

Nov. 10, 1970

HISASHI HAMANO

3,539,436

KNITTED PRODUCT HAVING A MATERIAL-ENGAGING SURFACE

Filed Aug. 10, 1967

3 Sheets-Sheet 1

Fig. 1

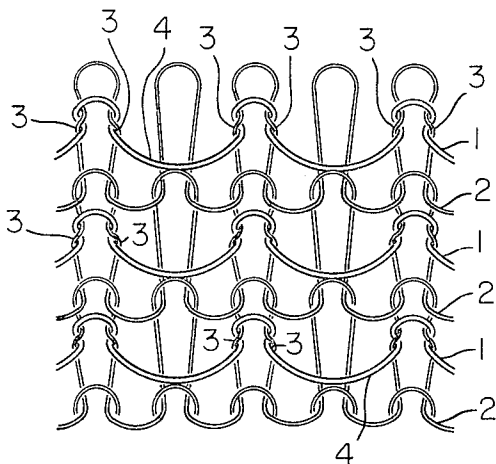
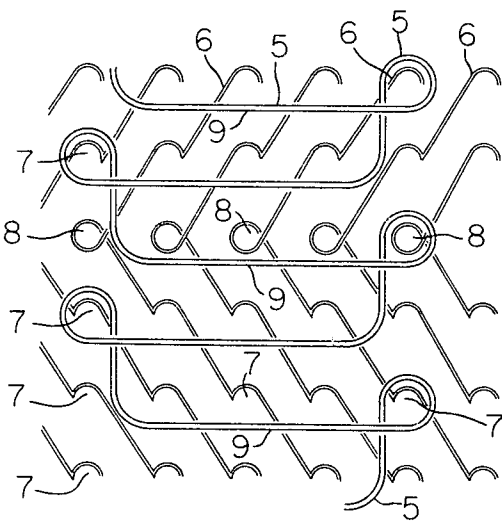


Fig. 2



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Fig. 3A

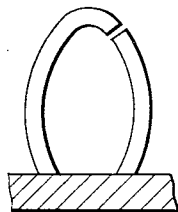


Fig. 3B

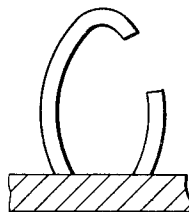


Fig. 4A

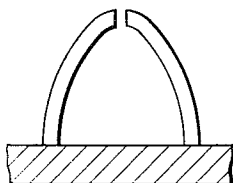


Fig. 4B

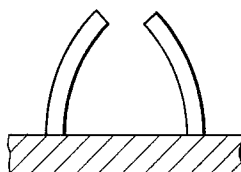
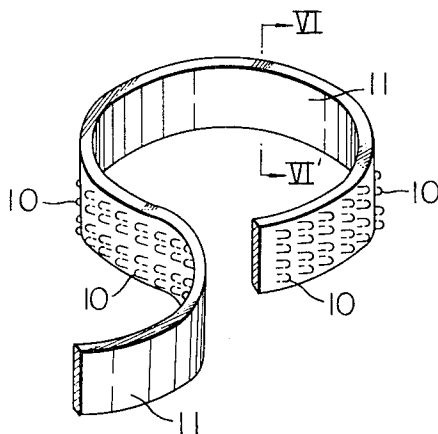


Fig. 5



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Fig. 6

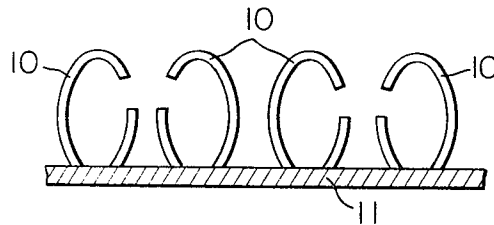


Fig. 7

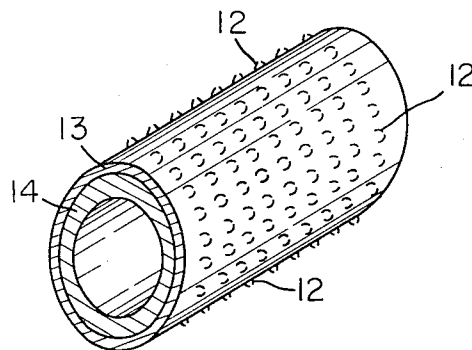
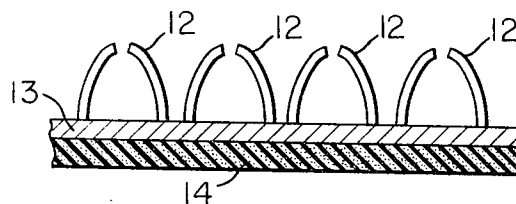


