

July 8, 1969

J. E. BURBANK

3,454,052

WOVEN ZIPPER FASTENER STRINGER

Filed March 10, 1967

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Fig. 1.

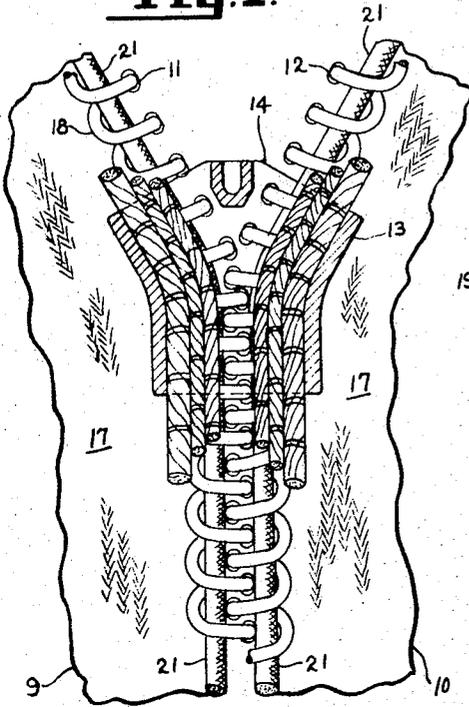


Fig. 2.

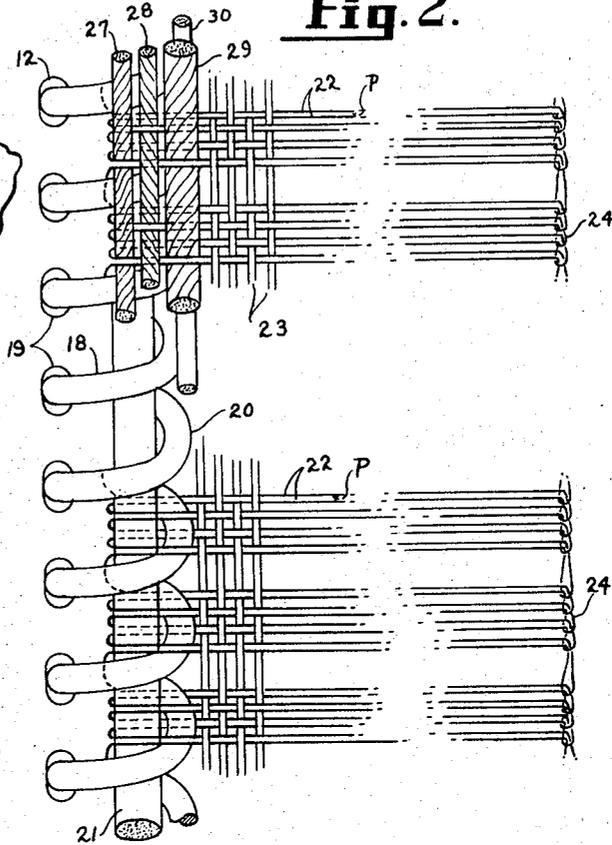


Fig. 4.

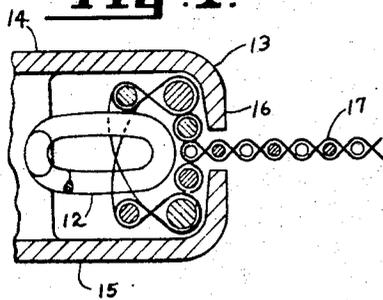
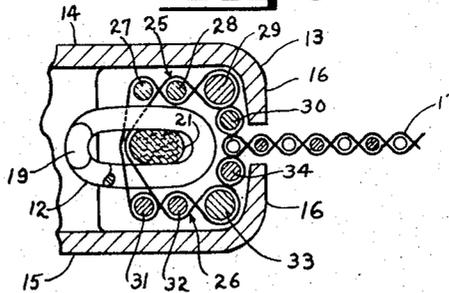


Fig. 3.



