Oct. 9, 1962 N. A. WAHL 3,057,031

SEPARABLE FASTENER ASSEMBLY

Original Filed March 16, 1954 2 Sheets-Sheet 1

FIG. 1.

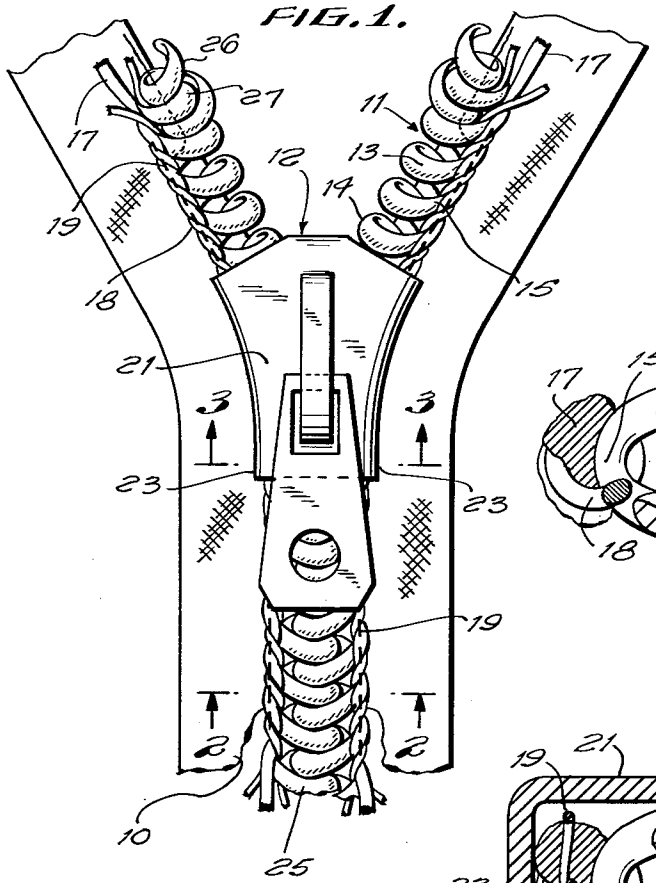
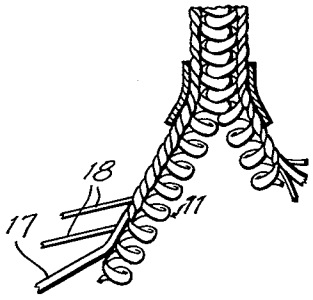


FIG. 10.



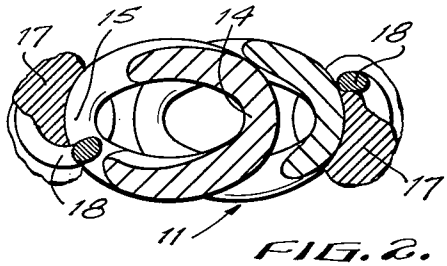
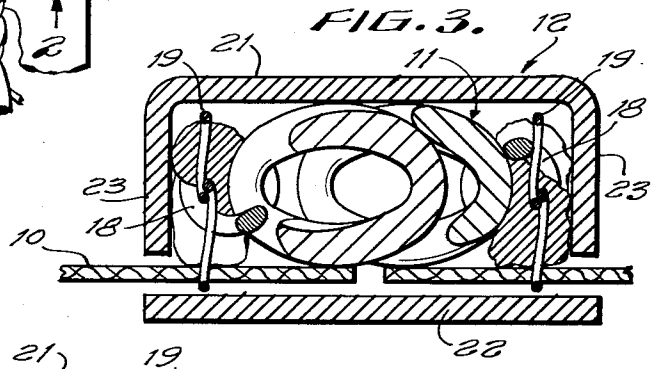


FIG. 2.

FIG. 3.



