Feb. 12, 1935. T. F. MOORE 1,990,836

ELASTIC FABRIC

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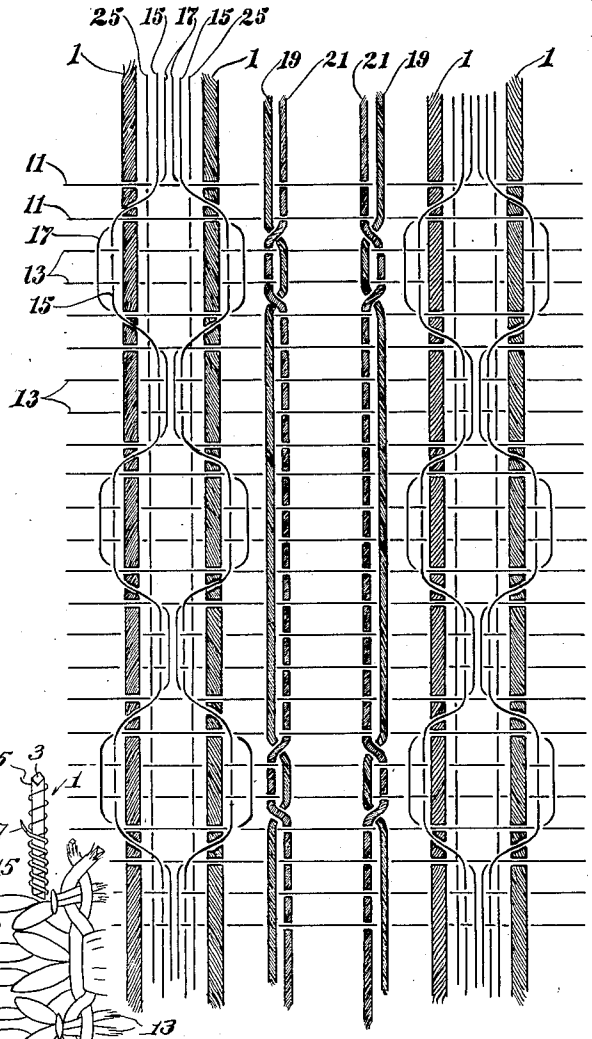


Fig. 2.

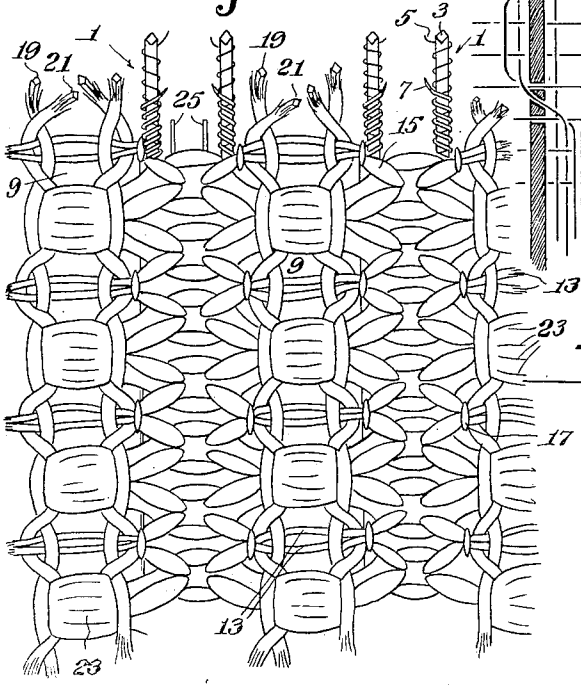


Fig. 1.

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ELASTIC FABRIC

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The inventon has relation to elastic fabrics, such as are used for making corsets, girdles, and other so-called foundation garments, sanitary belts, brassières, and garters, and the like.

The primary object of the invention is to provide a novel and improved elastic fabric for these uses which shall be of openwork construction and hence capable of affording ample ventilation.

Other objects are to provide an elastic fabric for these uses presenting a novel and attractive aspect, and which shall be durable in use and easily and inexpensively manufactured. A further object is to provide a fabric having peculiar capacity for flexibility and movement under strains tending to bias the fabric through lengthwise movement of one marginal edge of the garment with respect to the other edge thereof. Other objects are as will appear hereinafter.

