

PATENT SPECIFICATION

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(54) SLIDING CLASP FASTENER STRINGER WITH A CONTINUOUS COUPLING ELEMENT WOVEN INTO A FABRIC TAPE

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates generally to sliding clasp fasteners and in particular to a stringer for sliding clasp fasteners. More specifically, the invention deals with a sliding clasp fastener stringer of the type comprising a woven fabric tape and a continuous coupling element of helicoidal, zigzag or like configuration, such that the coupling element is affixed to the fabric tape by being substantially woven into the latter.

In the sliding clasp fastener stringer of the aforementioned type, the continuous coupling element is woven into the fabric tape along one of the longitudinal edges thereof usually by utilizing the weft yarn of the tape. The weft yarn includes portions engaged with the coupling element along the said one longitudinal edge of the stringer tape, and other portions extending transversely of the stringer tape to weave with its warp yarns. Consequently, no more tensile force can be possibly exerted on the weft yarn than that required for the formation of the desired weave construction of the stringer tape. It is of course impossible to apply any higher tension only to those portions of the weft yarn engaged with the continuous coupling element.

This is the principal reason why, in the prior art sliding clasp fastener stringer of the type now under consideration, the continuous coupling element is often not affixed to the fabric tape with a desired degree of firmness, that is, is not sufficiently strongly tied to the latter by the weft yarn. In the use of the complete sliding clasp

fastener, therefore, the continuous coupling elements thus insecurely affixed to the stringer tapes are easy to displace from their preassigned positions on the respective tapes, thereby impairing the proper functioning of the fastener.

According to the invention there is provided a sliding clasp fastener stringer comprising a continuous coupling element having a series of scoops each of which is constituted by a coupling head and upper and lower legs which are connected to each other via connecting portions remote from the coupling heads, having a stuffer warp extending longitudinally through said continuous coupling element, a woven fabric tape including an element-carrying portion and a major portion, said element-carrying portion extending along one of the longitudinal edges of said fabric tape and underlying said continuous coupling element; said fabric tape including a first group of warp yarns extending longitudinally of said element-carrying portion, a second group of warp yarns extending longitudinally of said major portion, and a first weft yarn; said first weft yarn first being woven with said first and second groups of warp yarns, and then passing under one of said lower legs of said continuous coupling element, and then being woven only with said second group of warp yarns; and a cover strip overlying said continuous coupling element; said cover strip also being a woven fabric including a third group of warp yarns extending longitudinally thereof, and a second weft yarn; said second weft yarn first being woven with said third group of warp yarns, and then passing under said stuffer warp and one of said connecting portions of said continuous coupling element and over one of said upper legs of said continuous coupling element.

The invention will be described by way of example with reference to the accompanying drawings in which like

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reference characters denote corresponding parts of the several views, and wherein;

Figure 1 is a partial, diagrammatic top plan view of a sliding clasp fastener stringer constructed in accordance with this invention;

Figure 2 is a left hand side elevational view in the direction of the arrow A of the sliding clasp fastener stringer shown in Figure 1;

Figure 3 is a cross sectional view taken along the plane of line III—III in Figure 2;

Figure 4 is a partly broken-away bottom plan view of the sliding clasp fastener stringer shown in Figure 1;

Figure 5 is a view similar to Figure 2 but illustrating another embodiment of the invention;

Figure 6 is a cross sectional view taken along the plane of line VI—VI in Figure 5; and

Figure 7 is also a cross sectional view taken along the plane of line VII—VII in Figure 5.

The invention will now be described more specifically in terms of a preferable embodiment thereof illustrated in Figures 1 to 4, inclusive. The illustrated sliding clasp fastener stringer broadly comprises a woven fabric tape 10 and a continuous coupling element 11. The stringer tape 10 includes an element carrying portion 12 along one of the longitudinal edges thereof and a major portion 13. The fabric construction of the stringer tape 10 is constituted of a first group of warp yarns 14 extending longitudinally of the element-carrying tape portion 12, a second group of warp yarns 15 extending longitudinally of the major tape portion 13, and a first weft yarn 16, as will be later described in more detail.

