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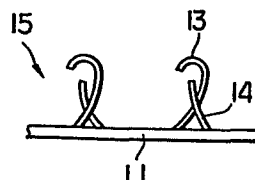
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54 Hooked fabric fastener tape and method of producing same.

57 A hooked fabric fastener tape (15) has on one of opposite surfaces of a foundation structure (11) a number of hook-shaped material engaging elements (13) and stems (14) which have been produced in pair from loops on the foundation structure (11). The respective free ends of the hook-shaped material engaging elements (13) and the stems (14) are displaced angularly away from one another as viewed from the general plane of the foundation structure (11) for easy hooking engagement with cooperating loops of a mating looped fabric fastener tape. A method of producing such a hooked fabric fastener tape (15) is also provided.

FIG. 4



HOOKED FABRIC FASTENER TAPE AND METHOD OF PRODUCING SAME

The present invention relates generally to surface type fasteners known as hook-and-loop fasteners, and more particularly to a fabric fastener tape carrying on its one surface a number of hook-shaped material engaging elements and a method of producing such a hooked fabric fastener tape.

According to a known method, a hooked fabric fastener tape of the type described is produced from a terry or uncut pile fabric carrying on its one surface a number of loops raised from the one surface, each of the loops having a pair of spaced leg sections and a head section interconnecting the leg sections. Each loop is cut open or severed at one of the leg sections thereof to produce, on one hand, a hook-shaped material engaging element and, on the other hand, a stem. The prior art hooked fabric fastener tape is disadvantageous in that after the loops have been cut open, the stems remain on the fastener tape adjacent to the corresponding hook-shaped material engaging elements in confronting relation to or substantially in vertical alignment with the respective free ends thereof. The stems are liable to hinder cooperating loops on a mating looped fabric fastener tape from being introduced into and hooked by the hook-shaped material engaging elements as the two fastener tapes are pressed into face-to-face contact together. As a result, the possibility of hooking between hooks and loops, and hence the firmness of engagement of a hook-and-loop fastener is considerably decreased. In order to displace the hook-shaped material engaging elements away from the stems, the prior art method needs to include an additional treatment by a raising machine or another complicate and expensive device.

According to a first aspect of the invention, there is provided a hooked fabric fastener tape comprising a foundation structure including a weft thread, a plurality of first warp threads and a plurality of second warp threads of synthetic resin material in the form of raised pile threads consisting of a number of pairs of hook-shaped material engaging elements

and stems, each pair of which has been produced from one loop.

The respective free ends of said hook-shaped material engaging elements are displaced angularly away from said stems
5 as viewed from the general plane of said foundation structure.

According to a second aspect of the invention, there is provided a method of producing a hooked fabric fastener tape comprising the steps of : weaving together a weft thread, a plurality of first warp threads and a plurality of second
10 warp threads of thermoplastic synthetic resin material, so as to form loops with said second warp threads on one of opposite surfaces of the so woven foundation structure, each of said loops having a pair of leg sections and a head section inter-connecting said leg sections ; heating said loops to cause
15 the loops to retain their shape to form raised pile threads ; and cutting each said loop at one of said leg sections thereof, whereby producing a hook-shaped material engaging element and a stem, while being woven, said second warp threads are submitted to a torque, said loops are heated at a temperature which allows
20 the loops to retain an internal torsional stress stored during said weaving step and upon cutting the loops, said hook-shaped material engaging elements and the stems are allowed to displace, due to said internal torsional stress, angularly away from one another as viewed from the general plane of said woven founda-
25 tion structure.

The present invention seeks to provide a hooked fabric fastener tape for hook-and-loop fasteners which can adhere to or engage with a cooperating looped fabric fastener tape with an increased degree of firmness.

30 The invention also seeks to provide a hooked fabric fastener tape having hook-shaped material engaging elements which can hook cooperating loops of a mating looped fabric fastener reliably without causing mis-engagement therewith.

The invention further seeks to provide a method which
35 produces such a hooked fabric fastener tape simply and less costly.

The above and other objects, advantages and features of the present invention will become apparent from the following

purely illustrative and not limitative description of a preferred embodiment taken in conjunction with the accompanying drawings, in which :

Figure 1 is a fragmentary diagrammatic front elevational view of loops on a foundation structure before being converted into a hooked fabric fastener tape according to the invention ;

Figure 2 is a side elevational view of Figure 1 ;

Figures 3 and 4 are views similar to Figures 1 and 2, respectively, showing a hooked fabric fastener tape having on one of opposite surfaces of a foundation structure a plurality of hook-shaped material engaging elements and stems which have been produced by cutting the loops at respective one leg sections thereof shown in Figures 1 and 2, according to the present invention ; and

5 Figure 5 is a plan view of Figure 3.

Referring now to the drawing, wherein like reference characters designate identical or corresponding parts throughout the several views, and more particularly to Figures 1 and 2, there is shown an uncut pile or looped fabric fastener tape 10 produced in accordance with the present invention. The looped fabric fastener tape 10 includes a foundation structure 11 constituted by a weft thread and a plurality of first warp threads woven with the weft thread (these threads being not shown for clarification).

