 August 2002 (13.08.2002) entire document	7 --- 1, 8-28
Y	EP 2537976 A1 (INSTITUTUL NATIONAL DE CERCETARE DEZVOLTARE PENTRU CHIMIE SI PETROCHIMIE - ICECHIM) 26 December 2012 (26.12.2012) entire document	2, 11
Y	US 3,699,958 A (SZUCS) 24 October 1972 (24.10.1972) entire document	8-10
Y	US 3,916,900 A (BREYER et al) 04 November 1975 (04.11.1975) entire document	27, 28

☐ 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 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
18 July 2017	07 AUG 2017
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774