The continuous coupling element 11 is arranged over the element carrying portion 12 of the stringer tape. As will be seen from the drawings, this coupling element is well known in the art as the helicoidal or coil type, in which a continuous filament of a synthetic resin is coiled to provide a series of scoops each of which comprises a coupling head and upper and lower legs and which are connected to each other via arcuate connecting portions located remote from the coupling heads. A cord-like stuffer warp 17 is accommodated within, and extends longitudinally through, the continuous coupling element 11.

The stringer tape 10 can be woven on a needle loom. Attention is not directed to the particular weft yarn loop indicated at 18 and 19 in the bottom plan view of Figure 4. It is assumed that this weft yarn loop has just been formed by inserting the aforesaid first weft yarn 16 in the direction of the arrow A through the shed formed by the

first and second groups of warp yarns 14 and 15 by a first needle of the needle loom so as to pass under and over the alternate warp yarns of the element-carrying tape portion 12 and the major tape portion 13. Prior to the next "picking" operation, this first weft yarn passes under a lower shank 20 of the continuous coupling element 11 along the near selvage (see to the left in Figures 3 and 4) of the stringer tape and upwardly over the stuffer warp 17 and the arcuate connecting portion 21 between the adjacent scoops of the element 11, as indicated at 22 in Figure 3. The first weft yarn 16 is then again inserted through the shed created by the warp yarns 15 of the major tape portion 13, thereby forming another weft yarn loop 23 best illustrated in Figure 4.

By the weave outlined in the foregoing, the continuous coupling element 11 is affixed onto the element carrying portion 12 of the stringer tape 10. It may be noted that the force with which the coupling element is woven to the tape by the fabric construction so far described is determined by the tensile force exerted by the first weft yarn 16 during its picking operation.

It will be seen from a consideration of Figure 4 that the first weft yarn 16 is knitted at the far selvage of the stringer tape 10, by a selvedge needle of the needle loom so as to form a knitted selvedge 24.

As clearly seen in Figure 1, there is further provided according to this invention a third group of warp yarns 26 extending over the upper legs 27 of the continuous coupling element 11. The weft woven with this third group of warp yarns is formed by a second weft yarn 28 that may be inserted by a second needle of the needle loom.

With reference to Figures 1 to 3, inclusive, the second weft yarn 28 extends over each upper leg 27 of the continuous coupling element 11 along the near selvage and is inserted, in the direction of the arrow A in Figures 1 and 2, under and over the alternate warp yarns 26 of the third group, thereby forming a weft yarn loop specifically designated by the numeral 29 in Figure 1. Prior to the next picking operation, this second weft yarn is guided downwardly to pass at 30 under the stuffer warp 17 and the connecting portion 21. The yarn is successively guided over the connecting portion 21 and is knitted at the connecting portion 21 to form an internal selvedge 31 anchoring the coupling element to fabric formed by the second weft 28 and the warps 26.

The third group of warp yarns 26 and the second weft yarn 28 interwoven in the above described fashion provide a cover strip 33 overlying the far portions of the upper legs 27 of the continuous coupling

element 11. The continuous coupling element is now positively anchored onto the stringer tape 10.

It is particularly noteworthy that the second weft yarn 28 of the cover strip 33 is associated only with the third group of warp yarns 26, the upper legs 27 of the continuous coupling element 11, the stuffer warp 17, and the connecting portions 21 of the coupling element. As a consequence, this second weft yarn can be tensioned to a desired degree without regard to the fabric construction of the element carrying portion 12 and major portion 13 of the stringer tape 10.

As best shown in Figures 1 and 4, loops of warp yarns are arranged in close side-by-side relationship at the extreme left, as seen in the drawings, of the element-carrying tape portion 12, the major tape portion 13 and the cover strip 33, respectively. This arrangement is designed to reinforce the fabric constructions of these portions.

