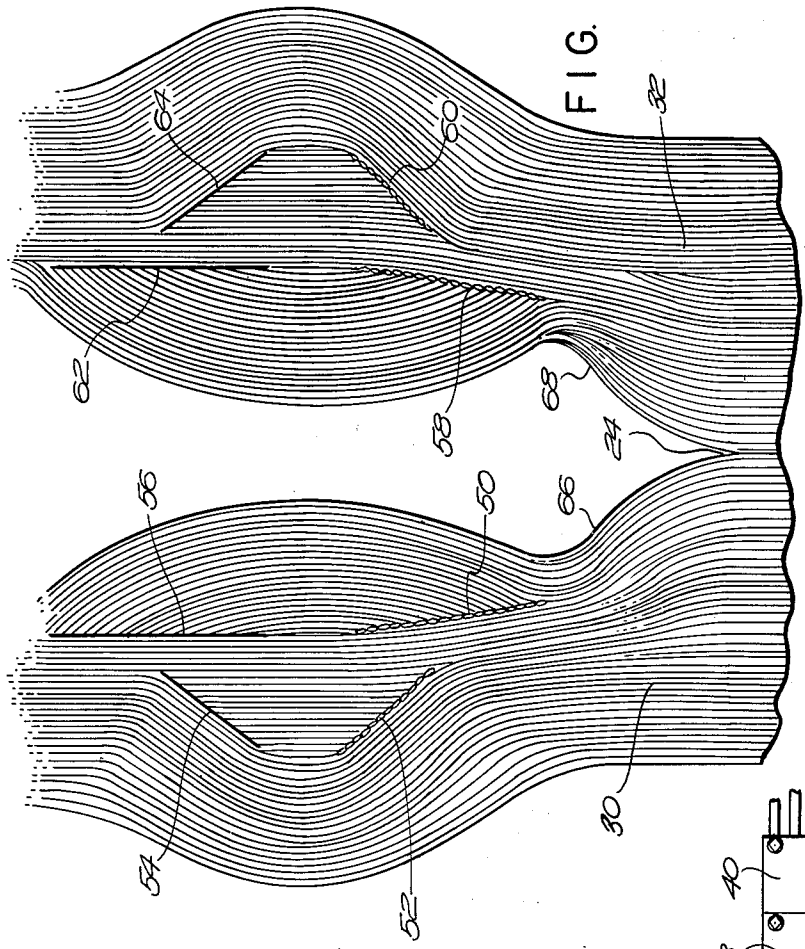
Jan. 14, 1964 B. D. GORDON ETAL 3,117,433

WOMAN'S KNITTED GARMENT PANEL AND METHOD OF MAKING SAME

Filed Dec. 19, 1961

FIG. 2



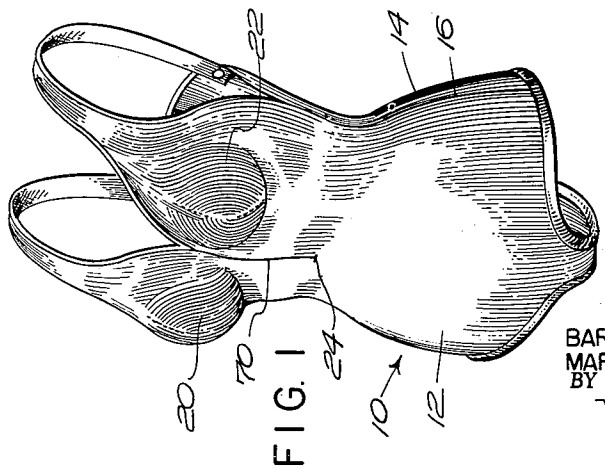


FIG. 1

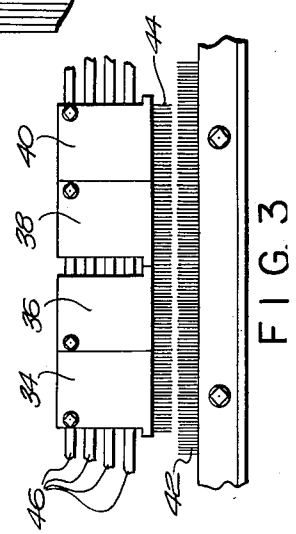


FIG. 3

INVENTORS
BARNETT DAVID GORDON
MARTIN TRUST
BY
Morse & Altman
ATTORNEYS

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WOMAN'S KNITTED GARMENT PANEL AND METHOD OF MAKING SAME

Barnett David Gordon, Brookline, Mass., and Martin Trust, Manchester, N.H., assignors to M.K.M. Knitting Mills, Inc., Manchester, N.H., a corporation of New Hampshire

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This invention relates to a method of making a front panel for a woman's knitted garment such as a swimsuit or undergarment and to the resulting panel. It is an object of the invention to make a one-piece front panel for a swimsuit having three-dimensional bulges for breast cups similar to those illustrated in U.S. Patent No. 2,969,662. As described in said patent, each such bulge is made by employing an inner and an outer narrowing finger to widen the fabric by employing the narrowing fingers during the knitting of the lower half of the breast cup areas, then using the narrowing fingers in reverse fashion in the upper half of the breast cup areas to narrow the fabric in such a way as to produce smoothly rounded, three-dimensional breast cup bulges entirely devoid of seams. To produce a front panel for a swimsuit as described in said patent, it was then necessary to make the panel in two separate parts which were subsequently joined by a central vertical seam. According to the present invention, we make a front panel in one piece, the breast cup bulges being made in the manner described in said patent.

