Dec. 3, 1963 H. HARDIE 3,112,494

LAMINATED FABRIC CONSTRUCTION

Original Filed July 8, 1957

Fig. 1.

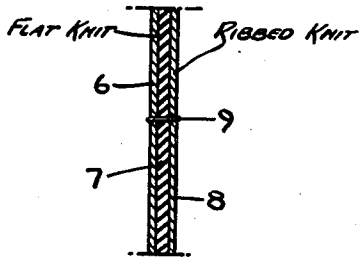


Fig. 3.

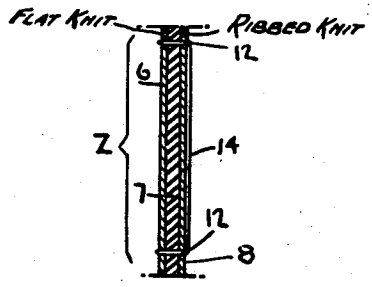


Fig. 2.

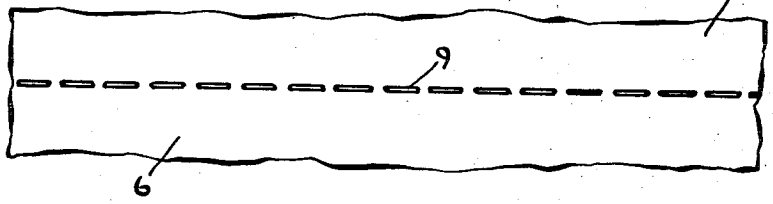


Fig. 4.

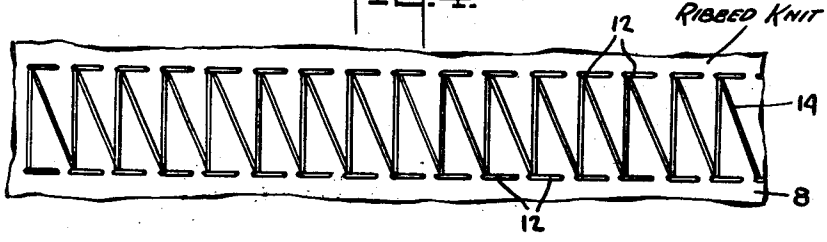
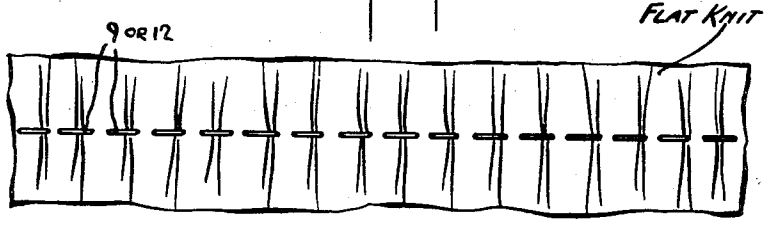


Fig. 5.



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LAMINATED FABRIC CONSTRUCTION

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Continuation of application Ser. No. 670,399, July 8, 1957. This application Oct. 30, 1962, Ser. No. 234,015

1 Claim. (Cl. 2—237)

This invention relates to a laminated structure for use in garment bands; and the present application is a continuation of application S.N. 670,399, filed July 8, 1957, now abandoned.

Elastic band-constructions are widely used to contract a garment about the wearer, by contracting all or part of a circumferential zone that extends about the wearer's waist, arm or leg.

In the case of certain sanitary and protective garments, there may be little more than the elastic band itself. In the case of more comprehensive garments, the band is customarily placed at the margin of a body opening in the garment, the elastic band-construction extending completely or only partially about the margin of the body opening.

Many specific elastic band-constructions are known, various ones having various advantages. In certain instances, for example in the case of underpants to be worn by a person who has heavy thighs or patulous buttocks, it is desirable that the elastic band, whether waistband or leg band, have a high degree of stretch; and elastic bands that have a high degree of stretch have been heretofore devised. However, few garments of these types are custom made. Ordinarily they are made on a quantity-production basis in incremental sizes and then sold over the counter.

With the most desirable and most frequently used band-constructions, the stitching is subject to breakage when the band, or a local length of it, is suddenly subjected to extreme stretch. To protect against such breakage, it has been customary to make the bands of the prior art with more stretch than required for comfortable wear under normal conditions. This provides an extra margin of stretch as protection against the band being suddenly subjected to extreme stretch under unusual conditions as, for example, when wearers of certain builds quickly assume particular positions. This has made it necessary to use more material than would otherwise be necessary, and has sometimes resulted in a band which is bulky under normal conditions of wear. It has also resulted in the body opening being unduly loose on the wearer when he was in more frequently assumed positions, particularly if he be of less extreme build.