To these ends, the invention comprises essentially the use of elastic elements, which may be used alone, but preferably are additional and auxiliary to the usual straight-running elastic elements such as rubber cords, which additional elements are bent around the non-elastic yarns used to bind the rubber cords in place, in such manner as to gather these yarns laterally into groups or bundles, with the corresponding creation of open spaces in the places from which these yarns have been diverted. So far as I am aware, I am the first to contemplate the use of longitudinally extending elastic elements or warps which are bent out of their otherwise straight course of extent, or interengaged with each other or with other longitudinally extending elements, to create an openwork fabric. By appropriate spacing and grouping of the longitudinally extending elements, the transverse dimension or length of these openwork spaces can be increased to any desired extent, and by varying the number of the generally transverse or non-elastic elements included in a group as defined by the bends of the aforesaid additional elements the other dimension of the openings may be varied as desired.

Additionally and preferably, by arranging the main straight-running elastic elements in pairs, in the case of fabrics embodying the invention which are made by weaving, these paired elastic elements are combined with the non-elastic weft elements through the use of leno warps which are worked alike but symmetrically, so that their alternate divergence and convergence produces an attractive cellular or honeycomb pattern on the ribs or wales marking the location of the main elastic elements, and which alternate with the lengthwise rows of open spaces.

By reason of the free lengths of non-elastic material extending from one rib to the next, which lengths are only yieldingly held in groups by the said additional elements, the fabric has marked ability to retain its flat relation when subjected to diagonal and biasing strains.

An illustrative embodiment of the invention as embodied in a woven elastic web is shown in the accompanying drawing, in which,—

Fig. 1 is an exaggerated face view of a small portion of the woven fabric, in its normal contracted relation.

Fig. 2 is a diagrammatic showing of the composition of the fabric of Fig. 1.

The main elastic elements 1 may be of any desired or preferred nature, and herein are shown as comprising the familiar double covered rubber cords, of which the single rubber strand 3 is spirally enwrapped by one or more ends 5 of yarn on which an outer fibrous wrapping 7 is wound in the opposite direction. These rubber cords are the elastic warp elements of the fabric shown, and to provide for the openwork spaces 9 are spaced apart widthwise of the fabric to the proper extent to provide for the desired length of the openwork spaces 9. In order to give the proper tensile or contractive strength to the fabric, they are preferably, though not necessarily, inserted in groups, herein of two each, which groups are spaced apart as shown. If desired, the winding of the fibrous wrapping may be reversed on the two members of a pair, as indicated, to help keep the finished fabric flat. The wefts are inserted in pairs, the face wefts 11 being always over the elastic warp elements 1, and the back wefts 13 being always under these elements 1. The elastic warp element 1 is fixed to both sets of wefts by a face leno warp 15 which crosses over the pair of face wefts 11 at the point where they cross the elastic warp 1, such leno being caught under both back wefts 13 at alternate sides of the element 1 immediately after crossing each succeeding pair of face wefts. Also, each element 1 has its proper back leno warp 17, which follows the path of the face leno 15, crossing back and forth across the element 1 at the back of the fabric, and being caught over each successive pair of back wefts 13 after each crossing. Thus the same back wefts are engaged by both leno warps.

The leno warps of each element 1 of a pair are worked symmetrically, as shown clearly in Fig. 2; that is, though all the leno warps engage the same pairs of back wefts in the same sequence, those of one of the two elements 1 cross such element to the right at the same time that those of the other element 1 cross such element to the left, with the result that the lenos of the two paired elements first converge and then diverge to form a characteristic cellu-

lar or honeycomb structure shown clearly in Fig. 1, and marking the course of the two elastic elements 1 of each pair.

In accordance with the invention additional elastic longitudinal or warp elements 19, 21, are interposed between the pairs or groups of main elastic elements 1. These additional elements engage the transverse or weft elements 11, 13, at relatively widely spaced intervals lengthwise of the fabric. By reason of the spaced relation of the pairs or groups of elements 1, the exposed transverse or weft elements 11, 13, are in the form of relatively long stretches of yarn, and these stretches of yarn are diverted laterally, i. e., warpwise or lengthwise of the fabric, through the engagement therewith of the additional elastic elements 19, 21, and formed into groups or bundles, leaving the openwork spaces 9 between adjacent groups in the place whence such wefts have been displaced.