In another embodiment of this invention illustrated in Figures 5 to 7, inclusive, there is incorporated a continuous coupling element 40 of zigzag type. As is well known, in the continuous coupling element of this second type, a filament of a synthetic resin is bent in zigzag configuration to provide a series of scoops each of which comprises a coupling head and upper and lower legs and which are connected to each other via alternating upper and lower connecting portions located remote from the coupling heads.

As in the preceding embodiment of the invention, the illustrated stringer includes a woven fabric tape 41 comprising an element carrying portion 42 along the front longitudinal edge thereof and a plain or major portion 43. More specifically, the stringer tape 41 is woven with a first group of warp yarns 44 extending longitudinally of the element-carrying tape portion 42, a second group of warp yarns 45 extending longitudinally of the major tape portion 43, and a first weft yarn 46.

The zigzag-type continuous coupling element 40 is arranged over the element carrying portion 42 of the stringer tape, and a stuffer warp 47 is accommodated within, and extends longitudinally through, the continuous coupling element.

This stringer tape 41 can also be woven on a needle loom. It is now assumed that the first weft yarn 46 has just been inserted, in the direction of the arrow B in Figures 6 and 7, through the shed between the first and second groups of warp yarns 44 and 45 by the first needle of the needle loom, thereby forming a weft loop 48 woven with the warp yarns of the element-carrying tape portion 42 and the major tape portion 43. Prior to the next picking operation, this

first weft yarn is guided under one of the lower legs 49 of the continuous coupling element 40 along the near selvage of the stringer tape and upwardly over the stuffer warp 47 and the lower or upper connecting portion 50 or 51 between the adjacent scoops of the element 40, as indicated by way of example at 52 in Figure 6. The first weft yarn 46 is then again inserted through the shed created between the warp yarns 45 of the major tape portion 43, thereby forming another weft loop labeled 53 in Figures 6 and 7.

As is well known, the individual scoops of the zigzag-type continuous coupling element now under consideration are alternately interconnected by the lower connecting portion 50 bridging the lower legs 49 of the adjacent scoops, as shown in Figure 6, and by the upper connecting portion 51 bridging the upper legs 54 of the adjacent scoops, as shown in Figure 7.

Thus, if the above mentioned weft yarn 53 was first inserted to weave-in the lower connecting portion 50 as shown in Figure 6, then the next weft yarn woven with the warp yarns 45 of the major tape portion 43 will weave-in the upper connecting portion 51, as will be seen from Figure 7.

The weave of the element-carrying tape portion 42 and the major tape portion 43 being as described hereinbefore, it will be observed that the zigzag-type continuous coupling element 40 is woven to the stringer tape 41 via the first weft yarn 46, with a force corresponding to the tensile force exerted by the first weft yarn during its picking operation. Although not specifically illustrated, it is understood that the weft loops 48, 53 and so forth are knitted along the far selvage of the stringer tape, with loops successively anchored to each other, as previously explained in conjunction with Figure 4.

As in the preceding embodiment of the invention, there is further provided a third group of warp yarns 55 extending over the upper legs 54 of the zigzag-type continuous coupling element 40. A second weft yarn 56, inserted by the second needle of the needle loom, forms the weft weaving the third group of warp yarns 55.

With reference to Figures 5 to 7, inclusive, the second weft yarn 56 extends over each upper leg 54 of the zigzag-type continuous coupling element 40 along the near selvage and is inserted, in the direction of the arrow B in Figures 6 and 7, through the shed formed by the warp yarns 55 of the third group, thereby forming a weft loop like that shown at 29 in Figure 1. Prior to the next picking operation, this second weft yarn is guided downwardly to pass at 57 under the core member 47 and the lower or upper connecting portion 50 or 51 between

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the adjacent scoops. As will be seen by referring back to Figure 1, each weft loop formed by the second weft yarn 56 is knitted to form an internal selvage anchoring the coupling element as with the first embodiment.

