

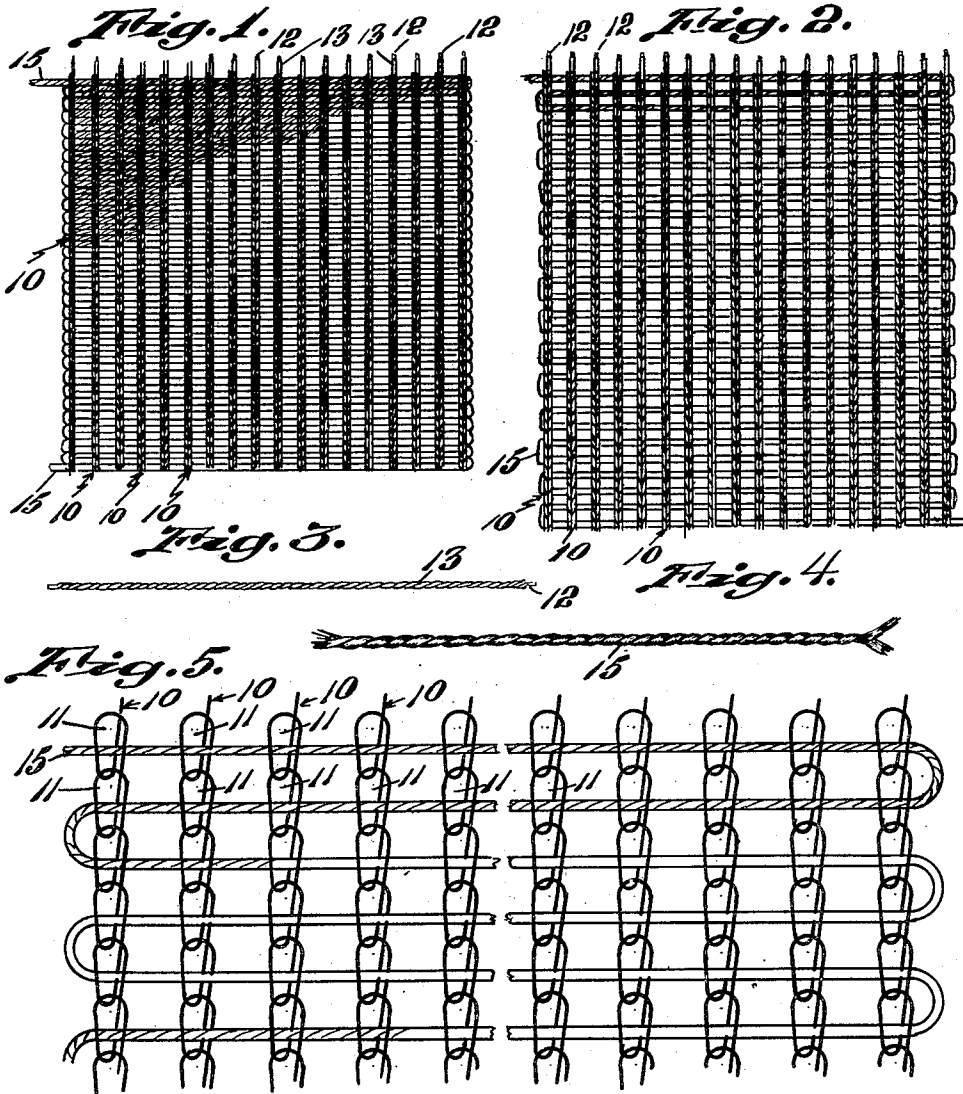
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KNITTED ELASTIC FABRIC

2,706,898

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3 Sheets-Sheet 1



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Fig. 6.

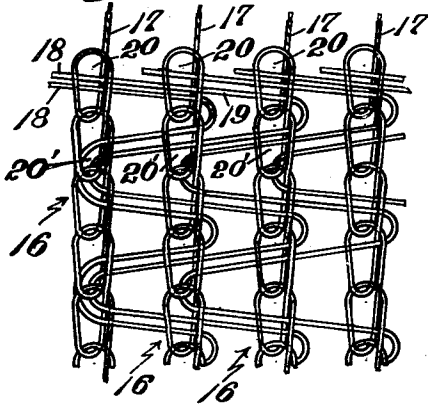


Fig. 7.

