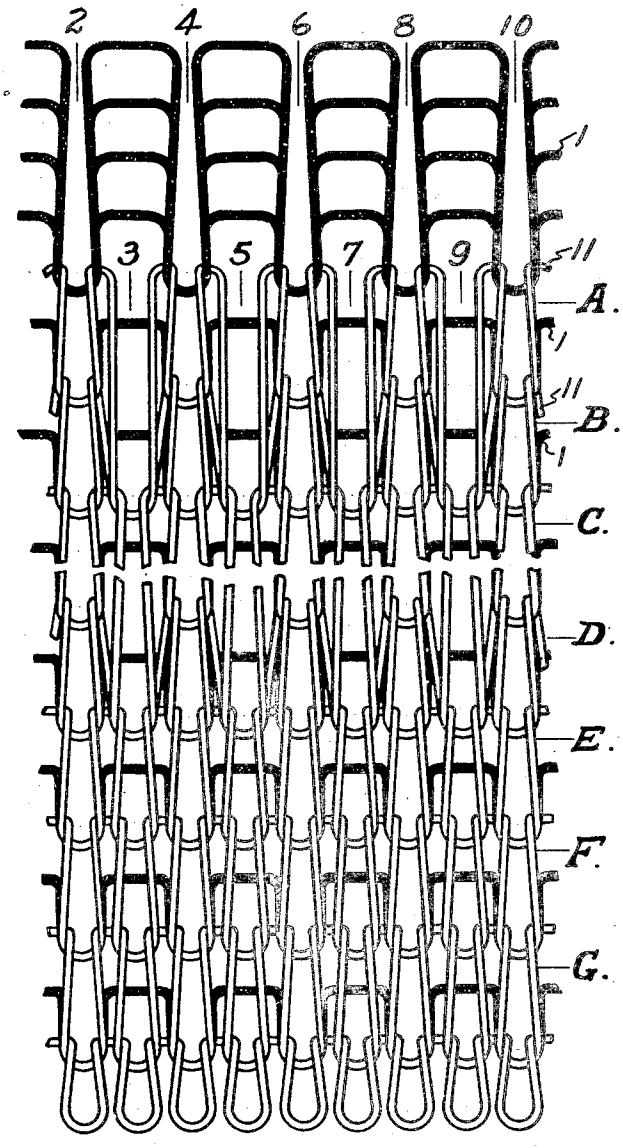
July 13, 1943. O. FREGEOLLE 2,323,988

KNITTED FABRIC AND METHOD

Filed May 1, 1941 3 Sheets-Sheet 1

FIG. 1.



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FIG. 2.

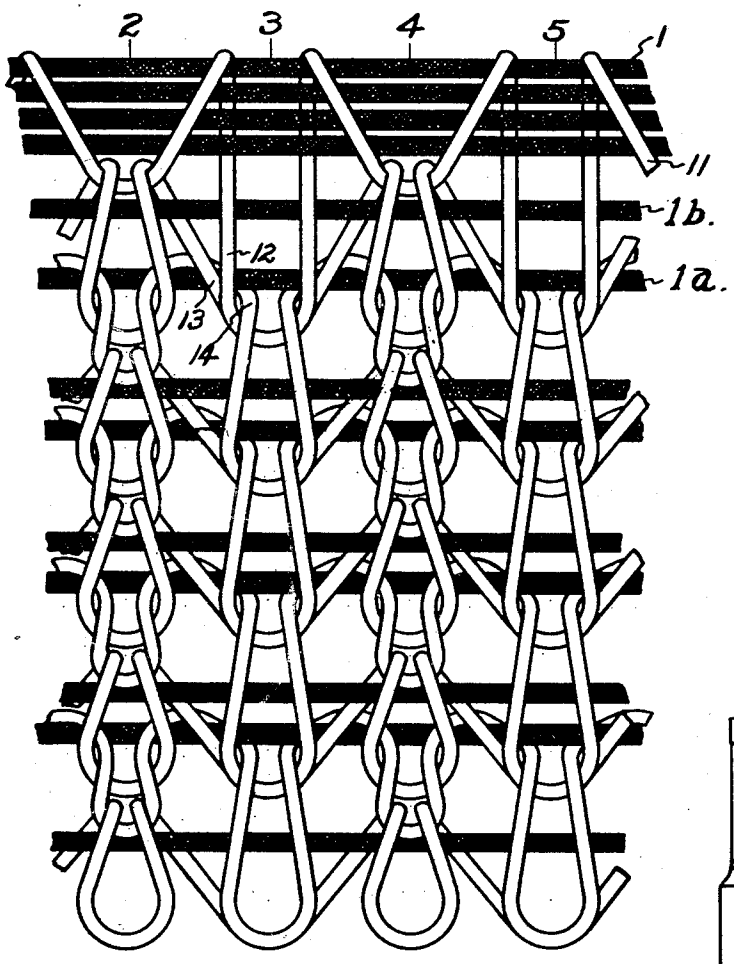
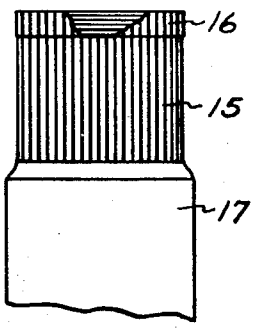


