

PATENT SPECIFICATION

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(54) A CONCEALED SLIDING CLASP FASTENER

(71) We, YOSHIDA KOGYO KABUSHIKI KAISHA, of No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan: a corporation duly organized under the laws of 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 to sliding clasp fasteners, more particularly to a slider-operated fastener of the concealed or masked type which in its closed disposition substantially simulates a garment seam.

Sliding clasp fasteners having two rows of interlocking fastener elements formed from a continuous filament or wire and secured to respective folded edges of opposed stringer tapes are well known, and such fasteners when closed by the slider mask the elements from external view, only leaving a linear seam in the junction of the opposed tapes.

The so-called "concealed" sliding clasp fasteners of known type are designed to maintain the effect of concealing or masking the fastener elements by folding the respective element-carrying edges of stringer tapes on themselves about the sewn seam which secures a rows of elements to the tape and which extends longitudinally of the tape and outermost of the elements or close to the coupling heads thereof. To obtain a maximum of the concealing effect, it is necessary to locate the sewn seam, which defines an axis of fold, as close to the coupling heads of the elements as possible. But if the sewn seam is brought too close to the coupling heads, it will obstruct their coupling engagement with those on the mating tape. Therefore, the known concealed sliding clasp fasteners have suffered from the tendency that the coupling elements are

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exposed to sight when lateral forces are exerted tending to split the two tapes apart.

Whereas, it is the primary object of the present invention to provide an improved concealed sliding clasp fastener which will eliminate the aforesaid difficulties of the prior-art fasteners.

It is a more specific object of the invention to provide an improved concealed sliding clasp fastener which is provided with a folded edge of the tape located as close to the coupling heads of the elements as required to maintain the desired concealing effect without obstructing the coupling operation of the fastener elements.

These and other objects and features of the invention will appear more clear from the following detailed description of preferred embodiments taken in conjunction with the accompanying drawings in which like reference characters refer to like or corresponding parts throughout the several views.

In the drawings:

FIG. 1 is a transverse cross-sectional view of an element-carrying tape embodying the invention and shown in a disposition prior to folding of the tape;

FIG. 2 is a transverse cross-sectional view of the same shown as in folded disposition;

FIG. 3 is a transverse cross-sectional view of two opposed stringer tapes of the type shown in FIG. 2 and as in interengaged or coupled disposition;

FIG. 4 is a transverse cross section of an element-free tape employed in accordance with another embodiment of the invention,

FIG. 5 is a transverse cross-sectional view of the tape of FIG. 4 carrying a row of elements and shown as in folded disposition;

FIG. 6 is a transverse cross section of

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an element-free tape according to a further embodiment of the invention;

FIG. 7 is a transverse cross-sectional view of the tape of FIG. 6 carrying a row of elements and shown as in folded disposition;

FIG. 8 is a transverse cross-sectional view of a pair of stringers of the type shown in FIG. 7 and shown as inter-engaged;

FIG. 9 is a transverse cross section of an element-free tape according to still another embodiment of the invention;

FIG. 10 is a transverse cross-sectional view of the tape of FIG. 9 carrying a row of elements and shown as in folded disposition;

FIG. 11 is a transverse cross-sectional view of a pair of stringers of the type shown in FIG. 10 and shown as inter-engaged;

FIG. 12 schematically illustrates an example of the construction of a fastener tape employed in accordance with the invention; and

FIG. 13 is a transverse cross-sectional view of a modification according to the invention.

According to the invention, there is provided a concealed sliding clasp fastener comprising a pair of opposed stringer tapes carrying rows of fastener elements each having a coupling head, each of said stringer tapes having on one surface longitudinally extending alternate ridges and grooves and having said row of elements secured along a longitudinal edge portion thereof by means of needle threads which run through and fill up the grooves in said longitudinal edge portion, said tape being folded on itself outwardly about an axis of fold defined by one of said grooves formed between two selected ridges in said longitudinal edge portion and lying close to said coupling head of the fastener element.