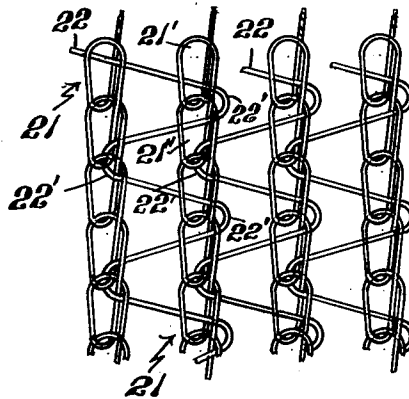


Fig. 8.

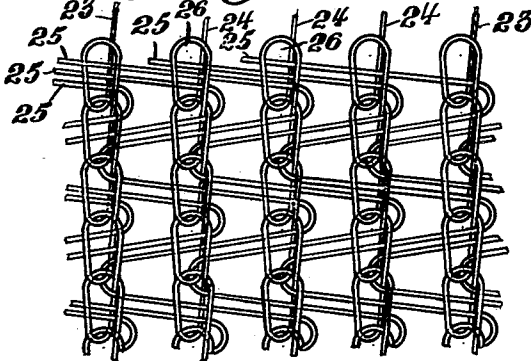


Fig. 9.

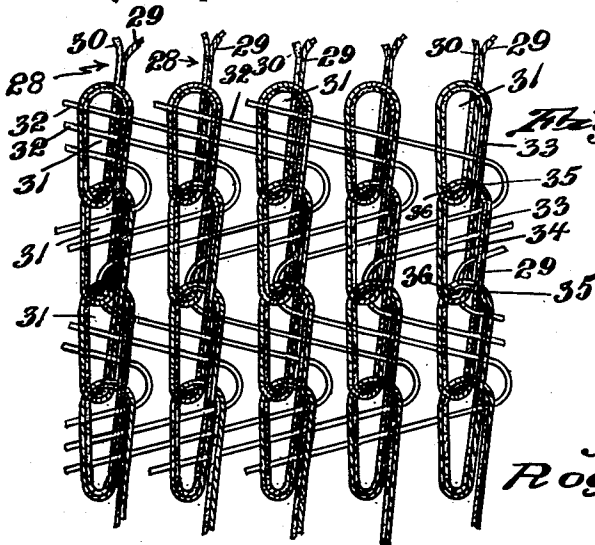
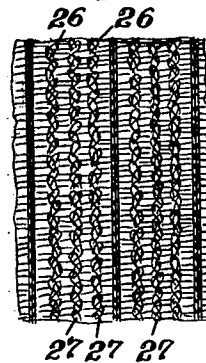


Fig. 10.

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Fig. 11.

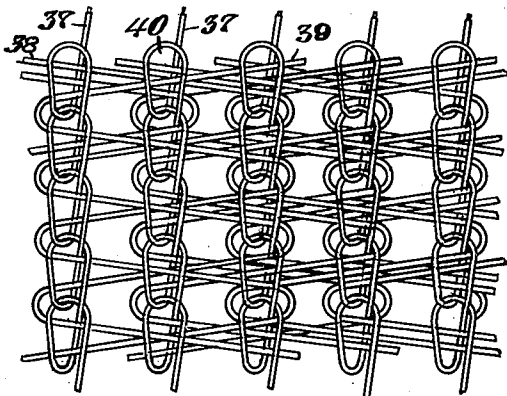


Fig. 12.

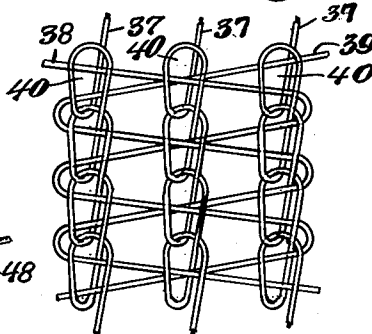


Fig. 13.