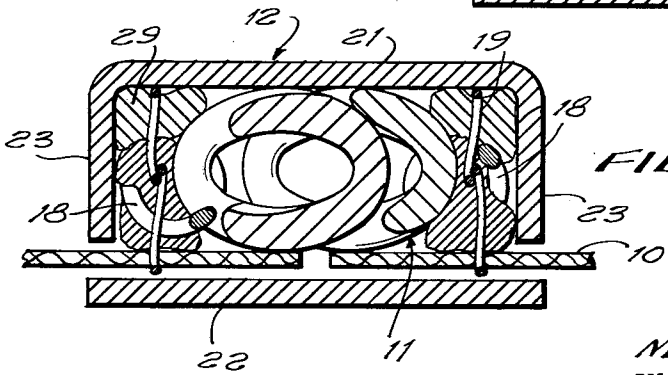


FIG. 4.

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SEPARABLE FASTENER ASSEMBLY

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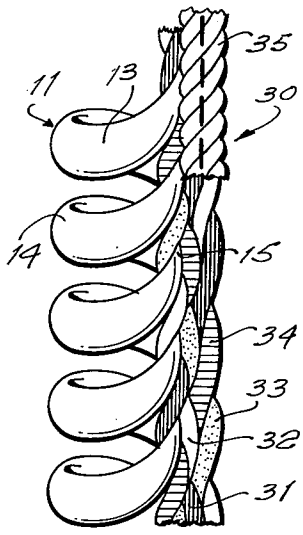


FIG. 5.

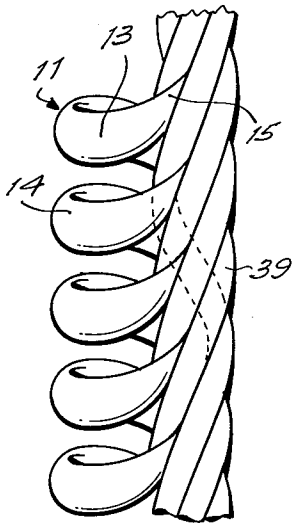


FIG. 6.

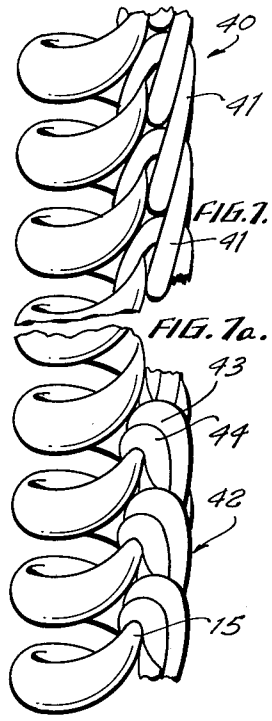


FIG. 7.

FIG. 7a.

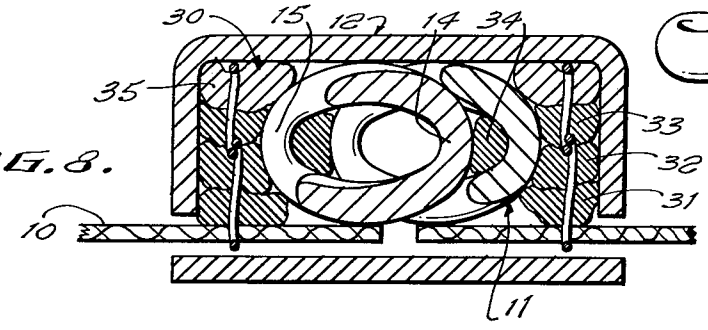


FIG. 8.

