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PILLOW WITH FIBER-ON-END PILE COVERING AIDING PREVENTION
OF FACIAL ACNE AGGRAVATION
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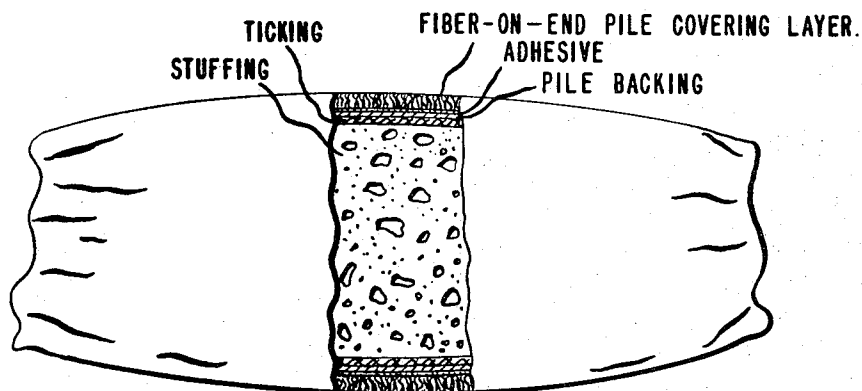


FIG. 1

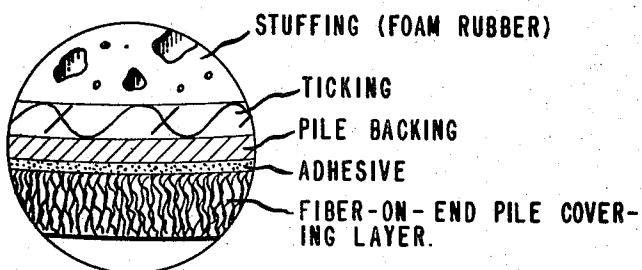


FIG. 2

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PILLOW WITH FIBER-ON-END PILE COVERING AIDING PREVENTION OF FACIAL ACNE AGGRAVATION

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ABSTRACT OF THE DISCLOSURE

A pillow having a covering of porous fiber-on-end pile layers as pillow coverings, bed sheets, and other articles. In the pile, parallel, crimped fibers are poined at a plurality of contact points, and the faces of the pile layer are composed essentially of fiber ends. The covering helps prevent aggravation of acne while the user's face is in contact therewith.

This invention relates to the use of fiber-on-end pile layers as pillow coverings, bed sheets, and other articles to promote more rapid healing of pimple sites in cases of simple acne (acne vulgaris). It also relates to an improved pillow and in particular to a pillow covering adapted to provide point support for human skin which is in contact therewith.

The invention involves the finding that the healing of simple acne as a human skin disorder is promoted by regularly and for extended periods of time maintaining an affected portion of the human skin in contact with a fiber-on-end pile layer comprising a porous, flexible, self-supporting sheet material comprising substantially parallelized crimped filamentary pile members of synthetic organic polymer, the said members being distributed throughout the sheet material and being attached at a plurality of contact points throughout the three dimensions of the sheet material, the faces of the sheet material being composed essentially of fiber ends and the air within said sheet constituting at least about 50% of its volume.

In one embodiment the invention relates to a pillow structure comprising a soft, resilient, compressible, filling material and a covering comprising a fiber-on-end pile layer as above described.

FIGURE 1 of the drawing is a diagrammatic view partly in section of a typical pillow structure of this invention, and

FIGURE 2 is an enlarged view of a cross-section portion of the pillow shown in FIGURE 1.

