

March 28, 1961

B. D. GORDON

2,976,708

KNITTED GARMENT WITH BREAST CUPS

Original Filed Feb. 2, 1959

3 Sheets-Sheet 1

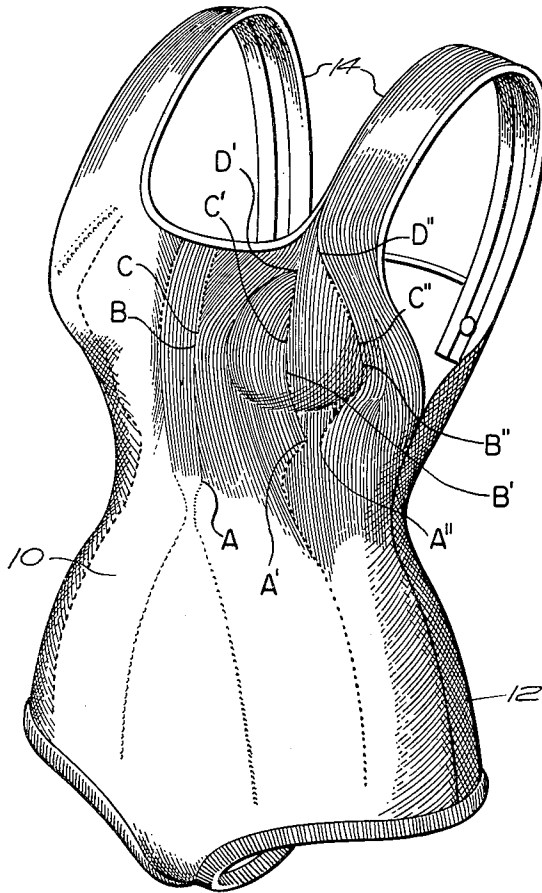


FIG. 1

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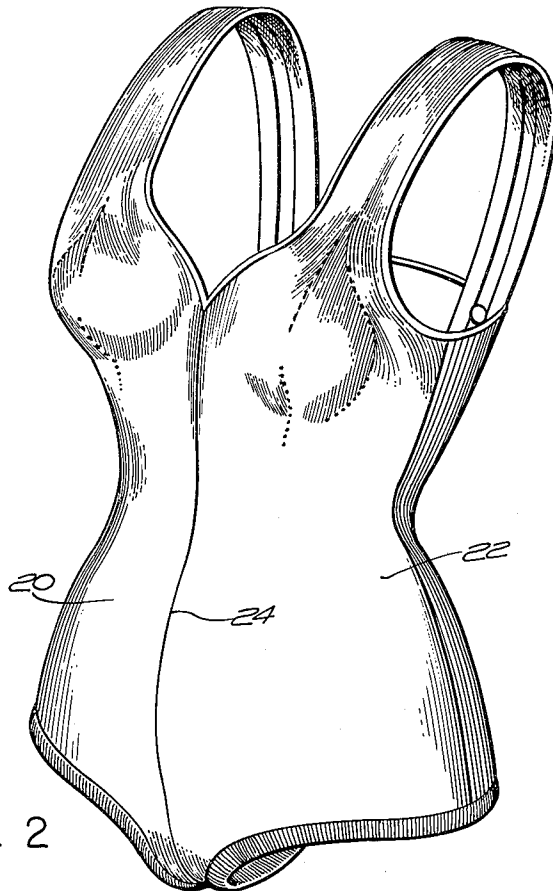


