United States Patent [19]

Cole et al.

[11] **3,789,098**

[45] **Jan. 29, 1974**

[54] **METHODS AND APPARATUS FOR CONSTRUCTING KNITTED BRASSIERE BLANKS AND BRASSIERES**

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[22] Filed: **June 11, 1971**

[21] Appl. No.: **152,245**

[52] **U.S. Cl.** **264/103,** 66/89, 66/176, 66/189, 128/516, 223/52

[51] **Int. Cl.** **D04b 11/36**

[58] **Field of Search** ..... 66/176, 189, 175, 96 R, 89; 223/52, 66, 68; 264/103, 292; 128/516

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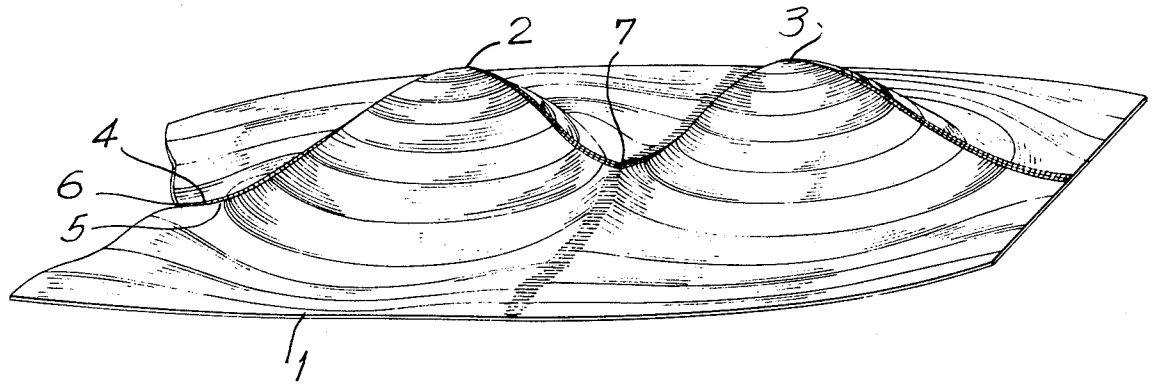
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[57] **ABSTRACT**

There is disclosed as an article of manufacture an integrally knit blank shaped to allow for the reorientation of the wales along the apex of the cup and to allow for the reorientation of the wales along the body of the breast receiving elements at least along the area which will comprise the lower cup portion, to an orientation other than originally knitted. There is also disclosed a flat boarding arrangement as the shaping apparatus as well as the stabilizing form. The method of knitting and shaping generally includes the steps of integrally knitting, with at least some heat setting yarns a blank having relatively concial breast pockets and a relative flat apex area; reorienting a portion of the yarns in the apex area to provide a relatively rounded apex configuration; and heat setting the blank to retain the apex area in such relatively rounded configuration.

16 Claims, 13 Drawing Figures



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SHEET 1 OF 4

FIG. 1

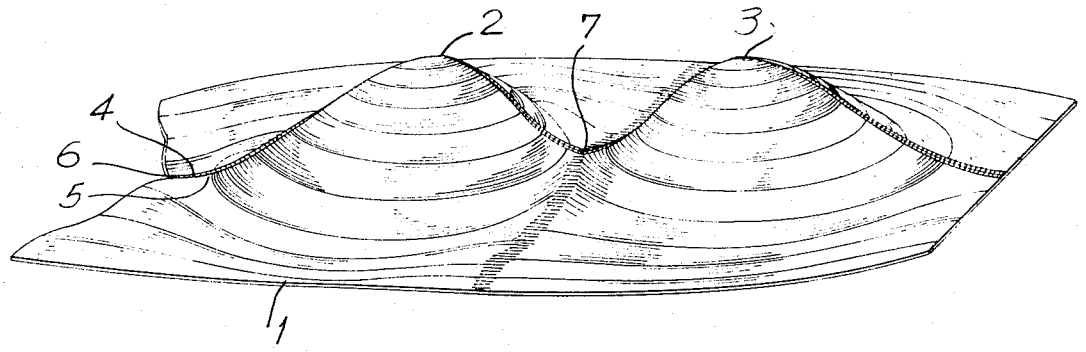


FIG. 2

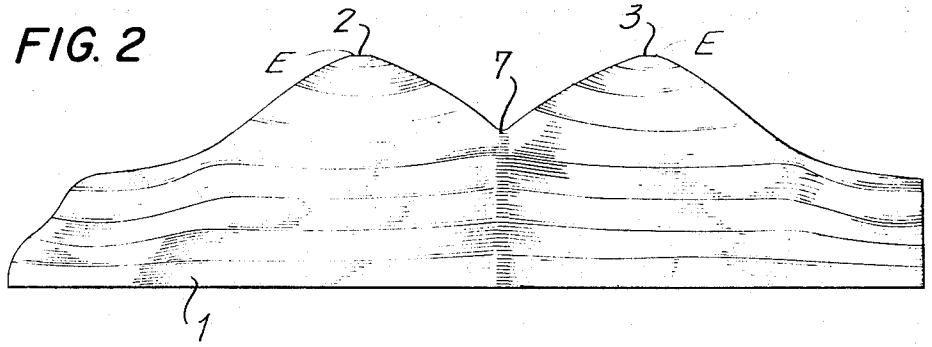
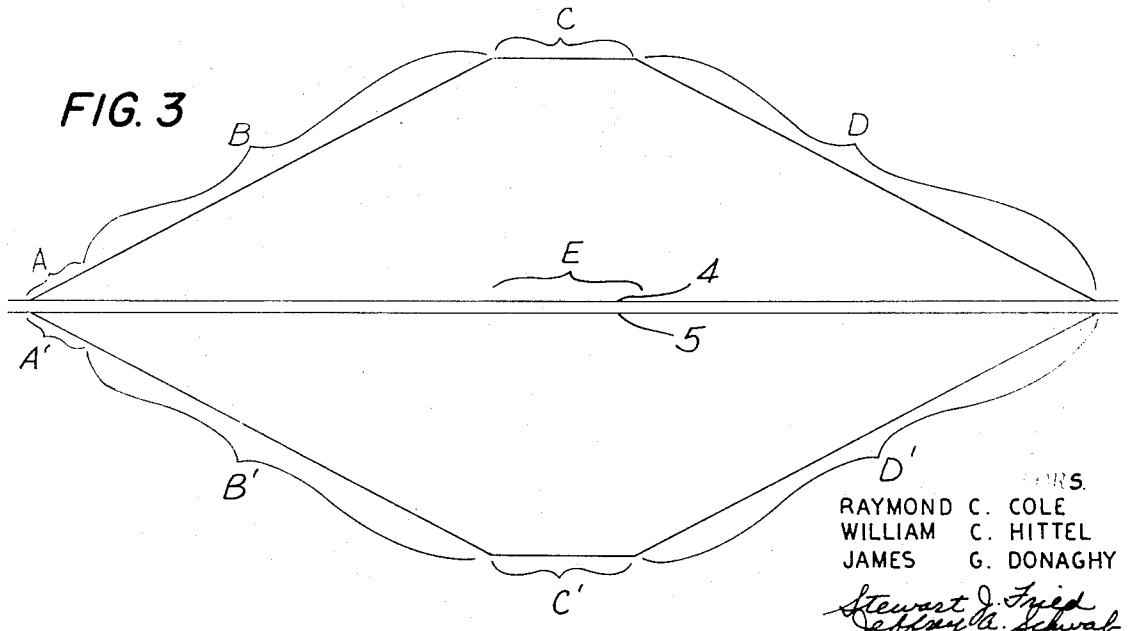


