

Nov. 4, 1958

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2,858,592

METHOD OF MAKING SLIDE FASTENERS AND THE RESULTING PRODUCT

Filed April 2, 1953

3 Sheets-Sheet 1

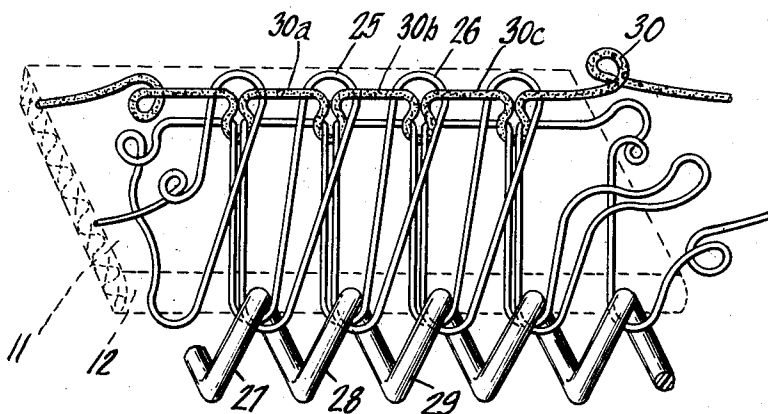


FIG. 2.

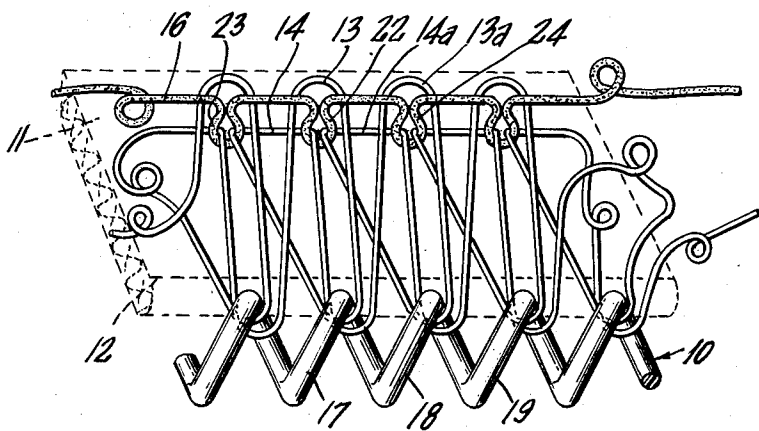


FIG. 1.

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FIG. 3d.

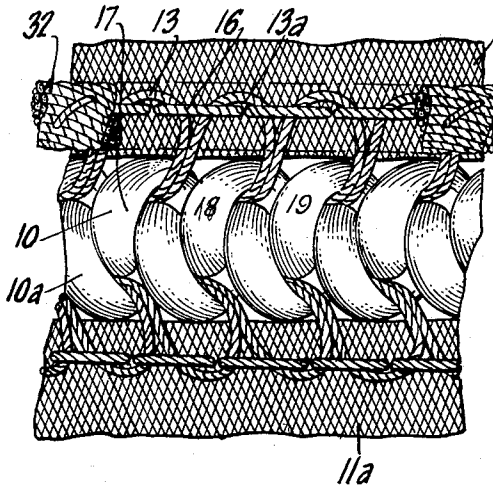


FIG. 3b.

