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2,919,482

INTERLOCKING FASTENER ELEMENTS FOR A SLIDE FASTENER

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FIG.1.



FIG.2.

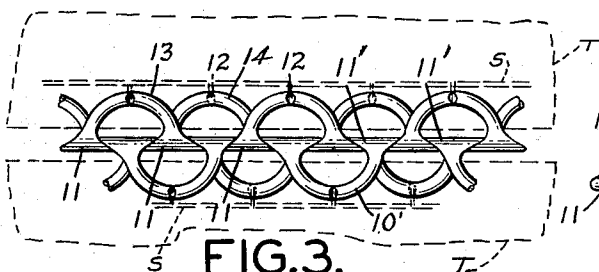
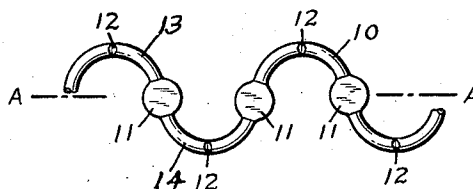


FIG.3.

FIG.4.

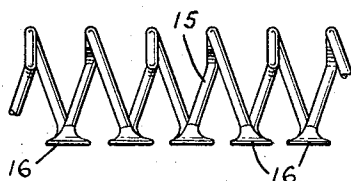
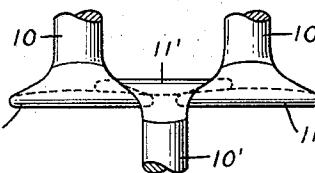


FIG.5.

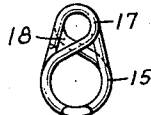


FIG.6.

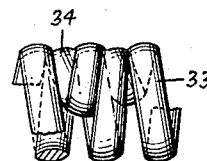


FIG.10.

FIG.8.

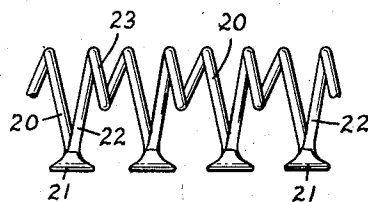
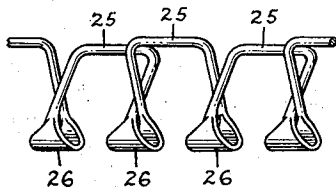


FIG.7.

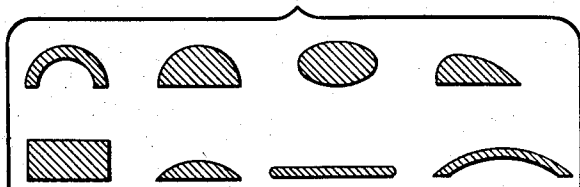


FIG.9.

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INTERLOCKING FASTENER ELEMENTS FOR A SLIDE FASTENER

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11 Claims. (Cl. 24—205.13)

This invention relates to an improved method of forming or manufacturing interlocking slide fastener elements and it relates particularly to the production of slide fastener elements which are made from a continuous strip, wire or filament of metal, plastic or other suitable material and to the resulting fasteners and fastener elements.

The slide fastener elements which have been made heretofore from continuous filaments or wires are usually in the form of a coil of helical shape which may or may not have protusions or bumps thereon or a flattened or oblong cross-section in order to lock with a similar fastener element. The fastener elements so produced are usually of oblong or oval shape when viewed from the end.

The prior coil-type fasteners have to be formed with rather specialized and complicated machinery. Thus, the two engaging coils must be formed by wrapping or braiding strips or filaments around a mandrel so as to obtain the proper spacing and interlocking of the two coils. These coils subsequently must be separated and secured to tapes or the like and reconnected and stored for further use or sale.

Difficulty is also encountered in securing the fastening elements to the tape or fabric in such a manner that misalignment of the coils is avoided. Inasmuch as the filament from which the coils are made is usually smooth, and the coils are oval or round in cross-section, it is difficult to prevent twisting of the coil relative to the material to which it is secured. Such relative twisting of the coils and the fabric will cause misalignment of the two coils with consequent danger of them failing to join or even of jamming or separation of the fastener elements after the slides have passed over them.

Therefore, while satisfactory coil-type fasteners have been produced heretofore, they still leave a great deal to be desired from the standpoint of ease and economy of production.

In accordance with the present invention, I have provided a method of producing slide fasteners from continuous filaments which enable the individual fastener elements of a slide fastener to be formed separately and, in fact, the cooperating fastening elements or coils are identical and can be formed by a rolling and bending machine so that the need for complicated braiding and twisting machines is substantially eliminated.