The typical purplish blotch which forms around an erupted pimple site in cases of simple acne is generally conceded by dermatologists to be due to ruptured blood capillaries. The formation of the pimple weakens the walls of the blood capillaries in the immediate vicinity. Any external pressure on the affected skin area such as observed when lying in bed on the relatively smooth surface of a sheet or pillowcase will restrict the capillary blood flow and cause a measurable increase in capillary pressure. The increased capillary pressure on the already weakened capillary walls leads to rupture and the formation of the purplish blotches surrounding pimple sites in simple acne. The failure of the blood capillary system surrounding the pimple renders the site less resistant to external infection and subsequent scar formation. Present dermatological practice depends upon the administration of antibiotics to prevent the infection and scar tissue formation. No treatment has heretofore been devised to prevent the rupture of the blood capillaries which is disfiguring and lowers the patient's resistance to localized infection. The use of a fiber-on-end pile layer in contact

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with the skin in accordance with this invention provides numerous point contact supports for the affected area of the skin without interfering with capillary circulation.

The fiber-on-end pile layers prove beneficial not only for acne cases but also for prevention of bed sores (decubitus) in patients confined to bed for prolonged periods. The essential cause of a bed sore is local pressure upon the tissues. The partial or complete occlusion of the blood supply leads to necrosis and gangrene of the affected area. A pressure sore may also develop from prolonged use of a splint or cast. Again, the fiber-on-end pile layer provides numerous point contact supports for the body without interfering with capillary circulation.

The fiber-on-end pile layers may be used in the form of various products which normally are adapted to contact the skin. Among such products, mention is made of the following: bed sheets, pillow cases, bed pads, body support pads, adhesive bandage pads, gauze-type bandaging, surgical bandaging, plaster cast liners, hospital linen, garments for hospitalized patients, wraps to protect pressure points from splints.

A particularly useful form of the fiber-on-end pile layer is a pillow covering and a pillow construction utilizing such is shown in the accompanying drawing. As indicated in FIGURE 1, the pillow comprises a filling material enclosed within a pillow ticking and having a fiber-on-end pile covering layer. The pile layer is composed of upstanding fibers which are bonded together at spaced contact points so as to provide the pillow with a porous surface consisting of fiber ends. This can be more clearly seen in FIGURE 2. The filling material may be any of the conventional stuffings used for this purpose, e.g. foam rubber, polyurethane foam, fiberfill or other batting materials, goose down, etc. The ticking, which in some cases can be dispensed with entirely, may be formed of a conventional fabric. It can be provided with an opening, not shown, along one edge and with a zipper fastener to enable insertion of the filling material and confinement thereof. The fiber-on-end pile covering layer can vary widely in shape and size so long as it provides sufficient area for contacting a human body portion such as the head. It may be in the form of a pillow case so as to completely enclose the filling material. For this purpose, zipper or button fasteners, not shown, may be provided to keep the covering in place. On the other hand, it need only cover a portion of the pillow, for example it may be formed by laminating a porous pile layer, for example by an adhesive or any other suitable means, to only one of the outer faces of an ordinary pillow case. It will be apparent that a wide number of variations in construction will be apparent depending upon the particular comfort and aesthetics desired.

The fiber-on-end pile layers employed in the practice of this invention are described in C. R. Koller U.S. Patent 3,085,922. In particular the fibers of the layer are contorted, e.g. crimped so as to overlap, be aligned generally in the same direction, be interconnected throughout the three dimensions of the layer and have a fiber density below 25 lbs./ft.³. Although a description of these sheet materials including definitions of the terms used in connection therewith is fully set forth in the above Koller patent, the disclosure of which is specifically incorporated herein by reference, they will be briefly mentioned herein. By "contorted" it is meant that the profile (i.e. side elevation) of an individual filament is irregular (i.e. not straight) when the filament is viewed from at least one side. In addition to being contorted, it is necessary that such filamentary structures overlap adjacent structures throughout the three dimensions of the article. By the term "overlap" is meant that in at least one view, a filamentary structure crosses over, with or without touching

or attachments, an adjacent filamentary structure. Furthermore it is critical to such structures that the contortion and overlapping of the filamentary structures do coact or are allowed to coact with one another. By "coact" is meant that the contortion and relative placement of the filamentary structures are such that they assist one another in producing and maintaining the claimed structures both with respect to the general alignment of the filamentary structures and their spacing with respect to each other to achieve the desirable densities contemplated.

