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(54) SELF-ADJUSTING BRASSIERE

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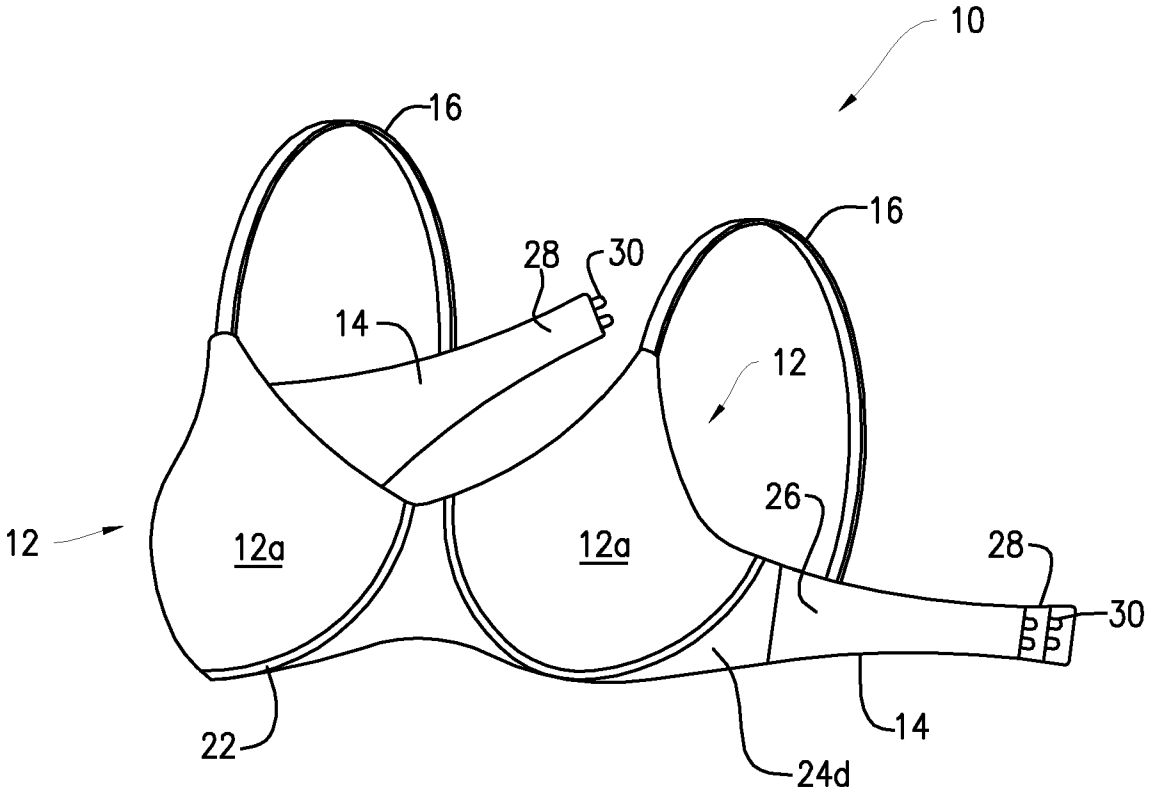
(57) **ABSTRACT**

The present invention relates generally to a garment that is capable of providing additional comfort, support, and/or flexibility to the user. For example, the garment can be in the form of a brassiere having bra cups defined at least partially by a bra rim. Each of the bra cups includes an outer stretchable layer and an inner layer, and a bra wing supports the bra cups on a user. A stretchable component is located on each of the bra cups adjacent to at least a portion of the bra rims and attached to the inner layer. The stretchable component is made from a stretchable fabric and has a stretchability greater than the inner layer and less than the outer layer. The inner layer, the outer layer and the stretchable component are structured so as to allow the bra cups to expand to accommodate differently shaped and/or sized body portion(s) across different shape and/or size groups.