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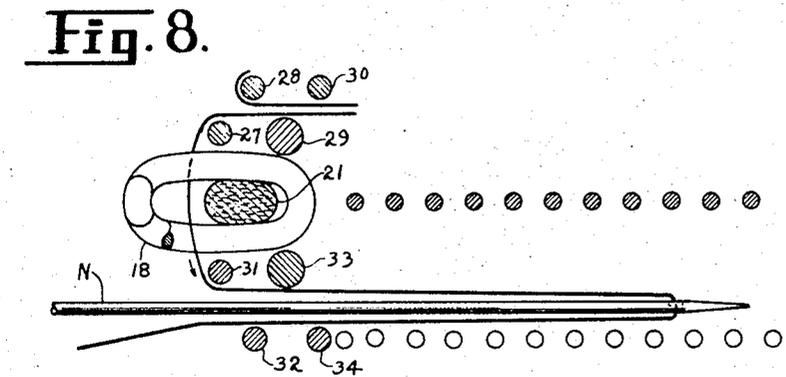
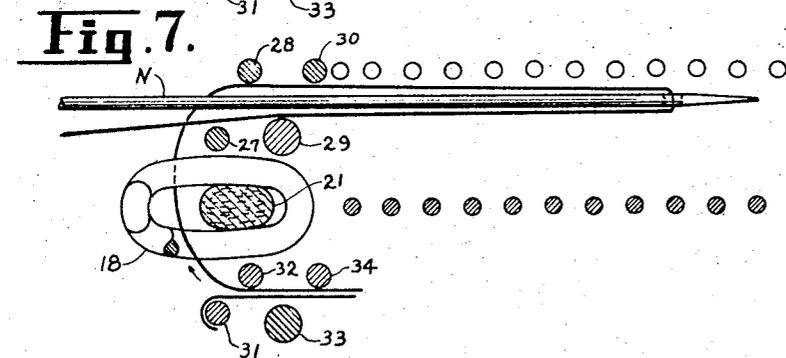
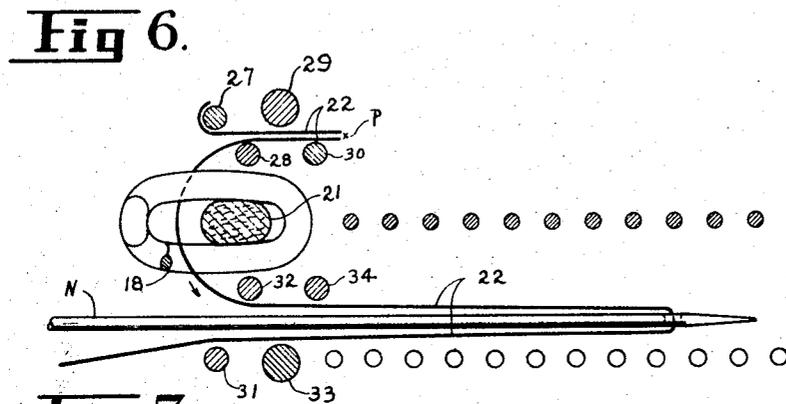
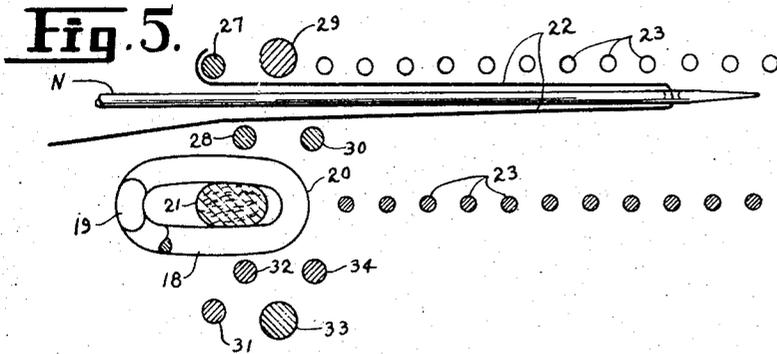
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3,454,052

WOVEN ZIPPER FASTENER STRINGER

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2 Claims

ABSTRACT OF THE DISCLOSURE

A fastener element strip consisting of a continuous filament of plastic material is woven into the tape in such a way as to provide substantial corners to serve as a better track for a zipper slider. Relatively large warps are located at the corners by spaced warps along an edge of a flat web to form wing sections which also extend over the outer surfaces of the plastic filament as a covering. The filament may be in the shape of a coil enclosing a cord and the wefts of the web are interwoven with the warps of the wing sections and pass around in front of the cord between the coil convolutions to tie the whole structure firmly together.

The invention is an improved woven zipper fastener stringer employing a fastener element strip consisting of plastic material. The strip may be a continuous coil with or without a cord through the coil or it may have other shapes.