FIG. 3



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FIG. 4

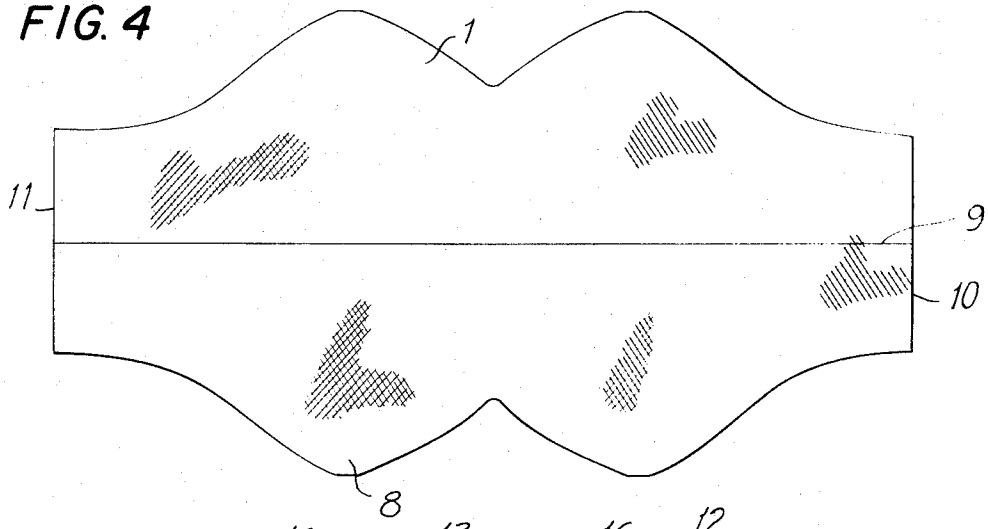


FIG. 5 A

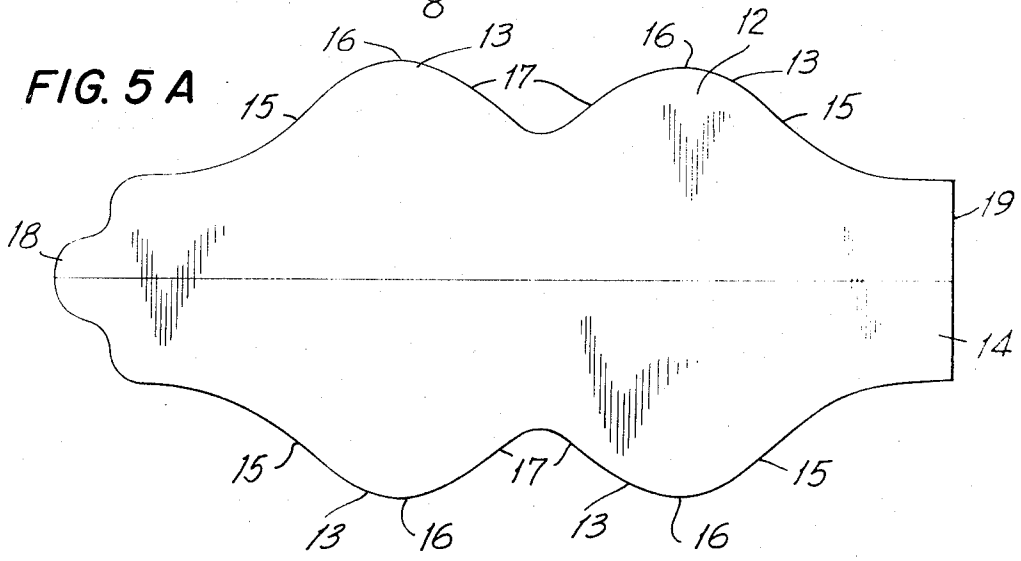
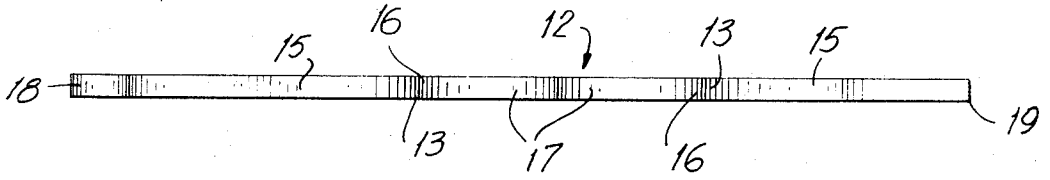