More particularly, I have provided a method of producing slide fastener elements wherein the fastener elements may be formed by crimping, rolling and simple bending operations at greatly increased production rates as compared with the conventional twisting and braiding operations heretofore used. Moreover, the new form of slide fastener element has a more secure locking action with respect to a cooperating fastening element and the fastening elements are so designed that they can be connected to a supporting tape or the like conveniently by a conventional plain stitching or over-edge stitching operation and when so secured, they will not twist relative to the tape

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or be moved out of proper locking position by reasonable forces exerted thereon.

For a better understanding of the present invention, reference may be had to the accompanying drawing in which:

Figure 1 illustrates diagrammatically the initial step in shaping a filament to produce a fastener element in accordance with the present invention;

Figure 2 is a view of the fastener after it has been treated to produce flat or wide areas therein;

Figure 3 is a schematic showing of a slide fastener produced from the filament shown in Figures 1 and 2 with the connecting elements being spaced widely to illustrate their shape;

Figure 4 is an enlarged view of three interlocking sections of the fastener showing the interfitting relation of the fastener teeth or loops thereon;

Figure 5 is a view in the side elevation of a modified form of fastener elements, shown stretched out to illustrate the formation thereof;

Figure 6 is an end view of the fastener shown in Figure 5;

Figure 7 is a side view of a modified form of fastener element also shown stretched out to illustrate the coil-ing or forming thereof;

Figure 8 is a perspective view of still another type of fastening element also shown stretched out to illustrate the formation thereof;

Figure 9 is a view showing the cross-sectional shapes of various filaments which may be used in the preparation of the slide fasteners in accordance with the present invention, and

Figure 10 is a side view of a portion of another type of fastener made of flattened or oblong cross-section filament.

In accordance with the present invention, the longitudinally extending rows or convolutions of a continuous slide fastener element are made by a crimping and rolling and bending operation which permits the continuous production of fastener elements at high speed. The product is essentially symmetrical so that sections of it can be meshed and used as the opposing rows of fastening elements of a slide fastener.

Basically all of the slide fasteners in accordance with the present invention are formed from a sinusoidal, crimped or snake-like filament as illustrated in Figure 1. The filament 10 may be of circular or other cross-section and is crimped into a generally wavy, snake, sinusoidal, crenelated, or zig-zag shape. The filament 10 may be formed of wire, plastic such as nylon or any of the other similar flexible materials which are used in the formation of the coil-type slide fasteners. The crimped or corrugated filament 10 is passed endwise through a rolling machine which has pressure rollers operating generally along the center line A—A of the filament 10 as shown in Figure 2 to flatten and deform the centers of the filament between the peaks of the loops and thereby form the flats or locking heads 11 in each loop of the filament. At the same time crimping rollers may nick or press notches 12 at the crest of the loops 13, 14, etc. for a purpose described hereinafter. After the flats or heads 11 have been formed in the filament 10, it is bent along the center line A—A into a generally circular or oval form so that the crests of the loops 13, 14 extend back into overlapping relation and the flats or heads 11, 11 are all positioned facing in the same direction and with their edges in relatively closely spaced relation. The fastener element produced thereby is capable of interlocking with a cooperating and similar fastening element 10'. The fastener elements 10' and 10 may be sections cut from the same strip inasmuch as the fastener element is symmetrical. Figure 3 illustrates

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schematically the relation of the flats or heads 11, 11' to each other to produce the locking action. Figure 4 illustrates in greater detail and in a more accurate relationship the condition of the parts when they are locked together. It will be seen that the two upper flats or heads 11, 11 have their adjacent edges in closely spaced relationship. The spacing is less than the width of the filament 10. The flat or head 11' of the lower filament 10' fits between the heads 11, 11 of the upper fastener element and overlaps not only the heads 11, 11 but also the portions of the loops 13, 14 on opposite sides of the heads or flats 11, 11. In this way, the head 11' cannot be disengaged from the head 11, 11 by relative lateral movement. The flats or heads 11, 11, 11' can, of course, be disengaged by flexing the fastening elements lengthwise in the usual way by means of a slider cooperating therewith.