FIG. 3.



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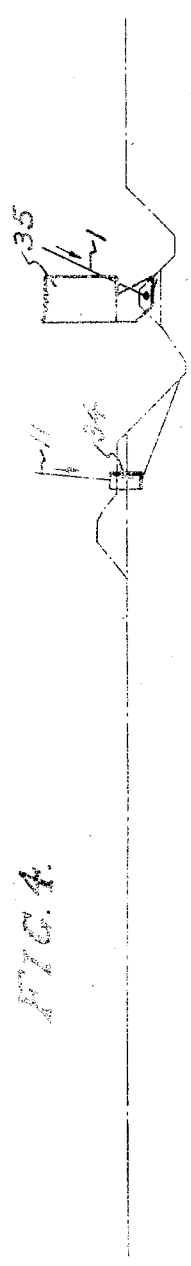
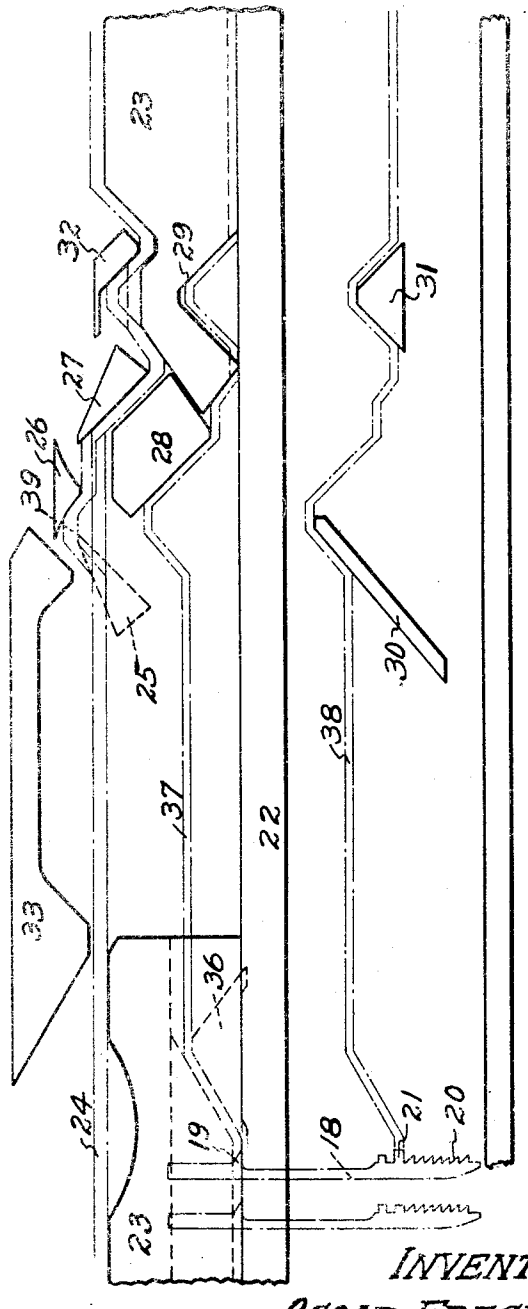


FIG. 4.



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UNITED STATES PATENT OFFICE

2,323,988

KNITTED FABRIC AND METHOD

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Application May 1, 1941, Serial No. 391,231

6 Claims. (Cl. 66—172)

This application deals with an invention in a knitted fabric and method of knitting wherein an improvement at and adjacent the selvage of knitted elastic material is involved. The case is a continuation-in-part of applicant's co-pending application Serial #332,161, filed April 29, 1940, now Patent #2,247,343.