FIG. 5 B



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FIG. 5 C

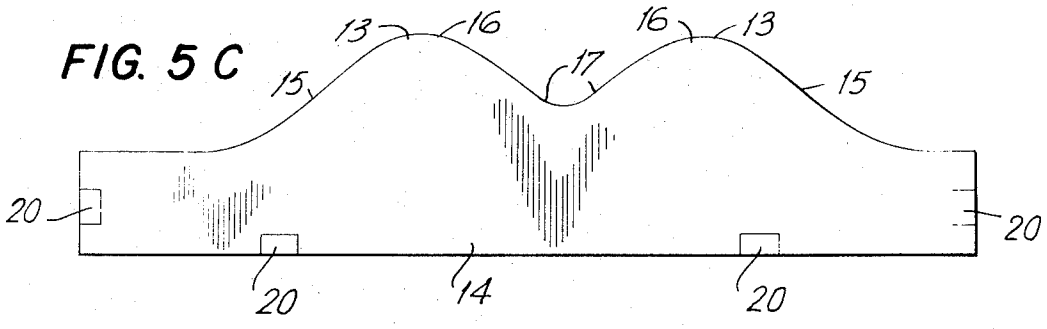
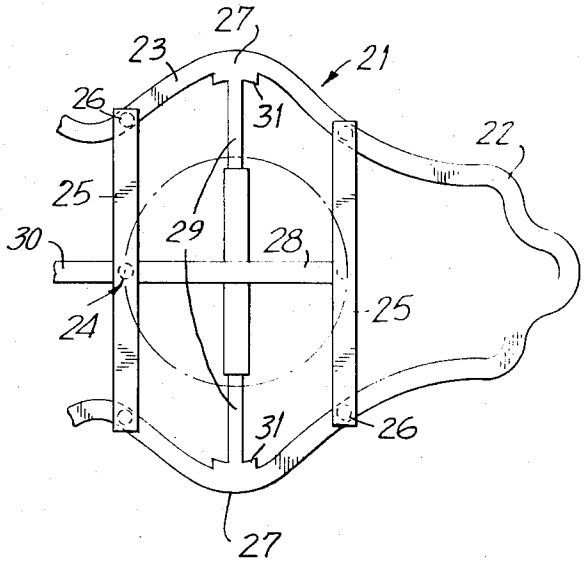