Referring now to the drawings and particularly to FIGS. 1 to 3 inclusive which illustrate a first embodiment of the invention, there is shown a concealed type sliding clasp fastener 10 which essentially comprises a stringer tape 11 and a row of fastener elements 12 mounted thereon. More specifically, the row of elements 12 in the form of a spring coil are secured by means of needle threads 13 to one longitudinal edge portion of the tape 11 and through the medium of a reinforcing cord 14 inserted in the element row in the usual manner. The stringer tape 11 which constitutes an important aspect of the invention is provided on one surface with alternate ridges 15 and grooves 16, while the other surface is rendered flat. A tape of this structure is preferably formed by

warp knitting, a typical example of which is shown in FIG. 12. This warp-knitted tape is comprised of chain stitches 17 forming wales which correspond to the above ridges 15, tricot stitches 18 and weft threads 19 laid in coursewise to interconnect between the chain stitches 17, with grooves 16 formed warpwise between adjacent wales or ridges 15.

Each individual coupling element 12 is provided in the lower leg portion 12a with a recess 12b for receiving therein sewing or needle threads 13 in a manner such that the threads 13 do not present themselves above the surface of the element and are furthermore anchored firmly in place. The elements 12 are sewn with their upper leg portions 12c borne against the flat surface of the tape 11 as shown in FIG. 1, in which instance the needle threads 13 on the tape side are embedded in the groove 16. For purposes of illustration, there are provided two lines of stitching S_1 and S_2 for securing the elements 12 to the respective tapes 11. The first line of stitching S_1 lies in the first or innermost groove 16a defined between the first ridge or wale 15a which constitutes a selvage of the tape 11 and the second ridge 15b. The second line of stitching S_2 similarly lies in the second groove 16b defined between the second ridge 15b and the third ridge 15c. In the case of the prior-art devices, the stitching S_2 would be required to lie much closer to the coupling head 12d of the element 12 since it would define an axis of fold about which to turn the tape over as previously stated.

In accordance with the invention, there is provided a first axis of fold 20 which extends longitudinally of the tape 11 and about which the tape 11 is folded on itself over the element 12 is defined by a selected groove 16c formed between the third and fourth ridges or wales 15c and 15d, and not directly by the stitching S_2 . It will be appreciated that the first axis of fold 20 can be extended, as desired, closer to the coupling head 12d by a distance corresponding to the width of a selected ridge or wale 15c. To permit the tape 11 to flex or bend outwardly exactly at the first axis of fold 20, it is important that the second groove 16b in particular be filled full with needle threads 13 so as to retain the third ridge 15c firmly in position against displacement.

The tape 11 is folded, as shown in FIG. 2, about the first axis of fold 20 and further about the second axis of fold 21 which is defined by a fourth groove 16d formed between the fourth and fifth ridges 15d and 15e. The tape 11 thus folded substantially in the form of "U" presents a folded marginal edge portion 22 which projects

outwardly into the coupling region 23 where the opposed rows of elements 12 are coupled together. It will be seen that with the fastener in closed position as shown in Fig. 3, the folded marginal edge portions 22 of the two mating tapes 11 abut against each other in intimate relation and form a junction 24 which is rendered resistant to the tendency of splitting apart by the provision of the third ridge 15c which is fixed in place by the needle thread S₂.

FIGS 4 and 5 illustrate a second preferred embodiment of the invention which is substantially identical in the inventive principles with the above-described first embodiment, with the exception that the third ridge or wale 15c is greater in width and height. The fastener 10 according to this embodiment features the fact that the first axis of fold 20 is shifted outwardly closer to the coupling head 12d for a distance corresponding to the increased width of the ridge 15c, with the folded marginal edge portion 22 lying substantially flush with the plane of the coupling head 12d, whereby the opposed folds 22 are more intimately matched together to provide increased concealing effect. To obtain a larger dimension of the third ridge 15c as illustrated, the corresponding wale in the knit system of FIG. 12 may be for example formed with threads of increased denier or bundles of increased numbers of threads.

