

Description

This invention relates generally to slide fasteners and particularly to coupling element therefor. More particularly, the invention is directed to such coupling elements which have a cross-sectionally semi-circular configuration and which are formed into a continuous meandering structure.

Slide fasteners having coupling elements of the character described find wide application as closure devices for garment articles, bags, suitcases, coverings and the like. Coupling elements having a semi-circular transverse cross-section formed from a synthetic resinous monofilament into a meandering or zig-zag structure are already known as disclosed for example in Japanese Patent Publication No. 39-9390 (corresponding to U.S. Patent No. 2,919,482).

US-A-3248767 discloses a row of coupling links for slide fasteners in which series of straight ladder-like elements are arranged so that in each series an element of a first series is connected to an element of a second series through a U-bend, each of said U-bends being constructed with a widened head portion.

Due to its physical peculiarity of being sectionally semi-circular and hence relatively small in radius, the monofilament is difficult to be freely bent or otherwise formed into a meandering structure with its flat surface aligned in a common plane and without causing the monofilament to become wavy or run off a predetermined track on opposite surfaces of a stringer tape. This makes it difficult to pass the sewing threads properly on the monofilament and through the tape. Furthermore, the monofilament being sectionally semi-circular provides limited contact areas to be guidedly threaded through a slider and hence opposed rows of coupling elements made from such monofilament would fail to be brought securely together, or would undergo what is known as "chain crack". Improper or loose coupling condition of the coupling elements would also lead to their deformation or damage when jammed between the stringer tape and the slider flanges.

The present invention seeks to provide a continuous row of meandering coupling elements having a semi-circular transverse cross-section for slide fasteners which will preclude the foregoing difficulties of the prior art.

The present invention further seeks to provide a continuous row of coupling elements having a semi-circular transverse cross-section for slide fasteners which ensures strong and stable interengagement with a companion element row by smooth sliding contact with a slider.

The present invention further seeks to provide coupling elements of the character mentioned

which can be easily removed for gapping or providing element-free sections on a slide fastener stringer.

These and other objects and features of the invention will appear more apparent from reading the following detailed description with reference to the accompanying drawings.

According to the invention, there is provided a coupling element for a slide fastener which is formed from a substantially cross-sectionally semi-circular monofilamentary material into a continuous meandering structure mounted on a stringer tape, said element having a coupling head, an upper leg and lower leg respectively extending from opposite ends of said head and a heel interconnecting said legs with corresponding legs of the next adjoining element, said heel comprising at least one protrusion extending beyond and above the planar level of each of said interconnected corresponding legs.

Particular embodiments of the invention are set out in dependent claims 2 - 8.

Figure 1 is a perspective view on enlarged scale of a row of meandering coupling elements embodying the invention;

Figure 2 is a plan view of the same in two rows shown mounted on stringer tapes;

Figure 3 is a longitudinal cross-sectional view taken on the line III - III of Figure 2;

Figure 4 is a transverse cross-sectional view of Figure 2 showing the two rows of coupling elements coupled together by a slider;

Figure 5 is a transverse cross-sectional view of Figure 2 showing how the coupling elements are removed from the respective tapes;

Figure 6 is a plan view of the coupling elements shown woven into the tape;

Figure 7 is a transverse cross-sectional view taken on the line VII - VII of figure 6;

Figure 8 is a transverse cross-sectional view of the coupling element shown secured to the tape edge;

Figure 9 is a cross-sectional view taken on the line IX - IX of Figure 8;

Figures 10 through 18, inclusive, are perspective views of modified forms of coupling elements embodying the invention; and

Figures 19a - 19d inclusive are transverse cross-sectional views of starting monofilaments from which the coupling elements of the invention may be formed.

Referring now to the drawings and Figure 1 in particular, there is shown a length of coupling elements 10 formed from a monofilament of a thermoplastic resin such as polyester, nylon and the like into a continuous meandering or zig-zag structure. The monofilament designated at M in Figures 19a - 19d has a substantially semi-circular transverse cross-section. An example shown in Figure 19a is

truly semi-circular in cross-section; that in Figure 19b has a semi-circular cross-section slightly higher than the example of Figure 19a; that in Figure 19c has a cross-sectional configuration somewhat elongated; and that in Figure 19d has a semi-circular cross-section canted along both of its longitudinal edges. Each of the elements 10 as observed individually consists of a coupling head 11 which is flattened out to provide on opposite sides thereof a pair of engaging ribs 11a and 11b as shown in Fig. 6, an upper leg 12 and a lower leg 13 respectively extending horizontally from the upper and lower ends of the head 11 and a heel 14 extending alternately from and interconnecting respective upper legs 12 and lower legs 13 of adjacent coupling elements 10.

