O. F. OAKES.

KNIT FABRIC.

APPLICATION FILED NOV. 6, 1916.

1,254,722. Patented Jan. 29, 1918.

Fig. 1.

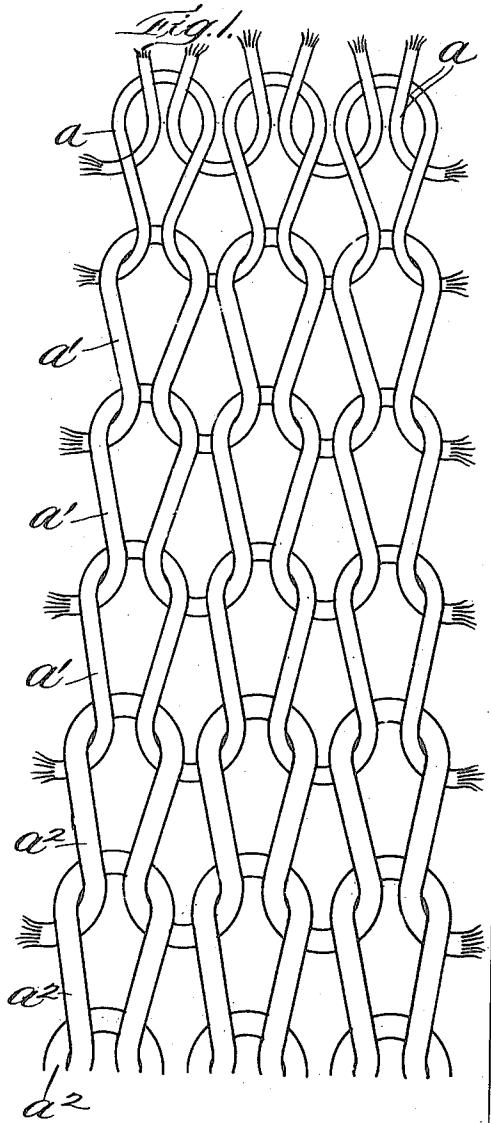


Fig. 2.

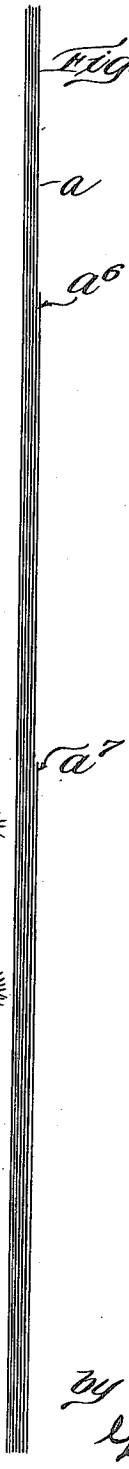
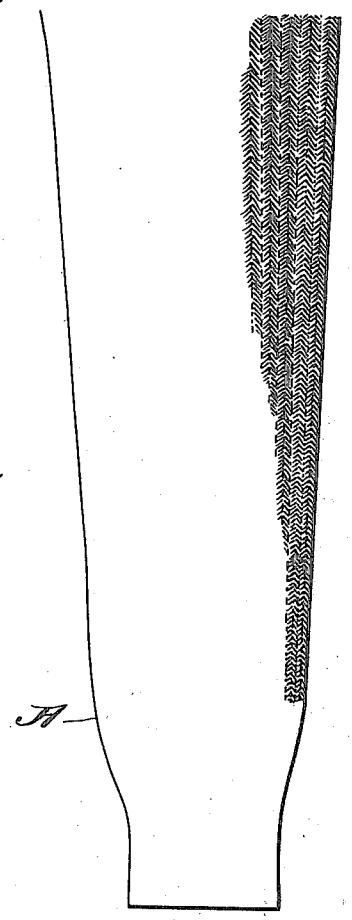


Fig. 3.



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KNIT FABRIC.

1,254,722. Specification of Letters Patent. Patented Jan. 29, 1918.

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To all whom it may concern:

Be it known that I, OWEN F. OAKES, citizen of the United States, and resident of Boston, county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Knit Fabrics, of which the following is a specification.

This invention relates to knit fabrics, and has for its object the production of a fabric which shall increase or diminish in width by a continuous taper during the course of the knitting, while still comprising the same number of stitches in both the wide and narrow portions, but without giving the effect of stretchiness or bagginess at the wider portion and without leaving any clearly marked or discernible line of transition or change.

