

Description

This invention relates generally to hook-and-loop or surface fasteners and particularly to hook elements therefor.

Many hook-and-loop fasteners have been proposed in the art for use on a variety of articles such as sphygmomanometer bands, wrist watch bands, diapers, bags, clothings, sporting goods and the like. Conventional hook-and-loop fasteners comprise hooks or male elements on one support tape engageable with corresponding loops or female elements on the other tape, the hooks being plastic monofilaments having a round cross section and smooth or refined surface characteristics. Because of these physical characteristics, the starting monofilamentary material is relatively low in thermal efficiency and hence difficult to retain the shape of the hook afforded upon heat set, the resulting hooks being susceptible to elongation or deformation and hence insufficient in opportunity and strength of coupling engagement with their mating loops. Such hook elements are further difficult to dye to sufficient depth and with uniformity.

EP-A-53 348 discloses a surface fastener comprising a substrate in the form of a tape and hook elements supported on said substrate and made of a thermoplastic filamentary material. However, the filamentary material is of smooth circular cross-section, making it less than ideal as regards thermal setting and retention of shape and, when dyed, retention of dye.

FR-A-2 318 951 discloses monofilamentary sewing threads made of thermoplastic material having a multivaned configuration which provides greater knot strength, a factor which is not relevant to hook elements of a surface fastener. FR-A-2 318 951 points out at the beginning thereof that monofilament thread assumes the colour of the fabric into which it is sewn, meaning that the thread does not require to be dyed. Of course, the characteristics required of sewing thread are quite different to the characteristics required of hook elements in a surface fastener.

With the foregoing drawbacks of the prior art in view, the present invention seeks to provide a hook or male element for surface fasteners which is capable of holding itself in the shape and posture desired for effective engagement with its female counterpart.

The present invention further seeks to provide a hook element for surface fasteners which can be effectively dyed.

The present invention further seeks to provide a hook element for surface fasteners which can be produced with less quantities of a starting plastic material than heretofore required.

It is an object of the invention to provide a

surface fastener comprising a substrate in the form of a tape and hook elements supported on said substrate and made of a thermoplastic filamentary material, with good thermal setting characteristics and good dye retention ability.

The present invention provides a surface fastener as claimed in each of the claims, to which reference is directed.

These and other objects and features of the invention will be better understood from the following description taken in connection with the accompanying drawings which illustrate by way of example certain preferred embodiments of the invention.

Figure 1 is a front elevational view on enlarged scale of a hook element secured to a support tape;

Figure 2a is a plan view, partly sectional, on enlarged scale of a portion of a hook element according to one embodiment of the invention;

Figure 2b is a cross-sectional view of Figure 2a;

Figure 3a is a plan view, partly sectional, on enlarged scale of a portion of a hook element according to another embodiment of the invention;

Figure 3b is a cross-sectional view of Figure 3a;

Figure 4a is a cross-sectional view on enlarged scale of a hook element according to a further embodiment of the invention;

Figure 4b is a cross-sectional view on enlarged scale of a hook element according to still another embodiment of the invention;

Figure 4c is a cross-sectional view on enlarged scale of a hook element according to still further embodiment of the invention; and

Figures 5a and 5b, Figures 6a and 6b, and Figure 7a and 7b inclusive each are cross-sectional views on enlarged scale of a symmetrical set of modified grooves in and protuberances on hook elements according to the invention contemplated under the invention.

According to the principles of the invention, a hook or male element for a surface fastener is provided peripherally with a plurality of protuberances and/or grooves or notches.

Referring to Figure 1, there is shown a preferred form of a hook or male element 10 generally circular in cross section which is supported on a substrate such as a tape 11 and which has a slit 12 through which the hook 10 is engageable with its mating loop or female element (not shown) in a manner well known in the art. The hook element 10 of Figure 1 is made of a suitable plastic filamentary material and has a plurality of longitudinally, radially extending protuberances 13 alternating with longitudinal grooves 14 as better shown in Figures 2a and 2b.

The hook element 10 shown in Figures 3a and

3b is characterized by the provision of four longitudinally extending, cross-sectionally square protuberances 15 which are equally spaced in symmetric positions with their corners 15' rounded off to prevent possible damage on the mating loop.