FIG. 2

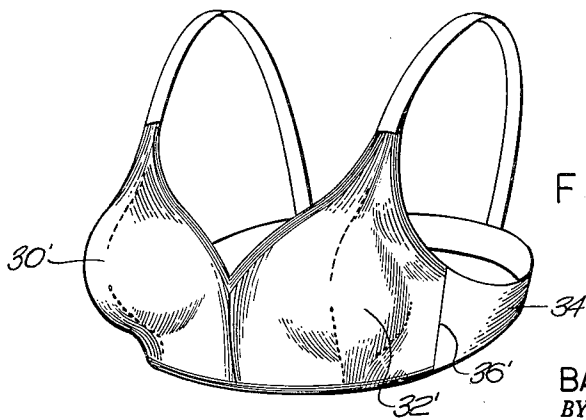


FIG. 3

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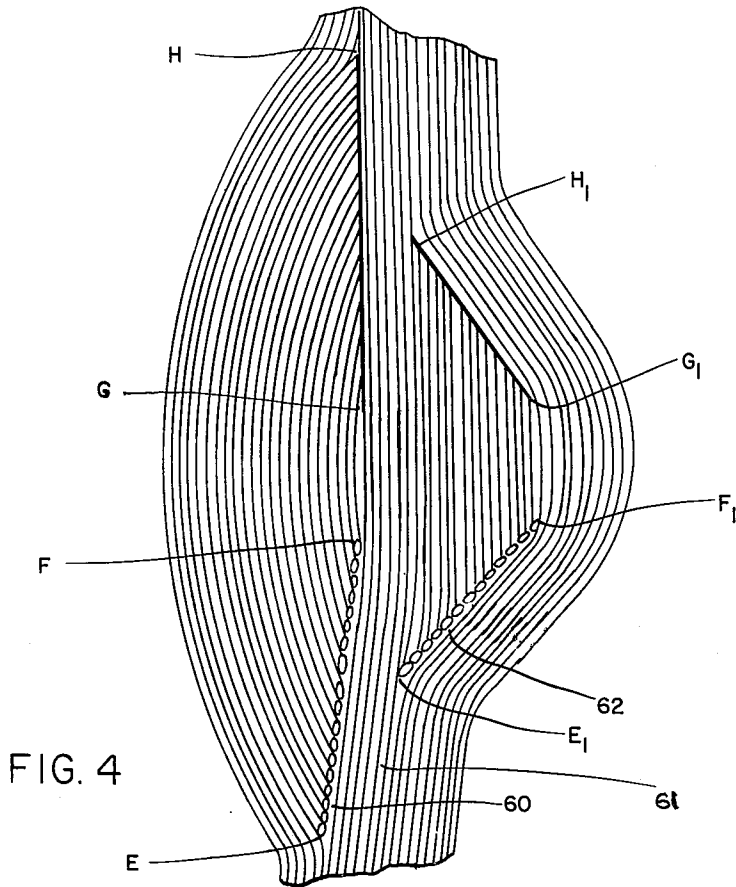


FIG. 4

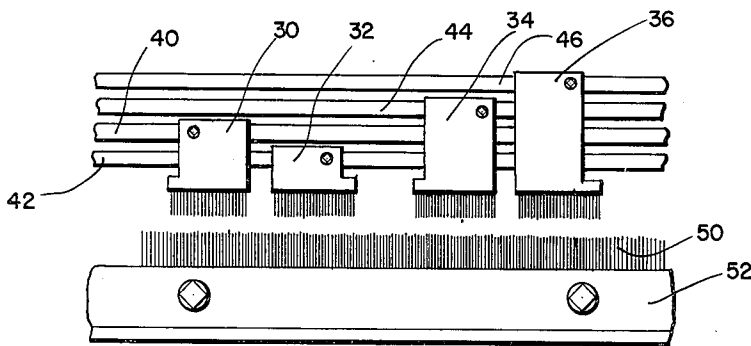


FIG. 5

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1

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KNITTED GARMENT WITH BREAST CUPS

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Original application Feb. 2, 1959, Ser. No. 790,669. Divided and this application Dec. 24, 1959, Ser. No. 861,878

2 Claims. (Cl. 66—176)

This application is a division of my copending application Serial No. 790,669, filed February 2, 1959, for Knitted Garment with Breast Cups. The invention relates to garments such for example as swimsuits, brassieres and the like, for women's wear, such garments having bulged or domed portions to accommodate the breasts. Breast cups are ordinarily made by stitching together suitably shaped sectors of fabric. Accordingly to the present invention, the cups are formed integrally with the surrounding portions of the garment by suitable control of the knitting machine and more particularly by the use of long narrowing fingers to transfer loops or stitches in one direction or the other as more particularly herein-after described.

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

Figure 1 is a perspective view of a knitted swim suit embodying the invention;

Figure 2 is a perspective view of a modified swim suit embodying the invention;

Figure 3 is a perspective view of a brassiere embodying the invention;

Figure 4 is a diagrammatic representation of the arrangement of wales employed to form a breast cup in knitting a swimsuit panel; and

Figure 5 is a fragmentary elevational view of narrowing fingers and knitting needles which can be used to make a breast cup such as is indicated in Figure 4.