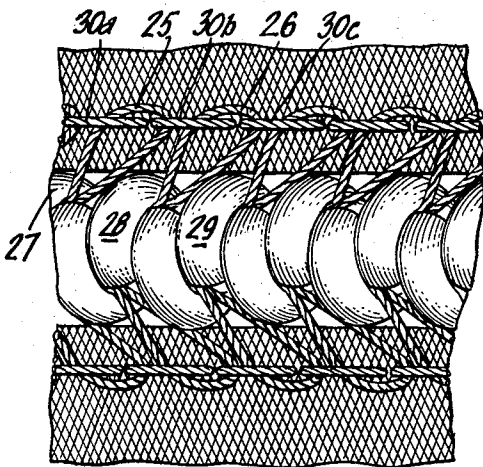
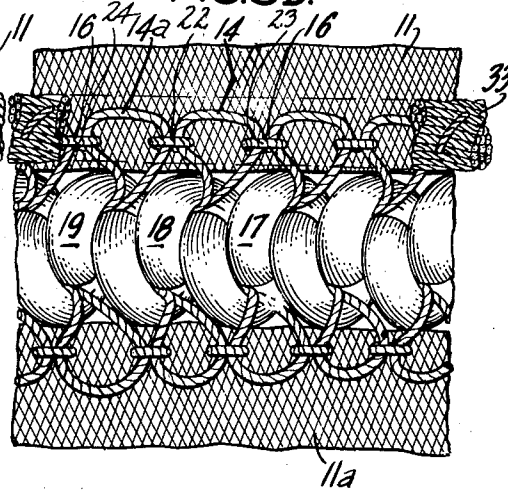


FIG. 4d.

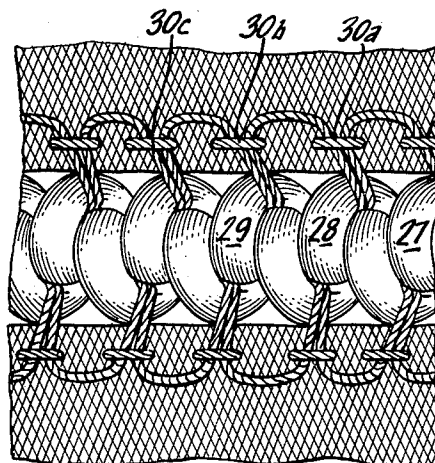


FIG. 4b.

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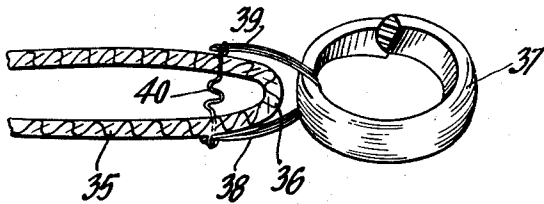


FIG. 5.

FIG. 6.

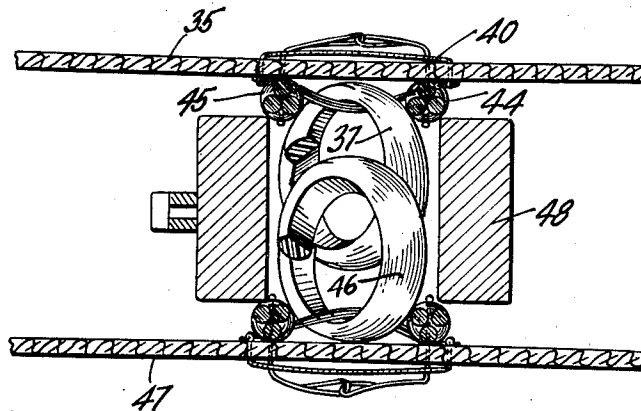
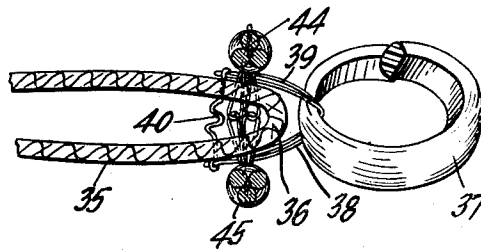


FIG. 7.