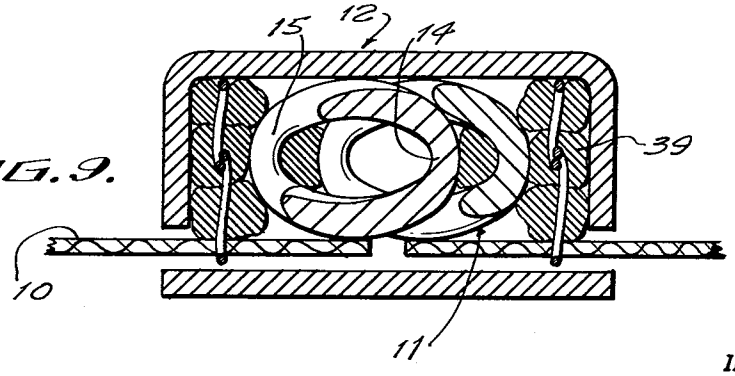


FIG. 9.

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SEPARABLE FASTENER ASSEMBLY

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Continuation of application Ser. No. 416,539, Mar. 16, 1954. This application Jan. 14, 1960, Ser. No. 2,549
8 Claims. (Cl. 24—205.16)

This invention relates generally to separable fasteners and methods of making the same. It is particularly directed to a novel slide fastener stringer assembly construction and methods for securing a stringer to a base, the present application for patent therefor, being a continuation of my copending application, Serial No. 416,539, filed March 16, 1954, for Separable Fastener Assembly, now abandoned.

As is well-known to those versed in the art, slide fasteners include those separable fasteners having stringers adapted for interfitting engagement with each other and a slide movable along the stringers for effecting engagement and disengagement of the latter. Slide fasteners fall broadly in two main types. One type is that which comprises generally a row of substantially parallel, spaced links or engaging elements each secured at one end to a runner or cord, the engaging elements and runner defining a stringer. The free ends of the engaging elements are adapted for interfitting and interlocking engagement with the links of a second stringer, and a slider is provided for effecting the engagement and disengagement of the stringer elements.

Another type of separable fastener is that which employs helicoidal or coil-like stringers wound for interlocking engagement with each other, as disclosed in my prior U.S. Patent No. 2,300,442. In this type of fastener, each convolution or loop of the coil stringers serves as an engaging or interlocking element, and the outer coil portions remote from the engaging loops serve to connect the loops and define a runner equivalent to the cord or runner of the link-type fastener. While the device and method of the present invention have been primarily developed and employed in connection with coil stringer type separable fasteners, and will be described hereinafter with particular reference thereto, it will be understood that the novel features of the invention are equally well adapted for use with the above-mentioned link-type stringer.

More particularly, the present invention embraces improvements in the stringer assemblies and methods disclosed in my prior U.S. Patent No. 2,586,891, wherein the securement of a coil stringer to a base involved a sewing operation in which it was necessary to extend a sewing needle between adjacent convolutions of the coils. Obviously, perfect synchronization of movement is required between the sewing needle and coil stringer to permit securement of each convolution to the backing member; and further, the smallest permissible coil stringer is limited by the size of the needle, as the latter must extend between adjacent convolutions. In addition, the constructions and methods of the prior art required two separate sewing operations to attach the stringer to a tape, and it was necessary to disengage or separate the stringers during the attaching operations, which served to increase labor costs and produce misalignment of the mating coil elements due to elongation and other deformation of the coils.

Viewed generally, the present invention, which is illustrated in the drawings, and which will be described hereinafter in greater detail, contemplates, in one form, the provision of a stringer including a row of fastener elements and a runner, a backing member extending along the runner, and flexible strands wrapped about the runner to secure the stringer to the backing member, said strands and backing member together forming a stringer base.

By the present invention, the stringer base is built or fabricated upon the coil, so that a coil stringer of relatively minute proportions may be provided with a base or marginal edging at relatively high speed.

More particularly, a flexible strand is wrapped about the stringer runner to secure the latter to one or more longitudinally extending filiform strands, which strands combine to form a base or edging, so that it is entirely unnecessary to pass a needle between the coil convolutions. Hence, the coils may be much smaller than was heretofore possible, and consequently, the entire fastener may be relatively small and inconspicuous.

