March 13, 1934. S. KENDRICK 1,950,559

ELASTIC WOVEN FABRIC

Filed May 28, 1931 3 Sheets-Sheet 1

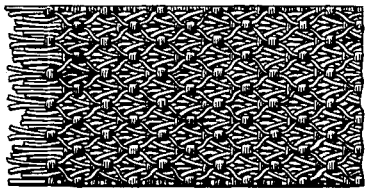

Fig. 2

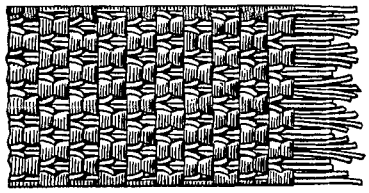

Fig. 3

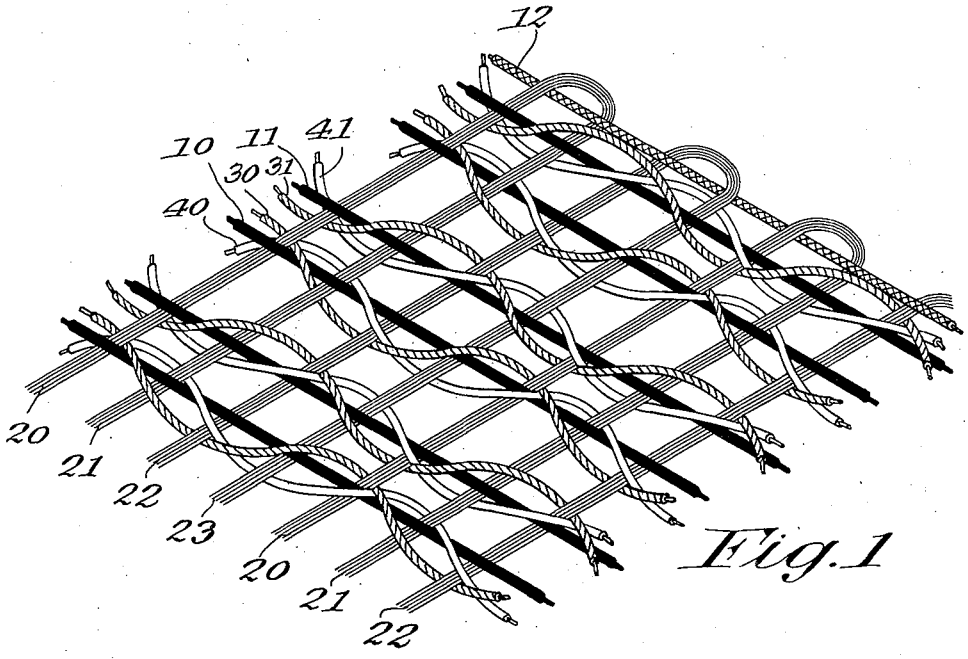

Fig. 1

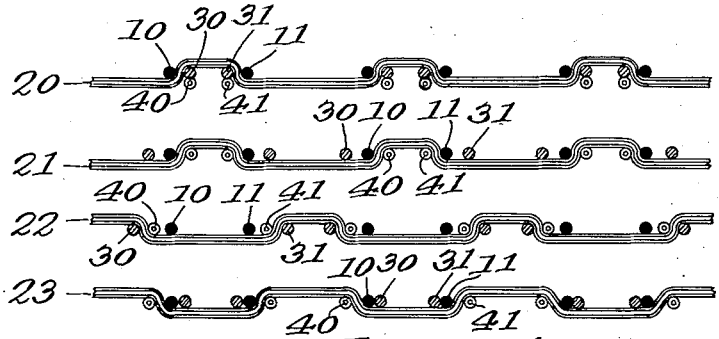

Fig. 4

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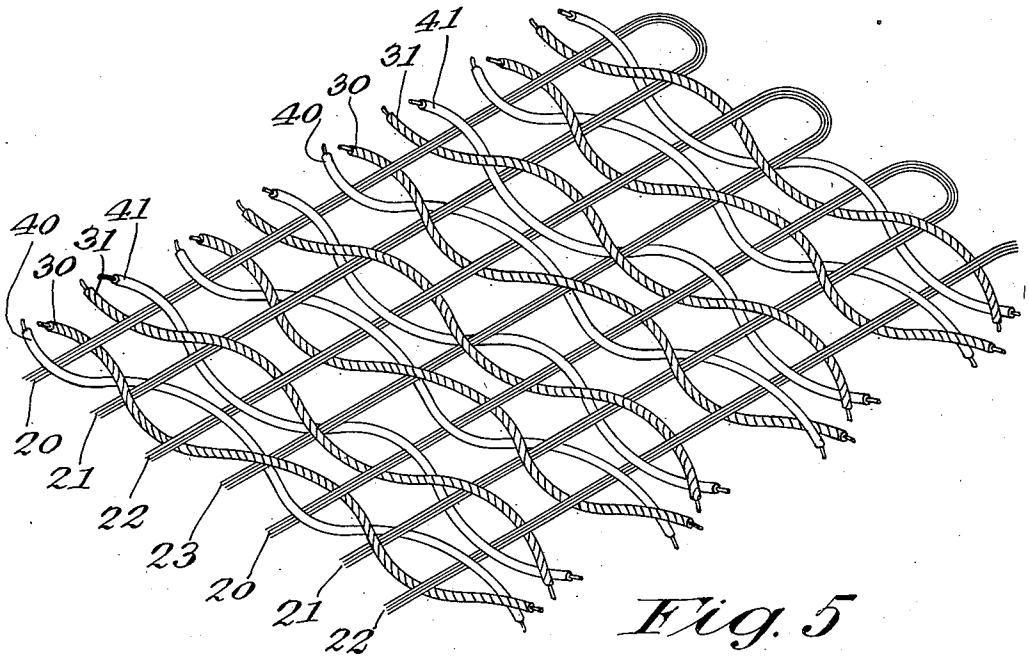

Fig. 5

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ELASTIC WOVEN FABRIC