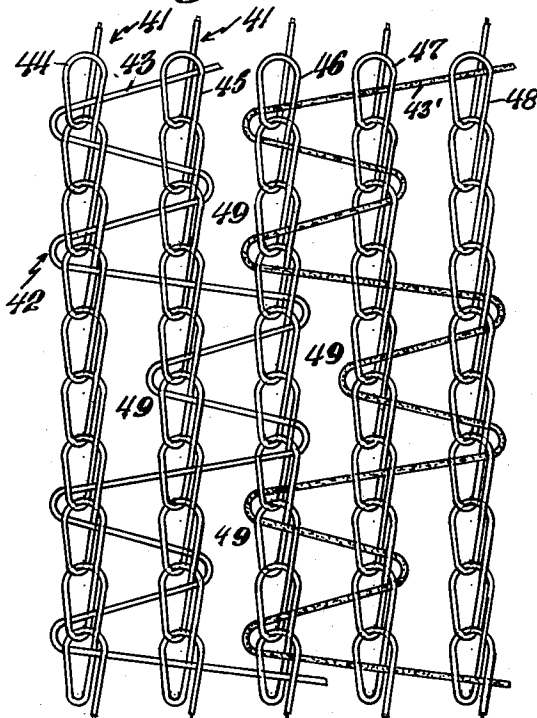
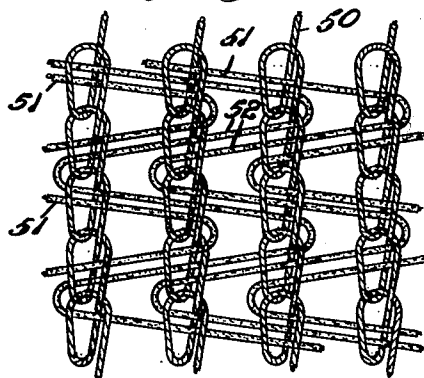


Fig. 14.



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KNITTED ELASTIC FABRIC

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Application January 31, 1951, Serial No. 208,728

9 Claims. (Cl. 66—193)

This invention relates to improvements in a knitted elastic fabric.

An object of the invention is to make an elastic fabric by a knitting operation on a knitting machine which can be carried on more rapidly than weaving.

Another object of the invention is to make on a knitting machine an elastic fabric having a two way stretch with greater porosity than a similar woven fabric.

Another object of the invention is to make on a knitting machine an elastic bandage with greater porosity and in greater varieties of widths than woven bandage made on narrow fabric looms.

Another object of the invention is to produce elastic bandage, tapes and the like fabrics at lower cost than similar woven fabrics.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a face view of a fabric embodying the invention;

Figure 2 is a similar view showing the fabric in stretched position;

Figure 3 is a plan view of a yarn covered elastic warp;

Figure 4 is a plan view of a filling yarn;

Figure 5 is an expanded plan view of the fabric shown in Figure 1 showing the arrangement of the threads of the fabric;

Figure 6 is an expanded plan view of a modified fabric;

Figure 7 is an expanded plan view of a further modification of fabric;

Figure 8 is an expanded plan view of a still further modification of fabric;

Figure 9 is a face view of the fabric of Figure 8 shown in the contracted condition; and

Figures 10 to 14 are expanded plan views of still further modification of fabrics.

In Figures 1, 2, and 5 the fabric of the present invention is illustrated in its simplest form and comprises a plurality of warp chains 10 each made up of a series of chain stitches 11. The warp chains are each made up of an elastic thread which may comprise a rubber thread 12 covered with a cotton yarn 13 or other suitable material which may be of a natural or synthetic character. The stitches 11 of the warp chains are aligned in courses extending transversely of the fabric and the warp chains 10 are held together in proper spaced relation by a single non-elastic filling yarn 15 which is laid to extend laterally back and forth across all of the warp chains. Each lateral stretch of the filling yarn 15 passes through the stitches 11 of all the warp chains at each course and is tightly engaged by the said chain stitches against displacement lengthwise of the fabric at each course. Thus, we provide a relatively strong elastic fabric of a simple character which has much more porosity than the usual woven fabric of substantially equal weight.