Figure 4a shows a modification of Figures 3a and 3b in which the hook element 10 is provided with four grooves 16 in place of the protuberances 15.

Figure 4b shows a hook element 10 similar to that shown in Figure 4a but having larger grooves 17.

Figure 4c shows a hook element 10 is the same as that of Figures 3 and 3b except for the protuberances 15 being dimensionally larger.

The hook element 10 shown in Figures 5a and 5b is provided with either cross-sectionally semicircular or arcuate protuberance or protuberances 18 or with cross-sectionally semicircular or arcuate grooves 19.

Figures 6a and 6d show a hook element 10 having protuberance 20 or a groove 21 cross-sectionally trapezoidal.

Figure 7a shows a further modification of a hook element 10 which is generally square in cross section and which has a longitudinal, cross-sectionally square groove 22 in each of the four sides, and Figure 7b has a hook element 10 symmetrical to that of Figure 7a in that it has protuberances 23 in place of corresponding grooves 22.

Having thus described the invention, it will be understood that the hook element 10 for surface fastener is importantly and invariably provided with peripheral surface irregularities either in a convex (protuberance) form or a concave (groove) form, or a combination thereof, thereby providing a greater gross surface area than that of the conventional counterpart with the result that the hook forming material with such surface characteristics can be more effectively thermally set in the desired form which is retainable over prolonged service life. The hook element 10 of the invention can be coloured distinctly and uniformly when dyed for example by pad steaming as the protuberances or grooves afford increased surface tension and greater dye pick-up. Also advantageously, the hook elements 10 with protuberances alone can be fabricated with reduced amounts of thermoplastic monofilamentary material as the protuberances serve to provide increased resistance to bending stress.

Claims

1. A surface fastener comprising a substrate (11) in the form of a tape and hook elements (10) supported on said substrate and made of a

thermoplastic monofilamentary material, characterized in that each said hook element (10) is thermally set in a hook form and has a peripheral surface configuration to enhance the thermal setting of the hook shape and to enhance the retention of said hook shape, said surface configuration comprises at least one protuberance (13) and/or at least one groove (14) extending longitudinally throughout the length of said hook element (10).

2. A surface fastener according to claim 1, characterized in that said hook element (10) is dyed with a predetermined colour and said surface configuration affords increased surface tension and greater dye pick-up.
3. A surface fastener according to claim 1 or 2, characterized in that said hook element (10) has a plurality of equally spaced longitudinal protuberances (13) and/or grooves (14).
4. A surface fastener according to claim 1, 2 or 3, characterized in that said hook element (10) has alternate radially extending protuberances (13) and grooves (14).
5. A surface fastener according to claim 1 or 2, characterized in that each of the protuberances (18) on said hook element (10) has a semicircular cross section.
6. A surface fastener according to claim 1 or 2, characterized in that each of the protuberances (20) on said hook element (10) has a trapezoidal cross section.
7. A surface fastener according to claim 1 or 2, characterized in that each of the grooves (19) in said hook element (10) has a semicircular cross section.
8. A surface fastener according to claim 1 or 2, characterized in that each of the grooves (21) in said hook element (10) has a trapezoidal cross section.
9. A surface fastener according to claim 1 or 2, characterized in that each of the protuberances (23) on said hook element (10) has a square cross section.
10. A surface fastener according to claim 1 or 2, characterized in that each of the grooves (22) in said hook element (10) has a square cross section.
11. A surface fastener according to claim 1 or 2,



3b is characterized by the provision of four longitudinally extending, cross-sectionally square protuberances 15 which are equally spaced in symmetric positions with their corners 15' rounded off to prevent possible damage on the mating loop.

Figure 4a shows a modification of Figures 3a and 3b in which the hook element 10 is provided with four grooves 16 in place of the protuberances 15.

Figure 4b shows a hook element 10 similar to that shown in Figure 4a but having larger grooves 17.

Figure 4c shows a hook element 10 is the same as that of Figures 3 and 3b except for the protuberances 15 being dimensionally larger.

The hook element 10 shown in Figures 5a and 5b is provided with either cross-sectionally semicircular or arcuate protuberance or protuberances 18 or with cross-sectionally semicircular or arcuate grooves 19.

Figures 6a and 6d show a hook element 10 having protuberance 20 or a groove 21 cross-sectionally trapezoidal.

