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O. FIRING

3,068,908

ZIPPER TAPE

Filed July 18, 1960

Fig. 1

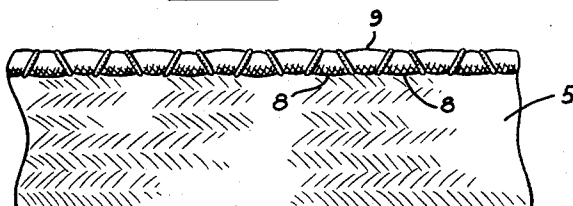


Fig. 3

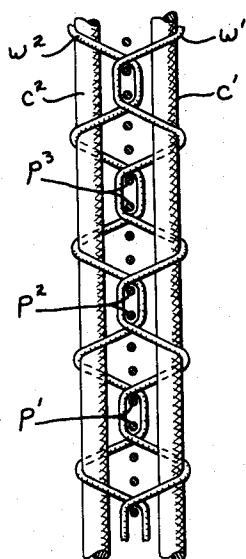


Fig. 2

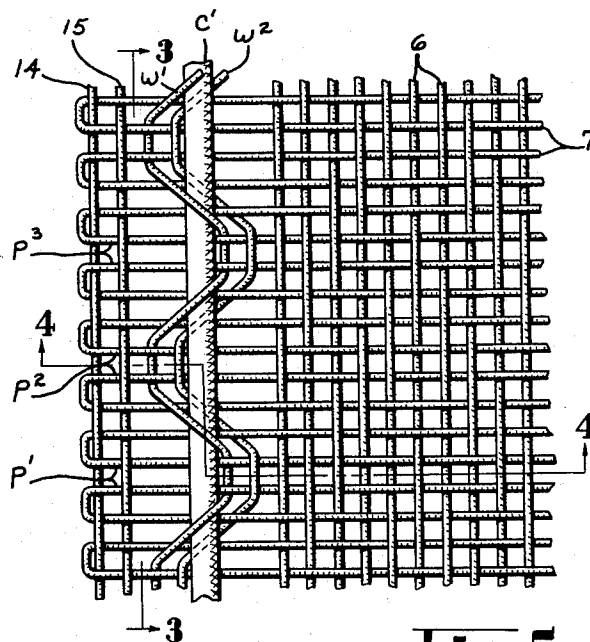


Fig. 5

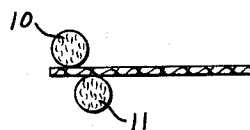
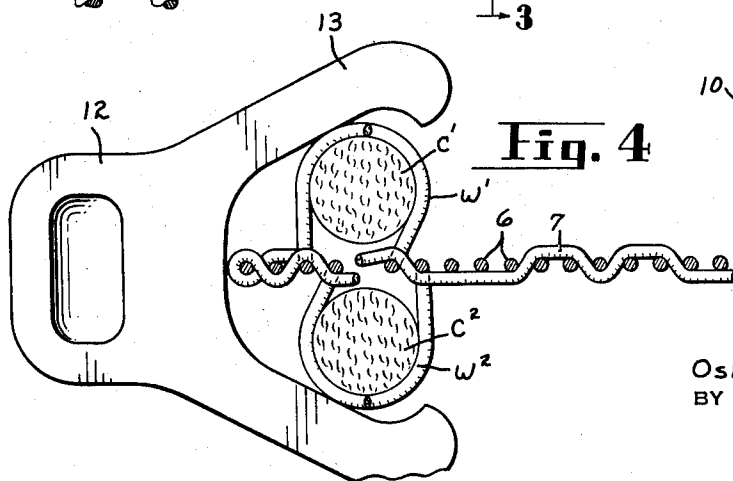


Fig. 4



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ZIPPER TAPE

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4 Claims. (Cl. 139-384)

My invention relates to tapes for zipper fasteners and more particularly to a woven tape in which a two-cord beaded edge is formed during the weaving operation as an integral part of the tape.

While many attempts have been made to produce beaded edge tapes suitable for zipper fasteners, it has heretofore not been possible to weave a tape with such a beaded edge which would equal in quality a tape in which the cords are sewn to the tape in a separate operation. Usually, former methods of weaving a beaded edge tape have tied in the cord by weft threads passing over the cords. The result here is a very substantial loss in crosswise strength of the tape due to the great pressure upon, and danger of rupture of, such weft threads by the jaws of the fastener elements. Another objection to prior tapes with two cords woven into one edge is that the position of the cords cannot be maintained with sufficient accuracy to produce a good quality zipper.