The third embodiment of the invention shown in FIGS 6 to 8 inclusive is also similar in the inventive concept to the first embodiment except for the fourth ridge 15d which is greater in width and height than the rest of the ridges 15. This is intended to provide increased height of the folded marginal edge portion 22, viz. increased distance between the first and second axes of fold 20, 21. With the fastener 10 closed as shown in FIG. 8, the opposed folded portions 22 are brought coherently together as the rows of elements 12 are interlocked by a slider (not shown). The resulting junction 24 is greater in height as viewed in the drawings so that it becomes more resistant to opening even under the influence of severe lateral forces tending to split apart the two stringer tapes. It will be understood that the features peculiar to the third embodiment may be achieved by enlarging the fourth ridge 15d in a manner similar to the second embodiment already described.

Reference to FIGS. 9 to 11 inclusive shows the fourth embodiment of this invention which incorporates the features noted of both the second and third em-

bodiments. It will be seen that both the third and fourth ridges 15c, 15d are greater in width and height than the remaining ridges 15, with the result that the aspect of locating the first axis of fold 20 closer to the plane of the coupling head 12d and the aspect of increasing the distance between the first and second axes of fold 20, 21 are simultaneously achieved.

Having thus described the invention, it will be understood that various changes, substitutions or modifications may be made in the precise form and construction herein above described and illustrated, without departing from the scope of the appended claims. As for example, the fancy stitching of the needle thread S₂ may be accommodated in the grooves 16 of the tape 11 as shown in FIG. 13.

WHAT WE CLAIM IS:—

1. A concealed sliding clasp fastener comprising a pair of opposed stringer tapes carrying rows of fastener elements each having a coupling head, each of said stringer tapes having on one surface longitudinally extending alternate ridges and grooves and having said row of elements secured along a longitudinal edge portion thereof by means of needle threads which run through and fill up the grooves in said longitudinal edge portion, said tape being folded on itself outwardly about an axis of fold defined by one of said grooves formed between two selected ridges in said longitudinal edge portion and lying close to said coupling head of the fastener element.
2. The concealed sliding clasp fastener as defined in claim 1 wherein said stringer tape is of a warp knitted structure comprising a chain stitch forming said ridge, a tricot stitch and a laid-in weft thread.
3. The concealed sliding clasp fastener as defined in claim 1 wherein one of said two selected ridges is greater in width and height than the remaining ridges.
4. The concealed sliding clasp fastener as defined in claim 1 wherein both of said two selected ridges are greater in width and height than the remaining ridges.
5. The concealed sliding clasp fastener substantially as herein described with reference to and as illustrated in the accompanying drawings.

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outwardly into the coupling region 23 where the opposed rows of elements 12 are coupled together. It will be seen that with the fastener in closed position as shown in Fig. 3, the folded marginal edge portions 22 of the two mating tapes 11 abut against each other in intimate relation and form a junction 24 which is rendered resistant to the tendency of splitting apart by the provision of the third ridge 15c which is fixed in place by the needle thread S₂.

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Reference to FIGS. 9 to 11 inclusive shows the fourth embodiment of this invention which incorporates the features noted of both the second and third em-

bodiments. It will be seen that both the third and fourth ridges 15c, 15d are greater in width and height than the remaining ridges 15, with the result that the aspect of locating the first axis of fold 20 closer to the plane of the coupling head 12d and the aspect of increasing the distance between the first and second axes of fold 20, 21 are simultaneously achieved.

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2. The concealed sliding clasp fastener as defined in claim 1 wherein said stringer tape is of a warp knitted structure comprising a chain stitch forming said ridge, a tricot stitch and a laid-in weft thread.
3. The concealed sliding clasp fastener as defined in claim 1 wherein one of said two selected ridges is greater in width and height than the remaining ridges.
4. The concealed sliding clasp fastener as defined in claim 1 wherein both of said two selected ridges are greater in width and height than the remaining ridges.
5. The concealed sliding clasp fastener substantially as herein described with reference to and as illustrated in the accompanying drawings.

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