The upper leg 12 and the lower leg 13 of each element 10 merge through the heel 14 into the corresponding upper and lower legs 12 and 13, respectively, of the next adjoining element 10 and extend in superimposed spaced apart relation to each other with their respective flat or planar surfaces 12a and 13a oriented in confrontation. Therefore, the upper and lower legs 12 and 13 in each of the successive elements 10 run in parallel with one another and are interconnected so as to present a substantially "U"-shaped configuration when observed in plan view as better shown in Figures 2 and 6.

As shown in Figure 2, a row of coupling elements 10 is mounted on one of a pair of opposed stringer tapes 15 and 16 with the respective planar surfaces 12a and 13a of the upper and lower legs 12 and 13 directed in face-to-face relation to respective upper and lower surfaces of the tape 15, (16) and with the coupling head 11 protruding beyond a longitudinal edge of the tape 15, (16) so as to be engageable with the heads 11 in adjacent elements 10 on the opposite companion tape 16. The two rows of coupling elements 10 are secured to their respective stringer tapes 15 and 16 by means of sewn seams 17 as shown in Figure 2.

According to an important aspect of the invention, the heel 14 of each unit element 10 is oriented as by stamping or clamping so that heel (14) comprises at least one protrusion extending beyond and above the planar level of the leg 12, (13). Orientation of the heel 14 may be done either before or after the monofilament M is formed into a meandering element structure.

According to a preferred embodiment of the invention, the heel 14 is oriented 90 degrees so as to direct the majority of its planar surface 14a inwardly toward the coupling head 11 with the result that the upper edge 14b and lower edge 14c of the heel 14 are raised to protrude beyond or lie above the outer surface levels of the upper leg 12 and lower leg 13, respectively as better shown in

Figure 4. Advantageously, a rounded or arcuate outer surface 14d of the oriented heel 14 provides increased guide surface for sliding engagement with an inner flange wall Sa of a slider S thereby enhancing smooth operation of the slider S. Further advantageously, the oriented heel 14 protects the seen seam 17 from coming into frictional contact with the interior surfaces of the slider S. Still further advantageously, a gapping operation to provide element-free portions at predetermined intervals on the stringer tapes 15, 16 is greatly facilitated as illustrated in Figure 5, in which a predetermined length of coupling elements 10 after having their heads 11 cut off by punch 18 and die 19 can be easily removed on account of the raised edges 14b, 14c of the oriented heels 14 serving as abutments for grippers 20 to firmly grip and smoothly take away the length of elements 10 that has been cut.

In place of the sewn seams 17, there may be employed a supersonic or high-frequency bonding procedure for securing the row of coupling elements 10 to the stringer tape 15, (16) as shown in Figures 8 and 9, in which instance the planar surfaces 12a and 13a of the upper and lower legs 12 and 13 are registered with and fused as at 21 to the respective surfaces of the stringer tape 15, (16). The elements 10 may be alternatively adhesively secured to the stringer tape 15, (16).

Further alternatively, the monofilament M which forms a row of meandering elements 10 may be woven simultaneously with weaving of a stringer tape in a manner well known in the art as shown in Figures 6 and 7.

While in the embodiment shown in Figures 1 and 4 in particular the major portion of the heel 14 of the element 10 is raised by orientation above the outer surface of the leg 12, (13), substantially equivalent results can be obtained by arranging at least a portion of the heel 14 to protrude beyond the outer surface of the leg 12, (13).

Figure 10 shows a unit coupling element 10 of a meandering or zig-zag form which has its heel 14 twisted by rotation counterclockwise through 180° with the planar surface 14a of the heel 14 lying parallel with but opposite to the tape surface. Thus twisting the element 10 causes the heel 14 to deform at opposite ends thereof and create bulged shoulders 14e which protrude beyond the outer surfaces of the leg 12, (13).