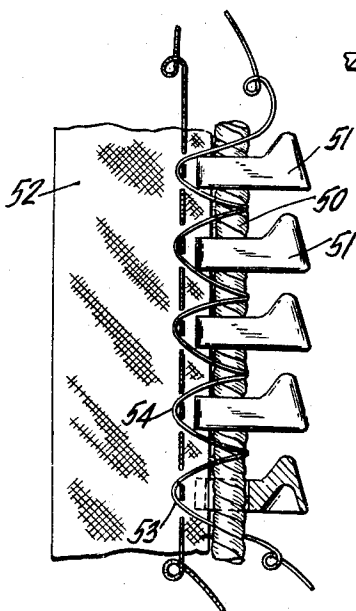


FIG. 8.

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2,858,592

METHOD OF MAKING SLIDE FASTENERS AND THE RESULTING PRODUCT

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Application April 2, 1953, Serial No. 346,380

14 Claims. (Cl. 24—205.16)

This invention relates to methods of making slide fasteners of the tooth or coil types and to the resulting fasteners and it relates, more particularly, to an improved method for attaching the fastening elements of slide fasteners to tapes or fabrics to produce a stronger connection therebetween in a more advantageous and economical way.

Many different methods have been proposed heretofore for securing the fastener elements of a slide fastener to a tape or fabric. In the manufacture of slide fasteners of the type including metal or plastic teeth, the usual procedure includes the step of sewing a bead cord to the edge of the tape or folding the cord in a portion of the tape and stitching through the cord and tape to secure them together. The tape with the bead cord thereon is then fed into a machine in which the fastener teeth are made and/or crimped or clinched on the bead and a portion of the tape. The above procedure has many advantages but it also is open to certain disadvantages which reduce the rate of production of such slide fasteners and increase their cost. For example, when the slide fasteners are made in different colors, it is necessary to provide tapes of the desired color, bead cords of the same color and thread which blends with the tape. Inasmuch as a wide variety of colors may be required, it is customary to make a great many beaded tapes of different colors and store them until an order is received for the particular color. Inasmuch as the demand for fasteners of a particular color cannot be accurately anticipated, it is necessary, at all times to maintain a rather large inventory of the colored beaded tapes on hand. When a slide fastener of a desired color is required, the beaded tape of the proper color is withdrawn from inventory and supplied to the tooth-applying machine for attachment of the teeth to the tape.

During the preparation of the tapes, it is, of course, necessary to fill the bobbin cases of the sewing machines with bobbins having the thread of the color needed thereon, replace the thread spool on the machine with a spool having a thread of different color and to replace the bobbins as the thread is used up. Moreover, replacement of the bobbin cases is often required because wear on the bobbin cases will produce sharp edges thereon which cut the threads and cause frequent shutdowns. Due to the delays mentioned above, a very substantial proportion of the time of the workmen operating the various machines is required for services other than the actual production of the fasteners.

In the manufacture of the so-called spiral or coil type of fastener, considerable difficulty has been encountered in attaching the fastening elements securely to tapes or fabrics. The coil or spiral type fastener comprises a continuous coiled strip of plastic, metal or the like in which the convolutions form the fastener elements. The best practice has been to use a special type of tape which is woven in such a manner that picks are dropped between the edges of the tape to give a ladder-like formation

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through which the coil strip is slipped to secure it in position. Such tapes are expensive and greatly increase the cost of the spiral or coil type of fastener.

Attempts have been made to sew the coiled strip directly to the tape but have not proved to be very successful because the convolutions of the strip stretch and contract so that spacing of the convolutions may not be exact. As a result the sewing machine needle may not enter between each convolution and make a secure tie with the fabric. Moreover, the needle may actually strike the coiled strip and break either the strip or the needle.

The present invention provides a method of attaching stringers of fastening elements of all types to tapes, strips or pieces of fabric, quickly and securely in a continuous operation. The term "stringers" used herein refers to a strip or string of fastener teeth or coils which may be joined integrally or by attaching the teeth to a cord or narrow strip. It does not include the tape or ribbon to which the coil or connected teeth are fastened.