One of the objects of my invention is to provide an improved tape for zipper fasteners in which the loss of crosswise strength by attachment of the fastener elements is not only less than that encountered with other woven cord edge tapes, but also less than in tapes where the cords are sewn to the tape in a separate operation, while at the same time avoiding the extra cost involved in the sewing operation.

Another object is to provide an improved tape for zipper fasteners in which the cords are held firmly and accurately in proper position with respect to the edge of the tape.

The tape of the present invention is adapted to be made on a needle loom as disclosed in my co-pending application, Serial Number 826,667, filed July 13, 1959. In a tape made as described in said patent, there are two picks or weft threads laid between each change of the shed and the special warps or tie-in threads must necessarily cross the cords at a substantial angle since while crossing the cords, they must pass lengthwise of the tape over two such picks or weft threads and then, on the next subsequent crossing back over the cords, the angle of each special warp is in the opposite direction. There is, thus, a tendency for that portion of the cord between the crossings or tie loops to shift laterally of the tape since each special warp or tie-in thread (which is under tension) will tend to pull the cord into a right angle relationship with it. This has a tendency to produce a snaky effect on the cords and with a tape manufactured according to the aforesaid application, the cord on one side of the tape will tend to shift laterally in one direction at the same place where the cord on the opposite side will tend to shift in the opposite direction. This results in a situation where the cords will not be exactly opposite one another with the result that the zipper fastener elements cannot properly grasp around the cords.

A specific object of my invention, therefore, is to eliminate the difficulty caused by such non-parallelism of the cords so that the zipper fastener elements will always grasp around the cords properly.

Another object of my invention is to provide an improved tape for zipper fasteners wherein the cord tie-in threads are so engaged with the weft threads that the tendency for such weft threads to pull out of the plane of the fabric is reduced to a minimum. Thus, none of the weft threads are placed under extra tension so that

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the crosswise strength of the zipper stringer is substantially the full crosswise strength of the body of the tape.

Other objects and advantages of my invention will hereinafter more fully appear.

In the accompanying drawings, I have shown for the purpose of illustration, one embodiment which my invention may assume in practice. In the drawings:

FIG. 1 is a plan view of my improved zipper tape;

FIG. 2 is also a plan view on an enlarged scale with the weave opened up to show the tape construction;

FIG. 3 is a cross-section with the weave opened up taken along line 3-3 of FIG. 2;

FIG. 4 is a cross-section on line 4-4 of FIG. 2 on an enlarged scale indicating how the fastener elements are applied to the tape; and,

FIG. 5 is a small section to indicate a condition above-referred to which results in prior tapes made with a loom as described in the aforesaid application.

The web or flat portion 5 of the tape is preferably of the twill or herring-bone type of weave commonly used in zipper fasteners. It is made up of warp threads 6 and weft threads 7. Each warp thread goes under 4 and over 4 and the next adjacent warp thread steps two weft threads along the length of the tape to make the familiar twill pattern. The weave illustrated is adapted to be made on a needle loom which necessarily lays two picks or weft threads between each shift of the shed. Such a tape has along one edge a knitted selvage but in the drawings, this is not shown because only a portion of the width of the tape appears. The weft thread 7 in FIG. 4 is shown broken between the cords because the weave of the flat portion of the tape is shown open as in FIG. 2.

The beaded edge is formed essentially by two relatively large cords C¹ and C², one cord being disposed on each side of the tape. These cords are held in place by special warp threads and in the embodiment illustrated, cord C¹ is held by its special warp thread W¹ and cord C² is held by its special warp thread W².

At every certain multiple of double picks of the weft, the special warp W¹ is brought from under the previous pair of picks, here designated P¹, diagonally across the top of cord C¹ jumping over at least one pair of picks and under the next pair labeled P², being returned back across cord C¹ diagonally while jumping at least another pair of picks and under the pair of picks P³ which follows.

At the same time, the special warp W² starting from the same position is brought from over the same previous pair of picks P¹ diagonally across the bottom of cord C² over said same next pair of picks P² diagonally back under cord C² and over the following pair of picks P³. It will thus be seen that the special warps are interengaged with the same weft threads at substantially the same place on one side of the cords, each such warp crossing its cord diagonally at the same angle with respect to the cords and then being interengaged with identical weft threads on the other side of the cord, and then re-crossing their respective cords again in the same direction and repeating. Thus, the cord tie loops are lying substantially in common planes vertically of the tape.