In Figure 6 there is illustrated a fabric in which all of the warp chains 16 are each made of a covered elastic thread 17 similar to that of the warp chains of the fabric of Figure 1. In the present instance, the warp chains 16 are connected and held together in proper spaced relation by a plurality of non-elastic filling yarns 18, each lateral stretch of which is laid in the fabric to connect together a plurality of warp chains 16. In the construction illustrated, each filling yarn 18 is laid to

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extend laterally back and forth across three warp chains 16. Each lateral stretch 19 of a filling yarn 18 passes through stitches 20 of three adjacent warp chains 16, the stitches lying in the same course, then the filling yarn 18 reverses direction and passes in the reverse order through the stitches 20' lying in the next course in the said three adjacent warp chains. At each point of reversal of the filling yarn, it is tightly held in place by two adjacent stitches 20, 20' in the same warp chain. The loops of laterally adjacent filling yarns formed at the reversal of direction overlap, so that each warp chain 16 is connected in each course to those on either side thereof by two filling yarns 18 and three of such yarns 18 pass through each chain stitch 20. Thus, each warp chain 16 is locked against lateral and lengthwise displacement in the fabric. The fabric thus provided has greater body than that of Figure 1 without materially impairing the porosity thereof. If desired, each lateral stretch of the filling yarn may cross more than three warp chains in which event, each warp chain may be connected to those on either side thereof by more than two filling yarns, and more than three filling yarns will pass through each chain stitch.

In Figure 7 there is illustrated a fabric in which all the warp chains 21 are made of covered elastic thread but in which the warp chains are connected together and held in proper spaced relation by means of but two non-elastic filling yarns 22. In the construction illustrated, each filling yarn 22 is laid to extend back and forth across two adjacent warp chains 21 and at each reversal of direction it tightly engages the chain stitches 21' and 21'' of two adjacent courses and is tightly engaged thereby. The loops 22' of lateral adjacent stretches of filling yarns 22, formed at each reversal of the filling yarns overlap so that each warp chain 21 is also connected in each course to those on either side thereof by two filling yarns 22 but only two of such yarns pass through each chain stitch 21'. Thus, each warp chain 21 is locked against lateral displacement in the fabric but only two filling yarns pass through each chain stitch.

In Figures 8 and 9 there is shown a fabric in which both elastic and non-elastic warp chains are united in the fabric. In the construction, shown by way of example, each repeat includes an elastic warp chain 23 and three non-elastic warp chains 24. These warp chains 23, 24 are connected and held in proper spaced relation by a plurality of non-elastic filling yarns 25 which are laid to extend laterally back and forth across three adjacent warp chains in a manner similar to that previously described and illustrated in Figure 6. Thus, each warp chain 23, 24 is connected at each course to those on either side thereof by two filling yarns 25. In this construction, the stretch of the fabric may be nicely controlled by the non-elastic warp chain. A fabric made according to the construction shown in Figure 8 will have the same appearance as the fabric of Figure 6 when both are in the stretched condition but when in the contracted condition, as shown in Figure 9, the stitches 26 of the non-elastic warp chains will tend to open to a loose condition, thereby providing rows of inter-connected loose loops 27 with a row of elastic warp chains 23 positioned on either side thereof and having a usual rib effect.

We have shown in Figures 8 and 9 a single elastic warp chain interposed between each three rows of non-elastic warp chains, however, such an arrangement may be varied whereby the proportion of elastic warp chains to non-elastic warp chains may be chosen to produce the desired fabric. For example each repeat may comprise a single or a plurality of adjacent elastic warp chains followed by a single or a plurality of adjacent non-elastic warp chains.