The swimsuit illustrated in Figure 1 may comprise a front panel 10 and a back panel 12 stitched at the sides and crotch and provided with suitable shoulder straps 14. The front panel 10 can be made on a standard full-fashioning machine of the "Reading" type such as is illustrated for example in Patent No. 1,978,454, granted October 30, 1934 to G. Gastrich, or of the type shown in Patent No. 2,666,311, granted June 19, 1954, to F. Lambach. Such machines produce Jersey cloth as distinguished from rib fabric which is produced on machines of the Lamb type having two sets of intermeshing needles. The machine employed is a "sweater" machine, that is, a machine equipped with needles of a size to knit yarn suitable for ladies' sweater, swimsuits, or equivalent garments. Such machines include a number of units simultaneously operated and controlled to knit an equal number of similar panels. Each unit is equipped with enough needles to knit the entire width of either the front panel 10 or the back panel 12 of the largest size of garment which is to be made, such as the swimsuit shown in Figure 1. By using two yarn carriers simultaneously, each limited to supply yarn to half the needles on the needle bar, the front panel can be made in two separate halves which are knitted simultaneously and are mirror images of each other. These halves 20 and 22 are later stitched together as at 24 to form a front panel for a swimsuit as shown in Figure 2. In either case, the formation of the breast cups by the method of knitting is substantially the same.

The standard "Reading" knitting machine is customar-

2

ily equipped with "narrowing fingers" consisting of blocks on which are secured a number of "narrowing points" for transferring the yarn loops from each of a group of consecutive knitting needles to the next adjacent needles.

5 These narrowing fingers operate on the needles which are knitting one or both side margins of a blank for the purpose of narrowing or winding the blank. If the loops on such a group of needles are shifted one needle space in either direction, the loop on the leading needle of the group will be transferred to the next adjacent needle. If 10 the latter already has a loop thereon, it will then have two loops. Thus when the next course is knitted, the two wales represented by the two loops will be merged into one wale. If the narrowing finger is operated to shift 15 loops in a direction away from other needles which carry loops, the trailing needle will be denuded, but when the yarn carrier makes a pass for knitting the next course the denuded needle will pick up a new loop, thus starting a new wale. This has the appearance of dividing the origi- 20 nal wale into two wales.

The panel 10 is symmetrical with respect to its vertical median so that a description of the knitting of one half of the panel will serve for the other half which is a mirror image thereof. Considering the panel as it appears in 25 Figure 1, the knitting starts at the bottom and the panel is suitably fashioned by the narrowing fingers during the knitting of the panel from the bottom up to the waist line.

Referring to the right-hand half of the upper or thorax-covering portion of the panel as it appears in Figure 1, the fine lines indicate the approximate arrangement of the wales in this portion of the garment. For the formation of the breast cup in this portion of the garment, the loops in a course extending from A to A' are shifted to the left after each course is knitted, so that the wales along the line from A' to B' divide, a new wale being formed each time. At the same time, the loops along the course from A'' to the selvage of the panel are shifted to the right after each course is knit. As a result of this shifting of loops 35 to the right, the wales along the line from A'' to B'' divide. Thus new wales are progressively added to the fabric below the horizontal centerline of the bulge and on both sides of the vertical centerline thereof. One such vertical centerline is indicated in Figure 1 by the dotted line extending from A' through B' and C' to D'. The horizontal centerline passes horizontally through the apex of the breast cup bulge, between B' and C'. No loops are shifted while the knitting proceeds from BB'' to CC' C''. The loops along the course from C to C' are shifted to the right after each course is knit, and the loops along the course from C'' to the selvage are shifted to the left. As a result of these shiftings, the wales merge along the line from C' to D' and merge along the line from C'' to D'', thus causing progressive decreases in the number of wales 40 of the fabric above the horizontal centerline of the bulge and on both sides of the vertical centerline thereof. As a result of the dividing and merging of wales as described and as indicated in Figure 1, a fullness is produced to accommodate one of the breasts. By loop-shifting in the other half of the panel 10, a fullness symmetrical to the one described above is produced, these results being obtained entirely by means of the narrowing fingers shifting groups of loops as described and the operation of the yarn carriers, that is, by knitting only.