An object of the present invention is to provide a laminated structure which, when used in usual and widely used elastic band-constructions, will protect the stitching against breakage when the band is suddenly subjected to extreme stretch.

Another object is to provide a laminated structure which renders it feasible to design advantageous and customarily used elastic band-constructions for comfortable wear under normal conditions, without providing an excess of stretch to protect the stitching against breakage under unusual conditions.

A further object of the invention is to provide a laminated structure for use in garment bands which affords a wide range of selection as regards the normal degree of stretch for which the band may be designed.

A still further object of the invention is to provide a generally improved laminated structure for use in garment bands.

I accomplish the above and other objects by means of a laminated structure in which a highly stretchable resilient layer (ordinarily one layer only) is combined with

a ribbed knit layer (one or more) and a flat knit layer (one or more), the layers being secured together by a longitudinal row of stitching (one or more) or by a longitudinal zone of stitching (one or more). This laminated structure may be used in making elastic garment bands of any known or desired construction. Where the band has a plurality of longitudinal rows or zones of stitching, they are positioned in parallel spaced relationship as is customary.

In the description and claims which follow, parts, structure and characteristics may at times be identified by specific names for clarity and convenience but such nomenclature is to be understood as having the broadest meaning consistent with the context and with the concept of my invention as distinguished from the pertinent prior art. The best mode in which I have contemplated carrying out my invention is herein disclosed.

All figures of the drawing are diagrammatic and are on a considerably enlarged scale.

FIG. 1 is a fragmentary section illustrating one laminated construction in accordance with the present invention.

FIG. 2 is a fragmentary elevation, looking from the left of FIG. 1.

FIG. 3 is a fragmentary section illustrating another laminated construction in accordance with the present invention.

FIG. 4 is a fragmentary elevation, looking from the right of FIG. 3.

FIG. 5 is a fragmentary elevation indicating shirring of the flat knit layer which occurs when the laminated construction is sewed with the highly stretchable resilient layer under sufficient tension.

Reference will first be had to FIGS. 1 and 2. A layer 6 of flat knit material is positioned against one face of an elastic sheet-rubber layer 7, and a layer of ribbed knit material 8 is positioned against the other face of the rubber layer 7. These three layers are shown secured together by a longitudinal row of stitching indicated diagrammatically at 9.

The stitching 9 may be chain stitching, for example, Union Special Machine Company's Stitch Type 101, or it may be lock stitching, for example, Union Special Machine Company's Stitch Type 301. With these types of stitching, the individual stitches as such are longitudinally stretchable to a relatively small degree. However, substantial longitudinal stretchability of the line of stitches as a whole may be imparted in known manner by feeding the rubber 7 to the sewing station with a metering device so that it is sewed while under tension. The tension on the rubber is released as the band leaves the sewing station, whereupon the rubber layer 7 contracts. The contraction of the rubber contracts the entire laminated construction, including the line of stitching which is thereafter free to elongate by the amount of such contraction plus the small inherent stretchability of the stitches themselves.

Both the ribbed knit material and the flat knit material are very soft. Both materials are highly stretchable in one direction and have little stretch in a transverse direction. However, the stretchability of the flat knit material in its highly stretchable direction is substantially less than the stretchability of the ribbed knit material in its highly stretchable direction, which is the direction transverse to the ribs. In the laminated construction of the present invention I so dispose the ribbed and flat knit materials that the direction of their high degree of stretch will extend generally lengthwise of the garment band. The rubber layer 7 has a degree of stretch lengthwise of the band which exceeds that of both the flat and ribbed knit layers.

When the laminated construction of the present invention is suddenly stretched to a point approaching its limit

of stretch, the flat knit layer **6** starts to exert a counterforce on the stitching before the ribbed knit layer **8** has started to exert any substantial counterforce on the stitching. In so doing the flat knit material imposes no harsh or cutting action on the thread of the stitches, since the flat knit material is soft and yields locally where engaged by the thread of the stitches. At the same time the thread of the stitches readjusts itself, with yielding and compression of the ribbed knit material which, still being some distance from its limit of stretch, is free to yield locally under the tightening action of the stitches.

Referring to FIGS. 3 and 4, flat knit layer **6**, sheet-rubber layer **7**, and ribbed knit layer **8** are disposed and arranged as in FIGS. 1 and 2 but are shown sewed with a zone Z of expansion stitching. This zone of stitching is composed of two primary rows of stitching indicated diagrammatically at **12**, **12**, and an interlocking thread, indicated diagrammatically at **14**, that extends between the rows of stitching **12**, **12** on one face of the laminated construction. Suitable stitching for zone Z, and which includes the two primary rows of stitching and the interlocking thread, is Union Special Machine Company's 2-needle Stitch Type 406.