The engagement of the additional elastic warps 19, 21, with the transverse or weft elements may be effected in any desired manner. Obviously, they may be made to engage the wefts by passing them through the fabric from face to back, or vice versa at the desired points; an advantageous way of effecting the engagement is shown herein, in which these warps are provided in pairs which are cross-woven with each other at the intervals which are desired to become openwork spaces. In this instance, these warps are crossed twice at each point where an openwork space is desired. The advantages of this arrangement are that the space is increased in its extent lengthwise of the fabric as a result of the double crossing, and also that the face warp 19 never leaves the face, while the back warp 21 never appears at the face.

To define the openwork spaces sharply, through grouping the bundle 23 of transverse or weft elements, the latter is preferably bound at both of its extremities, closely adjacent the ribs or wales enclosing the pairs of elastic elements 1. Such procedure necessitates the use of two pairs of additional elastic elements 19, 21, as shown in Fig. 2. With two pairs of elastic leno warps thus interposed between each two groups or pairs of the main elastic elements 1, it is possible to work each pair of these lenos 19, 21, alike but symmetrically with respect to its corresponding pair occupying the same space between adjacent groups of elements 1. This is shown clearly in Fig. 2, and where arranged as there shown, with the face leno warps 19 passing under the back leno warps 21, engaging the two back wefts 13, and then immediately passing under such back leno warps and thence over a great number of the succeeding picks of weft, the stretches of back leno warps 21 underlying this bundle of wefts cooperate with a tendency to lift or thrust such bundle upward, giving it a pleasing raised and rounded effect suggestive of embroidery, and at the same time the short stretches of face lenos between the two crossings depress the two picks of back weft 13 at the points where these warps are cross-woven, throwing them to the back of the fabric, where they are inconspicuous.

If desired, gut warps 25 may be used in connection with any or all of the elastic warp elements, to limit the stretch of the fabric and save straining of the elastic elements, after the manner well known in this art. Such limiting warps are illustrated at 25, and comprise non-elastic yarns interposed between the two elements 1 of a pair or group and underlying all picks of weft except one of the two back wefts 13, and tied in by the back leno warps 17 in crossing back and forth across the back of the elements 1.

As is obvious, the use of longitudinally extending elastic elements corresponding in function to the leno warps 19, 21, is not confined to woven fabrics, but may be similarly and equivalently incorporated in crocheted, knitted, and other fabrics for the purpose of diverting the transversely extending elements which bind together the main elastic cords so as to produce groups or bundles of such transverse or angularly engaging elements and corresponding openwork spaces.

What I claim as my invention is:—

1. Elastic fabric having in combination elastic warp elements disposed in groups of a plurality of warps, weft elements, and a pair of elastic leno warps cross woven with each other, located at each side of each group, the adjacent pairs which lie between two groups being spaced apart from each other and the respective members of each pair being woven symmetrically with respect to the members of the other pair and engaging the same wefts so as to hold the latter in compressed groups.

2. Elastic fabric having in combination weft elements, elastic warp elements arranged in pairs, face and back leno warps crossing each of such elastic warp elements and engaging the same wefts at either side of such element, the leno warps of one elastic warp element of each pair being worked symmetrically with respect to the corresponding leno warps of the other element of such pair, and other elastic warp elements cross-woven with each other and engaging the weft elements intermediate the several pairs of elastic warp elements.

3. Elastic fabric having in combination heavy elastic warp elements, weft elements, and light elastic warp elements, intermediate the heavy elastic warp elements, cross-woven at intervals of a plurality of picks and diverting the weft elements when the fabric is in contracted relation.

4. Elastic fabric having in combination heavy, straight elastic warp elements, weft elements, and light elastic leno warp elements extending intermediate the straight elastic elements, each leno warp engaging with the weft first on one side and then on the other of its associated warp but engaging a far greater number of wefts at each stitch on one side of its associated warp than at each stitch on the other side, with the wefts thus grouped together by the long stitch of the leno similarly engaged by a symmetrically worked second elastic leno element intermediate two of the straight elastic warp elements, whereby the wefts are diverted out of their normal direction of extent when the fabric is in contracted relation.

THOMAS F. MOORE.