Another advantage of the present invention is that the stringers may, in their interfitting or interlocked condition, be united with the article to be separably fastened at relatively high speed by sewing or other desired securing operation. That is, only one sewing or other securing operation is required to unite the stringer supports with tapes or the article to be separably fastened; and, a two-needle sewing machine or other multiple securing device may be employed to unite the stringers while in their engaged relation, with the desired article. As no synchronization is needed between the stitching and the coil convolutions, the sewing machine may operate at very high speed to effect considerable savings in time, while relative deformation of the coil stringers is obviated and perfect matching thereof is maintained for the interfitting engagement.

Further, as the coil stringers are firmly secured to the bases, there is very little likelihood of the coils twisting and presenting their non-interlocking sides toward each other, as frequently occurred in the prior art construction.

Furthermore, a pair of interengageable stringers may be simultaneously provided with stringer bases while in spaced apart relation and then in a single continuous operation led into a slider or guide and thus interengaged for simultaneous application to the contiguous edges of an article which are to be separably fastened such as conventional tapes.

Other objects and advantages of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, and combinations and arrangements of parts and method steps, which will be exemplified in the following description, and of which the scope will be indicated by the appended claims.

Reference is made to the accompanying drawings wherein, in the interest of clarity, the parts are shown greatly enlarged with some of them somewhat exaggerated, and wherein:

FIG. 1 is a plan view showing a separable fastener constructed in accordance with the principles of the present invention.

FIG. 2 is a sectional view taken substantially along the line 2—2 of FIG. 1, but with certain elements being omitted for purposes of clarity of understanding.

FIG. 3 is a sectional view taken substantially along the line 3—3 of FIG. 1.

FIG. 4 is a sectional view similar to FIG. 3 showing a slightly modified form of the present invention.

FIG. 5 is a partial, plan view showing another form of stringer and backing member constructed in accordance with the present invention.

FIG. 6 is a partial, plan view showing still another form of stringer and backing member constructed in accordance with the present invention.

FIGS. 7 and 7*a* are partial, plan views showing still other forms of stringer and backing members constructed in accordance wtih the present invention.

FIG. 8 is a sectional view similar to that of FIG. 3, showing the modification of FIG. 5.

FIG. 9 is a sectional view similar to FIG. 3, showing the modification of FIG. 6.

FIG. 10 is a fragmentary plan view, partly in section, and drawn to a reduced scale, of a separable fastener in an intermediate stage of its manufacture.

Referring now more particularly to the drawings, and specifically to FIGS. 1–3 thereof, the embodiment of the invention illustrated therein comprises flexible strips **10**, stringers **11** secured to the flexible strips, and a slider **12** for separably fastening the stringers, and hence, the strips.

The strips or sheets **10** may represent tapes for securement to a garment or the like to be separably fastened.

The stringers **11** are formed of flexible, helicoidal filaments or coils, the convolutions of which are preferably somewhat flattened, as seen in FIG. 2. Thus, the individual loops or fastener elements or convolutions **13** of the coils or stringers **11** are arranged in substantially uniformly spaced aligned relation and include inner, interlocking portions **14**, and outer runner portions **15**. Stated otherwise, the stringers **11** include a row of equally spaced interlocking portions **14** and a row of runner portions **15** defining a longitudinally extending runner connecting the interlocking portions of the fastener elements **13**. Hence, the stringers **11** define structures which are substantially equivalents of the link and cord type stringers mentioned hereinbefore.