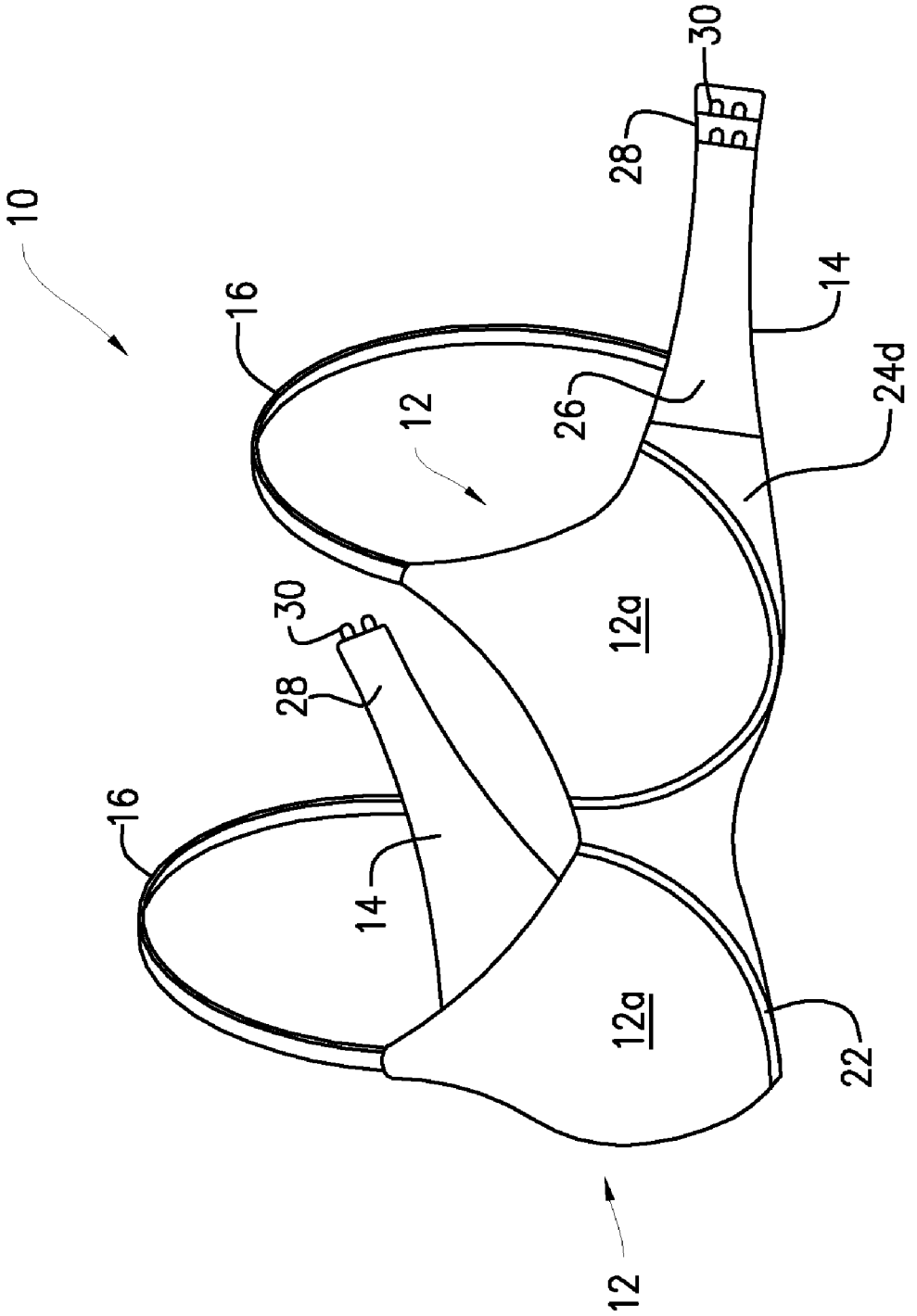


FIG. 1

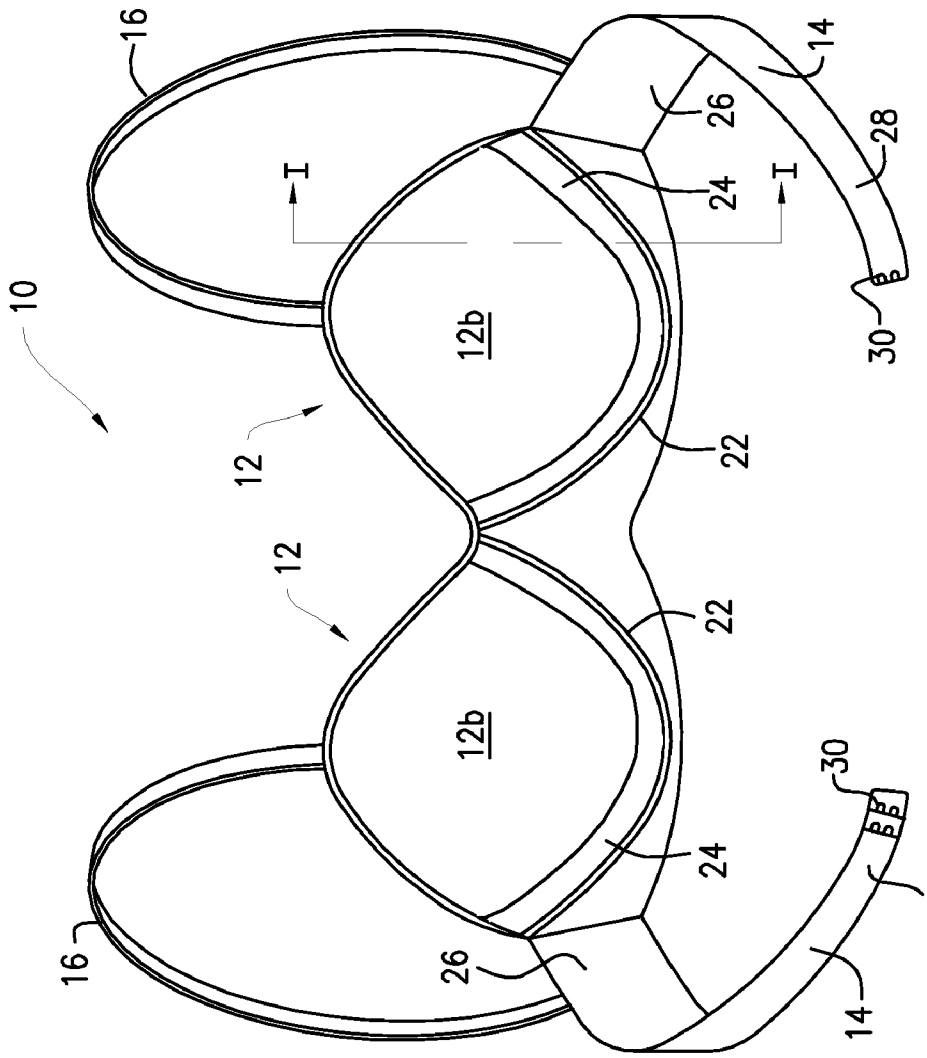


FIG. 2

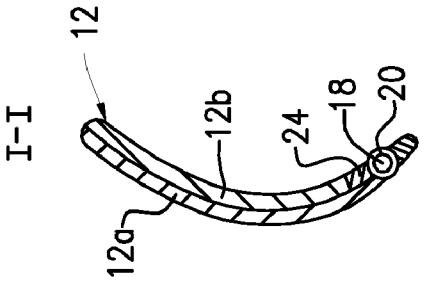


FIG. 3

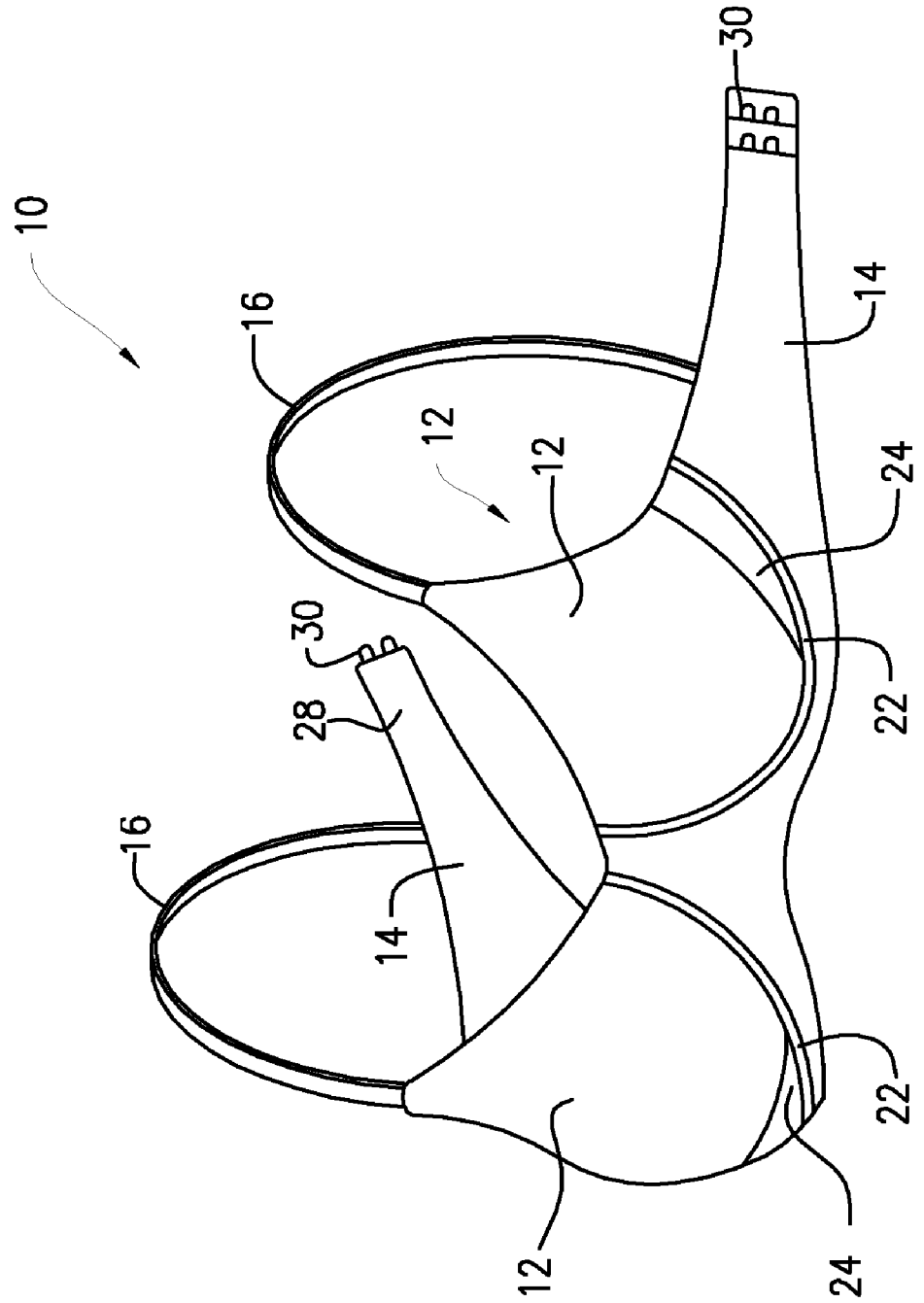


FIG. 4

SELF-ADJUSTING BRASSIERE

FIELD OF THE INVENTION

[0001] The present invention relates generally to a garment formed to provide increased comfort, support, and/or flexibility to the user. In particular, the present invention relates to a brassiere that provides a stretchable and/or customized fit to accommodate differently shaped and/or sized body portion(s) across different shape and/or size groups to enhance comfort, support, and/or flexibility to many different users.