In Figure 10 we have shown a fabric construction in which each warp chain 28 is made of a covered elastic thread 29 and a non elastic thread 30. These two threads 29, 30 are arranged to lie next to each other in a non-twisted relation and are individually controlled as to tension. Each warp chain 28 is made up of a series of single chain stitches 31 which are aligned in the usual manner in courses extending transversely of the fabric. The warp chains 28 are connected to each other by means of a plurality of non-elastic filling yarns 32 in a manner similar

to that shown in Figure 6 so that each warp chain is connected in each course to those on either side thereof by two filling yarns 32 and three of such yarns pass through each chain stitch 31. Thus, each warp chain 28 is locked both against lateral and longitudinal displacement. In forming each stitch 31 under tension, the stretch 33 of the yarn 30 is of greater length than the opposite stretch 34 of the yarn 30 and when the elastic thread 29 of the stitch is permitted to recover, the same will draw the ends 35 of the said stretch 33 toward each other to form a loop in said stretch 33. In a like manner the ends 36 of the stretch 34 are drawn toward each other and a smaller loop will be formed in the said stretch 34. The loops formed by the stretches 33 will substantially all extend in the same general direction between warp chains and the said smaller loops will also lie in the same general direction to extend over its warp chain and substantially cover the same. A fabric made according to the construction shown in this Figure 10 will have the general appearance of woven terry cloth but having much greater porosity.

In Figure 11 we have shown an all-elastic warp chain 37 in which each chain is secured in place by means of a plurality of non-elastic filling yarns 38, 39 which are laid in each course from opposite directions (see Figure 12). The yarn 38 extends in one course from left to right through three stitches while the yarn 39 in the same course extends through the same stitches from right to left and each yarn reverses direction at each course. Thus, as shown in the Figure 11 five stretches of filling yarns pass through each of the stitches 40 at each course and two of said yarns reverse direction at each course whereby at each point of reversal, each stitch is tightly held in place by two yarns in each stitch extending in different directions.

In some instances it may be desirable to provide for a greater porosity in the fabric than that provided in the constructions above described. To this end, the construction of fabric shown in Figure 13 is employed. In this construction the elastic warp chains 41 are secured to each other by filling yarns 42 which are passed back and forth through only two warp chains for a successive number of courses depending upon the amount of porosity in the fabric desired and then across the next chain. As shown by way of example, the filling yarn 43 is made to extend back and forth across the warp chains 44, 45 for two courses and at the reversal is passed across warp chains 44, 45 and 46, and then is laid laterally back and forth across warp chains 46, 45 for two courses. At the next course the yarn 43 is made to pass in the reverse order across warp chains 46, 45, 44 to again start a repeat. The filling yarn 43' is laid in a similar manner across warp chains 46, 47 and 48, thus providing alternate spaces 49 between warp chains for greater porosity of fabric.

The above constructions of fabric are particularly adapted to be made in narrow strips for use as bandage or elastic tapes and can be produced on a so-called flat knitting machine whereby any width of fabric may be made up to the capacity of the machine. Thus, a machine for making a fabric up to 78 inches in width may be used to make simultaneously strips of fabric of many widths not possible to make on a narrow fabric loom and in greater numbers since a narrow fabric loom is limited to a maximum number of strips regardless of width of fabric.

In all of the fabric constructions above described, a one-way stretch fabric is provided. It may be desirable to provide a fabric having a so-called two-way stretch; that is, the fabric will be stretchable both warpwise and fillingwise. To this end, a fabric construction having this characteristic in addition to greater porosity than heretofore provided is shown in Figure 14. In this construction, each warp chain 50 is made of a covered elastic thread as in the previous disclosure. However, these warp chains are connected to each other by means of covered elastic filling yarns 51 which are laid in the fabric in a manner similar to that shown for the filling yarns of the construction shown in Figure 6 so that each warp chain 50 is connected to those on either side thereof by two yarns 51 and two stretches 52 of the yarns 51 extend between each warp in each course, thus providing a two-way stretch fabric having great porosity.

We claim:

1. A flat knitted elastic fabric comprising a plurality of spaced warp chains made of elastic thread and with

each of said warp chains made up of a series of chain stitches with the stitches of each warp chain lying transversely aligned in courses, filling yarns extending laterally back and forth across said warp chains with successive stretches thereof passing in successive courses through chain stitches of a plurality of adjacent warp chains, each filling yarn tightly engaging a chain stitch at each point of reversal thereof and each warp chain being connected to warp chains on either side thereof by a plurality of filling yarns in each course.