In the figures of the drawings:

Fig. 1 is a conventional showing, greatly enlarged, of several courses of fabric knitted in accordance with the invention;

Fig. 2 is a view showing a smaller section of fabric with loops and yarns greatly enlarged and wherein an attempt has been made to illustrate the fabric pretty much as it actually appears after being cast from the needles of the machine;

Fig. 3 is an elevation of part of a stocking and a stocking top wherein the invention has been applied; and

Fig. 4 is a diagrammatic view showing cams and needle and jack butt pathways in illustration of the method of knitting.

In the application Serial #332,161 a method and resulting fabric were disclosed as a preferred embodiment wherein one elastic yarn was fed in combination with two inelastic yarns. In this case applicant knits a fabric having, or closely approximating, the characteristics of that in the application above mentioned, but by a method more simple and by a less complicated and cheaper machine. Here the method and machine involve feeding an elastic yarn and one inelastic yarn in the production of a selvage and stocking top characterized by a simulated rib appearance brought about by incorporation of the elastic yarn in a particular way. The edge is drawn together and simulates rib appearance by inlaying an elastic yarn at spaced, for example, alternate wales, and preferably, continuously or in each course of non-elastic material. In addition, the construction is such that intermediate wales are tucked, the result being that the elastic is held or gripped in the intermediate wales which are the tucked wales.

The invention will be described more specifically with respect to an embodiment of the same illustrated herein, but it is to be understood that this illustration and description are by way of example only and are not to be taken as limiting.

Referring to Fig. 1, at the initial edge, one or more courses of elastic are to be fed to alternate needles, four such courses of elastic yarn 1 being shown for purposes of illustration. It is desirable to load needle hooks for four courses before the non-elastic yarn is first taken so that the initial course of non-elastic yarn stitches will contain four elastic strands thereby making it strong and of a suitably bulky appearance. It is to be understood that the elastic yarn is fed under a desirable tension, preferably a relatively light knitting tension which will be sufficient to steady the yarn and allow it to feed to the hooks of those needles by which it is contemplated it shall be taken. Tension may be varied in accordance with the size of elastic yarn, relative extensibility thereof and the amount of contraction desired in the finished article. By the term alternate, reference is made to wales 2, 4, 6, 8 and 10 while intermediate wales are to be designated by the odd numerals 3, 5, 7 and 9. After loading the hooks of the so-called alternate needles with the four, more or less, courses of elastic yarn 1, a non-elastic yarn 11 is introduced and is fed at this course designated by letter A. As will be described in more detail later, a needle division or selection is to be employed by means of which the alternate needles may be selectively elevated or otherwise presented for taking the elastic yarn at any desired time. The elastic yarn is preferably fed at a separate feeding station from that at which the elastic yarn is fed and since the elastic yarn is first taken within the hooks of needles, and is to be inlaid, it is cleared below needle latches before those same needles take the non-elastic yarn. Of course, the statement just made applies to the knitting after the initial loading of elastic and drawing of the first course A have been completed. As the course A is drawn by all needles, the elastic 1 is taken in the hooks of, but cleared below the latches of, the said alternate needles in wales 2—10, etc.

Since the elastic is cleared below needle latches as above mentioned, it will be cast off to be inlaid rather than being drawn through previously formed stitches. When needles knitting in wales 2, 4, 6, 8 and 10 take an elastic yarn in their hooks and clear it below their latches prior to taking an inelastic yarn, that elastic yarn will be cast off to be held or pinched at or close to the contact point of sinker wales and needle wales drawn by needles knitting in the intermediate wales such as 3—9. It follows that while the elastic is referred to as being taken by hooks of alternate needles, or inlaid on alternate needles which is the usual shop term employed, that yarn is actually held or restrained within stitches of intermediate wales. As the elastic

yarn contracts since it is introduced under some tension, it will draw these said intermediate wales together and to the back of the fabric and create a rib appearance by projecting the alternate wales more to the front. After course A has been drawn the elastic yarn is again taken in the hooks of the alternate needles, or such needles as desired. That yarn is shown in Fig. 1 as being drawn into a sort of loop or kink, but it is to be understood that the elastic is cleared below needle latches and casts off without being drawn into a knitted stitch. The said temporary loops or kinks of elastic are not drawn through any previously formed stitches.