Since the cord tie loops cross at substantial angles and each succeeding loop is at the angle opposite to a preceding loop, each of the cords will tend to assume a slightly snaky effect. This is indicated in FIG. 1 where every other portion of the cord between the tie loops, here designated 8, tends to bulge slightly inwardly while the portions 9 in between tend to bulge slightly outwardly. However, with my improved tape, as can be seen in FIG. 3,

any such tendency for the cords to shift slightly out of line is the same for one cord as the other; in other words, the cords will always be parallel. However, with other attempts to weave in cords by special threads crossing at an angle, the angle at any place on one cord was usually opposite to that for the other cord with the result that the cords at any given place would not be exactly opposite one another. This is shown on an exaggerated scale in FIG. 5 where the top cord 10 may shift outwardly while the bottom cord 11 may shift inwardly. This results in a situation where a fastener element 12 having jaws 13 cannot grip symmetrically on the cords with the result that a poor zipper is obtained. Any slight snaky effect resulting from my construction is not objectionable because the cords are always parallel and will be received by the jaws symmetrically.

These special warps need not be of the same material or size as the regular warps; for example, they may be of more tightly twisted cotton or nylon to provide extra strength to the cord tie loops.

It will also be noted that at the places where one of the special warps is pulling on a pair of picks, the other special warp is pulling on the same pair of picks at substantially the same place and in the opposite direction, thus balancing the forces and minimizing the tendency for these picks to be placed under extra tension. While for purpose of illustration, in FIGS. 2 and 4 these warps appear to be separated, it will be understood that in the actual weave, they will be lying tightly together and thus crossing the picks at substantially the same place.

While the cord tie loops are spaced apart, preferably a distance of at least four picks, they nevertheless tend to imbed themselves in the cords so as not to vary the overall dimension of the cord edge. Thus it is possible to control the size of the cord edge much more accurately than in the case where the cords are woven in by threads crossing at each shift of the shed so as to form a tube around the cord.

At the outer edge of the tape, there are maybe two additional warp threads 14 and 15 which are preferably interwoven with the picks over 2 under 2 so as to afford a firm anchoring edge. The edge does not project beyond the cords as much as would appear in FIGS. 2 and 4 in which the weave is expanded for purpose of illustration.

It may be noted here that the space between the cords is devoid of any warp threads so that the wefts do not have to cross each other at such a sharp angle as in the main body of the fabric. This has the advantage that the pressure exerted by the clamping jaws 13 of the fastener elements do not have a tendency to crush or weaken the fibers of the weft threads.

It will thus be seen that in all respects, the fastener tape is of such construction and the cords are so arranged and held that the crosswise strength of the fabric tape is not diminished to any appreciable extent by the attachment of the fastener elements.

What I claim is:

1. A tape for zippers comprising a woven web having a beaded edge, the beaded edge being formed by two rela-

tively large cords disposed on each side of the tape and being held in place each by its own special warp thread, such special warps being interengaged with the same weft threads at substantially the same place on one side of the cords, each special warp crossing its cord diagonally at the same angle with respect to the cords, said warps then being interengaged with other weft threads again at the same place then re-crossing their respective cord diagonally and repeating the crossings forming tie loops which lie in substantially common planes vertically of the tape.

2. A tape for zippers comprising a woven web having a beaded edge, the beaded edge being formed by two relatively large cords disposed on each side of the tape and being held in place each by its own special warp thread, one of said special warps being engaged under selected pairs of picks first on one side of its cord then on the other, the other of said special warps being engaged over the same selected pairs of picks and at substantially the same place as said one special warp, whereby the pull against such picks of one special warp is substantially balanced by the pull of said other special warp.

3. A tape for zippers comprising a woven web having a beaded edge, the beaded edge being formed by two relatively large cords disposed on opposite sides of the tape and being held in place by special warp threads, one of said special warp threads first crossing under a first pair of wefts then angularly over a top cord, then under the third pair of weft threads angularly again over the top cord and under the fifth pair of weft threads and repeating, the other of said special warp threads passing first over said first pair of weft threads at the same side of the cords as said first special warp thread, then angularly under the bottom cord and second pair of weft threads, then over the third pair of weft threads and angularly across the bottom cord and repeating, the two warp threads throughout their extent being substantially in alignment as viewed from the top of the tape.

4. A tape for zippers comprising a woven web having a beaded edge, the beaded edge being formed by two relatively large cords disposed on each side of the tape and being held in place each by its own special warp thread, wherein at every certain multiple of double picks of the weft, one special warp is brought from under the previous pair of picks, diagonally across the top of its cord jumping over at least one pair of picks and under the next pair, being returned back across its cord diagonally while jumping at least another pair of picks and under the pair of picks which follows, while at the same time, the other special warp starting from the same position is brought from over the same previous pair of picks diagonally across the bottom of the said other cord and over the following pair of picks.

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