The invention is particularly applicable to the production of sleeves for sweaters, jerseys, and the like, in which a more or less continuous and gradual enlargement or contraction of the sleeve is desired, thus producing a gradually tapering effect without any jogs or angles marking the increase in width, and without rendering the larger or wider portion so open or loosely knit as to produce sleaziness or stretch that would render it unsuitable for wear. The same principle of construction is of course applicable to other articles also, which it may be desired to gradually narrow or widen.

Heretofore it has been customary to make a tapered knit article of this class either by knitting a cylindrical tube having the same width at both ends, and having the same number of stitches, then cutting out a V-shaped portion at one end and seaming together the two cut ends to produce the narrow effect. Another method of narrowing such an article is to throw out from time to time, some of the needles when working on the narrower portion of the sleeves, thus producing a smaller number of stitches at the narrow end of the fabric which however, produces one of the effects which it is the object of this invention to avoid; namely, a jog or angle and a change of appearance due to the diminished number of rows of stitches.

Where any substantial degree of taper is required, on a long tube, such as a sweater, sleeve, the mere relaxing of the tension on the yarn to produce longer and more open loops or stitches, would leave the large or wide part of the fabric so stretchy or sleazy, that it would not have sufficient firmness to hold its shape, and would be quite unfit for use in a garment of this class.

The present invention comprises a new method of producing a narrowed or widened fabric of this class, which consists essentially in gradually increasing or diminishing the length of the loops or stitches throughout the sleeve length and at occasional intervals increasing or diminishing the bulk or size of the yarn element by adding or subtracting strands from that yarn element so that the increased bulk or diminished bulk, as the case may be, of the yarn element compensates for the greater openness or greater tightness of the stitches in the wider or narrower parts, respectively, of the fabric.

In the accompanying drawings I have illustrated a fabric made in accordance with the principles of this invention in which—

Figure 1 is a greatly enlarged detail view showing the gradual increase or decrease in the size of the stitches as well as a compensating increase or decrease in the size of the yarn element.

Fig. 2 illustrates a diagrammatic development of the yarn element used in producing different portions of the fabric.

Fig. 3 shows a sweater sleeve illustrating the gradual taper of the sleeve itself and of the longitudinal rows of stitches.

It will of course be understood that in the practice of this art, according to my invention, it is immaterial whether one begins the knitting at the small end and gradually increases the length and width of the stitches, or whether one begins at the large end and gradually contracts or diminishes the length and width of the stitches.

Referring to Fig. 1, let us suppose that in knitting the small or narrow end of the sleeve or other article, we use a yarn element *a* comprising for example, five strands or plies of thread and that in knitting this portion of the garment with this five-ply yarn, the tension is relatively tight so as to release short loops or stitches in order to form a comparatively close knit fabric. As new rows of stitches across the fabric are formed, the tension is progressively and gradually relaxed to make a slightly more open stitch, but before the stitches become sufficiently open to produce a sleazy or stretchy fabric, we add an extra strand or ply of yarn a^6, as indicated in Fig. 2, there-

by increasing the bulk or size of the yarn element which now comprises six strands instead of five plies as in the case of stitches a. The effect of this increased bulk or size of the yarn element is to give more body to the fabric even though the individual stitches are larger than those previously knit. By adding another strand or ply a^7 to the six plies previously used to produce yarn element a' we get a still further increase in the size or bulk of the yarn element for producing the larger stitches a^2.

This operation of increasing the size or bulk of the yarn element by adding additional strands or by substituting a larger for a smaller strand may be resorted to in connection with the gradual increase in the size of the stitches as often as may be necessary to give sufficient body and firmness to the fabric, and the result will obviously be to form a tapered fabric having the same general appearance due to the fact that the taper is produced by enlarging the stitches and giving them more body while preserving the same number of rows of stitches as in the narrow portion of the fabric. There will be no jogs, offsets or angles indicating the increase in size at different points of the fabric, as is the case where additional needles are thrown in when widening, or some needles are taken out when narrowing, and yet the whole article from end to end has a sufficiently firm body to make it eminently suitable for wear and to wholly preserve its shape. The illustration of the sleeve A in Fig. 3, will give some idea of the effect obtained by this method of knitting articles of this kind, there being as indicated, a complete freedom from irregularities, unevenness or change in the character of the stitch.