FIG. 2 may be considered as showing the stringers **11** before attachment to the flexible strip **10**. An elongated bead-like base **17***a* extends longitudinally along the outer side of each of the stringers **11** and comprises a backing member **17** and a flexible strand or filament **18** which may be part of, or in addition to, the backing member **17**. The flexible strand **18** is intertwined with the stringer, extending between certain of the fastener elements **13** to gird the runner portions **15** thereof. Stated otherwise, the strand **18** which is part of the bead-like base **17***a* has portions thereof bound or looped about the runner portions **15** to attach the stringer **11** to the base member **17***a*. This attaching operation can be expeditiously and advantageously performed by simply passing the stringer and backing member through a conventional winding machine so that the strand **18** is inserted between the convolutions of the coil and wound about the runner portions **15** and backing member **17**. In this manner, the stringer assembly, including the coil stringer **11** and stringer base **17***a* composed of backing member **17**, and binding strand **18** may be manufactured without a sewing operation. As the backing member **17** is not stitched to the stringer **11**, the stringer size is not limited to that which will permit the insertion of a sewing needle between the convolutions; but rather, the stringer and its convolutions may be extremely small as it is only necessary to pass the strand or thread **18** between the convolutions. Moreover, the precise synchronization heretofore required between the stringer and needle movement is no longer necessary, as the binding thread diameter is normally small relative to the space between convolutions or engaging elements, so that variations in coil feed and winding movement of the thread **18** will not adversely affect the winding operation.

When it is desired to secure the stringer assembly of FIG. 2 to the strips **10**, the stringers **11** may be disposed in their interfitting or interlocking relation and arranged with each of the base members **17***a* overlying one of the strips **10**. The united or fastened stringer assemblies, together with the strips **10** may then be fed through the double needle sewing machine and the stitches **19** extended simultaneously through the stringer bases **17***a* and strips **10**. While it was heretofore necessary to separate the stringers in order to sew or otherwise secure the same to tapes, etc., the above described sewing operation effects considerable savings in time, and also insures the accurate matching or alignment of mating convolutions

or interlocking elements. That is, as the coil stringers **11** are secured when in their interlocked relation to the strips **10**, any possibility of relative elongation or other deformation of the stringers is prevented.

As seen in FIG. 3, the slider **12** includes front and rear walls **21** and **22**, respectively, and side flanges **23**, **23** formed on the front wall. It will be noted that the built-up base **17***a* is admirably well adapted to provide a track or guide for the slider **12**, substantially filling the latter, and engaging with the slider side walls **23** to prevent inadvertent movement of the slider between an adjacent pair of convolutions, such as frequently occurred in prior fastener constructions.

In order to limit reciprocating movement of the slider **12** and prevent removal of the latter from the stringers, where such operation is desired, it is necessary to provide stop or limiting means adjacent to opposite ends of the stringers. At the closed end of the fastener, the lower end in FIG. 1, it has been found satisfactory to merely extend one or more stitches axially through at least two interlocked elements to secure to elements in inseparable engagement. Hence, the slider **12** will be ineffectual to separate the lower end fastener elements and its downward, opening movement will be limited thereby. At the upper or opening end of the fastener, a pair of relatively short lengths of coil **26** are each interengaged with one of the stringers **11** in the same manner that the stringers **11** interengage with each other. That is, each of the coil lengths **26** is in interfitting engagement with its respective stringer **11**. In order to insure retention of the coil lengths **26** in the stringers **11**, a stitch or loop **27** may be extended axially through and around the upper stringer convolutions and the convolutions of the coil length. As the space between the upper convolutions of the stringers is occupied by the convolutions of the coil lengths **26**, it will be impossible to interengage the upper stringer convolutions with each other and upward closing movement of the slider **12** will thus be limited.

In FIG. 4 is shown a slightly modified form of the slide fastener illustrated in FIGS. 1-3, wherein an additional bead or cord **29** is secured in overlying relation along each of the base members **17***a*. The bead **29** serves to further fill the slider **12** and prevent looseness or wobbling of the latter and also protects from abrasion and wear, the thread or strand **18**.