FIG. 6



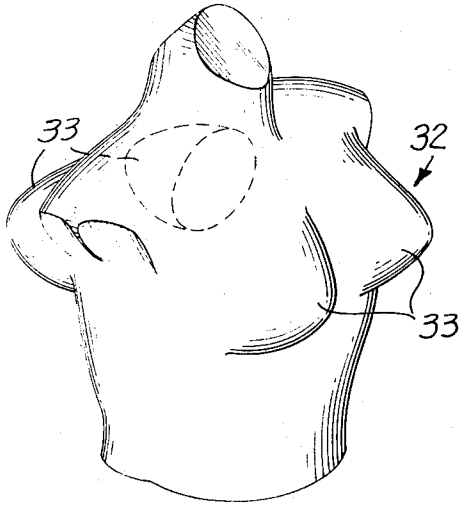


FIG. 7

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FIG. 9

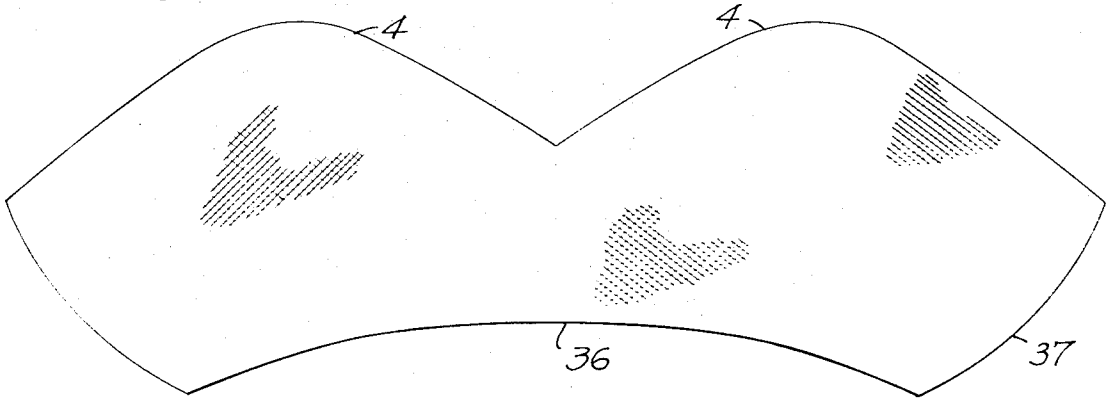


FIG. 8

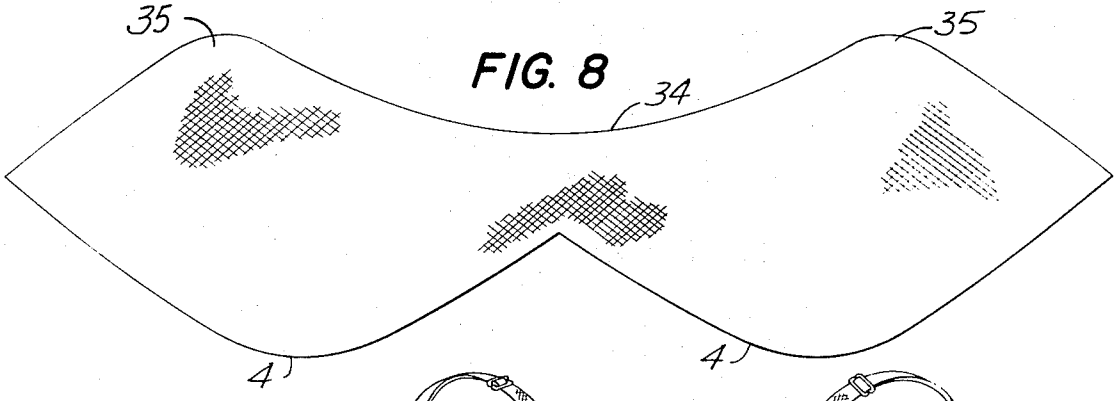


FIG. 10

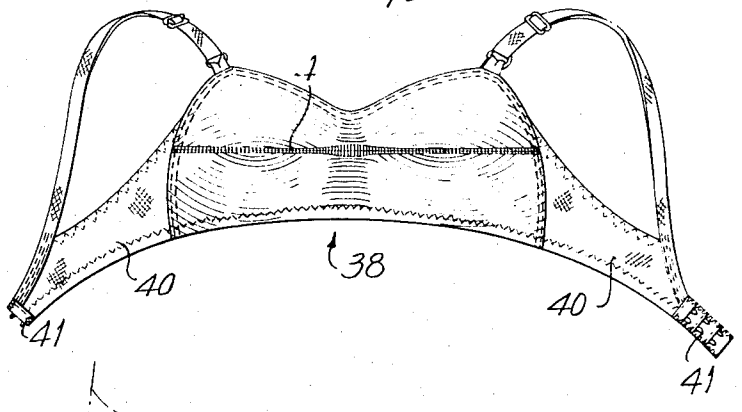
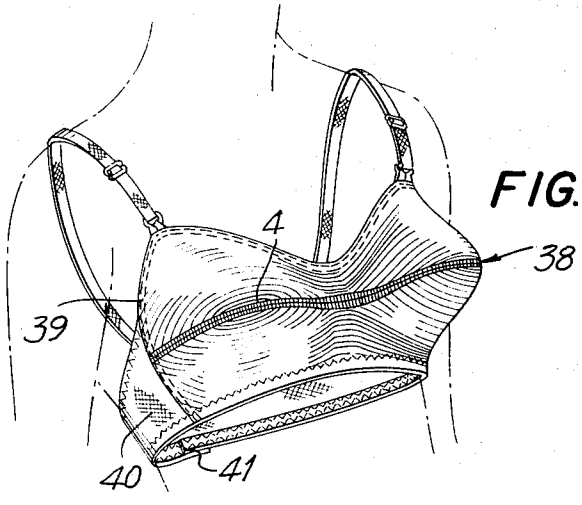


FIG. 11



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METHODS AND APPARATUS FOR CONSTRUCTING KNITTED BRASSIERE BLANKS AND BRASSIERES

The present invention relates to a knitted brassiere blank, brassieres and methods and apparatus for constructing the same.

Brassieres are generally formed of a variety of individual cut-out pattern pieces which are sewn together to form various brassiere constituents, e.g. cups, dorsal or side panels, shoulder straps, etc. In turn, the constituents are then sewn together to form a finished garment.

The most difficult portions of the brassiere to construct, in terms of the cutting and sewing operations are the cups or breast receiving elements, since the finished cups as sewn are formed into conical, three dimensional units.

While cups constructed of various constituent pieces do provide a shaped pocket for the reception of the breast, contouring of the cup to the actual shape of the breast is difficult. While a more natural contouring of the cups may be approached in a sewn cup, this generally requires the cup to be fabricated of a relatively large number of component cup segments successively joined along adjacent edges. While the resultant cup more closely approximates the actual contour of the breast, the sewing operation becomes complex, more expensive and results in a large number of seams in each cup portion. Such excessive seaming may be undesirable as detracting from the natural look presently in vogue.

Thus, most sewn cups are generally constructed today from two segments joining along a common edge. One segment forms the upper cup area and the other segment forms the lower cup area with the seam running longitudinally and somewhat medially through the cup. In some instances, the lower cup segment is itself a twopiece construction thus adding a vertical seam to the lower cup portion generally running from the apex or nipple receiving area of the cup vertically downward to the lower edge of the lower cup constituent.

These so-called two-piece or three-piece cups are relatively inexpensive to fabricate and have found large commercial acceptance, however the limitation of the cup constituents to two or three pieces limits the degree of contouring which can be effected especially with regard to the rather subtle curvatures along the inner and outer sides of the breast.

The result is that the cups mold the breast not visa versa with little if any degree of "personalization" of the cups to the natural contour of the women.

Various attempts have been made to overcome this problem. Stretchable or yieldable materials have been incorporated into the cups. While more natural contouring was effected there is a correlative loss of support. Molding of cups has also been developed, whereby a sheet of heat stabilizing material is die molded to a given configuration. Since the dies can be pre-shaped, as molded, the cups incorporate the more natural contour of the breast. However, the molding of breast cups is not without many problems. The shaping and stabilization of the material is not always permanent or sufficiently long-lived to make a product adaptable for a relatively long use period. Further the molding operation not only stabilizes the cup fabric, but additionally, in certain instances rigidizes certain areas of the fabric. In some instances, the area of rigidizing is not in desirable locations, thus adversely affecting the fit and supportive features of the cup or otherwise serves to unbalance the cup.

In lieu of a sewn cup of a molded cup, it has been suggested that knitting techniques be employed in fabricating the bra-ssiere. Knitting has many desirable features. Firstly, seams in the cup can be completely eliminated. Thus, the seam lines of the sewn cups which are oftentimes outlines through clinging outer garments are eliminated. Further, within limits proscribed by the knitting equipment, a more natural shaping of the cups may be effected.

In more recent years, it has been recognized that flat bed hosiery equipment can be adapted to a knitting program which will allow for the knitting of a griege blank in a form suitable for finishing into a brassiere. In particular, U.S. Pat. No. 3,092,987 to Levine and U.S. Pat. No. 3,500,665 to Braxton et al. generally describe brassiere blanks knit on a flat bed knitting machine. Similarly, techniques such as disclosed in U.S. Pat. No. 3,537,279 to Epley employing circular knitting equipment have also been developed to knit brassiere blanks.

The prior art flat bed full fashion hosiery knitting techniques form an elongate brassiere blank by continuously knitting from one end to the other and successively widening and narrowing to form a pair of breast cups or pockets. The prior art circular knitting machine generally employs the technology employed in knitting the heel portion of a stocking to knit an elongate brassiere blank. It has been found that the blanks knit by either method while providing satisfactory brassiere cup portions do not adequately provide sufficient support to function properly as a brassiere unless further steps are taken to stabilize or set the yarns of the knitted blanks into their predetermined shapes.

Thus, it has been found necessary to emplace the knit blanks over forms generally correlating to the contour of the blank and hydrosetting the blank in an autoclave. The knitted blank is thus stabilized so as to more permanently retain its knitted pre-determined shape when subjected to the weight and deformation stresses emplaced upon it by a wearer.

The process thus initially appears akin to that heretofore described with respect to molding, however, in lieu of the cup constituents starting as a sheet of heat stabilizing material, which are shaped by three dimensional dies, the cups are first pre-shaped by knitting and then subjected to three dimensional dies.