BACKGROUND OF THE INVENTION

[0002] Garments are typically made in standard shapes and/or sizes, each of which is intended to fit a group of users having similar body shapes and sizes. Within any shape and/or size group, the intended users may nevertheless have somewhat different heights and/or weights. As a result, the standard shape and/or size system cannot comfortably fit all users in the same shape and/or size group. This is particularly true when the garments are designed to fit closely on the users' bodies.

[0003] For example, brassieres are available in standard band sizes (e.g., 32 to 42 inches) and cup sizes (e.g., AA to DD) to accommodate women of different body shapes and sizes. Brassieres of a selected band and/or cup size are intended to fit not only users of that particular shape and/or size but also those whose actual bodily dimensions may fall between two standard shapes and/or two standard sizes. In view of this phenomenon, the standard shapes and/or sizes will not comfortably fit all users.

[0004] Custom tailoring is a conventional technique used to fit a garment to a specific user by first measuring the user, and then making, or modifying, the garment according to the measurement. Although custom tailoring can be employed to address the above-mentioned problem, the cost and effort associated with custom tailoring makes it impractical to supply to the mass market.

SUMMARY OF THE INVENTION

[0005] The present invention provides a garment that can be formed according to a standard shape and/or size system, yet capable of providing a stretchable fit to accommodate different shapes and/or sizes occurring across different shape and/or size group without significantly increasing cost. In particular, the present invention provides a brassiere that self-adjusts to a variety of different shape and size users, while also providing the ability to continuously self-adjust to that particular user when that user's body changes shape and/or size such as when the wearer bends her body during various physical activities or changes occurring during natural physiological cycles, while enhancing comfort, support, and/or flexibility to the user.

[0006] The present invention relates generally to a garment that provides additional comfort, support, and/or flexibility to users across different shape and/or size groups. For example, the garment can be in the form of a brassiere having bra cups defined at least partially by a bra rim. Each of the bra cups includes an outer stretchable layer and an inner layer, and a bra wing supports the bra cups on a user. A stretchable component is located on each of the bra cups adjacent to at least a portion of the bra rims and attached to the inner layer. The stretchable component is made from a stretchable fabric and has a stretchability greater than the inner layer and less than the outer layer. The inner layer, the outer layer and the stretchable component are structured so as to allow the bra cups to expand to accommodate differently shaped and/or sized body portion(s) across different shape and/or size groups.

[0007] According to a further aspect of the present invention, the brassiere can also have the bra wings and bra straps made of a stretchable fabric similar to the outer layer of the bra cups. This will allow the bra wings and bra straps expand to accommodate users across different shape and/or size groups.

[0008] The inner layer, bra wings and bra straps are preferably made from a stretchable fabric containing a fiber that has a high elongation and a low hysteresis, thereby providing a fabric with optimum stretching with less force and greater recovery power. This results in the wearer experiencing little or no perceptible resistance to stretch movements, as well as a quick shape recovery so as to closely conform to the body of the wearer. It will be appreciated that the stretchable fabric can be knitted or woven or in the form of lace, embroidery, mesh, and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] For the purposes of illustrating the present invention, there is shown in the drawings an illustrative form, it being understood however, that the invention is not limited to the precise form shown by the drawings in which:

[0010] FIG. **1** is the front view of a brassiere according to an embodiment of the present invention;

[0011] FIG. **2** is a body-side view of the brassiere of FIG. **1**;

[0012] FIG. **3** is a cross section of the brassiere taken along line I-I in FIG. **2**; and

[0013] FIG. **4** is a body-side view of a brassiere according to a further embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Referring now to the drawings where like numerals indicate like elements, a brassiere constructed in accordance with the principles of the present invention is shown and designated generally as **10**. In the various embodiments illustrated, the garment of the present invention is shown as a brassiere **10**. However, the present invention is not limited to brassieres **10** and can be incorporated into other garments, including, for example, briefs, tops and other types of shapewear. Additionally the exemplary brassieres **10** shown in the drawings are not to be considered limiting in any manner. It will be appreciated that the various features described herein may be used singly or in any combination thereof.