At the next course B, the inelastic yarn 11 is again taken in the hooks of all needles. However, it is only alternate needles knitting in wales 2, 4, 6, 8 and 10 which are raised to a clearing height that cast off their previously drawn stitches so that so far as alternate needles are concerned, they knit a distinct stitch at each course. Needles knitting in alternate wales 3, 5, 7 and 9 are not raised to a latch clearing height at the course B, but merely tuck by taking an additional loop of the inelastic yarn after passing through the inelastic yarn feed. The elastic yarn is again encountered and taken by alternate needles just as it was at the course A.

The next course C of inelastic yarn is taken by all needles, and at this time, all needle latches are cleared so that all loops held by needles at course B are cast off. Course C is a dupicate of course A so far as stitch structure and method are concerned and likewise course D is a duplicate of course B so that courses A and B each have an inlaid elastic therein at alternate wales comprising tuck stitches. Courses C and D are duplicates of the combined courses A and B. This inlaying of elastic at each course and tucking are to be continued throughout a few courses at the edge of the fabric, the extent thereof being dependent upon the appearance, tightness of the stitch, gage and other practical considerations. After a suitable tuck edge has been formed I preferably knit courses such as E, F and G wherein the inelastic yarn is knitted into plain stitches on each needle during each course. The elastic is inlaid on alternate needles and preferably, although not necessarily, at each course.

In the preferred form of the invention the elastic yarn is to be fed continuously, but that is not necessary since the elastic yarn feeding means may be so automatically controlled as to be retired from feeding relationship after introducing its yarn for a course or courses and thus the said elastic yarn may skip one or more courses between those in which it is incorporated. Inlaying and the scheme of tucking have been described as applied to alternate and intermediate wales. It is more or less essential that the actual selvage be started by feeding the elastic or some yarn to alternate needles so that it will be threaded through all loops of an initial course, otherwise, the inlaying of elastic may be on needles spaced other than 1 x 1. For example, after the selvage course, the elastic might be fed to the loops of two or three needles instead of the alternate needles 2, 4, 6, etc., pass below latches of those needles and be floated behind the intermediate needles such as 3, 5, 7 and 9. Then the said elastic would be cast off to be held at the intermediate wales which would of course, be tucked as above explained, then again, the tucking by holding a loop for two courses (a two course tuck) might be extended so as to hold loops for longer periods of time. A three or four course tuck might be employed if desired. The elastic may be fed at each course throughout the knitting of the tucked edge while in the courses E, F, G, etc., it may be spaced at greater intervals. The walewise spacing of selected needles applied to the taking of elastic yarn may be varied after tucking is completed. In the example of the fabric illustrated tucking is commenced immediately after a selvage has been completed, but for certain purposes it might be desired to knit one or more plain (non-tuck) courses either with or without inlaid elastic before starting the actual tuck portion of the stocking top or other fabric.

In Fig. 2 a small section of fabric is drawn to a greatly enlarged scale and shows more or less the stitch structure and general physical characteristics of the fabric after the elastic yarn has contracted upon being released from the needles. The elastic yarns 1 which go to make up the selvage in combination with the first course of non-elastic yarn 11 straighten out and lie parallel as they are threaded through all sinker loops of the initial course.

The tucking at intermediate wales such as the wales 3 and 5 tends to draw the fabric together longitudinally and also distorts the stitch structure to some extent so that the theoretical construction illustrated in Fig. 1 does not prevail. Loops of the inelastic yarn 11 in wales such as 2 and 4 vary in size since the tucking draws every other stitch out or robs from it so that in these wales, stitches are alternately large and small. The elastic yarn inlaid throughout the tuck portion of the top contracts as above described and that yarn designated at 1*a* is pinched between the bights 12 and 13 of a tuck stitch and the corresponding part 14 of a cooperating stitch, or as above described, between contacting parts of a tucked needle loop and cooperating sinker loops. Of course, the elastic is knitted or held in the manner just described at either side of the tuck wales. It floats behind stitches in wales 2 and 4, upon needles knitting which the said elastic was originally taken. The tuck loops of which the said bights 12 and 13 form a part, may be referred to as the combined loops of a tuck stitch. Preferably there are two such loops, but there may be more than two depending upon the number of courses over which loops are accumulated before being cast off.