The prior art includes other suggestions of woven zipper fastener stringers where a preformed fastener element strip is woven into the tape, the best known example being the patent to Hendley 3,143,779 granted Aug. 11, 1964. Prior patents show a large cord positioned along the back of a coil and a plain tubular weave around such cord and coil. The result is a large round bundle which is not a very satisfactory guide for a slider. The bundle is supposed to resist pulling out merely because of its bulk. On the other hand, the present invention provides a stringer where the cross-section in the region of the fastener strip is rectangular or very nearly so. The result is a more definite and easier running slider guide which resists pulling out of the slider by its shape, not just bulk alone.

Instead of using some standard weave such as the tubular pattern of the Hendley patent, the invention involves a special weave wherein a wing section, preferably on each side of the flat web has warps of different sizes selected and arranged to function in the most desirable way, all of such warps being interwoven with the same weft threads as the flat web, such weft threads also wrapping around the connecting portions of the fastener element strip. Where such strip is in the form of a coil there is preferably a cord running through the coil and the weft threads pass around such cord to tie the entire combination securely together.

Another suggestion of a woven stringer is found in the Wilcken Patent 3,047,923 (FIG. 10). Here the slider rides on the coil and thus it does not have the well known advantages of a continuous track of textile material. The cover warps over the coil are said to be woven "by means of a warp thread" and it is well known that any mechanism for handling warp threads in such a fashion is relatively cumbersome and slow in operation.

Accordingly a principal object of the invention is a zipper fastener stringer with a generally rectangular track and also preferably adequate covering for the fastener strip, which can all be woven together in one operation economically on a needle loom. The construction

has distinct advantages over track cords and covers which are secured by an additional sewing operation after the tape is woven and wherein the stitching is liable to wear out and break to render the fastener useless.

Other objects and advantages of the invention will hereinafter more fully appear. In the accompanying drawings I have shown for purposes of illustration, two embodiments which the invention may assume in practice. In these drawings:

FIG. 1 is a general front view of a zipper fastener embodying my invention, and showing the upper portion of the slider in cross section;

FIG. 2 is a diagrammatic view of a portion of the stringer wherein the wing section material is omitted in the lower portion of the figure to facilitate illustration;

FIG. 3 is a schematic cross section through the stringer showing the preferred embodiment of the invention;

FIG. 4 is a schematic cross section similar to FIG. 3 showing a modification where there is no cord inside the coil; and

FIGS. 5, 6, 7, and 8 are diagrams showing the different positions assumed by the coil and warps during the weaving operation.

The portion of an assembled zipper fastener shown in FIG. 1 has a pair of stringers generally designated 9 and 10, carrying fastener element strips 11 and 12 respectively and a slider 13 for opening and closing the fastener. As seen in the section of FIG. 3 the slider has the usual upper and lower plates 14 and 15 with side flanges 16 turned inwardly at right angles. Each stringer has, extending along one edge of a flat woven web 17, a fastener element strip shown in the drawings as a continuous filamentary coil 18 made of suitable plastic material such as nylon. It has preformed head portions 19 projecting away from the web 17, connecting heel portions 20 and also in the preferred form, a cord 21 extending longitudinally through the coil, the cord being spaced far enough back of the head portions 19 to permit interlocking of such head portions with a corresponding shaped fastener element strip.

Any conventional weave pattern may be used in the web 17 and in the one illustrated each double pick P of a weft thread 22 as laid by a needle loom, passes alternately over one and under one of the uniformly sized web warps 23, the picks being knitted together to form a selvage edge 24 as usual in tapes made on needle looms. Upper and lower wing sections generally designated 25 and 26 respectively, are integrally woven with the web 17, the upper section 25 containing warps 27, 28, 29, and 30, and the lower section similar warps 31, 32, 33, and 34. Those designated 30 and 34 are herein sometimes called spacer warps, 29 and 33 corner warps, 27, 28, 31, and 32 covering warps. In order to achieve the desired rectangular shape the corner warps are substantially larger than warps 23 of the web, while the spacer warps may be approximately the same size or even smaller than the web warps. The cover warps are also preferably smaller than the corner ones, but may be somewhat heavier than the warps in the flat web 17.