Fig. 8



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KNITTED PRODUCT HAVING A MATERIAL-ENGAGING SURFACE

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8 Claims

ABSTRACT OF THE DISCLOSURE

A knitted product having a material-engaging surface used for a hooking element for a separable fastener, a hair curler and a skid-proof tape. The product comprises a warp-knitted material or a weft-knitted material including a plurality of pile loops on its surface, and a plurality of hooks made by cutting at least a part of the pile loops, thereby forming a material-engaging surface on the knitted material.

The present invention relates to a knitted product having a material-engaging surface, more particularly relates to a knitted material having a plurality of pile loops thereon at least a part of which are cut in the form of hooks so as to engage with another material having a roughened surface.

Most of the conventional products having a material-engaging surface are made of woven cloths such as velvet type and terry fabrics. In case of such woven cloths having a material-engaging surface, it is necessary to increase the density of the woven cloth so as to provide strong engagement power to the material-engaging surface in order to prevent loosening and falling-out of hooks from the basic woven cloth. Consequently this results in a high production cost due to low production efficiency, heavy weight caused by increased density of the woven cloth, and poor elasticity and poor flexibility of the product.

The principal object of the present invention is to provide a knitted product having a material-engaging surface which can be produced at high production speed and consequently, at low production cost.

The other object of the present invention is to provide a knitted product having a material-engaging surface provided with improved anchoring effect of loops and hooks due to interlocking with the basic knitted cloth of light weight.

Further object of the present invention is to provide a knitted product having a material-engaging surface of desirable elasticity and favourable flexibility suitable for a variety of uses.

Further features and advantages of the present invention will be apparent from the ensuing description with reference to the accompanying drawings to which however the scope of the invention is in no way limited.

FIG. 1 is a schematic plan view of a felt knitted cloth embodying the present invention having a plurality of pile loops thereon,

FIG. 2 is a schematic plan view of a warp knitted cloth embodying the present invention having a plurality of pile loops thereon,

FIGS. 3A, 3B, 4A and 4B are schematic side views of hooks of the present invention,

FIG. 5 is a perspective view of a hooking piece of a separable fastener embodying the present invention,

FIG. 6 is a section taken along the line VI-VI' in FIG. 5,

FIG. 7 is a perspective view of a hair curler embodying the present invention,

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FIG. 8 is an enlarged sectional side view of a portion of the hair curler shown in FIG. 8.

An example of the knitted cloth embodying the present invention having a plurality of pile loops thereon is shown in FIG. 1, wherein the pile yarns 1 are interlocked with the knitting yarns 2 at the positions 3 to form pile loops 4 over alternate wales of the weft knitted basic cloth of plain stitch constructed by the knitting yarns 2.

Another example of the knitted cloth embodying the present invention having a plurality of pile loops thereon is shown in FIG. 2, wherein the pile yarns 5 are interlocked with the knitting yarns 6 at cotton laps 7 of the courses and silk laps 8 of adjacent courses to form pile loops 9 in such a way that the pile loops 9 float over three wales intervening in the respective laps of the warp knitted basic cloth constructed by the knitting yarns 6.

A knitted cloth having a plurality of pile loops as shown in FIGS. 1 and 2 can be used for a material-engaging surface such as a hooking element for a separable fastener, a hair curler and skid-proof tape by cutting at least a part of the pile loops on the basic knitted cloth.

Materials for making the knitted cloth of the present invention can favourably be chosen from materials in the form of filaments such as synthetic monofilaments, synthetic multifilaments, metallic wires, plastic wires, ordinary textile yarn and yarn made of glass fibers etc. Such materials in the form of filament will be called "filament-like material" in the following description. An embodiment of the present invention is obtained by using the different types of yarns made of filament-like materials described above as materials for pile yarns and basic yarns of the knitted cloth. For example, the knitted cloth is constructed by using thermoplastic monofilaments for the pile yarns and yarns made of thermoplastic synthetic fiber for the basic yarn, filament-like metallic yarn for the pile yarn and yarn made of thermoplastic synthetic fibers for the basic yarn, or thermoplastic monofilaments for the pile yarn and ordinary spun yarn of rayon staple for the basic yarn.