The strand of elastic 1*b* was cast off at a course in which loops on needles knitting in intermediate wales such as 3 and 5 were being held or tucked. At that time, it is obvious that there was no sinker loop to cooperate with a contacting portion of a needle loop and by means of which the elastic might be pinched or held as is the strand of elastic 1*a*. The result is that the strand 1*b* merely passes through in front of certain stitch legs and behind others. That yarn passes behind loops in alternate wales 2, 4, etc. and between the combined loops of a tuck stitch, that is, between the loops 12 and 13. It passes behind loops 12 and in front of loops 13. The showing in Fig. 2 is necessarily opened up to some extent for purposes of clearness and the actual diameter of yarns compares to the size of stitches in such a manner that both the strands 1*a* and 1*b* practically contact or lie adjacent one another so that the appearance in the fabric is that of tuck courses in which two strands of elastic appear in each tuck course. One strand assumes a position more to the face of the fabric

than the other. Due to the above mentioned size of the elastic yarn as compared to the actual size of stitches in a commercial fabric, neither elastic yarn is capable of being displaced or drawn through stitches in their respective courses.

In Fig. 3 a stocking top generally indicated at 15 has a tuck elastic edge 16 such as herein described. The stocking leg shown at 17 is of conventional construction as might be the remaining parts of that article. The tuck edge 16 has been shown broken away at the front side so that the horizontal lines inside the fabric represent pairs of elastic strands 1a and 1b at each tuck course group. The edge construction herein described may be used alone since the remainder of the stocking top may embody an elastic construction or may not as desired. The length of the tuck portion 16 is dependent upon many factors as previously described and in fact, one tuck portion may follow another being separated by plain fabric or by fabric such as constitutes the courses E, F and G, Fig. 1.

In Fig. 4 a diagrammatic illustration is employed to demonstrate one effective way of producing the fabric described and needles (not shown) are to be controlled by jacks 18, one of which will be placed beneath every other needle if a 1 x 1 construction is contemplated. These jacks have a so-called master butt 19, a series of selective butts 20 which are removable and a rectangular butt 21. So far as the instant case is concerned the selective butts 20 are not necessary, but are merely shown herein since in machines of this general type they may be employed for other purposes. The cam structure of the machine is of somewhat conventional type and is mounted upon the usual cam plate 22. Raise cam 23 is adapted to guide needle butts (not shown) in a pathway 24 and at the main feeding station or main cam block, a front stitch cam 25 is so mounted as to be automatically movable to and from a needle butt engaging position. The usual guard cam 26 and back stitch cam 27 are provided and a cam 28 serves both as a center raise cam and a jack lowering cam. The other end of raise cam 23 is cut out at 29 to allow jack butts 19 to move upwardly without interference.

A cam 30 movably mounted to engage butts 21 on the jacks serves to raise jacks and accompanying needles to a latch clearing height. Cam 31 engages jack butts to raise them at the elastic yarn feed for taking that elastic yarn, but does not elevate needles to a height at which they would have latches cleared. A cam 32 is so constructed as to draw down needles which take the elastic yarn at the auxiliary or elastic yarn feed. The cam 33 is a top instep cam and is not particularly important so far as the instant description is concerned. The non-elastic yarn 11 is fed through a yarn feeding lever 34 at the main feeding station, and, of course, several other yarns would presumably be fed at that point. An elastic yarn feeding finger 35 has threaded therethrough the elastic yarn 1.

Elastic yarn feeding finger 35 is so constructed that it may be dropped to feeding position and raised from that position as described. Likewise, control may be provided to elevate the finger periodically throughout the knitting of an edge or top so as to space the elastic one or more courses apart. A cam 36 serves to level jacks as it raises them by means of butts 19 which are guided within the pathway 37. Then the butts 21 moving in a pathway 38 ride up cam 30 and raise needles to a clearing position. Needle butts then arrive at their uppermost pathway 39. Other needles having their butts moving in pathway 24 are not cleared, but both groups will take the yarn 11 as they pass beneath cam 26 and knit as they ride down cam 27.

Cam 25 is automatically controlled to move in and out at alternate courses. Alternate needles (those having jacks 18) will always clear, take yarn and knit at this main feeding station. Intermediate needles having no jacks take yarn but will only be cleared so that they will knit when cam 25 is moved inwardly against the cylinder. To make the fabric described in Figs. 1 and 2, cam 25 will be automatically moved inwardly for a course, then out a course and then rendered active on the next course. If the tucking were to be continued over more than two courses the movement of cam 25 would be varied accordingly.