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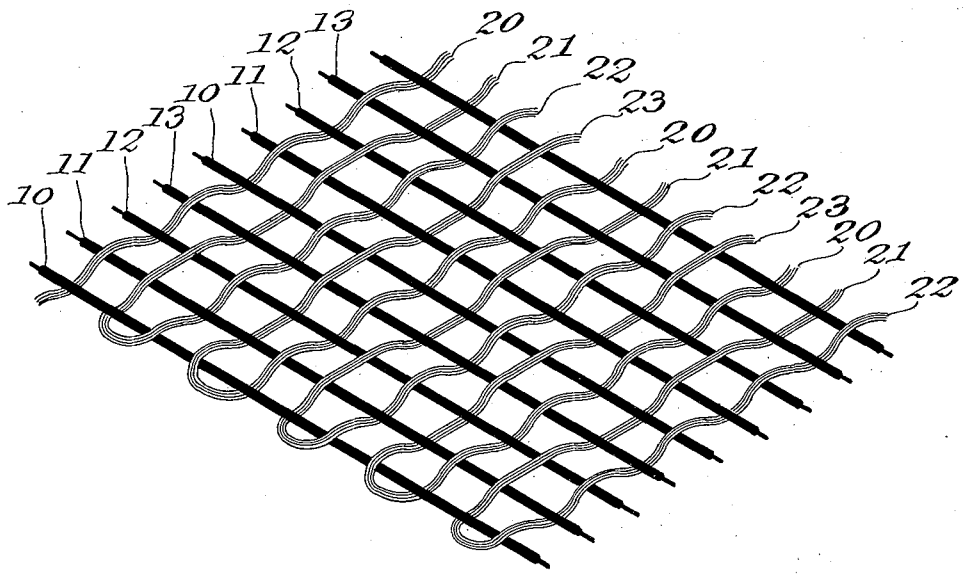

Fig. 6

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UNITED STATES PATENT OFFICE

1,950,559

ELASTIC WOVEN FABRIC

Solomon Kendrick, Easthampton, Mass., assignor to United Elastic Corporation, Easthampton, Mass., a corporation of Massachusetts

Application May 28, 1931, Serial No. 540,572

8 Claims. (Cl. 139—421)

This invention relates to elastic woven fabric, and has for its object to produce a fabric of maximum resiliency in one direction.