Figure 7a shows a further modification of a hook element 10 which is generally square in cross section and which has a longitudinal, cross-sectionally square groove 22 in each of the four sides, and Figure 7b has a hook element 10 symmetrical to that of Figure 7a in that it has protuberances 23 in place of corresponding grooves 22.

Having thus described the invention, it will be understood that the hook element 10 for surface fastener is importantly and invariably provided with peripheral surface irregularities either in a convex (protuberance) form or a concave (groove) form, or a combination thereof, thereby providing a greater gross surface area than that of the conventional counterpart with the result that the hook forming material with such surface characteristics can be more effectively thermally set in the desired form which is retainable over prolonged service life. The hook element 10 of the invention can be coloured distinctly and uniformly when dyed for example by pad steaming as the protuberances or grooves afford increased surface tension and greater dye pick-up. Also advantageously, the hook elements 10 with protuberances alone can be fabricated with reduced amounts of thermoplastic monofilamentary material as the protuberances serve to provide increased resistance to bending stress.

Claims

1. A surface fastener comprising a substrate (11) in the form of a tape and hook elements (10) supported on said substrate and made of a

thermoplastic monofilamentary material, characterized in that each said hook element (10) is thermally set in a hook form and has a peripheral surface configuration to enhance the thermal setting of the hook shape and to enhance the retention of said hook shape, said surface configuration comprises at least one protuberance (13) and/or at least one groove (14) extending longitudinally throughout the length of said hook element (10).

2. A surface fastener according to claim 1, characterized in that said hook element (10) is dyed with a predetermined colour and said surface configuration affords increased surface tension and greater dye pick-up.
3. A surface fastener according to claim 1 or 2, characterized in that said hook element (10) has a plurality of equally spaced longitudinal protuberances (13) and/or grooves (14).
4. A surface fastener according to claim 1, 2 or 3, characterized in that said hook element (10) has alternate radially extending protuberances (13) and grooves (14).
5. A surface fastener according to claim 1 or 2, characterized in that each of the protuberances (18) on said hook element (10) has a semicircular cross section.
6. A surface fastener according to claim 1 or 2, characterized in that each of the protuberances (20) on said hook element (10) has a trapezoidal cross section.
7. A surface fastener according to claim 1 or 2, characterized in that each of the grooves (19) in said hook element (10) has a semicircular cross section.
8. A surface fastener according to claim 1 or 2, characterized in that each of the grooves (21) in said hook element (10) has a trapezoidal cross section.
9. A surface fastener according to claim 1 or 2, characterized in that each of the protuberances (23) on said hook element (10) has a square cross section.
10. A surface fastener according to claim 1 or 2, characterized in that each of the grooves (22) in said hook element (10) has a square cross section.
11. A surface fastener according to claim 1 or 2,



characterized in that each of the grooves (14) in said hook element (10) has a triangular cross section.

12. A surface fastener according to claim 1 or 2, characterized in that said hook element (10) has a generally square cross section.

Revendications

1. Fermeture du type de surface comprenant un substrat (11) se présentant sous forme d'un ruban et des éléments (10) formant crochets portés par ledit substrat et fabriqués en un matériau thermoplastique constituant un monofilament, caractérisée en ce que chacun desdits éléments (10) formant crochets est fixé thermiquement en forme de crochet et a une configuration de surface périphérique qui est destinée à renforcer la fixation thermique de la forme de crochet et à améliorer la capacité de retenue de ladite forme de crochet, ladite configuration de surface comprenant au moins une protubérance (13) et/ou au moins une rainure (14) qui s'étendent longitudinalement sur toute la longueur dudit élément (10) formant crochet.
2. Fermeture du type de surface selon la revendication 1, caractérisée en ce que ledit élément (10) formant crochet est teint en une couleur prédéterminée et que ladite configuration de surface assure une tension superficielle accrue et une meilleure absorption de la teinture.
3. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que ledit élément (10) formant crochet comporte une pluralité de protubérances longitudinales (13) et/ou de rainures (14), espacées de manière égale.
4. Fermeture du type de surface selon les revendications 1, 2 ou 3, caractérisée en ce que ledit élément (10) formant crochet comporte des protubérances (13) et des rainures alternées (14) qui s'étendent radialement.
5. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacune des protubérances (18) dudit élément (10) formant crochet a une section transversale en forme de demicercle.
6. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacune des protubérances (20) dudit élément (10) for-

mant crochet a une section transversale en forme de trapèze.

7. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacune des rainures (19) dudit élément (10) formant crochet a une section transversale en forme de demicercle.
8. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacune des rainures (21) dudit élément (10) formant crochet a une section transversale trapézoïdale.
9. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacune des protubérances (23) dudit élément (10) formant crochet a une section transversale carrée.
10. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacune des rainures (22) dudit élément (10) formant crochet a une section transversale carrée.
11. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacune des rainures (14) dudit élément (10) formant crochet a une section transversale triangulaire.
12. Fermeture du type de surface selon la revendication 1 ou 2, caractérisée en ce que chacun desdits éléments (10) formant crochet a une section transversale de forme généralement carrée.

Ansprüche

1. Flächenhaftverschluß, umfassend einen Träger (11) in Form eines Bandes und Hakenelemente (10), die auf dem Träger abgestützt und aus einem thermoplastischen Drahtmaterial hergestellt sind, dadurch gekennzeichnet, daß jedes dieser Hakenelemente (10) in einer Hakenform wärmefixiert ist und eine Ausbildung der Umfangsfläche hat, um die Wärmefixierung der Hakenform und die Haltekraft der Hakenform zu verbessern, wobei diese Oberflächenausbildung mindestens einen Vorsprung (13) und/oder mindestens eine Nut (14) umfaßt, der bzw. die sich in Längsrichtung über die Länge des Hakenelements (10) erstreckt.
2. Flächenhaftverschluß nach Anspruch 1, dadurch gekennzeichnet, daß das Hakenelement (10) mit einer bestimmten Farbe gefärbt

ist und daß die Oberflächenausbildung eine vergrößerte Oberflächenspannung und eine bessere Farbaufnahme bewirkt.

3. Flächenhaftverschluß nach Anspruch 1 oder 2, dadurch **gekennzeichnet**, daß das Haken-
element (10) mehrere gleichabständige längliche
vorsprünge (13) und/oder Nuten (14) hat. 5
4. Flächenhaftverschluß nach Anspruch 1, 2 oder
3, dadurch **gekennzeichnet**, daß das Haken-
element (10) abwechselnd radiale Vorsprünge
(13) und Nuten (14) hat. 10
5. Flächenhaftverschluß nach Anspruch 1 oder 2, 15
dadurch **gekennzeichnet**, daß jeder der Vor-
sprünge (18) des Hakenelements (10) einen
halbkreisförmigen Querschnitt hat.
6. Flächenhaftverschluß nach Anspruch 1 oder 2, 20
dadurch **gekennzeichnet**, daß jeder der Vor-
sprünge (20) des Hakenelements (10) einen
trapezförmigen Querschnitt hat.
7. Flächenhaftverschluß nach Anspruch 1 oder 2, 25
dadurch **gekennzeichnet**, daß jede der Nuten
(19) des Hakenelements (10) einen halbkreis-
förmigen Querschnitt hat.
8. Flächenhaftverschluß nach Anspruch 1 oder 2, 30
dadurch **gekennzeichnet**, daß jede der Nuten
(21) des Hakenelements (10) einen trapezfö-
rmigen Querschnitt hat.
9. Flächenhaftverschluß nach Anspruch 1 oder 2, 35
dadurch **gekennzeichnet**, daß jeder der Vor-
sprünge (23) des Hakenelements (10) einen
quadratischen Querschnitt hat.
10. Flächenhaftverschluß nach Anspruch 1 oder 2, 40
dadurch **gekennzeichnet**, daß jede der Nuten
(22) des Hakenelements (10) einen quadrati-
schen Querschnitt hat.
11. Flächenhaftverschluß nach Anspruch 1 oder 2, 45
dadurch **gekennzeichnet**, daß jede der Nuten
(14) des Hakenelements (10) einen dreieckigen
Querschnitt hat.
12. Flächenhaftverschluß nach Anspruch 1 oder 2, 50
dadurch **gekennzeichnet**, daß das Haken-
element (10) einen im allgemeinen quadratischen
Querschnitt hat.