For a more complete understanding of the invention, reference may be had to the following description thereof, and to the drawing, of which—

FIGURE 1 is a perspective view of a knitted swimsuit embodying the invention;

FIGURE 2 is a schematic view of a portion of the front panel, showing the arrangement of the wales formed by the knitting operation; and

FIGURE 3 is a fragmentary elevational view of a needle bar with narrowing fingers supported above it.

As an example of a woman's knitted form-fitting garment, a swimsuit 10 is illustrated in FIGURE 1 of the drawing. The garment is designed to be made of a front panel 12 and a rear panel 14, both of which are knitted on a flat knitting machine and are afterwards joined by side seams 16.

The front panel 12 is made with three-dimensional bulges 20, 22 formed without any seam by knitting operations such as are described in detail in U.S. Patent No. 2,969,662. In order to obtain a front panel in which the areas other than the breast cup areas are smooth and free from wrinkles, it was necessary in the case of the method described in said patent to make the front panel in two separate pieces, each piece having two selvages. When the two pieces were brought together side by side, the mutually abutting selvages were joined by stitching or otherwise, forming a central vertical seam in the front panel.

We have found that a one-piece front panel can be made in which the breast cup bulges are made as described in said Patent No. 2,969,662 but the remaining areas of the panel are smooth and free from wrinkles. To this end the knitting of a front panel starts as usual at its lower end. The panel is plain knitted up to a point, e.g. 24, several courses below the breast cup areas. At the point 24 the machine is operated to divide the fabric so that from that point on two separate bands 30, 32 are formed. This is done by shifting the loops on half of the active needles outward in one direction, shifting the loops on the other half of the active needles outward in the other direction, and substituting two yarn carriers

for the one which has been used up to that point. From that point on and until the breast cup area on each band is reached, all of the loops on the active needles are shifted one needle space outward after each course is knitted. For this purpose four narrowing fingers 34, 36, 38, 40 are provided. These fingers are of sufficient length to span the needles 42 required for the knitting of the lower portion of the panel 12. The fingers are provided with narrowing points 44 which are all above consecutive needles 42 when the fingers are brought together as shown in FIGURE 3. The fingers are shifted by means of rods 46 acting in response to cams as well known in the art. When dividing the fabric at the point 24, the fingers 34, 36 move as a unit one needle space to the left, as viewed in FIGURE 3, while at the same time the fingers 38, 40 move as a unit one needle space to the right, these moves being made just after the loops of yarn have been taken from the needles by the narrowing points 44. The loops are then deposited on the next adjacent needles, leaving the two central needles denuded. Two yarn carriers then feed yarn to the needles which have received loops but not to the central denuded needles. Then a course is knitted and another outward shift of all the loops takes place, half going in one direction and half in the other. Another course is knitted after yarn is fed to only those needles which have loops thereon. This sequence is repeated until the breast cup area of each of the bands 30, 32 is reached. Thereupon the fingers 34, 36 act separately to widen the band 30 and then narrow it in the manner described in said Patent No. 2,969,662. At the same time, the fingers 38, 40 operate similarly to widen and then narrow the band 32. For example, in knitting the band 30, the inner finger 36 helps to create new wales along the transfer line 50 by shifting loops inward (toward the right) and then returning to its previous position after the next course is knit. Widening of the band 30 is also done by the outer finger 34 along the transfer line 52. This finger moves progressively outward one needle space at a time in shifting loops. In the upper half of the breast cup area the finger 34 moves progressively inward (toward the right) in shifting loops to merge wales along the transfer line 54 while the finger 36 shifts loops outward to terminate successive wales by merging along the transfer line 56, the finger moving back to its original position after every loop-shifting move.

In like manner the fingers 38 and 40 shift loops to widen the band 32 along the transfer lines 58 and 60 respectively. In the upper half of the breast cup area the band 32 is narrowed by operation of the fingers 38, 40 along the transfer lines 62, 64 respectively.

When the knitting of the bands 30, 32 has been completed, the inner selvages 66, 68 of the bands are joined by stitching or other means as far up from the point 24 as desired, forming a central seam 70. The front panel 12 is then finished as desired and is joined to a rear panel 14 by stitching or the equivalent to complete the garment.

If preferred, the breast cup bulges 20, 22 may be made in the manner described in Patent No. 2,977,783, the inner narrowing fingers being used only in knitting the upper half of the breast cup bulges and not in the lower half, but ordinarily when using that method of forming breast cup bulges, it will not be necessary to divide the fabric into two bands, as hereinbefore described, in order to obtain a panel of which the two-dimensional areas are smooth and free from wrinkles.

We claim:

1. A method of making a knitted one-piece front panel for a woman's garment having three-dimensional breast cup bulges, which comprises plain knitting said panel

from the bottom up to a point several courses below the breast cup areas, dividing the fabric centrally at said point, continuing the knitting to form two separate bands extending upward from said point to the beginning of the breast cup areas, widening each said band in the lower half of the breast cup areas by forming successive additional wales, and narrowing each said band in the upper half of the breast cup areas by reducing the number of wales by merging successive wales near the vertical center lines of the breast cup areas.

2. A method as described in claim 1, plus the step of joining the inner selvages of said bands to each other.

3. A knitted one-piece front panel for a woman's garment having a lower portion with courses extending for the full width thereof and an upper portion including breast cup areas divided into two separately knitted bands,

each said band having a smoothly rounded three-dimensional seamless breast cup bulge, and a seam joining the mutually adjacent edges of said bands.

4. A front panel as described in claim 3, the wales in each said breast cup bulge increasing progressively in number from the lower end of the breast cup area to near the middle thereof and decreasing progressively in number from near the middle thereof to the upper end of said area.

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