However, these techniques do not fully solve the problem. Where flat bed full fashioning equipment is employed, the prior art teaches a particular sequence of widening and narrowing along either side of a medial row of plain knit wales to effect a three dimensional shaping especially in the apex or nipple area of the cups. In practice, fashioning in this manner results in a relatively large number of wales in the apex or nipple area. These additional wales while required to fashion the cups provide an undesirable effect in the finished blank in that the additional wales form a pocket in the nipple area which is larger than required thus adversely affecting the fit and aesthetic appeal of the brassiere. Further, the ability of the garment to lose support or sag is heightened, since there is an excess of wales, there is a greater tendency for the lower cup area to

give as the weight of the breast pulls downward on the lower cup area of the brassiere.

Even absent the problems presented due to the excess of wales in apex or nipple area, there is an arcuate orientation of wales in the bust receiving elements and there is thus a natural prediliction of these curved areas to give, due to their shape, under the weight and stresses of the breast. Thus, prior workers have found it desirable, in order to provide a functional garment, to add in fairly substantial numbers, reinforcing yarns along the lower cup portion of the brassiere blank. In terms of a knitting program, there is thus required a more complex arrangement since the lower cup portion has a different knitted structure than the upper breast cup portion.

Not only are there problems in the knitting as above described, further, the stabilization step requires three-dimensional forms and relatively large autoclaves to accept the forms. There are also problems of registry and affixation of the blanks to the forms to provide a proper positioning as between the two as well as the problem of uniformity in terms of emplacing the same portion of the blank over the same portion of the form in order to mass produce brassiere blanks having like consistencies of shape and stability.

According to the present invention, all of the above disadvantages are obviated by the provision of an integrally knit brassiere blank knit with at least some of the yarns being heat setting, with such integrally knit brassiere blank having a first configuration or orientation of wales. After knitting the blank is shaped so as to reorient the wales in selected areas to a different finished configuration with the blank stabilized with the wales in their reoriented finished position. That is, the knit brassiere blank is knit to a first configuration and after knitting, shaped to a preselected, different finished configuration.

As more particularly described, the present invention provides as an article of manufacture an integrally knit blank shaped to allow for the reorientation of the wales along the apex of the cup to a selected curvature and to allow for the reorientation of the wales along the body of the breast receiving elements at least along the area which will comprise the lower cup portion.

In lieu of the three-dimensional forms hereinbefore described, it has been found desirable to employ a flat boarding arrangement as the shaping apparatus as well as the stabilizing form. Advantageously, the flat board may be used to shape and stabilize two blanks, simultaneously.

By affixing two blanks together along their respective selvages it is possible to reorient such apex wales in two blanks simultaneously. The preferred apparatus for shaping and reorienting selected yarns of the blanks employs an elongated flat board having at least two shaping surfaces extending laterally outward of the board, with each of the shaping surfaces adapted to stress portions of the blank in selected areas. Preferably the shaping surfaces are reciprocating, that is extensible and retractable to provide for selective pressures and also to allow for proper positioning of the shaping board and the blank prior to the exertion of the shaping force.

The blank itself is preferably a full fashioned knit brassiere blank having knit wales extending longitudinally of the blank; fashioned breast cups; a row of fashioning mark lines extending longitudinally through the breast cups; each of the breast cups including sections of widened and narrowed knit courses extending transversely of the blank to opposite selvages thereof, and an area of straight knitting which extends through the apex of the cup between the sections of widened and narrowed knit courses with at least a portion of the yarns in the straight knit area adapted to be reoriented under stress and set as reoriented. Preferably an identical knitting pattern is followed along either side of the fashioning mark lines.

There is thus hereinafter described a method of knitting and shaping a breast receiving article generally including the steps of integrally knitting, with at least some heat setting yarns a blank having relatively conical breast pockets and relative flat apex area; reorienting a portion of the wales in the apex area to provide a relatively rounded apex configuration; and heat setting the blank to retain the apex area in such relatively rounded configuration.

Although the features believed to be characteristic of the invention are pointed out in the claims, the invention in a manner in which it may be carried out may be further understood by reference to the following description and the accompanying drawings.

FIG. 1 is a perspective view of a blank knit in accordance with the teachings of the present invention.

FIG. 2 is a side elevation of the blank of FIG. 1 as viewed lying flat.

FIG. 3 schematically shows the knitting sequence for the cup areas of a single cup of the present invention.

FIG. 4 is a plan view of two blanks knit in accordance with the present invention and then sewn together along their respective selvages.

FIG. 5A is a top plan view of a flat forming board used to finally shape a pair of knit blank in accordance with the present invention.

FIG. 5B is a side elevation of the shaping board of FIG. 5A.

FIG. 5C is a side elevation of an alternate shaping board used to shape a single blank of the present invention.

FIG. 6 is a sectional view of a laterally expandable shaping board of the present invention.

FIG. 7 is a perspective view of a three-dimensional shaping member which may alternatively be used in the practive of the present invention.

FIG. 8 is a plan view of a pattern for the upper cup section of a brassiere having cup portions constructed in accordance with the present invention.

FIG. 9 is a plan view of a pattern for the bottom cup section of a brassiere having cup portions constructed in accordance with the present invention.

FIG. 10 is a plan view of a brassiere constructed in accordance with the teachings of the present invention, shown laid out flat.

FIG. 11 is a perspective view of a brassiere of FIG. 10 shown as worn.

Referring now to the figures where like numbers denote like parts from the various figures.

In FIG. 1 there is illustrated a knit bra blank 1 which is knit longitudinally on a flat bed full fashioned hosiery machine. The blank 1 is generally comprised of a pair of knit breast pockets 2,3 with a pair of fashioning mark lines 4,5 extending longitudinally through the breast cups.

The dark lines on the blank **1** schematically represent some of the wales, it being understood that courses extend transversally across the wales, between the selvages of the blank.

A number of plain wales generally indicated by the number **6** longitudinally extend between the fashioning mark lines **4,5.** As knit, the blank **1** further provides a bridging area **7** between the knit pockets **2,3.**

While the blank as knit has a shape which generally conforms to that of a breast receiving garment, the blank **1** is knit to provide pockets having a contour of a lesser volume and more angular orientation of areas than in the finished brassiere.