The folded form of fastener illustrated in Figures 3 and 4 is particularly advantageous in its mode of connection with a supporting tape T. It will be apparent from the formation of the fastener as shown particularly in Figure 3 that threads S may be passed around the backs of the loops 13, 14, etc. by an over-edge stitching operation, a conventional stitching operation or by a weaving operation. The stitches or picks retain the fasteners against turning relative to the fabric or tape. The fastener element cannot twist relative to the fabric once it has been secured in position because the oppositely facing arrangement of the loops 13, 14, etc. prevent angular slippage. Moreover, by drawing the stitches down tightly into the nicks or notches 12, endwise movement of each fastener element is precluded. It will be seen, therefore, that the new fastener element lends itself to easy fastening to and proper alignment with a supporting tape by any of the conventional methods of sewing or the like.

A similar type of fastening element which may be secured even more firmly to the fabric is illustrated in Figures 5 and 6. The fastener element shown therein may also consist of a filament 15 of circular cross-section or of any of the oblong cross-sections illustrated in Figure 9 of the drawing including rectangular, oval, crescent, semi-circular or the like. As illustrated, the filament 15 is circular in cross-section and initially is crimped generally into the corrugated or wavy form illustrated in Figure 1. The filament 15 is then rolled to form the heads 16 thereon, and the loops on opposite sides of the flats are then twisted at right angles to form the loops 17 and 18 best shown in Figure 6 of the drawing. With the loops extending at right angles, the filament is then bent along the center line, that is, along the line passing through the centers of the flats or head 16 so that the loops 17 and 18 overlap and produce a generally figure 8 configuration as shown in Figure 6. It will be understood that as the convolutions and the head 16 thereon are shown as spaced apart further than they normally will be, in Figure 5, the spacing between the heads 16, 16 will be similar to the spacing of the heads 11, 11 in Figure 4 when the fastener is completed. The advantage of the fastener shown in Figures 5 and 6 is that the thread loops in sewing or picks in weaving are passed between the coils and they will be drawn tightly into the loops 17 and 18 of the fastener. When so located, the fastener element cannot rotate relative to the fabric so that misalignment of the coil elements and the failure of them to function properly because of such misalignment is completely avoided.

Figure 7 shows a further variation of the fastener disclosed in Figures 3, 5 and 6. The fastener shown in Figure 7 may be formed of a filament 20 which is originally snake-like as shown in Figure 1. Preferably, however, the filament is provided with flats 21 as described above, and then the loops on opposite sides of the flats 21 are bent oppositely around a mandrel to form the large loops 22 and interposed smaller loops 23 between

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them. This action is not produced by a coiling operation but is formed by bending each loop between the flats one complete turn around a mandrel of small diameter to form the small loops 23 therein. This fastener element operates in exactly the same manner as the fastener elements shown in Figures 3 and 5 but the presence of the small loops 23 therein provides a better spacing for the locking heads 21 and, moreover, provides a very strong anchoring medium in conjunction with the threads or woven picks of the tape for anchoring the fastener against angular or rotational movement relative to its supporting tape.

Figure 8 illustrates a further modification of the fastening elements described above in which the filament 25 is formed with generally rectangular loops and after being flattened centrally, the loops are bent back in opposite directions to form the locking loops 26 thereon.

The locking loops 26 may be provided with flats or heads as described above or, if the filament 25 is of oblong cross-section, the loops may be so related that they interlock with other similar loops without the need for the flattened heads thereon.

In this connection, the fasteners shown in Figures 5, 7 and 8 may be formed of oblong cross-section filament. The filaments can be pre-formed, or the oblong cross-section produced by rolling the wavy filament to flatten it centrally of the waves or throughout the entire width of the wavy form.

Figure 10 discloses a fastening element like that shown in Figure 7 in which the large loops 33 and small loops 34 are formed of flattened or oblong cross-section filament having the larger axes of the oblong shape extending lengthwise of the fastener element. This arrangement of the filament can be produced easily by passing the wavy filament between flattening rollers and flattening the entire filament. The filament is then bent to form the loops, as described above. Fasteners similar to those shown in Figures 4, 5 and 8 can be formed similarly from completely flattened or oblong filaments.

It will be apparent that the above-described method greatly facilitates production of slide fasteners and converts the formation of such slide fastener elements from a complicated die-forming or braiding operation into a simple crimping, rolling and folding operation which can be accomplished with simple and well known types of machines. The method may be practiced either with metal wire or with plastic fibres or filaments such as nylon and the like, depending upon requirements. The fasteners may be made of any desired size from the very small inconspicuous fasteners to relatively large and heavy duty fasteners. It will be understood that they may be formed of materials of any desired color and they may be attached to tapes by stitching or sewing operations or by actually weaving the fasteners in the edge of the tape or fabric. Preferably, due to the shape of the coils of the fastener, they will be used in conjunction with a bead cord which is secured to the supporting tape either on opposite sides of the fastener or adjacent to one edge of the fastener to serve as a guide for the slider for opening and closing the fastener.