Typical of the fibers and filaments which may be employed in such fiber-on-end pile layers are those made of polyamides, such as poly(hexamethylene adipamide), poly(metaphenylene isophthalamide), poly(hexamethylene sebacamide), polycapraamide, copolyamides and irradiation grafted polyamides, polyesters and copolyesters such as condensation products of ethylene glycol with terephthalic acid, ethylene glycol with a 90/10 mixture of terephthalic/isophthalic acids, ethylene glycol with a 98/2 mixture of terephthalic/5-(sodium sulfo)-isophthalic acids, and trans-p-hexahydroxylylene glycol with terephthalic acid, self-elongating ethyleneterephthalate polymers, polyacrylonitrile, copolymers of acrylonitrile with other monomers such as vinyl acetate, vinyl chloride, methyl acrylate, vinyl pyridine, sodium styrene sulfonate, terpolymers of acrylonitrile/methylacrylate/sodium styrene sulfonate made in accordance with U.S. Patent 2,837,501, vinyl and vinylidene polymers and copolymers, polycarbonates, polyacetals, polyethers, polyurethanes such as segmented polymers described in U.S. Patents 2,957,852 and 2,929,804, polyesteramides, polysulfonamides, polyethylenes, polypropylenes, fluorinated and/or chlorinated ethylene polymers and copolymers, (e.g., polytetrafluoroethylene, polytrifluorochloroethylenes) cellulose derivatives, such as cellulose acetate, cellulose triacetate, composite filaments such as, for example, a sheath of polyamide around a core of polyester as described in U.S. Patent 3,038,236, and self-crimped composite filaments, such as two acrylonitrile polymers differing in ionizable group content cospun side by side as described in U.S. Patent 3,038,237, regenerated cellulose, cotton, wool, glass, metal, ceramic and the like. Blends of two or more synthetic or natural fibers may be used, as well as blends of synthetic and natural. Other fibers such as silk, animal fibers such as mohair, angora, vicuna are also suitable.

Binders are used in the fiber-on-end pile layer to bond the fibers to one another and these are preferably insoluble at least in water. They may be either thermoplastic in nature or may be thermosetting. Suitable binders include natural rubber or synthetic elastomers (e.g., chloroprene, butadienestyrene copolymers, butadiene-acrylonitrile copolymers), which may be used in the form of a latex dispersion or emulsion or in the form of a solution, vinyl acetate polymers and copolymers, acrylic polymers and copolymers such as ethyl acrylate, methyl acrylate, butyl acrylate, methyl methacrylate, acrylic acid/acrylic and methacrylic ester copolymers, cellulose nitrate, cellulose acetate, cellulose triacetate, polyester resins such as ethylene terephthalate/ethylene isophthalate copolymers, polyurethanes such as the polymer from piperazine and ethylene bis-chloroformate, polyamide polymers, and copolymers, methoxymethyl polyamides, vinyl chloride polymers and copolymers such as vinyl chloride/vinylidene chloride copolymer latices. Alcohol soluble polyamide resins are also suitable binders. Suitable binders which are insoluble in organic solvents include polytetrafluoroethylene and ureaformaldehyde resin latices.

Additional suitable binder compositions include chlorosulfonated polyethylene; butyl rubbers, such as isobutylene/isoprene copolymers; polyhydrocarbons, such as polyethylene, polypropylene and the like and copolymers thereof; high molecular weight polyethylene glycols sold under the trade name of Polyox; epoxide resins, such as

the diepoxide of bisphenols and glycols; polystyrene; alkyd resins, such as polyesters of glycerol with phthalic or maleic acid; polyester resins such as from propylene glycol-maleic anhydride-styrene; phenol-formaldehyde resins; resorcinol-formaldehyde resins; polyvinyl acetals, such as polyvinyl butyral and polyvinyl formal; polyvinyl ethers, such as polyvinyl isobutyl ether; starch, zein, casein, gelatin, methyl cellulose, ethyl cellulose, polyvinyl fluoride, natural gums, polyisobutylene, shellac, terpene resins and rosin soaps. Segmented polymers, such as spandex polymers, polyether amides, polyether urethanes (e.g. those in U.S. 2,929,800) and polyester/urethanes are also suitable.

