Abstract: This invention discloses unique nonwoven fabrics that may be constructed using various nonwoven processes that are resistant to mosquito and other commonly known bugs without any chemicals treatments commonly used for mosquito and bug repellency. The nonwoven fabrics may be made using any type of fibers and their blends such as natural, synthetic, high performance, fire resistant, antimicrobial, microfibers, etc., that are bonded within the fabric matrix.

Title: MOSQUITO AND INSECT BITE RESISTANT NONWOVEN FABRICS WITHOUT CHEMICAL TREATMENT
Published:

- with international search report (Art. 21(3))
MOSQUITO AND INSECT BITE RESISTANT NONWOVEN FABRICS WITHOUT CHEMICAL TREATMENT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to provisional application 61/572,006 which is hereby incorporated by reference in its entirety.

DESCRIPTION

[0002] Today, most bug resistant garment and other applications use traditional woven fabrics treated with mosquito or other bug repellent chemicals. The application of such chemicals as DEET and Permethrin used in the industry is a concern for the environment. The treatment adds cost and the chemicals are added to the woven fabrics in a separate step after dyeing, printing and finishing the woven fabrics. Additionally, there is no guarantee that treated fabrics will completely prevent mosquitoes from biting the wearer of the garments. Thus there is a need to come up with a fabric that does not contain any bug repellent chemicals.

[0003] In order to develop a fabric that prevents the mosquito or other bugs to pierce their proboscis into the body to initiate a bite, one needs to understand the differences in construction between the traditional woven and knitted fabrics and the novel nonwoven fabrics of the current invention. As shown in Figure 1, woven and knitted fabrics are two-dimensional structures that are made of warp and fill yarns that contain holes. This type of construction makes it easy for the insect to enter their proboscis to initiate a bite on the human skin. Nonwoven fabrics, on the other hand, are not woven using the loom as indicated by their name and are made directly from individual fibers in much fewer processing steps than woven fabrics. As shown in Figure 1, nonwoven fabrics are three-dimensional structures that are impervious to many elements and they have been used for filtration of various particles in automotive and other industries. The holes present in the nonwoven fabrics do not run straight-through the fabric and are not
interconnected and thus offering what is known as a "tortuous path" for any element passing through the fabric. For these fabrics, a mosquito or any bug will not be able to penetrate the fabric using their proboscis to initiate a bite on the human skin. The nonwoven fabrics need not be treated with mosquito or other bug repellent chemicals to be effective against the bug bites.

[0004] Nonwoven fabric technologies offer innovative solutions with improved scale of economy because of the fact that the machines can be run at several hundred feet per minute. The nonwoven fabrics can be made using various known methods such as needle punched, spunlaced, spunbonded, stitch-bonded, thermal bonded, chemical bonded, melt blown, electrospun etc. The nonwoven fabrics of the current invention have very good air permeability to keep the wearer comfortable in all environments. The nonwoven fabrics can be made durable as in the case of needle-punched plus spunlaced structures or disposable as in the case of spunbonded, thermal bonded and laminated etc.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Figure 1. Schematic of the differences in construction between a woven and nonwoven fabric and how that impacts a mosquito bite.
What is claimed is:

1. A unique nonwoven fabric capable of resisting bites from mosquito and other bugs without any added bug repellent chemical.

2. The nonwoven fabric type of claim 1 could be needle-punched, spunlaced, hydroentangled, spunbonded, thermally bonded, chemically bonded, stitch-bonded, melt blown, electrospun etc.

3. The nonwoven fabric of claim 1 could be made from all known natural and synthetic fibers, high performance fibers, splittable fibers, nanofibers, antistatic fibers, antimicrobial fibers, fire retardant fibers and their blends.

4. The nonwoven fabric of claim 1 may be used to make garments, blankets, coveralls, tents, and any other article to protect the human skin from insect bites.
Cross-Section of Traditional Woven Fabric (two dimensional fabric made of warp and fill yarns)

Cross-Section of Nonwoven Fabric (3-dimensional fabric made of bonded individual fibers)

FIGURE 1
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPCA - A41 D 13/00 (2012.01)
USPC - 2/4 and 2/456

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
2/4,456 CL
A41D013/00

C. DOCUMENTS CONSIDERED TO BE RELEVANT
Category* Citation of document, with indication, where appropriate, of the relevant passages
X US 2002/0162161 A1 (ZEILER) 11 November 2002 (11.11.2002) fig. 1; para [0001]; [0005]; [0008]; [0016]

Relevant to claim No.
1-4

Further documents are listed in the continuation of Box C.

Date of the actual completion of the international search 26 Aug 2012 (26.08.2012)
Date of mailing of the international search report 06 SEP 2012

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer: Lee W. Young
PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/2.10 (second sheet) (July 2009)