Therefore, it will be apparent that the modifications of the invention described above are illustrative and should not be considered as limiting the claims other than as specified therein.

I claim:

1. A slide fastener comprising a piece of material having an edge, a continuous wavy filament having wave crest portions at its lateral edges, and substantially parallel arcuate portions substantially concentric with a common longitudinal axis between said wave crest portions, said wave crest portions at the lateral edges of said filament being disposed adjacent to each other, and said arcuate portions having sections of oblong cross section at at least their mid-portions with their greatest dimension extending approximately parallel with said axis, and

stitches passing around said wave crest portions and through said material and attaching said filament to said material with said arcuate portions adjacent to said edge.

2. The slide fastener set forth in claim 1 in which said filament is substantially circular in cross-section on opposite sides of said oblong sections.

3. The slide fastener set forth in claim 1 in which said filament is of oblong cross-section throughout its length.

4. The slide fastener set forth in claim 1 in which said wave crest portions lie substantially normal to said axis.

5. A slide fastener comprising a piece of material having an edge, a continuous wavy filament having wave crest portions at its lateral edges forming loops joined by substantially parallel arcuate portions of said filament substantially concentric with a longitudinal axis extending between said loops, said arcuate portions having sections of oblong cross section at about their mid-portions, the greatest dimension of said sections being substantially parallel with said longitudinal axis, and stitches passing around said wave crest portions and through said material and attaching said filament to said material with said arcuate portions adjacent to said edge.

6. The slide fastener set forth in claim 1 in which said wave crest portions contain loops extending substantially normal to said axis.

7. An interlocking type fastener device adapted to interlock with a companion device comprising a piece of material having an edge to which the fastener is to be applied, a continuous flexible filament of serpentine form extending back and forth around said edge of the material and having arcuate portions disposed on opposite sides of and generally parallel with said material, and stitches extending through said material and around said arcuate portions for anchoring said filament to said material adjacent said edge, and flattened interlocking portions formed on portions of said filament extending transversely of the edge of said material between said arcuate portions.

8. An interlocking type fastener device adapted to interlock with a companion fastening device comprising a material to which the fastener is to be applied, a continuous filament forming a plurality of overedge type loops along the edge of the material, a stitched thread anchoring said loops to the edge of the material, the filament during each entire repeat pattern forming an overedge type loop in passing around the edge of the material from one side to the other, a partial loop in a plane parallel to the surface of the material around a stitch of the anchoring thread, another overedge type loop adjacent to the one previously formed, thereby passing to the opposite side of the material, then a partial loop connecting adjacent loops of the anchoring thread, before forming another overedge type loop to begin the next repeat, and interlocking elements formed integrally

on the overedge loops between the anchored portions of said loops and adjacent to the edge of said material for intermeshing with the interlocking elements of the companion device.

9. An interlocking type fastener device as set forth in claim 8 wherein the filament is formed of nylon.

10. An interlocking type fastener device as set forth in claim 8 wherein the cross sections of the filament through the interlocking elements are of oblong shape, the longer dimension thereof running generally parallel to the edge of the material.

11. A slide fastener having a pair of interlocking fastener members for releasably joining the edges of pieces of material, each fastener member comprising a continuous filament of serpentine form for interlocking engagement with a similar fastener member, the filament having throughout its length along the edge of the material a repeat pattern consisting of a first arcuate portion extending substantially transversely with respect to the edge of said material, a second reversely curved arcuate portion joined at one end to one end of said first arcuate portion, said second arcuate portion extending substantially parallel to said material, said second arcuate portion having its other end joined to one end of a third arcuate portion extending substantially parallel and coaxial with said first arcuate portion, the other end of said third arcuate portion being joined to one end of a fourth reversely curved arcuate portion extending substantially parallel with but offset along said edge with relation to said second arcuate portion, stitches extending around the filament in said second and fourth arcuate portions and through said material to secure said fastener member to said material, said first and third arcuate portions having mid portions of oblong cross-section adjacent to the edge of said material, the longer dimension thereof extending generally parallel with said edge of said material and the remainder of said filament in said arcuate portions being of substantially uniform, generally circular cross-section.

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