5 The fastener tape 10 also includes on one of opposite surfaces of the foundation structure 11 a number of loops 12 formed with a plurality of second warp threads woven into the foundation structure during the weaving operation of the same in a loom of the general type employed in weaving velvet ribbon. Each of the loops 12 has a pair of leg sections 18, 19 and a head section 20 interconnecting the leg sections 18, 19. The second warp threads preferably are thermoplastic monofilaments made of a synthetic resin material, such as nylon or other material capable of being set by heat into a predetermined shape.

5 The second warp threads are woven, while submitted to a torque or torsional load, together with the foundation weft and warp threads, with the result that the loops 12 formed with thus twisted warp threads are twisted correspondingly as shown

in Figure 2. Exertion of the torque or twist may be done either as the second warp threads are supplied into the loom for formation of the loops 12 or as they are wound on bobbins, with the aid of a suitable torque exertion means.

5 The loops 12 are heated at a temperature which causes the loops 12 to retain their shape to form raised pile threads while allowing the same to retain an internal torsional stresses stored during the weaving operation. The heating temperature of the loops 12 is preferably set at a relatively low temperature
10 in a range within which the second warp threads of thermoplastic synthetic resin material retain their thermoplasticity.

Each of loops 12 is then cut open or severed at one 18 of the respective leg sections 18, 19 to produce, on one hand, a hook-shaped material engaging element 13 formed jointly with
15 the other leg section 19, the head section 20 and a part of the one leg section 18 and, on the other hand, a stem 14 formed with the reminder of the cut one leg section 18 and constituting a dressed nap, whereupon the hook-shaped material engaging element and the stem 13, 14 are allowed to displace, due to the
20 internal torsional stress stored therein, angularly away from each other as viewed from the general plane of the foundation structure 11, as shown in Figures 3 to 5. Thus, a large opening is provided between the free end of the hook-shaped element 13 and the stem 14 for easy reception of a corresponding loop 16
25 on a mating looped fabric fastener tape 17 (shown by phantom lines in Figure 3). A hooked fabric fastener tape 15 now converted from the looped fabric fastener tape 10 has the hook-shaped material engaging elements 13 which allow the cooperating loops 16 on the looped fabric fastener tape 17 to enter into hooking
30 engagement therewith smoothly and reliably as the two fastener tapes 15, 17 are pressed together. As a result, the possibility of hooking between hooks and loops, i.e. the firmness of engagement of a fastener is substantially increased.

Following to the loop-heating operation and prior to the
35 loop-cutting operation, the fastener tape 10 may be subjected to additional treatments at the desire, such as dyeing and fixing of the loops 12 to the foundation structure 11. The latter operation may be effected by coating or impregnating on the other or

reverse surface of the foundation structure 11 with an adhesive or a heat settable resin capable of withstanding such temperatures as are likely to be encountered in normal usage of a hook-and-loop fastener of which the hooked fabric fastener tape 5 15 forms a part.

CLAIMS

1. A hooked fabric fastener tape comprising a foundation structure (11) including a weft thread, a plurality of first warp threads and a plurality of second warp threads of synthetic resin material in the form of raised pile threads consisting of a number of pairs of hook-shaped material engaging elements (13) and stems (14), each pair of which has been produced from one loop (12), characterized in that the respective free ends of said hook-shaped material engaging elements (13) are displaced angularly away from said stems (14) as viewed from the general plane of said foundation structure (11).