Another object of the invention is to produce an elastic woven fabric suitable for use in belts, suspenders, garters etc., of attractive appearance, and of sufficient strength and tightness in the weft threads as not to pull apart and to be durable and satisfactory.

Previous elastic fabrics used for belts, suspenders etc, have had their natural resiliency limited by the use of fibrous warp threads of very slight resiliency. This invention, however, produces an elastic woven fabric of the greatest possible resiliency by reason of its use of wound or covered elastic strands in the warp exclusively, and by the manner of weaving the warp threads are properly held together to produce a highly satisfactory fabric for the purpose named. No fibrous strands whatever are used in the warp, except for the spirally wound fibrous covering of the elastic strands, which does not, however, restrict the resiliency of the fabric. The invention is not limited to the specific types of weave herein shown, for the invention is capable of being utilized in a wide variety of other weaves.

In using elastic warp strands exclusively an important feature is that, regardless of the particular weave used, each fibrous filling strand should be built up of individual yarns to approximate the size of the elastic warp strands. If this is not done and the weft or filling strands are made up of small sized individual yarns, a practical workable elastic warp fabric cannot be made exclusively of elastic warp strands, but non-elastic warps must be added to provide necessary firmness and to make the fabric hold its shape under ordinary wear. With the fibrous weft strands, however, substantially as large as the elastic warp strands the fabric stands up entirely satisfactorily.

Illustrative embodiments of the principle of the invention are hown in the accompanying drawings, wherein

Fig. 1 is a diagram showing the weave of the preferred form of the woven fabric, shown on a greatly enlarged scale;

Fig. 2 is a face view of a portion of the preferred form of fabric showing the front side;

Fig. 3 is a face view of a portion of the preferred fabric showing its reverse side;

Fig. 4 is a diagrammatic cross sectional representation of the weave in the preferred construction; and

Figs. 5 and 6 are diagrams illustrating certain modified forms of construction.

In Figs. 1 to 4, the fabric organization is composed of covered elastic strands 10 and 11, and 12, employed as warp-elements; face picks 20 and 22, back picks 21 and 23 of non-elastic weft for filling, each pick composed of a plurality of individual fibrous threads wound or in substantially parallel alignment with each other and built up to be substantially the same size as each covered elastic warp strand; a pair of covered elastic face leno warps 30 and 31, and a pair of covered elastic back leno warps 40 and 41. The elastic strands 10 and 11 extend in substantially straight lines on the top side of the transverse weft or filling strands 20, 21, 22 and 23, with the exception of the elastic warp strand 12 forming the edge of the fabric, which starting by passing under face pick 20, passes above the adjacent back pick 21 and face pick 22 thence under back pick 23—and so on, repeating with the next series of weft threads.

With each pair of elastic warps 10 and 11 is associated the two pairs of leno warps, the face leno warps 30 and 31 and back leno warps 40 and 41, the pair of face leno warps 30 and 31 starting between the two warps 10 and 11 and beneath the face pick or weft strand 20. Then the pair diverge and each face leno strand 30 and 31 crosses diagonally over its adjacent warp strand to the opposite side thereof, where it crosses over the next succeeding back pick 21 and thence under the next face pick 22. Next, each face leno warp strand 30 and 31 reverses and recrosses diagonally over its adjacent warp strand passing over the next back pick 23, the pair 30 and 31 then converging to position again between the two warp strands 10 and 11, where they repeat the weave, passing under the adjoining back pick 21 and so on.

