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METHOD FOR THE MANUFACTURE OF PILE FABRICS

Original Filed May 9, 1958

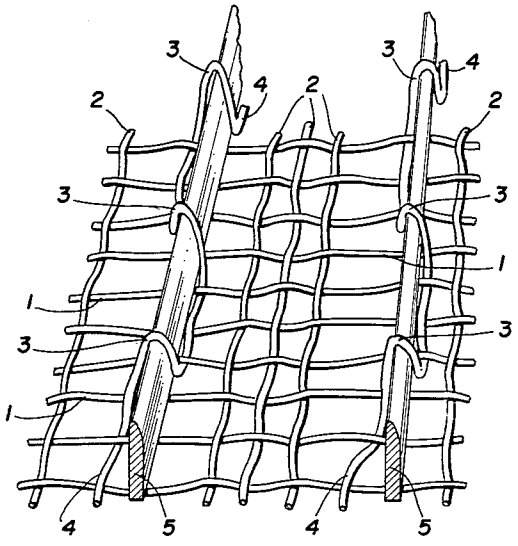


FIG. 1

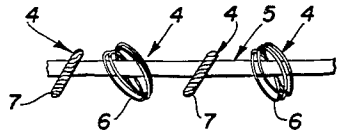


FIG. 2

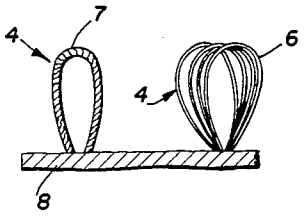


FIG. 3

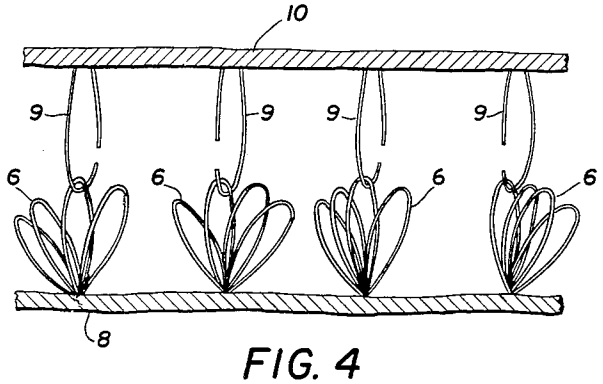


FIG. 4

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METHOD FOR THE MANUFACTURE OF PILE FABRICS

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Original application May 9, 1958, Ser. No. 734,347, now Patent No. 3,009,235, dated Nov. 21, 1961. Divided and this application Mar. 21, 1961, Ser. No. 105,846

1 Claim. (Cl. 28—72)

From Swiss Patent No. 295,638 and United States Patent No. 2,717,437, respectively, there is known a separable fastening device comprising two elements, in that case, two layers of woven fabric of the velvet type in which the loops have been cut to form hooks. The hooks of these layers of fabric are formed by a thread of artificial material, such as nylon or similar materials, so that they are capable of preserving their shape after cutting the loops to form hooks. The preservation of the shape of the hooks is obtained by a thermal treatment appropriate for the particular artificial material used.

It will be understood that when two layers of this type are pressed into face to face relation a substantial percentage of the hooks engage with one another, and the two layers are thus hooked one to the other. Separation requires a force of a considerable magnitude when it is attempted to release a large number of hooks at once but separation may be quite readily effected by progressively peeling the layers apart. Hooking or connecting devices of this character are adapted to be used, for example, as closing devices for clothing, blinds or the like, thus replacing slide fasteners, buttons and other attachments of this type, particularly when a flexible closure, which is invisible and can be opened easily, is desirable.

It has been found that the use of one layer of fabric of the hooked velvet type, as described above, with a layer of fabric of the loop-type, such as terry or uncut velvet, provides greatly improved resistance to separation of the two layers of fabric.

Experience has shown that a hooked layer, of the type disclosed in said Patent 2,717,437, provided, for example with 120 hooks per square centimeter has a relatively large portion of its surface which is not provided with hooks. As a result, only about 30% of the total number of hooks come into engagement with other hooks when two layers of such hooked fabric are pressed together. In contrast with this, when one such layer with hooks is pressed against a layer having, for example, about 1000 loops per square centimeter, the possibilities of hooking are considerably augmented.

The present application is a division of application Serial No. 734,347, filed May 9, 1958, for Separable Fastening Device and Method and Apparatus for the Manufacture of the Same, now U.S. Patent 3,009,235.

The present invention therefore has for its object the provision of a method of manufacturing a separable fastener consisting of two elements provided with cooperating hooking members characterised in that one of said elements is provided with hooks and the other with loops.

For the purpose of further enhancing the firmness of engagement of such a separable fastener the present invention provides a method for weaving the elements having the loops in which the loops are formed from multifilament yarns having such a degree of twist that as an incident of the formation of certain of the loops the filaments within such loops will become untwisted and thus will fan out to form a large number of individual loops. This method affords increased probability of engagement of the hooks with the loops so that a

major percentage, if not all, of the hooks on the hook-carying element will become engaged with a loop on the other element.