Figure 11 shows a modification similar to the element 10 of Figure 10 but having the heel 14 twisted clockwise through 180° with its planar surface 14a lying likewise opposite to the tape surface, thereby producing projections 14f at opposite ends of the heel 14.

Figure 12 shows an element 10 having its heel 14 twisted through 90° so as to direct the planar

surface 14a outwardly away from the coupling head 11 in contrast to the embodiment shown in Figure 1.

Figures 13 and 14 respectively show elements 10 each having the planar surface 14a of the heel 14 directed face to face with the tape surface with opposite ends of the heel 14 stamped to form a protuberance 14g, the only difference being that a recess 14h resulting from stamping is produced externally of the heel 14 in the case of Figure 13 and internally of the heel 14 in the case of Figure 14.

Figure 15 shows a modified form of meandering element 10 characterized by the formation of an upwardly projecting lug 14i substantially over the entire length of the heel 14 by means of a punch 22 and a die 23 schematically illustrated in Figure 16, the resulting heel 14 having a substantially L-shaped cross-section as taken on the line XVI-XVI of Figure 15.

The meandering elements 10 shown in Figures 13 - 15 are most suitable for weaving into the stringer tape because of greater flexibility provided at the respective worked surfaces of the heel 14.

Figure 17 shows a further modification of Figure 1 in which the heel 14 has a cavity 14j formed in its outer surface 14d.

A meandering coupling element 10 shown in Figure 18 has the planar inner surfaces 12a, 13a of the upper and lower legs 12, 13 which are rendered coarse so as to provide slip-free, stronger attachment of the element 10 to the stringer tape.

Claims

1. A coupling element (10) for a slide fastener which is formed from a substantially cross-sectionally semi-circular monofilamentary material (M) into a continuous meandering structure mounted on a stringer tape (15, 16), said element (10) having a coupling head (11), an upper leg (12) and a lower leg (13) respectively extending from opposite ends of said head (11) and a heel (14) interconnecting said legs (12, 13) with corresponding legs of the next adjoining element, characterized in that said heel (14) comprises at least one protrusion extending beyond and above the planar level of each of said interconnected corresponding legs.
2. A coupling element (10) according to claim 1 characterized in that said heel (14) is oriented by rotation through 90° so as to direct the majority of its planar surface (14a) inwardly toward said coupling head (11).

3. A coupling element (10) according to claim 1 characterized in that said heel (14) is oriented by rotation through 90° so as to direct its planar surface (14a) away from said coupling head (11).
4. A coupling element (10) according to claim 1 characterized in that said heel (14) is oriented by rotation through 180° with its planar surface (14a) extending parallel with the surface of said tape (15, 16).
5. A coupling element (10) according to claim 1 characterized in that said planar surface (14a) of said heel (14) is directed face to face with the surface of said tape (15, 16) with opposite ends of said heel (14) stamped to form said at least one protrusion (14g).
6. A coupling element (10) according to claim 1 characterized in that said at least one protrusion of said heel (14) is an upwardly projecting lug (14i) extending substantially over its entire length.
7. A coupling element (10) according to claim 1 characterized in that said heel (14) has a cavity (14j) formed in its outer surface (14d).
8. A coupling element (10) according to claim 1 characterized in that said upper and lower legs (12, 13) have coarse inner surfaces (12a, 13a), respectively.

Patentansprüche

1. Kuppelglied (10) für einen Reißverschluß, das aus einem im Querschnitt im wesentlichen halbkreisförmigen drahtartigen Material (M) in eine fortlaufende Mäanderform gebracht und auf einem Tragband (15, 16) befestigt ist, wobei das Kuppelglied (10) einen Kupplungskopf (11), einen oberen Schenkel (12) und einen unteren Schenkel (13), die von gegenüberliegenden Enden des Kupplungskopfes (11) ausgehen, und ein Verbindungsstück (14) aufweist, das die besagten Schenkel (12, 13) mit entsprechenden Schenkeln des benachbarten Kuppelglieds verbindet, dadurch gekennzeichnet, daß das Verbindungsstück (14) mindestens einen Vorsprung aufweist, der über die Höhenebene jedes der benachbarten Schenkel hinausragt.
2. Kuppelglied (10) nach Anspruch 1, dadurch gekennzeichnet, daß das Verbindungsstück (14) durch eine Verdrehung um 90° orientiert ist, damit der Hauptteil seiner ebenen Fläche



surface 14a outwardly away from the coupling head 11 in contrast to the embodiment shown in Figure 1.