The pair of back leno warps 40 and 41 start between the two warps 10 and 11 beneath the back pick 21, one pick behind the pair of face leno warps. Like the face leno warps, the back leno warps then diverge and each back leno strand 40 and 41 crosses diagonally over its adjacent warp strand to the opposite side thereof, passing over the next succeeding face pick 22, the pair of face leno warps having passed beneath face pick 22. On passing under the next back pick 23, the leno strands 40 and 41 first cross diagonally under their respective face leno strands 30 and 31, which are then reversing their path. Passing under back pick 23, the back leno strands 40 and 41 then reverse and recross di-

agonally over their respective warp strands 10 and 11 and the next face pick 20 to again converge between the two warp strands, where they in turn repeat the weave by passing under the adjoining back pick 21, and so on.

Thus each pair of face and back leno warps pass alternately under and over successive face and back picks, the pair of back leno warps 40 and 41 passing under the picks which the pair of face leno warps 30 and 31 go over and vice versa. Also, each strand of the face and back leno warps passes alternately under and over two successive face and back picks on one side of the warp strand 10 or 11, then crosses diagonally over the warp strand 10 or 11 to the opposite side thereof to pass again alternately under and over the next two successive face and back picks, and to repeat, each back leno strand crossing over the warp strand 10 or 11 at a point one pick behind the face leno strand. The face and back picks or weft strands 20 and 22, 21 and 23 are each composed of one or more fibrous threads but this number may be increased as desired, although sufficient number of small individual threads to form a single strand of substantial breadth and thickness is preferred. The successive face and back picks are preferably joined together, being formed of one continuous strand, one pick reversing up itself at the edge of the fabric to become the next successive pick etc.

In this manner of weaving, a secure locking of the warp strands against lengthwise creeping is effected and since the warp strands are exclusively spirally wound or covered elastic strands, with no fibrous warp threads to limit the natural resiliency of the fabric, an elastic woven fabric of the maximum resiliency in one direction is achieved, which is highly suitable for garters, suspenders, belts, etc.

In Fig. 5 a modification of the weave shown in Figs. 1 to 4 is illustrated diagrammatically. Here the face picks 20 and 22 and back picks 21 and 23 are as before, and the face leno warps 30 and 31 and back leno warps 40 and 41 are spirally wound or covered elastic strands, as before. The elastic warp strands 10 and 11 (and 12) shown in the preferred weave are omitted here. As in the preferred form of construction, each pair of face and back leno warps pass alternately under and over successive face and back picks, the pair of back leno warps 40 and 41 passing under the back picks, as the pair of face leno warps 30 and 31 go over them, and over the face picks as the face leno warps go under them, and one face leno warp crosses diagonally over its corresponding back leno warp between every pair of successive face and back picks, thereby tightly intertwining with each other and with the weft threads.

In Fig. 6 the face and back picks or weft threads 20 and 22, and 21 and 23 respectively, are as before, and the warp-elements are composed of two pairs of spirally wound or covered elastic face warps 10 and 12, and back warps 11 and 13. The leno warps are entirely omitted. The covered elastic face and back warp strands 10 and 12, 11 and 13 extend in substantially straight lines between the upper and lower weft planes, and do not cross over each other. The first face warp 10 starts at the left and passes alternately over and under successive pairs of face and back picks, passing first over face pick 20 and back pick 21, and under the next adjacent face pick 22 and back pick 23 and so on. The next adjacent back warp 11, forming with the first face warp 10 the first pair of face and back warps, engages oppositely to face warp 10, and passes under the first pair of face and back picks comprising face pick 20 and pack pick 21, thence over the next adjacent pair of face and back picks, comprising face pick 22 and back pick 23, and so on. The face warp 12, starting with the back pick 21, passes alternately over and under successive pairs of adjacent back and face picks, passing under the first pair of back and face picks comprising back pick 21 and face pick 22, thence over the second pair of successive back and face picks comprising back pick 23 and the second face pick 20, and so on. The back warp 13, comprising with face warp 12 the second pair of face and back warps, engages oppositely to face warp 12, and starting with the first back pick 21 passes alternately over and under the successive pairs of adjacent back and face picks, and so on. The weave is then repeated by the third and fourth pair of adjacent face and back warps.