The above described method of producing an article of this kind by gradual increase or decrease in the size of the stitch and of the occasional compensatory increase or decrease in the size of the yarn element constitutes the salient feature of this invention.

It will be understood by those skilled in the knitting art, that existing knitting machines, whether of the circular or flat web type, may be provided with means for automatically and gradually increasing the length of the loop or stitch when widening, or decreasing such length when narrowing, and for adding when widening, or taking out when narrowing, individual strands or plies of yarn, and I have devised such arrangements applicable to knitting machines for this purpose, but as the same forms a distinct and separate invention from that disclosed and claimed herein, it will be made the subject matter of a separate companion application.

The use of the terms widening and narrowing depend simply upon the end of the fabric where one starts the knitting, since obviously, precisely the same fabric may be formed by beginning at the large end with the coarse stitches and gradually increasing the tension and shortening the stitch loops to knit more closely, while occasionally cutting out a strand or ply in the yarn element to reduce its bulk, or by beginning at the small end with the finer closer stitches and relaxing the tension to form stitches of gradually increasing size, adding from time to time as needed, the additional strand to give firmness to the fabric. Hence the widening and narrowing operations are simply the reverse of each other, depending upon which starting point is selected.

To give a concrete illustration I may say that a sweater sleeve of ordinary length, twenty-one inches, made by this process is found to contain about 130 circular courses of stitches from the cuff end to the shoulder end, the sleeve measuring about 8 inches in circumference at the small end and about fourteen inches at the larger end when the fabric is not distended or stretched. At the small end the stitches run approximately 8 courses to the inch lengthwise of the sleeve, while at the top or large end the circular courses run about 4½ to the inch. In knitting this sleeve from the small end to the large end the tension is progressively relaxed at every course or every other course of stitches from one end to the other, while a new ply is added at intervals of about every 25 courses. That is to say, in an ordinary sleeve containing between 125 to 150 circular courses of stitches the yarn element would be increased about 4 or 5 times, so that after each increase of the yarn element by adding an additional strand there would be 25 or 30 courses of stitches knitted with a continuously increasing length before there would be another increase in the bulk of the yarn element. These figures are not to be taken as absolute or prescriptive, but merely as giving an illustration of the principle by reference to one of the many sleeves knit under this process. A sleeve knitted in this manner will show a gradual and continuous taper from the shoulder or large end to the end next to the cuff, and will have the same number of longitudinal rows of stitches, each row tapering gradually and continuously in correspondence with the tapering of the whole sleeve.

The continuous taper from end to end without bulge or shoulder is due to the fact that the extra ply is not added until a considerable portion of the sleeve length has been knit with a considerably increasing length of stitch, that is by adding the extra ply only after a considerable number of circular courses have been knit, the enlarged yarn element is caused to so completely merge into the preceding course of stitches as to prevent the formation of any bulge or

shoulder and to present no perceptible change marking the transition from one course of stitches to the next. The increase in the length of the stitches is gradual and continuous, while the increase of the bulk of the yarn element is relatively intermittent so as to only partially compensate for the increase in the length of the stitch.

What I claim is:

1. The art of producing a tubular knit sleeve tapered from end to end, and having the same number of rows of stitches throughout, which consists in gradually and continuously increasing or diminishing the tension of the yarn element as the knitting progresses from one end to the other to form stitches of gradually diminishing or increasing length and partially compensating for the increasing or diminishing length of the stitches by increasing or diminishing the bulk of the yarn element at occasional intervals after the lengthening or shortening of the stitches has been in progress for a considerable portion of the sleeve-length, substantially as described.

2. A sleeve for sweaters or the like embracing a knit tube tapered continuously from end to end, containing the same number of longitudinal rows of stitches throughout its length which are tapered to correspond to the taper of the sleeve, the circular courses of stitches being formed of progressively and gradually increasing length from the small to the large end, the progressively lengthened stitches after a considerable number of courses have been knit, being composed of a yarn element of relatively larger bulk to partially compensate for the constantly increasing length of the stitches, substantially as described.

In witness whereof, I have subscribed the above specification.

OWEN F. OAKES.