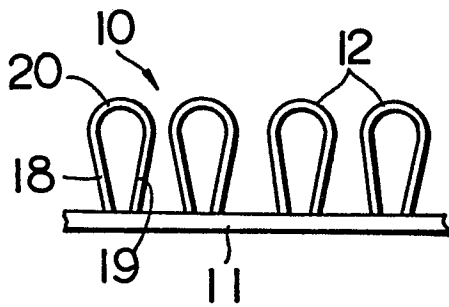
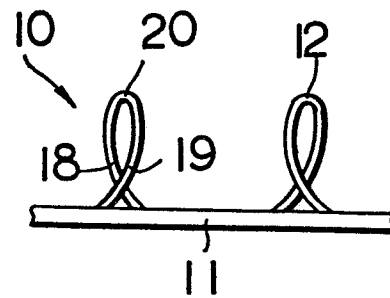
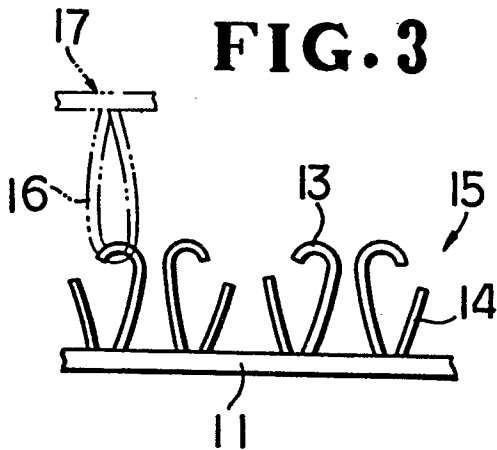
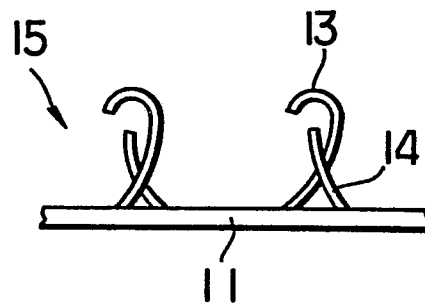
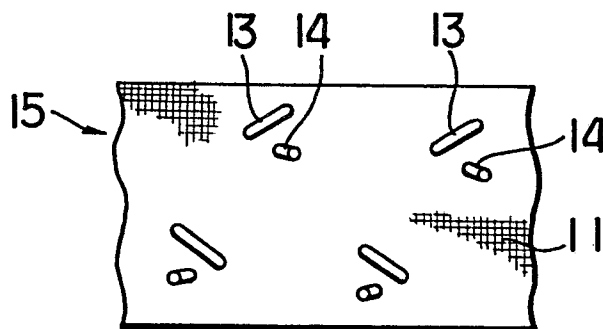
2. A hooked fabric fastener tape according to claim 1, characterized in that each of said pile threads (13,14) is formed with a thermoplastic monofilament.

3. A method of producing a hooked fabric fastener tape comprising the steps of : weaving together a weft thread, a plurality of first warp threads and a plurality of second warp threads of thermoplastic synthetic resin material, so as to form loops (12) with said second warp threads on one of opposite surfaces of the so woven foundation structure (11), each of said loops having a pair of leg sections (18, 19) and a head section 20 interconnecting said leg sections ; heating said loops (12) to cause the loops to retain their shape to form raised pile threads ; and cutting each said loop (12) at one of said leg sections (18, 19) thereof, whereby producing a hook-shaped material engaging element (13) and a stem (14), characterized in that while being woven, said second warp threads are exerted thereon a torque, that said loops (12) are heated at a temperature which allows the loops (12) to retain an internal torsional stress stored during said weaving step and in that upon cutting the loops (12), said hook-shaped material engaging elements (13) and the stems (14) are allowed to displace, due to said internal torsional stress, angularly away from one another as viewed from the general plane of said woven foundation structure (11).

4. A method according to claim 3, characterized in that said heating temperature is set at a relatively low temperature in a range within which said second warp threads of thermoplas-

tic synthetic resin material retain their thermoplasticity.

5. A method according to claim 3 or 4, characterized in that each of said second warp threads comprises a thermoplastic monofilament.

FIG. 1**FIG. 2****FIG. 3****FIG. 4****FIG. 5**



European Patent
Office

EUROPEAN SEARCH REPORT

0052338

Application number
EP 81 10 9621

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>US - A - 3 136 026 (VELCRO S.A.)</u> * column 2, lines 3-11, 24-72; column 3, lines 1-36; claims; figures * --	1,2	A 44 B 18/00
A	<u>DE - A - 1 604 743 (SELECTUS LTD.)</u> * page 3, last 2 paragraphs; page 4, paragraph 1; figures 1A-1C * --	1	
A	<u>US - A - 3 154 837 (INTERNATIONAL VELCRO CO.)</u> * column 2, lines 20-71; column 3, lines 1-16 * --	3	TECHNICAL FIELDS SEARCHED (Int.Cl. ³) A 44 B D 03 D
A	<u>US - A - 3 879 835 (G.C. BRUMLIK)</u> * column 4, lines 35-40; column 5, last paragraph; column 6, lines 1-23; figures 7A,11 * -----	1	CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document
☒ The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19-02-1982	Examiner GARNIER