2. A flat knitted elastic fabric comprising a plurality of spaced elastic and non-elastic warp chains each made up of a series of chain stitches with the stitches of each warp chain lying transversely aligned in courses, filling yarns extending laterally back and forth across said warp chains with successive stretches thereof passing in successive courses through chain stitches of a plurality of adjacent warp chains, each filling yarn tightly engaging a chain stitch at each point of reversal thereof and each warp chain being connected to warp chains on either side thereof by an equal plurality of filling threads in each course.

3. A flat knitted elastic fabric comprising a plurality of spaced elastic warp chains made up of a series of chain stitches with the stitches of said warp chains lying transversely aligned in courses, filling yarns extending laterally back and forth across said warp chains with successive stretches of said filling yarns passing in successive courses through said chain stitches to tightly engage the same and be engaged thereby to be bound together into the fabric, said filling yarns extending across a plurality of stitches in opposite directions in each course.

4. A flat knitted elastic fabric comprising a plurality of spaced elastic warp chains made up of a series of chain stitches with the stitches of said warp chains lying transversely aligned in courses, filling yarns extending laterally back and forth across said warp chains with successive stretches of said filling yarns passing in successive courses through said chain stitches to tightly engage the same and be engaged thereby to be bound together into the fabric, said filling yarns comprising covered rubber threads.

5. A flat knitted elastic fabric comprising a plurality of spaced elastic warp chains made up of a series of chain stitches with the stitches of said warp chains lying transversely aligned in courses, filling yarns extending laterally back and forth across said warp chains with successive stretches of said filling yarns passing in successive courses through said chain stitches to tightly engage the same and be engaged thereby to be bound together into the fabric, there being an equal number of filling yarns extending across each warp chain in the body of the fabric in opposite directions in each course.

6. A flat knitted elastic fabric comprising a plurality of spaced elastic warp chains made up of a series of chain stitches with the stitches of said warp chains lying transversely aligned in courses, filling yarns extending laterally back and forth across said warp chains with successive stretches of said filling yarns passing in successive courses through said chain stitches to tightly engage the same and be engaged thereby to be bound together into the fabric, there being an equal number of filling yarns extending across each warp chain in the body of the fabric in opposite directions in each course and filling yarns are reversed in direction in equal number on opposite sides of each warp chain.

7. A flat knitted elastic fabric comprising a plurality of spaced elastic warp chains made up of a series of chain stitches with the stitches of said warp chains lying transversely aligned in courses, filling yarns extending laterally back and forth across said warp chains with successive stretches of said filling yarns passing in successive courses through said chain stitches to tightly engage the same and be engaged thereby to be bound together into the fabric, there being an equal number of filling yarns extending across each warp chain in the body of the fabric in opposite directions in each course and filling yarns are reversed in direction in equal number on opposite sides of each warp chain in each course.

8. A flat knitted elastic fabric comprising a plurality of spaced warp chains, each comprising an elastic thread and a non-elastic thread laid side by side and untwisted relative to each other, said chains being made up of a series of chain stitches with the stitches of said warp chains lying transversely aligned in courses, filling yarns extending laterally back and forth across a plurality of said warp chains with successive stretches of said filling yarns passing in

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successive courses through said chain stitches to tightly engage the same and be engaged thereby to be bound together into the fabric, said elastic threads being held under tension when being made into said chains whereby said non-elastic thread in each stitch of a chain will form a loop when said warp chains are in contracted condition.

9. A warp knit fabric having wales and courses formed of yarns equal in number to twice the number of its wales, half of said yarns being knit to form parallel individual chain stitch wales in the courses of which the other half of said yarns are incorporated unknit, each of said unknit yarns being arranged in regular sinuous form with successive portions thereof incorporated in successive courses in the chain stitches of a number of adjacent wales, the said sinuously arranged unknit yarns being disposed so that a like number thereof are incorporated in each chain stitch, the fabric having the knit yarns of at least one

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group of a plurality of adjacent wales of a different character than the knit yarn of a wale next thereto, the fabric also having a like plurality of unknit yarns of the same different character, the said different character unknit yarns being disposed so that they alone extend coursewise between said plurality of adjacent wales.

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