In none of the constructions shown are any fibrous warp threads employed and the invention is not limited to the particular modes of weaving as shown, for it is obvious that various other modes of weaving may be employed without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. An elastic woven fabric comprising essentially elastic warp elements, fibrous face picks of weft or filling, fibrous back picks of weft or filling, elastic face leno-warps engaging under the face picks alternately at opposite sides of the respective elastic warp elements and elastic back leno-warps engaging under the picks alternately at opposite sides of the respective elastic warp elements.

2. An elastic woven fabric comprising essentially, elastic warp elements, fibrous face picks of weft or filling, fibrous back picks of weft or filling, elastic face leno-warps engaging under the face picks alternately at opposite sides of the respective elastic warp elements and elastic back leno-warps engaging under the picks alternately at opposite sides of the respective elastic warp elements, the face leno-warps engaging under the face picks and the back leno-warps engaging under the next adjacent back picks at the same side of the respective elastic warp elements.

3. An elastic woven fabric comprising essentially, elastic warp elements, fibrous face picks of weft or filling, fibrous back picks of weft or filling, the face and back picks being each composed of a plurality of smaller strands in substantial parallel alinement, elastic face leno-warps engaging under the face picks alternately at opposite sides of the respective elastic warp elements and elastic back leno-warps engaging under the picks alternately at opposite sides of the respective elastic warp elements, the face leno-warps engaging under the face picks and the back leno-warps engaging under the next adjacent back picks at the same side of the respective elastic warp elements.

4. An elastic woven fabric composed of warps and wefts or filling in sets comprising a pair of wound or covered elastic warp strands, fibrous picks of weft or filling, fibrous back picks of weft or filling, a pair of elastic face leno-warps engaging under a face pick between the two elastic warps, then diverging from each other in opposite directions over the two elastic warps and engaging under the next face pick at the outer sides of the two elastic warps and then converging toward

each other over the two elastic warps and engaging under the next face pick between the two elastic warps as before, and a pair of elastic back leno-warps engaging under the back pick next adjacent the first face pick between the two elastic warps, then diverging from each other in opposite directions over the two elastic warps and engaging under the next back pick at the outer sides of the two elastic warps, and then converging toward each other over the two elastic warps and engaging under the next back pick between the two elastic warps as before, and so on.

5. An elastic woven fabric comprising in sets, fibrous face picks of weft or filling, fibrous back picks of weft or filling, an elastic face leno-warp engaging under the face picks and over the back picks, and an elastic back leno-warp engaging under the back picks and over the face picks, the face leno-warp engaging under the face picks alternately at opposite sides of the back leno-warp.

6. An elastic woven fabric comprising in sets, fibrous face and back picks of weft or filling, fibrous back picks of weft or filling, an elastic face leno-warp engaging under the face picks and over the back picks, and an elastic back leno-warp engaging under the back pick and over the face picks, the face leno-warp crossing diagonally over back leno-warp between each face pick.

7. An elastic woven fabric comprising in sets, fibrous face and back picks of weft or filling, fibrous back picks of weft or filling, an elastic face leno-warp engaging under the face picks and over the back picks, and an elastic back leno-warp engaging under the back pick and over the face picks, the face leno-warp crossing diagonally over back leno-warp once between each face pick.

8. An elastic woven fabric comprising pairs of fibrous face and back picks of weft or filling, and pairs of elastic face and back warp elements, the first pair of adjacent face and back warps engaging alternately over and under and oppositely to each other successive pairs of adjacent face and back picks, starting with the first face pick, and the second pair of adjacent face and back warps engaging alternately and oppositely to each other over and under the successive pairs of adjacent back and face picks, starting with first back pick and so on.

SOLOMON KENDRICK.