More particularly, the method involves the use of bobbinless sewing machines to secure a continuous coil stringer or a stringer of the cup or tooth fastener type directly to the tape or fabric. An overedge sewing machine is typical of the kind of sewing machine used in the new method. An overedge sewing machine is constructed and arranged to alternately throw loops of thread around the edges of a piece of fabric or the like which loops are picked up by a needle stitching through the fabric so that the loops are secured alternately to opposite sides of the fabric by a thread passing through the fabric. In the new method, the loops formed by the overedge stitching machine are passed around the stringer and the edge or through a portion of a tape or other piece of fabric to secure them together in a single continuous operation. The loop forming action of the overedge sewing machine is particularly advantageous for the reason that the loops formed by a properly adjusted machine will either fall between or straddle the individual fastening elements thereby assuring the presence of at least one thread between each pair of fastening elements. Moreover, there is no possibility of the needle and loopers damaging the fastening elements or stringers thereof, or being damaged thereby. Also, inasmuch as overedge machines do not have bobbins, shutdowns for refilling or replacement of the bobbins are entirely eliminated. In addition, it is unnecessary to provide special and correspondingly expensive kinds of tapes for the fasteners or to have any special facilities for storing or processing the tapes prior to attachment of the stringers of fastening elements to the tapes.

The new method enables the production of slide fasteners with a minimum of shutdowns so that the capacity of the stringer or tooth-making machines can be used to the fullest, thereby resulting in reduced labor costs. It also permits narrower tapes to be used thereby additionally reducing manufacturing costs.

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

Fig. 1 is a schematic illustration of the action of an overedge sewing machine in securing a spiral type of fastener to a piece of fabric and illustrating one type of loop formation produced by the sewing machine;

Fig. 2 illustrates schematically a variation in the loop formation which may be produced by the sewing machine in securing a spiral type fastener during the normal operation of the machine;

Fig. 3a is a plan view of the front of a spiral type fastener in which the stringers are secured to the edge of the fabric in accordance with the present invention;

Fig. 3b is a plan view of the back edge of the fastener of Fig. 3a;

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Figs. 4a and 4b are plan views of the front and back, respectively, of a spiral type fastener in which the stringers are attached thereto by means of a modified form of connection between the stringer and the fabric;

Fig. 5 is a view in section through a folded tape or piece of fabric and through a spiral type of stringer illustrating the manner of attaching the fabric to the stringer;

Fig. 6 illustrates another step in the manufacture of the stringer of the type shown in Fig. 5, illustrating the manner in which guide beads may be attached to the folded fabric;

Fig. 7 is a view in cross-section through a complete slide fastener interposed between two pieces of fabric at a zone between their edges, a slider, the interfitting stringers and the fabric being shown in cross-section; and

Fig. 8 illustrates the manner in which a tooth type of fastener may be secured to the edge of a piece of fabric in accordance with the invention.

The invention will be described first in connection with the production of slide fasteners of the type utilizing the so-called spiral type of stringer which consists, as shown schematically in Figs. 1 and 2, of a generally helically wound coil 10, formed of plastic, the coil being flattened into a generally oval cross-section and the filament having an oblong cross-section so as to form interfitting locking elements when two such stringers are brought together in interleaved arrangement. Spiral type stringers of the type described are disclosed, for example, in the Wahl U. S. Patent No. 2,300,442, dated November 3, 1942.

The stringers 10 of the type described above may be formed as a continuous element from nylon or other plastic materials or, if desired, even of metal wire of appropriate cross-section. As the stringer is produced or manufactured, it is advanced or fed into overlapping relationship to a tape 11, or other piece of fabric which may be woven in any desired way. Preferably the tape or strip has a selvage edge 12 to prevent ravelling and to strengthen it.