This is more clearly shown in FIG. **3** which is a somewhat schematic representation of a cup knitting sequence. The peripheral shape defines the selvage with the plain knit wales indicated as **6** in FIG. **1** extending medially, longitudinally across the schematic representation between the fashioning mark lines **4,5.**

As illsutrated in FIG. **3,** there are at least three areas B,C and D and preferably four sequential knitting areas A,B,C and D. Each delineated area represents a particular fashioning sequence. It should be noted that the fashioning is identical both above and below the medial plain wale portions (excluding any indicia marking as thereinafter discussed.)

The representation and the data following represents the knitting and fashioning sequences with respect to a size 34B brassiere blank, however, it is to be understood that an appropriate modification of the sequence will adapt it to any size brassiere desired.

In the illustrative example, there are 196 wales transversally from selvage to selvage in the body portion of the blank where the fashioning sequences for the formation of the pockets begins. The number of wales is increased in the following manner:

In the area delineated by A there is indicia knitting, that is there is fashioning in a manner so as to readily provide visual identity to the brassiere, such as by knitting as follows 3 [1×2] [1×4]; that is, three repeats of a sequence of adding one wale for every two courses and then a single repeat of one wale for every four courses.

In the area marked B the knitting sequence is 61 [1×2] that there is repeated the addition of one wale for every two courses 61 times.

The apex area C is knit 40 straight. The inner cup area D is knit 65 [1×2], that there is repeated 65 times a decreasing of one wale every two courses.

Stated in another manner, a blank for a size 34B brassiere can be made in the following method:

Fashioning method		Total wales adjusted, [1] 130	Courses per cup, [1] 302	Total wales at start	Total wales at apex	
3 (1 x 2) (1 x 4) 61 (1 x 2) (40 straight) 65 (1 x 2)	3 (1 x 2) =	3	6	196	Start	196
	(1 x 4) =	1	4			
	61 (1 x 2) =	61	122		One side knit to apex	65
	40 (str) =	0	40			
	65 (1 x 2) =	65	130		Other side knit to apex	65
Total		130	302			326

[1] As follows.

It should be noted readily by the above and FIG. **3** that the apex area is straight knot as distinguished from fashioned. In lieu of the rather complex knitting program which is heretofore been employed, especially along the apex area there is no widening and narrowing through the apex area and, the apex area on either side of the straight knit wales **4,5** are knit in an identical manner. There is thus eliminated the problems of excess wales in the nipple or apex area hereinbefore described.

The areas A', B', C', and D' are knit respectively simultaneously with areas A,B,C and D and are respectively identical on either side of the plain knit wales **4,5.**

It should be noted that the configuration thus effected by the knitting of the blank **1** in its knitted stage provides a blank **1** having a contour, in particular in the areas through the apex or nipple receiving area E (FIG. **2,3**) dissimilar to the shape of the nipple of the breast. In lieu of a softly convexed nipple area, the blank **1** provides a relatively flat profile. There is thus provided a knitted blank **1** having pockets **2,3** whose nipple area E contour is less convex than desirable in a finished garment.

While the selection of yarns will vary depending upon the artisan the following yarns have been found readily suitable:

In outer side portions (knit together in splicing relationship)	IN MAIN BODY OF BLANK
Total Denier - 145 1.1/100/34, that is single ply—100 denier 34 filament yarn	Total Denier added - 35 1. 1/15/1, that is single ply-15 denier monofilament
2.3 (1/15/1, that is 3 (single ply-15 denier monofilament)	2. 1/20/7, that is single ply-20 denier seven filament (1 and 2 above are added knit in selected proportions to the 145 denier in outer side portions to arrive at the 180 total denier)

Once the blank **1** has been knit, it is then subjected to a further shaping step. Thus further shaping step is preferably effected by a flat boarding arrangement, more particularly described hereinafter. However, other means such as through the use of specially configured three-dimensional molds may be employed. The shaping realigns the wales, in particular in the nipple area and along the adjacent areas on either side of the plain knit wales **4,5** to provide an outwardly rounded contoured shape to the nipple area and further, to provide a less arcuate orientation of wales through that portion of the blank which will be subjected to the greatest distortional forces of the breast, to wit; the central lower portion of the blank. thus, not only has the problem of excess wales in the nipple area been eliminated, but the degree of curvature of the wales has been modified with a resultant decrease in the predilection of the lower cup portion or distort to sag under the weight of the breast.

While the shaping of the blank **1** may be effected in a number of ways, FIG. **4–6** illustrate the preferred process and apparatus therefore.

As shown in FIG. 4 the blank 1 is sewn along its selvage edges [only one shown] 9 to another blank 8 of like construction. There is thus provided a tubular arrangement of two blanks 1, 8, having an opening 10 into which the shaping mechanism may be emplaced.

In lieu of the opening formed by the distal end portion of the sewn together blanks 1, 8 it will be noted in FIG. 4 that the opposite distal end portion, instead of being open, is sewn shut in a straight transverse line to provide a closed end arrangement 11.

As hereinafter more particularly described, the closed end is adapted to seat a portion of the shaping mechanism so as to provide for a registered alignment and orientation of the blanks. However, it is to be understood that in lieu of the closed end arrangement 11, both ends may be open.

Inserted internally within the chamber formed by the sewn together blanks 1, 8 is a flat shaping board such as shaping board 12 illustrated in FIGS. 5A and 5B. The shaping board 12 is a relatively flat longitudinally ending member having respective pairs of laterally extending diametrically opposed shaping protuberances 13 along its longitudinal side edges. The shaping protuberances may be generally described as having a substantially curvilinear hemispheric profile.

While the shaping board 12 illustrated is configured in a manner which will allow the shaping of two blanks simultaneously, such as the blanks 1,8 of FIG. 4, a single blank, can be shaped by a board such as the board 14 shown in FIG. 5C.

The board 12 protuberances 13 which serve as the shaping surfaces for the blank 1 or blanks 1,8 have a peripheral contour somewhat dissimilar to that of the knit blank. While generally hemispheric in shape the outer side 15 of the protuberances 13 are somewhat concave; the inner sides 17 are somewhat convex and the apex area 16 is concave.

Thus, when the board 12 is emplaced within the sleeve or chamber formed by the sewn together blanks 1,8 stress in selected areas is exerted on the blanks 1,8 thus forcing the blanks 1,8 to shape.