The special weave involving the wing sections 25 and 26, the coil 18 and cord 21 may be best explained by reference to the diagrams FIGS. 5, 6, 7, and 8. FIG. 5 shows the laying needle N passing through the upper wing section with warps 27 and 29 above, and warps 28 and 30 below the shed, and then between the warps 23 of the web which are shedded as desired for any particular weave pattern. At this time the coil 18 with its cord 21, as well as all of the warps of the lower wing sections 31, 32, 33, and 34 are below the shed. In this position the needle projects a double pick P of weft thread 22 where-

upon such pick is caught in the knitted selvage edge 24 and the needle retracts from the shed. Next, a second shed is formed as seen in FIG. 6, with the coil, all warps of the upper wing section, and warps 32 and 34 of the lower wing section all on top while warps 31 and 33 remain on the bottom and of course the web warps 23 have been shifted. When the shed changes from FIG. 5 to FIG. 6, weft thread 22 moves through a space between head portions 19 of the coil and around the cord 21 in a downward direction into the lower wing section 26. At the next shed position in FIG. 7 the needle N is again passing through the upper wing section, over warps 27 and 29, under warps 28 and 30 and on between the web warps 23, which have now returned to the position of FIG. 5. As the coil moves to the bottom of the shed, weft thread 22 passes between the fastener element head portions 19 and around in front of cord 21 in an upward direction. In FIG. 8 the weft needle is again passing through the lower wing section and below the coil, but the relative positions of warps 31, 32, 33, and 34 are reversed from FIG. 6. At the next change of the shed everything returns to the position of FIG. 5 ready for repeating the four stages of the weaving operation.

In the resulting product as depicted in the upper part of FIG. 2 the upper corner warp 29 is tied in by every fourth one of the double picks running through the web and likewise the lower corner warp 32. Only the top wing section, of course, appears in FIG. 2. At every change of the shed, the weft thread goes around the cord 21 and the connecting heel portions 20 to anchor the coil firmly against the edge of the web. In the case illustrated the weft thread crosses over four times in each coil space so that in effect, there are two double picks P for each coil convolution as clearly appears in the bottom portion of FIG. 2 where the wing section is omitted.

In the modification shown in FIG. 4 the weave and arrangement of warps may be the same as that already described except that the cord 21 is omitted. One of the covering warps may also be omitted so that the weft thread will cross the coil nearer to the connecting heel portions 20. While the modified construction will not make a product which is as secure or as satisfactory as the preferred form it may be useful for some fasteners.

It will be observed especially in FIG. 3 that my novel construction provides rather well defined corners to fit the right angles between the slider plates 14, 15 and flanges 16. The spacer warps 30 and 34 serve not only to locate the corner warps properly, but also offers great resistance to pulling out through the space between the slider flanges 16. This is so because the warps 30 and 34 are securely held by the weft thread interwoven in and out and between the web and corner warps 29 and 33.

What I claim is:

1. A zipper fastener stringer comprising:
 - (a) a web having substantially uniformly sized warps and a weft thread interwoven therewith;
 - (b) a fastener element strip extending along one edge

of said web, said strip having head portions projecting away from the web and connecting portions adjacent said edge of the web and integral with said head portions, said fastener strip being a continuous filamentary coil and having a cord extending longitudinally therethrough;

- (c) a wing section extending outwardly from said edge of the web and consisting of a group of warps in parallel lying against said fastener element strip, wherein two double picks or four threads of said weft thread through said web, are extended and interwoven with said group of warps and thence are extended from the outer edge of said wing section and passed around the cord and said connecting portions between each two coil convolutions before returning to the web to tie said group of warps to said web and firmly against said fastener element strip;
 - (d) one of those warps in said wing section being spaced outwardly of said web and being of larger size than those warps in the web to provide a substantial corner for guiding a zipper slider.
2. A zipper fastener stringer comprising:
 - (a) a web having substantially uniformly sized warps and a weft thread interwoven therewith;
 - (b) a fastener element strip extending along one edge of said web, said strip having head portions projecting away from the web and connecting portions adjacent said edge of the web and integral with said head portions, said fastener element strip being a continuous filamentary coil and having a cord extending longitudinally therethrough;
 - (c) two like wing sections extending outwardly from said edge of the web one on either side of the web, and each consisting of a group of warps in parallel lying against said fastener element strip, wherein double picks of weft thread are extended and interwoven alternately with said groups of warps of the two wing sections and thence are extended from the outer edge of each one of said wing sections and passed around in front of said cord and back through the other wing section to the web to tie said groups of warps to said web and firmly against said fastener element strip;
 - (d) one of those warps in each of said wing sections being spaced outwardly of said web and being of larger size than those warps in the web to provide a substantial corner for guiding a zipper slider.

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U.S. Cl. X.R.

24—205.1, 205.16