Since the stitches are protected against breakage upon sudden extreme stretch, as above explained, it is not necessary in making garment bands with the laminated fabric construction of the present invention, to make the band with an amount of material and a degree of stretchability which will, under infrequent conditions of wear, prevent the limit of stretch from being suddenly reached. Thus, material is saved, the band may be so designed that it will be better-fitting under normal conditions of wear, and a wide range of selection as regards the normal stretch of the band is feasible.

If the laminated construction of the invention be sewed with the rubber layer under only slight tension, it will lie flat without shirring, since both the flat knit layer **6** and the ribbed knit layer **8** may be contracted to a limited extent by the contracting rubber without shirring of the knit layers. If the sewing be done with the rubber layer under sufficient tension, shirring will result. The present laminated fabric construction is well-adapted for sewing with the rubber under a high degree of tension, to produce a band having a high degree of stretch, since the flat knit material shirrs readily and regularly and presents a good appearance.

For particular uses and to obtain particular advantages, garment band-constructions are made with many arrangements of garment material, sheaths and rubber. In some instances an edge zone of the garment material is folded about the rubber. In other instances a separate piece of sheath material is folded in opposite directions about the rubber to enclose it within a sheath. This sheath with the rubber enclosed therein is sometimes placed on the outside of the garment and sometimes placed on the inside of the garment. In either case a separate but empty sheath is sometimes placed in overlying relationship on the opposite face of the garment. In some garment band-constructions the rubber is enclosed within a sheath and the garment material is folded to form a hem in contact with the sheath. In other constructions the rubber is in one sheath which is positioned face-to-face with an empty sheath, the garment material being unhemmed and entered between the two sheaths. In still other garment bands the rubber is not within a sheath at all, but empty sheaths are used in conjunction therewith, disposed on one or both sides of the rubber.

The laminated construction of the present invention may be used for all of the foregoing types of garment bands and others. The combination of ribbed knit layer (one or more) and flat knit layer (one or more) may be obtained in any appropriate way, as by a sheath of flat knit material while the garment material is ribbed knit, or vice versa. For a band having two sheaths facing each other, one may be of flat knit material and the other of ribbed knit material.

By selection as between known types of stitching and sewing with the rubber under degrees of tension ranging from no tension to high tension, the laminated construction of the present invention may be given selectively a wide range of normal stretch, ranging from a normal elongation of 70% to a normal elongation of as much as 200%.

In sewing the laminated construction with chain stitching I place the interlooping of the threads of the stitching on the inside of the garment. Likewise, I place the cross thread **14** shown in FIGS. 3 and 4 on the inside of the garment.

I claim:

In an elastic garment band for contracting a garment about the wearer, a laminated construction comprising:

a layer of ribbed knit material extending longitudinally on one face of the band,

a layer of flat knit material extending longitudinally on the other face of the band,

a layer of sheet rubber extending longitudinally between said knit layers,

and longitudinally extending expansion stitching securing said layers together,

said layers being in laminated relation and all of the layers being sewed through and through by said expansion stitching, the expansion stitching engaging the opposite outer faces of the band and maintaining the laminated relationship of the layers,

said stitching having been applied with the rubber layer temporarily stretched longitudinally by R% whereby upon relaxation of the rubber layer the knit layers and the stitching were pulled in longitudinally by the rubber layer and, as the band is stretched in use, the knit layers and the stitching are freely extensible until the band has been extended by R%,

the rubber layer being stretchable by more than the R% and the material itself of each knit layer as sewn with the rubber layer stretched longitudinally by R% being stretchable longitudinally of the band whereby, through stretch of the rubber layer beyond R% and the stretchability of the knit materials themselves as sewn, the band is extensible beyond R%,

the stretchability of the rubber layer beyond R% being at least as great as the stertchability of the ribbed knit material itself as sewn and the the stretchability of the ribbed knit material itself as sewn being greater than the stretchability of the flat knit material itself as sewn whereby, as the band approaches extreme stretch, the flat knit layer approaches its limit of stretch ahead of both the ribbed knit layer and the rubber layer and thereby retards the extension of the band,

the knit layers being soft and affording ready readjustment of the stitches as the band is stretched beyond R%, and the stitching being extensible by an amount at least equal to the extensibility of the flat knit layer whereby the extension-retarding action of the flat knit layer as the band approaches extreme stretch affords protection against breakage of the stitches.

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