The most notable deviation from the initially knit shape is in the respective apex area E of the blank 1 as it is contoured by the respective apex area 16 of the board protuberance 13. This primary area of shaping however interacts with other areas of the blank to alter to some degree other major areas of the blank. For example, the stress in the apex area E aids in the molding of the area of the blank adjacent the apex area E to the convex inner sides 17 and concave outer sides 15 of the board 14. This prestressing provides in the finished blank a roundness and a shaping closely following the supple contours of the breast, thus effecting a more natural cup shape.

Additionally the stress exerted transversely along the blanks 1,8 from the apex of one blank 1, to the apex of its mated blank 8 causes the wales extending along the line of stress to deviate from their initially knit orientation (See FIG. 1) to a given curvature. It has been found that such reorientation, after the blanks 1,8 are stabilized has a salutory effect in terms of the supportive capabilities of the finished brassiere in that the lesser degree of curvature in the area along the central underside of the breast deters the brassiere from sagging.

As shown in FIG. 5A and 5B, one end 18 of the board 12 is stepped so as to provide an omega shape. In emplacing the board within the chamber formed by the sewn together blanks 1,8, the omega shaped end portion of the board is positioned in juxtaposition to the sewn together end portions 11 of the blanks 1,8.

The omega shaped end relaxes the tensions along the end portions of the blanks 1,8 and allows the blanks 1,8 to be selectively deformed by the protuberance portions 13 of the board 12.

So as to insure uniformity and proper tensioning of the blanks 1,8 by the board 12, gripping means such as pins or clamps may be provided along the opposite end 19 of the board 12. Additionally, and as previously state, the blanks 1,8 may be knit in a manner such that indicia markings discernible to the trained eye are preknit into the blank affording a registration point for the gripping means. The pin or gripping means placement may be chosen to effect an equalization of tensions such as by providing for securement along the central width area of the ends of the blanks 1,8, thus allowing one end outer portion of the sewn together blanks 1,8 to remain free.

In terms of removal after setting, the stitching affixing the blanks 1,8 is merely removed and the two, now separated blanks 1 and 8 can be removed from the shaping mechanism.

Where, such as shown in FIG. 5C, the board 14 is adapted to shape a single blank means such as clamps 20 are provided along the non-protuberance edges of the board 14 to retain the blank in a preselected manner on the board.

While the nature of the knitting yarns prior to their being stabilized or set into their final shape may allow for the emplacement of a board 12 within the chamber formed by sewn together blanks 1,8 and extensible and retractable board 21 such as illustrated in FIG. 6 may be employed.

As illustrated in FIG. 6 the board 21 is a tubular arrangement which although more structured is akin to a pants stretcher. The board 21 extends longitudinally (with only a portion of the board 21 illustrated) so as to generally define a shape like that of the board 12 of FIGS. 5A and 5B including the omega shaped end, but absent the preshaped protuberances 13 of the board 12. The board 21 of FIG. 6 provides transversely extensible and retractable units 23, which in extended position define shaping protuberances like the protuberances 13 of FIG. 5A.

Extensibility may be effected in a variety of ways. FIG. 6 illustrated a hydraulically actuating arrangement including an H shaped unit 24 having hollow legs 25 which act as tracks for the roller 26 mounter extensible units 27. The bridge 28 of the H shaped unit 24 acts as a mount for the hydraulic rams 29 and a conduit for the hydraulic fluid conduit 30. The rams 29 may be actuated to extend or retract with the outer end 31 of each ram 29 secured to the inner surface of the extensible units 27.

The sewn together blanks 1,8 of FIG. 4 are emplaced over the frame 22 when the extensible units 27 are in retracted position. After the blanks 1,8 are secured, as aforedescribed, the extensible units 27 are actuated to their extended position and the blanks 1,8 are subjected to the shaping forces hereinbefore described.

It can be appreciated that the aforedescribed means and arrangement allowing for extensible and retractable unit is but one of many arrangements which may be suitably employed.

As shown in FIG. 7 in lieu of what may be termed the flat shaping techniques hereinbefore described, the blanks knit in accordance with the present invention may be shaped on a three-dimensional shaping form

32. The shaping form 32 generally provides a dual upper torso arrangement having shaped bust protuberances 33. The knit blanks are sewn together along their transverse edges as distinguished from the longitudinal edge joining of FIG. 4. The sewn together blanks are then emplaced over the shaping form 32 with the shape of the blanks altered by the shaping form 32 in a manner akin to that previously described.

It is to be understood that the knitting technique may be varied somewhat where three-dimensional forced shaping as distinguished from flat shaping is concerned. Indicia knitting may be employed to provide for ease of transverse edge registry. Additionally, both the shaping form 32 bust protuberances 33 would be three-dimensionally shaped to provide proper concavity and convexity in selected areas.

Once the blank or blanks 1,8 have been emplaced upon the shaping structure and secured, the blank is set into shape. This may be readily accomplished by employing in the knitting of the blank, heat stabilizing or setting yarns and by subjecting the boarded blanks to heat. While any heat means may be employed, hydrosetting in an autoclave has been found particularly suitable. It should be noted that while the yarns are stabilized by the heat, they need not be rigidized.

Once set, the blanks 1,8 are removed from the autoclave and the shaping means, the blanks may then be finished in any desired manner to form a finished brassiere. While the steps may vary depending upon the desired end result, FIGS. 8–10 illustrate a preferred method of completing the brassiere so as to provide a garment having enhanced characteristics.

As aforedescribed, to provide for ease in knitting, shaping and registry the areas on either side of the central plain knit wales 6 between the fashioning marks 4,5 of the blank 1 are the same. However, as illustrated in FIG. 8 that portion of the blank which will in a finished brassiere act as the upper cup portions may be cut along its selvage to provide an arcuate inwardly curved line 34 centrally between the brassiere strap or tab locations 35 and a slightly outwardly curved line along each tab location 35 and the medial fashioning line 4 of the blank.

The lower cups are cut in the general shape illustrated in FIG. 9, that is with the selvage cut to provide an arcuate underbust line 36, convex with respect to the fashioning line 4 and with a concave line extending between the fashioning line 4 and the arcuate underburst line 36.