As shown in Fig. 3a, the stringer 10 preferably is positioned above the selvage edge of the tape and is passed therewith through a conventional overedge type of sewing machine. In such a machine, a needle is provided which stitches through the fabric adjacent the inner edge of the stringer while two other needles or loopers alternately throw loops 13, 13a, etc., and 14, 14a, etc. around the edge of the fabric. Inasmuch as the stringer 10 and the fabric are interposed in between the loopers, the loops of thread are thrown around the stringer 10 and the edge 12 of the tape 11 and are caught on opposite sides of the tape by means of the thread 16 which is stitched through the fabric by the first-mentioned needle. In this way, as shown in Fig. 1, the loop 13, for example, will be thrown over and will straddle one convolution 17 of the stringer 10 while the next adjacent loop 14 will lie between the convolution 17, and the convolution 18, another loop 13a corresponding to the loop 13 will straddle the convolution 18 and the loop 14a will lie between the convolutions 18 and 19. Between each of the convolutions 17, 18, 19, etc., there are two threads which secure the stringer to the tape.

The end of the loop 13, for example, is caught under the thread 16 where it passes through the loop and the tape to form the loop 22. The loop 14, at the opposite side of the tape is caught by the loop 22 and an adjacent loop 23 of the thread 16. The loop 13a is caught in the loop 24 of the thread 16, and the loop 14a is caught by the loops 22 and 24 on the opposite side of the fabric from the loop 13. All of the loops are drawn up tightly during the normal sewing operation, so that the stringer 10 will be bound to the side of the tape by a plurality of threads, disposed on opposite sides of each convolution of the stringer. The arrangement of the loops 13, 13a, 14, 14a and the thread 16, when these threads are pulled up tightly, is best shown in Figs. 3a and 3b of the drawings. Looking at the front of a fastener including the

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stringer 10, as shown in Fig. 3a, it will be seen that the loop 13 straddles the convolution 17 and is engaged by the thread 16 passing through the tape 11. Inasmuch as loops 13, 13a, etc. and the thread 16 are pulled up tightly, the stringer 10 will be drawn tightly against the edge of the tape 11. Also, as shown in Fig. 3b, the loops 14, 14a, etc. are caught by the thread 16 and are drawn tightly between the convolutions 17, 18 and 19, as described above. Each stringer, as described above, cooperates in the usual way, with a similar stringer 10a which is secured to a tape 11a by similar overedge stitching. It will be understood that multiple threads may be used instead of the single threads disclosed or that the stringers and tapes may be run through successive overedge machines to produce a multiple thread connection of great strength. The stitching gives the appearance of a woven edge.

Inasmuch as it is not possible to control precisely the position of the thread loops with respect to the convolutions of the stringer 10, because of variation in the spacing in the convolutions of the stringer due to stretching or compression, bending of needles or loopers, variation in feed rates, and other reasons, sometimes both threads of a loop will be thrown between different convolutions of the stringer. As shown in Fig. 2, both threads of a loop 25 may pass between two convolutions 27 and 28 instead of straddling one convolution in the manner shown in Fig. 1. The next adjacent loop 26 will pass between the convolutions 28 and 29 and will be caught by the thread 30 passing through the tape.

The stitching produced as disclosed in Fig. 2 of the drawing, results in a stringer arrangement which is best shown in Figs. 4a and 4b of the drawings in which the corresponding parts bear the same reference characters. Fig. 4a shows the front view of a completed slide fastener in which each loop, 25, 26, etc., of the overedge stitching is caught by different stitches 30a, 30b and 30c, 30d formed in the thread 30. The arrangement of the loops forms a different pattern than that shown in Figs. 3a and 3b, for example. The pattern of the stitches on the back of the fastener shown in Fig. 4b also differs from the pattern of the stitches on the fastener shown in Figs. 3a and 3b, due to the fact that the loops 25, 26, etc., do not straddle the convolutions 27, 28, 29, etc., of the stringer.

Sometimes both types of loops will occur in securing a stringer to a piece of fabric but even if both types of stitches do occur at random, at least one thread will be present between each of the convolutions.

According to the method described herein the stringers 10 may be formed and advanced continuously into overlapping relation with tape fed from a large spool of the same and stitched directly to the tape without any interruptions to the operation except for replacement of the large reels of tape and the large spools of thread on the sewing machine. Bobbins not being used in an overedge sewing machine, the sewing operation may continue for long periods of time without interruption.