Cam 31 acting upon jack butts 21 will raise jacks and accompanying needles so that needle hooks may engage and take the elastic yarn 1. Alternate needles thus take the elastic while intermediate needles will have it floated behind their shanks. Cam 32 serves to draw elastic yarn taking needles downwardly and will draw out an amount of elastic varying in length depending upon the distance the needle hook is lowered beneath the immediate, effective stitch drawing edge. That edge may be the usual sinker edge or the top of a sinker nib as explained in application Serial #332,161. Of course, if a different scheme is employed from that illustrated, for example 2 x 1 or 3 x 1, jacks will be arranged accordingly and the general functioning of the cams will merely vary as different numbers of jacks and needles follow the respective pathways.

The invention has been described by reference to one specific embodiment of the same in a stocking top, it is to be understood that it applies to all fabrics wherein it may be found useful and the variations explained are merely illustrative of different manners in which the fabric may be produced without departing from the general concept and teaching. Reference has been made to inlaying as a method of incorporating the elastic to be held at specific wales, but it is to be understood that my disclosure contemplates incorporation of the elastic in any other way by means of which it can be so combined with the inelastic yarn as to be held at those desired wales. The invention is defined in the appended claims.

I claim:

1. A method of knitting including the feeding of elastic and inelastic yarns, said elastic yarn being fed in the initial course to form a selvage and thereafter inlaid at spaced wales in each course and the inelastic yarn being so fed and knitted as to be drawn into independent stitches at alternate wales in consecutive courses but held and tucked at intermediate wales, whereby alternate strands of elastic will be inlaid to be held at intermediate wales while intermediate strands of elastic will be threaded between tuck loops in intermediate wales and plain loops at alternate wales.

2. A knitted fabric having in combination elastic and inelastic yarns, the said inelastic yarn being knitted into consecutive stitches at each course in spaced wales, and at wales intermediate said spaced wales, being formed into tucked stitches in a plurality of groups of courses and having elastic yarn inlaid in such a manner that alternate strands thereof are held at intermedi-

ate or tucked wales only while other strands are threaded through and retained by plain loops in spaced wales and tucked loops of the tuck stitches in the said intermediate or tucked wales.

3. A knitted fabric having in combination elastic and inelastic yarns, the said inelastic yarn being knitted into consecutive stitches at each course in alternate wales, and in intermediate wales, being tucked to form tuck stitches for several courses, the said elastic yarn being inlaid so that in tucked courses one strand of said elastic will be held at tuck wales and floated behind alternate wales while another strand of said elastic will be inlaid to pass behind plain stitches in alternate wales and between the combined loops of each tuck stitch at intermediate wales.

4. A knitted fabric having in combination courses containing elastic and inelastic yarns, the said inelastic yarn being knitted into independent loops at alternate wales of each course, and at intermediate wales, being accumulated over at least two courses and knitted off as tuck stitches, the said elastic yarn being incorporated as an inlaid yarn so that one strand of elastic will be held at tuck wales and floated behind alternate wales at those courses in which accumulated loops are cast off while another strand of said elastic will appear as inlaid to pass behind plain stitches in alternate wales and between the combined loops of each tuck stitch at intermediate wales.

5. A method of knitting to incorporate elastic and inelastic yarns in a plain knitted stocking top including the steps of feeding an elastic yarn to be drawn into temporary stitches for a plurality of courses, then feeding an inelastic yarn and drawing it into stitches casting off all previously drawn elastic courses so that they will be held within that course of inelastic yarn stitches, then continuing knitting said top by feeding the inelastic yarn and knitting it at alternate wales while tucking repeatedly on intermediate wales, and at each course thus knitted, feeding the elastic yarn so that it will be inlaid to be held at intermediate wales of the fabric by passing behind plain stitches in alternate wales and between the combined loops of each tuck stitch at intermediate wales.

6. A method of knitting to incorporate elastic and inelastic yarns in a plain knitted stocking top which includes the steps of feeding and drawing stitches of an elastic yarn for a course, then drawing stitches of an inelastic yarn for a course while casting off the elastic yarn first drawn, continuing with the knitting of the inelastic yarn by drawing it into independently knitted stitches at alternate wales but tucking at repeated intervals in intermediate wales, and at each course thus knitted from the inelastic yarn, feeding elastic yarn to alternate needles but in such a manner that it will be inlaid to be held in the intermediate or tucked wales by passing behind plain stitches in alternate wales and between the combined loops of each tuck stitch at intermediate wales.

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