The formation of the breast cups in the swimsuit shown in Figure 2 is somewhat similar to that hereinbefore described. Each half-panel 20, 22 has a lower body portion which is 2-dimensional and which extends up from the bottom of the half-panel to the breast cup area thereof which is 3-dimensional. Progressive increases in the numbers of wales below the horizontal centerline of the breast cup and on both sides of the vertical centerline, 70

and progressive decreases in the numbers of wales in the fabric above said horizontal centerline result in a smooth, domed bulge for the breast cup which is free from distortion and free from any seam. The breast cups of the brassiere shown in Figure 3 are knitted in the same manner as those of the swimsuit shown in Figure 2. The parts 30' and 32' of the front panel may be separately or integrally knitted. The chest band 34' is preferably stitched to the front panel as at 36', and shoulder straps may be made and attached as desired.

The arrangement of wales forming a breast cup in a half-panel is more clearly illustrated in Figure 4. As shown in this figure, the breast cup comprises a narrow medial band of continuous wales of which the innermost wale is the wale 60 and the outermost is 61. The inner group of continuous wales to the left of this band diverges from it at E and rejoins it at H, defining a space which is filled by a series of new wales which branch off to the left successively from the continuous wale 60 and later merge with it in reverse order between G and H.

The outer group of continuous wales to the right of the medial band, of which the innermost wale is indicated at 62, diverges from the wale 61 at E₁ and later rejoins it at H₁, defining a space which is filled by a second series of new wales parallel to the wale 61 which branch to the left successively from the continuous wale 62 along the transfer line E₁F₁ and rejoin it in reverse order along the line G₁H₁. As a result of this arrangement of wales, the transfer lines EF and E₁F₁ diverge upward and the transfer lines GH and G₁H₁ converge upward.

Some of the apparatus which can be employed to knit the two halves of a front panel for a swimsuit is illustrated in Figure 5. Four narrowing fingers 30, 32, 34 and 36 are mounted respectively on transfer rods 40, 42, 44 and 46. The narrowing fingers carry narrowing points 48 which are directly above some of the knitting needles 50 mounted on the needle bar 52. The rods are slidably mounted in brackets (not shown) which are moved down and up to enable the point 48 to pick up loops from the needles below them or to deposit loops thereon. When the machine is in operation in making halves 20, 22 of the front panel of a swimsuit, the outer narrowing fingers 30, 36 are simultaneously shifted in opposite directions so that they move inward (toward each other) or outward (away from each other). In like manner the

shifting movements of the inner narrowing fingers are always simultaneous and are either inward toward each other or outward away from each other, but the inner fingers 32, 34 never move more than one needle space from their original positions. The showing of the needles 50 and of the points on the narrowing fingers is conventional as such parts are too small and numerous to be indicated in their actual members on the drawing.

I claim:

1. A Jersey-knitted front panel for a woman's swimsuit, said panel having a flat 2-dimensional lower body portion and 3-dimensional breast cups and comprising two parts joined by a central vertical seam, each said part having a domed bulge for a breast cup made by knitting only and characterized by the formation of successive new wales along transfer lines which diverge upwardly in the lower portion of the breast cup area, and by the merging of successive wales in the upper portion of the breast cup area along transfer lines which converge upwardly.
2. A swimsuit as described in claim 1, in which the transition from the flat 2-dimensional lower body to the 3-dimensional breast cup in each said part is smooth and free from distortion of the fabric surrounding the cup and free from any seam with the contour being fitting to the shape of the breast.

References Cited in the file of this patent

UNITED STATES PATENTS

482,097	Pike	Sept. 6, 1892
1,978,307	Heinitz	Oct. 23, 1934
2,121,489	Rutledge et al.	June 21, 1938
2,406,969	Silman	Sept. 3, 1946
2,707,381	Lombardi	May 3, 1955

FOREIGN PATENTS

1,909	Great Britain	of 1893
9,320	Great Britain	of 1887
633,208	Germany	July 22, 1936
986,562	France	Mar. 28, 1951

OTHER REFERENCES

Publication: "Framework Knitting and Hosiery Manufacture," vol. III, "Hosiery Trade Journal," office, Leicester, England, 1914 (pages 346 and 347). (Copy in Div. 21.)