A practical method for satisfying the above-described requirement is constituted by permanently setting in an interlocked position the pile yarns 1 with the knitting yarns 2 in case of the embodiment shown in FIG. 1 or the pile yarns 5 with the knitting yarns 6 in case of the embodiment shown in FIG. 2 by using resin. To obtain the above-mentioned stable condition of pile loops 4 or 9, the knitted cloth is first coated by a thermoplastic resin in a liquid form and then heat-treated so as to bond the pile yarns firmly together with the basic knitting yarns by means of the hardened resin.

Another practical method for fixing the pile loops to the knitted basic cloth consists of using highly heat-shrinkable synthetic fiber yarns as the knitting yarns forming the basic knitted cloth. When the knitted cloth of this type is heat-treated, the basic knitted cloth shows high shrinkage, consequently, the hooks produced by cutting the respective pile loops of the above-mentioned heat-treated knitted cloth are stably fixed to the basic knitted cloth.

Each fixed pile loop produced by the above-mentioned method is cut at a suitable place by a conventional cutting method. The strength of engagement of the material-engaging surface of the present invention can be appropriately adjusted by selecting the shape of loops and the length of cut portion of a hook as shown in FIGS. 3A, 3B, 4A and 4B. Generally, the strength of engagement of a hook shown in FIGS. 3A and 3B is higher than that of a hook shown in FIGS. 4A and 4B, while the strength of engagement of a hook shown in FIGS. 3A and 4A, wherein the length of cut-off portion is smaller, is higher than that of a hook shown in FIGS. 3B and 4B, wherein the length of cut portion is greater.

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A hooking element for a separable fastener embodying the knitted cloth of the present invention is shown in FIGS. 5 and 6, wherein a plurality of hooks **10** made of the above-mentioned filament-like materials are fixed firmly to the basic knitted cloth **11** by the above-mentioned method. Although, in this example, all the hooks are formed in the shape shown in FIG. 3B, it is also possible to choose another shape of hooks or to mix different shapes of hooks in accordance with the strength of engagement required in the end use.

Referring to FIGS. 7 and 8, an example of a hair curler embodying the knitted cloth of the present invention is shown, wherein a plurality of hooks **12** made of the above-mentioned filament-like materials are fixed to the basic knitted cloth **13** by the above-mentioned method. The knitted cloth thus formed is attached to the base material **14** of the hair curler by a suitable bonding agent. In this example, it is preferable to apply the hooks having the shape as shown in FIGS. 4A or 4B, because a moderate strength of engagement is preferable for a hair curler so as to make it possible to remove the hair curler easily from the hair after use.

While the invention has been described in conjunction with certain embodiment thereof it is to be understood that various modifications and changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. Knitted material having on one side a multiplicity of upstanding hook-like elements suitable for repeated face-to-face engagement and disengagement with a material having a multiplicity of upstanding pile loop elements, comprising a basic knitted fabric of filament-like material yarn, a plurality of hook-like elements knitted-in by a series of interconnecting and intermeshing loops which are interlocked with the filament-like material yarn of the basic knitted fabric resulting in said hook-

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like elements firmly anchored and fixed into the basic knitted fabric and said hook-like elements projecting away from a surface of the basic knitted fabric.

2. The knitted material according to claim 1 wherein the basic knitted fabric comprises a weft knitted material.

3. The knitted material according to claim 1 wherein the basic knitted fabric comprises a warp knitted material.

4. The knitted material according to claim 1 further including a bonding agent disposed on the basic knitted fabric to reinforce and stabilize said basic knitted fabric.

5. The knitted material according to claim 1 wherein the filament-like material yarn of the basic knitted fabric comprises a heat shrinkable material.

6. The knitted material according to claim 1 wherein the basic knitted material yarn comprises a synthetic thermoplastic filament-like material.

7. The knitted material according to claim 1 wherein the hook-like elements comprise a thermoplastic filament-like material.

8. The knitted material according to claim 1 wherein the basic knitted material yarn comprises a multifilament yarn.

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U.S. Cl. X.R.

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