Another slightly modified form of the invention is illustrated in FIG. 5, wherein the coil stringer **11** is provided with a different form of base, generally designated **30**. Viewed generally, the base **30** comprises a plurality of flexible strands **31**, **32**, **33** and **34** (illustrated symbolically, respectively, in the colors red, white, yellow and blue, for clarity of understanding) which are braided together, constituting the base **30**, along the outer side of the coil stringer so that each of the flexible strands extends between a successive, adjacent pair of coil convolutions, and girds the intermediate runner portion **15**. The strands **31–34** are preferably formed of relatively heavy or bulky yarn to provide a base of sufficient proportions.

This form of the invention also possesses the manufacturing advantages mentioned above, and may be produced at relatively high speed without the limitations imposed by a sewing operation. That is, the flexible strands **31–34** and the coil stringer **11** may be passed through a conventional braiding machine at relatively high speed to automatically produce the stringer and base assembly of FIG. 5. While a four strand braid has been illustrated and described, wherein each strand loops over every fourth runner portion **15**, it is, of course, apparent that any number of strands may be braided together in substantially the same manner. For example, under certain circumstances, it is desirable to employ a base of relatively substantial proportions, which may be accomplished by increasing the number of intertwined or braided strands. The thickness of the base **30** may also be increased by stitching a bead or piping **35** overlying the base in the

manner described in connection with FIG. 4. Obviously, too, it is not necessary that each individual strand, or that but a single strand be used to connect the base **30** to the runner portions. One or more particular strands, of the total making up the base, may be used for securing the runner to the base.

Another slightly modified form of the present invention is illustrated in FIG. 6, wherein a plurality of flexible strands **39**, being four in number for purposes of illustration, are intertwined with, wrapped or twisted about the runner portion of the stringer so that each of the strands extends between each fourth successive adjacent pair of fastener elements **13** respectively, and girds or loops over the adjacent runner portion **15**, the strands combining to define a stringer base. The form of the invention may be simply and efficiently produced on a conventional, multiple winding or twisting machine to achieve all of the advantages set forth in connection with the above described forms of the invention. Of course, any selected number of flexible strands **39**, preferably of relatively heavy yarn, may be employed to provide a stringer base of the desired bulk and stiffness.

FIG. 7 shows another form of the present invention wherein a base **40** is secured longitudinally along the outer side of the coil stringer **11**. More particularly, the base **40** is formed of one or more crocheted strands **41** extending between the successive pairs of adjacent convolutions of the coil stringer and wound about the runner portions **15**.

FIG. 7*a* shows still another form of the present invention wherein a base **42** is secured longitudinally along the outer side of the coil stringer **11**. More particularly, the base **42** is formed of two or more knitted strands **43** and **44** extending between the successive pairs of adjacent convolutions of the coil stringer and wound about the runner portions **15**.

In FIG. 10 there is shown an intermediate step in the method of making the form of invention shown in FIG. 1. After the pair of stringers **11** have been provided with bases, that is to say after the backing members **17** have been secured to the stringers by strands **18**, they are led to a guide member and thus interengaged ready to be sewn onto the tapes.

Obviously, the bead or piping **35** may be secured longitudinally on top of the crocheted or knitted support member **40** or **42**. As in FIG. 4, the bead or piping **35** is provided to further fill the slider and prevent looseness or wobbling of the latter and to protect the thread or strands from abrasion and wear.

As in my previous Patent No. 2,586,891, for convenience of nomenclature, the segment of each turn of the coil which is opposite the engagement segment, and which is indicated in the drawing by the reference numeral **15** is designated herein as the "rearward" segment of the turn and the engaging segment **14** is referred to as the "forward" segment. Each individual loop of the coil is considered to consist of a portion of the coil filament starting at or near a rearward segment **15** and following along the filament until the next adjacent rearward segment is reached. Each loop thus includes two opposite side segments of one turn of the coil and the engaging segment between the two side segments. Each rearward segment **15** serves to join one loop of the coil to an adjacent loop. For this reason, the row of rearward segments is herein considered to constitute a discontinuous runner which holds the row of loops together in proper spacing and alignment and which corresponds to the conventional runner cord of the individual link type of fastener.