Figures 13 and 14 respectively show elements 10 each having the planar surface 14a of the heel 14 directed face to face with the tape surface with opposite ends of the heel 14 stamped to form a protuberance 14g, the only difference being that a recess 14h resulting from stamping is produced externally of the heel 14 in the case of Figure 13 and internally of the heel 14 in the case of Figure 14.

Figure 15 shows a modified form of meandering element 10 characterized by the formation of an upwardly projecting lug 14i substantially over the entire length of the heel 14 by means of a punch 22 and a die 23 schematically illustrated in Figure 16, the resulting heel 14 having a substantially L-shaped cross-section as taken on the line XVI-XVI of Figure 15.

The meandering elements 10 shown in Figures 13 - 15 are most suitable for weaving into the stringer tape because of greater flexibility provided at the respective worked surfaces of the heel 14.

Figure 17 shows a further modification of Figure 1 in which the heel 14 has a cavity 14j formed in its outer surface 14d.

A meandering coupling element 10 shown in Figure 18 has the planar inner surfaces 12a, 13a of the upper and lower legs 12, 13 which are rendered coarse so as to provide slip-free, stronger attachment of the element 10 to the stringer tape.

Claims

1. A coupling element (10) for a slide fastener which is formed from a substantially cross-sectionally semi-circular monofilamentary material (M) into a continuous meandering structure mounted on a stringer tape (15, 16), said element (10) having a coupling head (11), an upper leg (12) and a lower leg (13) respectively extending from opposite ends of said head (11) and a heel (14) interconnecting said legs (12, 13) with corresponding legs of the next adjoining element, characterized in that said heel (14) comprises at least one protrusion extending beyond and above the planar level of each of said interconnected corresponding legs.
2. A coupling element (10) according to claim 1 characterized in that said heel (14) is oriented by rotation through 90° so as to direct the majority of its planar surface (14a) inwardly toward said coupling head (11).

3. A coupling element (10) according to claim 1 characterized in that said heel (14) is oriented by rotation through 90° so as to direct its planar surface (14a) away from said coupling head (11).
4. A coupling element (10) according to claim 1 characterized in that said heel (14) is oriented by rotation through 180° with its planar surface (14a) extending parallel with the surface of said tape (15, 16).
5. A coupling element (10) according to claim 1 characterized in that said planar surface (14a) of said heel (14) is directed face to face with the surface of said tape (15, 16) with opposite ends of said heel (14) stamped to form said at least one protrusion (14g).
6. A coupling element (10) according to claim 1 characterized in that said at least one protrusion of said heel (14) is an upwardly projecting lug (14i) extending substantially over its entire length.
7. A coupling element (10) according to claim 1 characterized in that said heel (14) has a cavity (14j) formed in its outer surface (14d).
8. A coupling element (10) according to claim 1 characterized in that said upper and lower legs (12, 13) have coarse inner surfaces (12a, 13a), respectively.

Patentansprüche

1. Kuppelglied (10) für einen Reißverschluß, das aus einem im Querschnitt im wesentlichen halbkreisförmigen drahtartigen Material (M) in eine fortlaufende Mäanderform gebracht und auf einem Tragband (15, 16) befestigt ist, wobei das Kuppelglied (10) einen Kupplungskopf (11), einen oberen Schenkel (12) und einen unteren Schenkel (13), die von gegenüberliegenden Enden des Kupplungskopfes (11) ausgehen, und ein Verbindungsstück (14) aufweist, das die besagten Schenkel (12, 13) mit entsprechenden Schenkeln des benachbarten Kuppelglieds verbindet, dadurch gekennzeichnet, daß das Verbindungsstück (14) mindestens einen Vorsprung aufweist, der über die Höhenebene jedes der benachbarten Schenkel hinausragt.
2. Kuppelglied (10) nach Anspruch 1, dadurch gekennzeichnet, daß das Verbindungsstück (14) durch eine Verdrehung um 90° orientiert ist, damit der Hauptteil seiner ebenen Fläche



(14a) nach innen und zu dem Kupplungskopf (11) hin gerichtet ist.