The foregoing cutting of the blank provides a brassiere 38 (shown in FIGS. 10–11) having a common medial fashioning line 4 with biased pitched outer edges 39. The pitch is highly desirable in terms of proper fitting of the brassiere 10. The human torso in the chest area is shaped somewhat like a truncated inverted cone. When laid flat, the pitched brassiere describes an arc, as shown in FIG. 10, however, when wrapped about the body, a proper contouring to the torso is effected.

A single circumferential band or a pair of dorsal or side panels 40 of any desired material are attached to the blank along its outer side edges and it two side panels 40 are employed, conventional closure means 41 (e.g. hook and eye) is provided to complete the brassiere 40. Shoulder straps extend from the upper portion of the blank and are secured along the rear of the brassiere.

It is to be appreciated that in lieu of the aforedescribed method of providing a desirable pitch to the blank, it is also possible to knit the dorsal portions integrally with the frontal area of the blank and provide the desired pitch, by selective cutting, tucking, sewing or darting of the dorsal portions.

It has been found that along with the aforementioned enumerated advantages effected by the teachings of the present invention various additional highly desirable results result. For example, the absence of fashioning in the nipple or apex of the blank results in a less perceptive difference in opacity as between the main body portion of the blank and the nipple or apex area E.

Even with the denier yarns previously described which are of a relatively light denier, the reorientation of the wales, as aforedescribed provides a relatively firm supportive brassiere.

Where the flat boarding shaping is employed, aside from the economies effected in board costs, and the required size of autoclave needed, the problems of registry are lessened especially in view of there being less variables and surfaces for the worker to contend with. Additionally, the flat boards may be of uniform thickness irrespective of size, with the variations in size determined by the size of the protuberances.

While the aforedescribed description sets forth the basic steps of knitting a blank, preferably longitudinally sewing two blanks together, shaping the blanks preferably by flat boarding, setting and finishing the blanks into a brassiere, it is appreciated that after knitting the blanks are subjected to many other processing steps, such as scouring, dyeing, brightening, etc..

Although the foregoing description has been particularly set forth with respect to brassiere blanks and brassieres made therefrom, it is to be appreciated, that the term "brassiere" as employed contemplates any breast receiving article such as halters, bathing suit tops and other breast receiving outerwear, as well as breast receiving liners for garments.

The terms and expressions employed herein are used as terms of description; it is recognized though that various modifications are possible.

Having thus described certain forms of the invention in some detail, what is claimed is:

1. A method of knitting and shaping breast receiving articles comprising the steps of:

integrally knitting a breast receiving blank from yarns, at least a portion of which are heat setting, said blank having a relatively flat body portion and two spaced apart relatively conical breast pockets, each of said breast pockets including a relatively flat apex area;

knitting a second breast receiving blank;

securing said second breast receiving blank to the originally knit blank along respective longitudinal selvages of each of said blanks to form a hollow chamber defined by said blanks;

simultaneously re-orienting said portion of the yarns in the respective flat apex areas on both of said blanks to provide a relatively rounded apex configuration by exerting a shaping force internal of said hollow chamber; and

heat setting said blank to retain said apex areas in shaped relatively rounded configuration.

2. The method as claimed in claim 1 wherein said re-orientation includes the step of inserting an elongated flat shaping board having laterally extending shaped protuberances adapted to shape at least the apex areas of said breast receiving pockets within the chamber formed by said secured together blanks.

3. The method as claimed in claim 2 wherein said

shaped protuberance of said flat shaping board are extensible and retractable transversely of said board and whereby said shaping board is inserted within said chamber formed by said secured together blanks with said protuberances in retracted position, said protuberances being extended when said board is within said chamber.

4. The method as claimed in claim **2** wherein each of said protuberances of said shaping board include a peripheral contour having a concave outer edge, a convex inner edge, and a concave apex between said outer and inner edges.

5. The method as claimed in claim **1** further including the step of securing one distal end of each of said blanks transversely to provide a closed end chamber defined by said blanks.

6. The method as claimed in claim **5** wherein said re-orientation step includes the step of inserting a flat shaping board having laterally extending shaped protuberances adapted to shape at least the apex areas of said breast receiving pockets within said flat shaping board includes at least one end portion having a peripheral stepped shape, said last referred to end portion adapted to seat along said closed end of said sewn together blanks.

7. The method as claimed in claim **6** wherein said stepped shape is an omega shape.

8. The method as claimed in claim **1** further including the step of separating said blanks and incorporating each said blank, after said heat setting step , as the frontal portion of a brassiere.

9. The method as claimed in claim **8** wherein said incorporating step includes the steps of cutting the outer side edges of each said blank to an inclined orientation.

10. The method as claimed in claim **8** wherein said incorporating step further includes the step of cutting one selvage edge of each said blank to provide a concave line from first points along the lateral edges of said blank to respective second points along said selvage spaced apart and laterally offset from the respective apex areas of said blank and cutting a convex line which extends downward through the area between said breast receiving pockets between said second points.

11. The method as claimed in claim **1** wherein the knitting of said blanks is effected by a flat bed full fashioning machine.

12. An apparatus for shaping a pair of brassiere blanks comprising an elongated flat board having at least two shaping surfaces extending laterally of said board, each of said shaping surfaces adapted to stress portions of one of said blanks in selected areas and at least two additional shaping surfaces extending laterally of said board along the longitudinal edge of said board opposed to said first pair of shaping surfaces adapted to stress selected areas of the other said blank.

13. The apparatus as claimed in claim **12** wherein one end of said board is stepped.

14. The apparatus as claimed in claim **13** wherein said stepped end portion defines a peripheral omega-like shape.

15. The apparatus as claimed in claim **12** wherein each of said shaping surfaces includes a peripheral edge defining a substantially curvilinear hemispheric profile.

16. A method of knitting and shaping breast receiving articles comprising the steps of:

integrally knitting a breast receiving blank from yarns, at least a portion of which are heat setting, said blank having a relatively flat body portion and two spaced apart relatively conical breast pockets, each of said breast pockets including a relatively flat apex area;

knitting a second breast receiving blank;

securing said second breast receiving blank to the first blank along respective transverse portions of the body portion of each blank to form an endless length defined by said blanks;

simultaneously re-orienting a portion of the yarns in said relatively flat apex area to provide a relatively rounded apex configuration by exerting a shaping force internal of said endless length; and

heat setting said blank to retain said apex areas in said shaped relatively rounded configuration.

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