The fastener may be provided further with bead cords 32 and 33 on opposite sides of the tape adjacent to the coil to serve as guides for the slider; not shown, of the fastener. The bead cords 32 and 33 can be attached to the tape by stitching through them with a conventional lock-stitch machine.

Another advantage of the new method is that it enables a stringer to be secured to a piece of fabric between its edges in a continuous operation to form a "covered" fastener, as illustrated more particularly in Figs. 5, 6 and 7 of the drawings. Thus, as shown in Fig. 5, the fabric 35 may be folded to provide a fold edge 36, to which the stringer 37 is secured. The threads of the loops 38, 39 produced by the overedge sewing machine will pass between the convolutions of the stringer 37 and through the tape on opposite sides of the fold line 36, as described in connection with Figs. 1 to 3. The tension of the stitches 40 which pass through the

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two loops of fabric to catch the loops 38, 39 may be slackened slightly for a purpose to be described. After the stringer 37 has been secured, the cords 44 and 45 are attached to the fabric 35 on opposite sides of the fold edge 36 by sewing directly through the cords and both sides of the tape with a loose lock stitch with a conventional lock stitch machine. The cords 44 and 45 are the guide beads for a slider (for opening and closing the fastener). Due to the looseness of the loops 40 and the looseness of the lock stitches passing through the bead cords 44 and 45, the fabric may then be unfolded. The thread loops passing through the stringers and also the stitching passing through the bead cords 44 and 45 are tightened as the fabric is unfolded, as best shown in Fig. 7. In this way, the stringer 37 and a cooperating stringer 46 may be secured between the edges of the fabric strip 35 and another fabric strip 47 to be joined to it. The slider 48 for the fastener will be disposed between the two pieces of fabric, as shown in Fig. 7.

From the preceding description it will be clear that slide fasteners may be produced in a continuous operation by means of the new method and that fasteners having tapes of widely differing colors can be produced merely by substituting one spool of tape for another and continuing the operations of forming the stringers and securing them to the tapes. All need for maintaining a supply of partially completed or special kinds of tapes is avoided and the production and handling of the material entering into the manufacture of the tapes is reduced to a minimum.

Generally the same procedure may be followed in the manufacture of the tooth-type of fastener of all types such as those having scoops or teeth integral with a bead cord or separate teeth or scoops clinched on a bead cord. Fig. 8 discloses a continuous stringer which may be produced by passing a bead cord 50 through the tooth-making machine where the teeth 51 are clinched onto the bead cord 50. The continuous stringer consisting of the bead cord 50 with the teeth 51 thereon is advanced continuously into overlapping relation with a tape 52 which is fed continuously with the stringer to the over-edge sewing machine. The over-edge sewing machine throws loops 53, 54, etc. around the bead cord 50 and between or around the teeth 51 in the same manner that it does when using a spiral type stringer, as described above, so that usually two threads pass around the bead cord between each pair of fastener teeth 51, 51 and at least one thread is present between each pair of teeth, under all conditions. In this way, the stringer is anchored securely to the tape without any weak spots therein.

The method of securing the tooth type fastener is particularly advantageous for the manufacture of several different colors or sizes of tapes with a single machine set-up. In order to change from one color to another, it is only necessary to supply bead cord of a suitable color to the tooth-making machine, supply a correspondingly colored tape to the sewing machine and utilize in the sewing machine a sewing thread of an appropriate color. Thus, a single machine set-up can be used to prepare in succession slide fasteners of a series of desired colors. In this way, loss of manufacturing time is reduced to a minimum so that operating economies of substantial magnitude are obtained.

It will be understood that the invention may be practiced with almost any type of fastener element whether of the tooth, cup or spiral type of stringer, or fastening element, that the width and construction of the tape may be varied depending upon requirements for strength, ornamental appearance, and the like.