3. Kuppelglied (10) nach Anspruch 1, dadurch **gekennzeichnet**, daß das Verbindungsstück (14) durch eine Verdrehung um 90° orientiert ist, damit seine ebene Fläche (14a) von dem Kupplungskopf (11) weg gerichtet ist.
4. Kuppelglied (10) nach Anspruch 1, dadurch **gekennzeichnet**, daß das Verbindungsstück (14) durch eine Verdrehung um 180° orientiert ist, wobei seine ebene Fläche (14a) zur Oberseite des Tragbandes (15, 16) parallel verläuft.
5. Kuppelglied (10) nach Anspruch 1, dadurch **gekennzeichnet**, daß die ebene Fläche (14a) des Verbindungsstücks (14) der Oberseite des Tragbandes (15, 16) zugekehrt ist, wobei gegenüberliegende Enden des Verbindungsstücks (14) geprägt sind, um den mindestens einen Vorsprung (14g) zu bilden.
6. Kuppelglied (10) nach Anspruch 1, dadurch **gekennzeichnet**, daß der mindestens eine Vorsprung des Verbindungsstücks (14) eine sich im wesentlichen über seine gesamte Länge erstreckende nach oben vorspringende Nase (14i) ist.
7. Kuppelglied (10) nach Anspruch 1, dadurch **gekennzeichnet**, daß das Verbindungsstück (14) einen in seiner Außenseite (14d) ausgebildeten Hohlraum (14j) aufweist.
8. Kuppelglied (10) nach Anspruch 1, dadurch **gekennzeichnet**, daß der obere und der untere Schenkel (12, 13) eine raue Innenfläche (12a bzw. 13a) hat.

Revendications

1. Élément d'accouplement (10) pour une fermeture à glissière, cet élément d'accouplement étant réalisé à partir d'un monofilament (M) de section transversale sensiblement semi-circulaire, sous la forme d'une structure continue sinueuse ou en méandres montée sur un ruban (15, 16) de bande d'accrochage, ledit élément (10) comportant une tête d'accouplement (11), une branche supérieure (12) et une branche inférieure (13) s'étendant respectivement depuis les extrémités opposées de ladite tête (11) et un talon (14) reliant mutuellement lesdites branches (12, 13) aux branches correspondantes de l'élément d'accouplement contigu, caractérisé en ce que ledit talon (14) comprend au moins une saillie s'étendant au-delà

et au dessus du niveau plan de chacune desdites branches correspondantes mutuellement reliées.

2. Élément d'accouplement (10) selon la revendication 1, caractérisé en ce que ledit talon (14) est orienté du fait d'une rotation sur 90° de manière à diriger la majeure partie de sa surface plane (14a) vers l'intérieur en direction de ladite tête d'accouplement (11).
3. Élément d'accouplement (10) selon la revendication 1, caractérisé en ce que ledit talon (14) est orienté du fait d'une rotation sur 90° de manière à diriger sa surface plane (14a) en sens opposé de ladite tête d'accouplement (11).
4. Élément d'accouplement (10) selon la revendication 1, caractérisé en ce que ledit talon (14) est orienté du fait d'une rotation sur 180° de manière que sa surface plane (14a) s'étende parallèlement à la surface dudit ruban (15, 16).
5. Élément d'accouplement (10) selon la revendication 1, caractérisé en ce que ladite surface plane (14a) du talon (14) est dirigée vers la surface dudit ruban (15, 16), les extrémités opposées du talon (14) ayant été matricées de manière à former ladite saillie (14g) au nombre d'au moins une.
6. Élément d'accouplement (10) selon la revendication 1, caractérisé en ce que ladite saillie au nombre d'au moins une dudit talon (14) est une patte (14i) qui fait saillie vers le haut et qui s'étend sensiblement sur la totalité de sa longueur.
7. Élément d'accouplement (10) selon la revendication 1, caractérisé en ce que ledit talon (14) comporte une cavité (14j) formée dans sa surface extérieure (14d).
8. Élément d'accouplement (10) selon la revendication 1, caractérisé en ce que lesdites branches supérieure et inférieure (12, 13) comportent des surfaces intérieures rugueuses (12a, 13a), respectivement.