In the drawings:

FIG. 1 is an enlarged diagrammatic view illustrating a portion of an apparatus and a method for the weaving of either hooked or looped fabrics suitable for the present invention;

FIG. 2 is a fragmentary plan view of a lancet with a series of pile loops formed thereon in accordance with the present invention;

FIG. 3 is a diagrammatic, vertical sectional view of a fabric, taken in a plane parallel with the warps from which the loops are formed in accordance with the present invention; and

FIG. 4 is a diagrammatic, vertical sectional view taken in a plane perpendicular to FIG. 3 and showing the fabric of FIG. 3 in cooperative relationship with a hook element to form a fastening device.

With reference to FIG. 1, the terry or velvet-type uncut fabric illustrated is manufactured by forming a base fabric which comprises a number of firmly woven weft threads 1 and warp threads 2. It will be understood that a large number of warp threads 2 have been omitted and that the weft threads 1 have been shown spread apart. The loops 3 of said fabric are formed in supplementary warp threads 4 passed over metal bars 5 in the form of lancets during the weaving operation, in a loom of the general type employed in weaving velvet ribbon. Said supplementary warp threads 4 preferably are of artificial material, such as nylon or other material capable of being set by heat into a predetermined form. Such supplemental warps are thus capable of retaining by reason of thermal heat treatment, the shape which has been imparted thereto during weaving. Said supplementary warp threads 4 are multifilaments which are preferred for the manufacture of the looped elements.

The fabric shown in FIG. 2 is a looped fabric woven as illustrated in FIG. 1 with lancets 5 all having substantially the same cross-section. Said fabric includes supplementary warp threads 4 of the multifilament type. By selecting multifilament threads or yarns 4 having an initial twist or torsion equal to the amount of untwisting which will occur as the yarns are carried in one direction across the lancets 5, every other loop in the same series will be fanned out as shown at 6 while the remaining loops 7 will be even more tightly twisted as diagrammatically indicated in FIGS. 2 and 3. The untwisting just referred to results from the fact that the pile yarn 4 is secured against twisting about its longitudinal axis at the point where it has been beaten into the base fabric 8 as it is formed from yarns 1 and 2 and at the point where this same yarn 4 is held by tension in the doupe and against the reed dents. If, for example the pile yarn 4 is twisted clockwise (Z-twist) the portion thereof between the points just mentioned will untwist when the doupe moves from the right (looking from the front of the loom) to the left side of the lancet 5. Such untwisting will constitute only a fraction of a complete turn and the initial twist of the yarn 4 is so selected as to be equal to the amount of untwisting which will occur in the particular length of yarn between such points of engagement. A similar fractional turn of additional twist will be added when the doupe moves from left to right.

The separated filaments 6 in those loops which have been untwisted as just described constitute individual loops, any one or more of which is readily available for engagement with a hook 9 forming a part of a hook fastening element 10, as shown in FIG. 4. As noted above FIG. 4 is taken in a plane perpendicular to the plane

of FIG. 3 whereby a transversely extending row of untwisted loops **6** is shown. The hook fastening element **10** may be of any desired construction, for example, it may be an element such as shown in the aforesaid U.S. Patent No. 2,717,437.

In the weaving of the loop element herein disclosed it is preferred to weave the base fabric **8**, formed from yarns **1** and **2** as shown in FIG. 1, very tightly and to weave the pile yarns **4** into the base fabric with considerable firmness. After the weaving operation the loops formed from yarns **4** may be fixed or stabilized so that they retain their shape and position. This fixing or stabilization may be effected by heat setting or by impregnation of the fabric, for example by adhesive products, or both. In this manner a very large number of durable and firmly anchored loops are provided.

A preferred manner of heat setting of the loops and fabric as just described is to so arrange the loom on which the fabric is woven that the lancets **5** extend in the direction of movement of the woven fabric for a substantial distance whereby the loops may slide along the lancets while continuing to surround the lancets. A heating device, not shown, may be arranged to heat the loops on the extended lancets **5** to a heat setting temperature appropriate for the particular synthetic material of which the loops and/or the fabric base **8** are formed. As indicated above, the base fabric **8** may be impregnated with an adhesive and preferably may be impregnated or coated on the reverse face with a heat-settable resin capable of withstanding such temperatures as are likely to be encountered in normal usage of a fastener element.

The hooked fabric **10** or the looped fabric **8** as shown in FIG. 4 may be produced in various ways. For example, they may be woven as relatively narrow bands having a width required for the intended use. In that event a number of such bands may be woven simultaneously on a loom of the type used for weaving ribbon. Alternatively, they may be woven as a band of considerable width which may be slit to form bands of desired width. In either event the bands may be of indeterminate length from which desired lengths may be cut at will.

What is claimed is:

A method for the manufacture of a separable fastener member comprising weaving a base fabric including warp and weft yarns and supplemental yarns forming a loop pile on said base fabric, utilizing as said supplemental yarns a multifilament synthetic resinous material having a twist in a predetermined direction, weaving each of said supplemental yarns in a predetermined zig-zag pattern such as substantially to untwist said supplemental yarn in every other loop formed consecutively from each of said supplementary yarns, whereby to separate the filaments in each of such untwisted loops into discrete loops, and stabilizing said fabric to maintain said discrete loops in separated condition.

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2,857,652	McNally et al.	Oct. 28, 1958
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