Accordingly, the forms of the invention described above should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. A method of making slide fasteners comprising moving a continuous stringer having fastener elements

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thereon into overlapping relation to a strip of fabric and securing said stringer to said strip with an overedge stitching operation characterized by passing loops of thread around the stringer to opposite sides of said strip alternately to position the thread between said fastener elements and catching said loops on opposite sides of said strip with a row of stitches of another thread passing through the strip between its edges in spaced-apart relation to said stringer to locate at least one thread between each pair of fastener elements.

2. The method set forth in claim 1 comprising securing a bead to said strip adjacent to said stringers by sewing directly through said bead and said strip.

3. The method set forth in claim 1 comprising advancing bead cords into overlapping relation to said strip on opposite sides thereof adjacent to the inner edge of said stringer and sewing said bead cords to said strip by sewing directly through said cords and said strip.

4. A method of making slide fasteners comprising moving a stringer including a continuous bead having fastener elements fixed thereto in spaced apart relation, into overlapping relation to a moving strip of fabric and securing said bead to said strip by an overedge stitching operation in which loops of thread are passed around said stringer to opposite sides of said strip alternately with at least one thread extending around the bead between each pair of fastener elements and secured to said strip by a row of stitches of another thread passing through the strip between its edges in spaced-apart relation to said stringer.

5. A method of making slide fasteners comprising advancing a stringer of connected fastener elements and a strip of fabric into overlapping relation and securing said stringer to said strip by an overedge stitching operation in which loops of thread are passed around said stringer from one side of said strip to the other alternately and between said fastener elements to locate at least one thread between each pair of fastener elements and said loops of thread are secured to said strip by a row of stitches of another thread passing through said strip between its edges in spaced-apart relation to said stringer.

6. A method of making slide fasteners comprising advancing a continuous strip of folded fabric having a fold edge extending lengthwise thereof, advancing endwise a continuous slide fastener stringer having a plurality of fastener elements thereon into a position adjacent to said fold edge of said strip and securing said stringer to said fold edge of said strip with a stitching operation consisting of passing loops of thread over the stringer to opposite sides of said strip alternately between said fastener elements and catching said loops on opposite sides of said strip with a row of stitches of another thread passing through the strip between its edges in spaced-apart relation to said stringer to locate at least one thread between each pair of fastener elements.

7. The method set forth in claim 6 comprising advancing bead cords into overlapping relation to said strip adjacent to said stringer and at opposite sides of said fold edge and securing said cords to said strip by sewing through said cords and said strip, and unfolding said strip to position said stringer on one side of said strip and between said bead cords.

8. A slide fastener comprising a strip of flexible material having a stringer of fastener elements secured thereto by loops of thread extending around said stringer to opposite sides of said strip alternately, said loops of thread being secured to the strip by other loops of another thread passing through said strip and through the loops of thread passing around said stringer, at least one thread passing around said stringer between each pair of fastener elements thereon, said other loops being outside of and spaced laterally from said stringer.

9. The slide fastener set forth in claim 8 in which said

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stringer comprises a flexible bead member having a plurality of separate fastener elements secured thereto in spaced apart relation lengthwise of said bead member.

10. The slide fastener set forth in claim 8 in which said stringer comprises a plurality of interconnected fastener element loops and the threads extending around the stringer pass between said fastener element loops.

11. The slide fastener set forth in claim 8 in which the stringer is secured to said strip between the edges of said strip.

12. The slide fastener set forth in claim 8 comprising a bead cord secured to one side of said strip adjacent to said stringer and forming a guide for a slider for said slide fastener.

13. The slide fastener set forth in claim 8 in which the stringer is secured to said strip between its edges and comprising bead cords on opposite sides of said stringer on the same side of said strip.

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14. The slide fastener set forth in claim 8 in which the stringer comprises a flattened helix of plastic material having a plurality of convolutions forming fastener elements.

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