The third group of warp yarns 55 and the second weft yarn 56 woven in the above described fashion provide a cover strip 58 overlying the rear portions of the upper legs 54 of the zigzag-type continuous coupling element 40. The positive anchorage of the coupling element onto the stringer tape 10 is thus accomplished.

Since the scoops of the zigzag-type continuous coupling element are connected to each other by the alternating upper and lower connecting portions as previously mentioned, the second weft yarn 56 is required to alternately extend over and under these connecting portions. Figure 6 illustrates the second weft yarn 57 extending under the lower connecting portion 50, and Figure 7 the second weft yarn 57 extending over the upper connecting portion 51.

Thus, the first weft yarn is so arranged as to effectively bind onto the element carrying portion of the stringer tape the lower legs and the connecting portions of the continuous coupling element together with its stuffer warp. The second weft yarn likewise effectively fastens together the upper legs, the connecting portions, the stuffer warp, and the third group of warp yarns overlying the upper legs. It will therefore be appreciated that not only the lower legs but the upper legs, too, of the continuous coupling element are secured to the stringer tape via the stuffer warp, and that the connecting portions of the element are also woven to the tape by the first and second weft yarns via the stuffer warp.

Even more importantly, the second weft yarn forming the weft of the cover strip can be tensioned to a degree desirable for the positive anchorage of the continuous coupling element, totally without regard to the construction of the element-carrying tape portion and major tape portion. The coupling element can thus be definitely checked against any substantial displacement with respect to the stringer in the use of the complete sliding clasp fastener.

It may also be worth mentioning that the cover strip over the continuous coupling element can be woven simultaneously with the major portion of the stringer tap along one of the longitudinal edges of the stringer tape. Thus, the manufacture of the sliding clasp fastener stringer requires only a step

of inserting the second weft yarn through the third group of warp yarns in addition to the conventional manufacturing steps of the prior art stringers of this class and character. The sliding clasp fastener stringer is therefore mass-producible by a single weaving process.

WHAT WE CLAIM IS:—

1. A sliding clasp fastener stringer comprising a continuous coupling element having a series of scoops each of which is constituted by a coupling head and upper and lower legs which are connected to each other via connecting portions remote from the coupling heads, having a stuffer warp extending longitudinally through said continuous coupling element, a woven fabric tape including an element-carrying portion and a major portion, said element-carrying portion extending along one of the longitudinal edges of said fabric tape and underlying said continuous coupling element; said fabric tape including a first group of warp yarns extending longitudinally of said element carrying portion, a second group of warp yarns extending longitudinally of said major portion, and a first weft yarn; said first weft yarn first being woven with said first and second groups of warp yarns, and then passing under one of said lower legs of said continuous coupling element and over said stuffer warp and one of said connecting portions of said continuous coupling element, and then being woven only with said second group of warp yarns; and a cover strip overlying said continuous coupling element; said cover strip also being a woven fabric including a third group of warp yarns extending longitudinally thereof, and a second weft yarn; said second weft yarn first being woven with said third group of warp yarns, and then passing under said stuffer warp and one of said connecting portions of said continuous coupling element and over one of said upper legs of said continuous coupling element.

2. A sliding clasp fastener stringer as claimed in claim 1, wherein said first weft yarn forms a knitted selvage of loops along the longitudinal edge of said stringer tape opposite to said one longitudinal edge thereof, and wherein said second weft yarn forms loops along one of the longitudinal edges of said cover strip remote from said one longitudinal edge of said fabric tape, said second weft yarn being knitted at the connecting portions to form an internal selvage anchoring the coupling element to

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the adjacent scoops. As will be seen by referring back to Figure 1, each weft loop formed by the second weft yarn 56 is knitted to form an internal selvedge anchoring the coupling element as with the first embodiment.