The composition of both the binder and the fiber in the fiber-on-end layer should, of course, be selected to be insensitive to skin. Polyethylene terephthalate fibers are preferred. The pile layers may also be treated with various medicaments, antiseptic materials, etc.

The fiber-on-end pile layers may be used as laminates, for example to an ordinary fabric backing. For this purpose there may be used adhesives such as chloroprene rubber, elastomeric foams and sponges, butadienestyrene rubber, polyvinyl chloride resin (e.g. those in combination with either a polymeric plasticizer or a monomeric plasticizer curable after application of the adhesive), polyurethane resins, polyamide copolymer of hexamethylene diamine and the adipic and sebacic acids, casein resins, and epoxy resins such as the diepoxide of 2,2-bis(parahydroxyphenyl)propane. Other illustrative backings are: woven fabrics such as nylon or cotton scrim fabrics, knit fabrics, nonwoven fabrics such as polyethylene or polypropylene fiber webs, etc.

The fiber-on-end pile layers of the invention are particularly advantageous in that they may be formed wholly of inert synthetic materials, e.g. ordinary textile fibers and binders. In this respect they would be more suitable than natural furs, fleeces, and other pile materials. In addition they can be fabricated at extremely low densities to provide support for the body portion and yet permit free circulation of air.

The thickness of the fiber-on-end pile covering layer can be varied as desired depending upon the type and particular function of the product. Thicknesses of $\frac{3}{32}$ " to $\frac{5}{8}$ " are generally most suitable.

In one suitable construction, polyethylene terephthalate fibers (blend of 60 parts 4 denier/filament staple having a helical crimp and 40 parts of 1.5 denier per filament staple having a stuffer box type of crimp, parts being on a weight basis) were bonded by a low melting polyester binder to a sheet density of 1 lb./ft.². The polyester binder was an ethylene terephthalate/ethylene isophthalate (79/21 molar ratio) copolyester ($\eta_{rel}=29$). The pile layer was laminated to one side of a cotton scrim fabric. In one test, part of such a laminate was sewn in the shape of an ordinary pillow case and another part in the shape of draw sheets. These products were then used as replacements for ordinary cotton pillow cases and sheets and tested by individuals having facial acne. In each case, a marked reduction in the severity of facial blemishes was noted within two weeks after start of the tests. The observed improvement did not result from prevention of pimple formation. However, the new pimples which formed healed quickly without damage to blood capillaries or development of post infection sites. These tests have continued for approximately one year with excellent results. In each case, when conventional sheets and pillow cases were substituted for the fiber-on-end structures for one month, the facial blemishes were observed to increase and then disappear after return to the fiber-on-end materials.

The fiber-on-end draw sheets and pillow cases were washed each week using cotton laundry cycles. The materials continued to be effective after a period of several months.

The term "regularly and for extended periods of time

maintaining an affected portion of the human skin in contact with a fiber-on-end pile layer" is intended to embrace usage such as the tests described above, i.e. daily contact for at least several days in which individual exposures may last several hours or more.

What is claimed is:

1. A pillow of a soft resilient, compressible filling material and a covering of a fiber-on-end pile layer comprising a porous, flexible, self-supporting material comprising substantially parallelized crimped filamentary pile members of synthetic organic polymer, the said member being distributed throughout the sheet material and being attached at a plurality of contact points throughout the three dimensions of the sheet material, the faces of the sheet material being composed essentially of fiber ends and the air within said sheet constituting at least about 50% of its volume, said covering helping to prevent aggravation of acne while a user's face is in contact therewith.

2. The pillow of claim 1 wherein the pile covering layer is composed of polyethylene terephthalate fibers.

3. The pillow of claim 1 wherein the pile covering layer has a thickness of $\frac{3}{32}$ " to $\frac{5}{8}$ " and comprises a laminate to a fabric backing.

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DALTON L. TRULUCK, *Primary Examiner*.

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