For convenience and clarity, the terminology used herein may be defined as follows:

Fastener elements=(*a*) interlocking portions **14** and (*b*) runner portions **15**;

Interlocking portion is that part of each convolution which is overlapped or interlocked with a mating or corresponding convolution of another interlocking portion;

Runner portions=those parts of each convolution which join together adjacent interlocking portions;

Runner=a row of aligned runner portions;

Base=the backing member (as **17**) and the binding strand **18**;

Stringer assembly=stringer coil **11** plus the base or backing member **17** and its binding strand **18**, all arranged in a single row.

From the foregoing description of the various embodiments of the present invention, it is seen that a separable fastener construction and method of making the same are provided which fully accomplish their intended objects, and which are well adapted to meet practical conditions of manufacture and use.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In the method of making a separable fastener stringer assembly of the type which has a row of fastener elements each of which has a runner portion and an interengaging portion in spaced relationship along a flexible strip and which is adapted to engage in a positive interlocking fashion another row of fastener elements set in spaced relationship along another flexible strip; those steps which comprise providing a flexible backing member of filiform strands and securing it on the outside of and along a row of fastener elements by intertwining at least one of the filiform strands with the backing member and with the runner portions of the fastener elements at spaced intervals to provide a stringer assembly, all of said strands together being of sufficient number and bulk to define a marginal beadlike base for receiving fastening means for securing the stringer assembly to a flexible strip and to provide a guide track for the runner, directly interlocking the mating interengaging elements of a pair of said stringer assemblies, and then securing simultaneously the respective bases of said interlocked pair of stringers independently of the fastener elements thereof to a pair of adjacently positioned flexible strips.

2. A slide fastener comprising a pair of mating stringer assemblies each constituted by a row of fastener elements formed by a series of spaced interlocking portions interconnected by runner portions and a bead-shaped base extending along said row and outwardly therefrom, said base including at least one filamentary strand intertwined with certain of said runner portions to secure said base permanently thereto; a pair of tapes, means independent of said fastener elements for attaching the bases of said stringer assemblies to the respective tapes; and a runner slidable along said bases and guided thereby for separably coupling said fastener elements.

3. A slide fastener, as set forth in claim 2, wherein said base is constituted by a plurality of strands each of which is intertwined with certain of said runner portions and being relatively heavy to provide sufficient bulk to form a guiding track.

4. A slide fastener, as set forth in claim 2, wherein said base is constituted by a plurality of strands at least one of which is knitted to the runner portions.

5. A slide fastener, as set forth in claim 2, wherein said base is constituted by a plurality of strands at least one of which is crocheted to said runner portions.

6. A slide fastener, as set forth in claim 2, wherein said base further includes an additional bead secured thereto to increase its bulk.

7. A slide fastener comprising a pair of mating stringer assemblies each constituted by a row of fastener elements formed by a continuous filament shaped to provide a

series of spaced interlocking portions interconnected by runner portions and a bead-like base extending along said row and outwardly therefrom, said base including a backing member and at least one flexible strand continuously and repeatedly encircling said backing member and certain of said runner portions to secure said base thereto, said backing member and said strand having a bulk providing a guiding track alongside said row; a pair of tapes; means independent of said fastener element to stitch the bases of said stringer elements to the respective tapes; and a runner slidable along said bases and guided thereby for separably coupling said fastener elements.

8. In the method of making a slide fastener, the steps of forming a pair of mating stringer assemblies each of which is fabricated by intertwining at least one strand of a bead with certain of the runner portions of a row of fastener elements having interlocking portions interconnected by said runner portions thereby to secure said bead marginally to said fastener elements to provide a runner guide track, directly interlocking the fastener elements of said pair of stringer assemblies, and simultaneously attaching the beads on said interlocked assemblies, independently of the fastener elements thereof, to a pair of supporting tapes.

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