The third group of warp yarns 55 and the second weft yarn 56 woven in the above described fashion provide a cover strip 58 overlying the rear portions of the upper legs 54 of the zigzag-type continuous coupling element 40. The positive anchorage of the coupling element onto the stringer tape 10 is thus accomplished.

Since the scoops of the zigzag-type continuous coupling element are connected to each other by the alternating upper and lower connecting portions as previously mentioned, the second weft yarn 56 is required to alternately extend over and under these connecting portions. Figure 6 illustrates the second weft yarn 57 extending under the lower connecting portion 50, and Figure 7 the second weft yarn 57 extending over the upper connecting portion 51.

Thus, the first weft yarn is so arranged as to effectively bind onto the element carrying portion of the stringer tape the lower legs and the connecting portions of the continuous coupling element together with its stuffer warp. The second weft yarn likewise effectively fastens together the upper legs, the connecting portions, the stuffer warp, and the third group of warp yarns overlying the upper legs. It will therefore be appreciated that not only the lower legs but the upper legs, too, of the continuous coupling element are secured to the stringer tape via the stuffer warp, and that the connecting portions of the element are also woven to the tape by the first and second weft yarns via the stuffer warp.

Even more importantly, the second weft yarn forming the weft of the cover strip can be tensioned to a degree desirable for the positive anchorage of the continuous coupling element, totally without regard to the construction of the element-carrying tape portion and major tape portion. The coupling element can thus be definitely checked against a substantial displacement with respect to the stringer in the use of the complete sliding clasp fastener.

It may also be worth mentioning that the cover strip over the continuous coupling element can be woven simultaneously with the major portion of the stringer tap along one of the longitudinal edges of the stringer tape. Thus, the manufacture of the sliding clasp fastener stringer requires only a step

of inserting the second weft yarn through the third group of warp yarns in addition to the conventional manufacturing steps of the prior art stringers of this class and character. The sliding clasp fastener stringer is therefore mass-producible by a single weaving process.

WHAT WE CLAIM IS:—

1. A sliding clasp fastener stringer comprising a continuous coupling element having a series of scoops each of which is constituted by a coupling head and upper and lower legs which are connected to each other via connecting portions remote from the coupling heads, having a stuffer warp extending longitudinally through said continuous coupling element, a woven fabric tape including an element-carrying portion and a major portion, said element-carrying portion extending along one of the longitudinal edges of said fabric tape and underlying said continuous coupling element; said fabric tape including a first group of warp yarns extending longitudinally of said element carrying portion, a second group of warp yarns extending longitudinally of said major portion, and a first weft yarn; said first weft yarn first being woven with said first and second groups of warp yarns, and then passing under one of said lower legs of said continuous coupling element and over said stuffer warp and one of said connecting portions of said continuous coupling element, and then being woven only with said second group of warp yarns; and a cover strip overlying said continuous coupling element; said cover strip also being a woven fabric including a third group of warp yarns extending longitudinally thereof, and a second weft yarn; said second weft yarn first being woven with said third group of warp yarns, and then passing under said stuffer warp and one of said connecting portions of said continuous coupling element and over one of said upper legs of said continuous coupling element.

2. A sliding clasp fastener stringer as claimed in claim 1, wherein said first weft yarn forms a knitted selvedge of loops along the longitudinal edge of said stringer tape opposite to said one longitudinal edge thereof, and wherein said second weft yarn forms loops along one of the longitudinal edges of said cover strip remote from said one longitudinal edge of said fabric tape, said second weft yarn being knitted at the connecting portions to form an internal selvedge anchoring the coupling element to



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5 fabric formed by the second weft and the third group of warp yarns.

5 3. A sliding clasp fastener stringer substantially as herein described with reference to and as illustrated in Figures 1 to 4 of the accompanying drawings.

4. A sliding clasp fastener stringer substantially as herein described with reference to and as illustrated in Figures 5 to 7 of the accompanying drawings.

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