[0015] In the embodiment illustrated in FIGS. **1-3**, the brassiere **10** generally comprises a pair of bra cups **12** and a bra wing **14**. The bra cups **12** can be joined to each other in the front either permanently, such as through a center fabric as shown in FIGS. **1** and **2**, or releasably, such as through various conventional fasteners (not shown). The bra wing **14** can join the bra cups **12** in the back.

[0016] If desired, the brassiere **10** can be formed with one or more supporting elements to provide additional support to the user. For example, one or more shoulder straps **16** can be provided and joined to the bra cups **12** and the bra wing **14** in various conventional manners. A bra underwire **18** (visible in FIG. **3**) can be provided and encased in a wire channel **20** formed at the bottom bra rim **22** of each of the bra cups **12**. It will be appreciated that various other supporting elements can

be employed in the brassiere **10** to provide additional support, which are also within the scope of the present invention.

[0017] The bra cups **12** are preferably formed so as to have a multi-layer structure, such as including outer layers **12***a* and inner layers **12***b*. In the preferred construction, the outer layers **12***a* and the inner layers **12***b* are attached to each other only along the outer edges, or periphery, of the bra cups. This allows each of the outer and inner layers to move freely with respect to each other within almost all of a region contacting the wearer. This assists the fabric layers to more easily conform to the individual shape and/or size of the wearer.

[0018] The outer layer **12***a* is preferably made of a fabric containing a fiber that has a high elongation and a low hysteresis, thereby providing a fabric with optimum stretching with less force and greater recovery power. As a result of the low force required for stretching, the wearer experiences little or no perceptible resistance to stretch movements. As a result of the low hysteresis characteristic of the fabric layer material, the fabric quickly recovers its shape and closely conforms to the body of the wearer. That is, the fabric of the outer layer **12***a* conforms and maintains contact with the body of the wearer throughout a wide range of movements by the wearer. A non-limiting example of an elastomeric fabric that is applicable to the present invention is fabric containing LYCRA® T902C spandex. LYCRA® T902C spandex is a co-polyether-based, clear spandex with high elongation and relatively flat stress/strain behavior. Such a fabric can be composed of a nylon/elastane material blend, for example, a 58% nylon/42% elastane fabric available from Best Pacific Textile Ltd. as item number 12765MS1.

[0019] The material of the outer layer **12***a* preferably has an elongation in a range from about 95% to about 153% in either or both of the length and width directions under an 8.8 lb load. In another example, the fabric of the outer layer **12***a* also preferably has a modulus in the range from about 1.2 to about 2.1 when the elongation of the material is about 40%.

[0020] The inner layer **12***b* can be formed from a material that is less stretchable than the outer layer so as to provide a desired shaping effect to the user. In one example, the inner layer **12***b* can include a padding material, such as a foam material with a polyester fabric liner, to provide a desired shape and enhanced support to the user. In yet another example, the inner layer **12***b* can be a semi-rigid fabric that has a limited stretchability, i.e., a limited elongation and/or modulus, to maintain the predetermined shape of the fabric. Such a fabric can be composed of a nylon/elastane material blend, for example, a 72% nylon/28% elastane fabric available from Ruey Tay as item number D3051. The material of the inner layer **12***b* also preferably has an elongation in a range from about 0%, where the material is substantially non-stretchable, to about 115% in either or both of the length and width directions under a 10 lb load. The material of the inner layer **12***b* also preferably has a modulus in the range from about 1.5 to about 2.6 when the elongation of the material is about 40%.

[0021] A stretchable component **24** is also provided on the inner portion of the bra cup **12**, and attached between the inner layer **12***b* and the bottom bra rim **22**. The stretchable component **24** is preferably formed of a material that is more stretchable than that of the material forming the inner layer **12***b*, such as a power mesh fabric available from Ruey Tay under item number 16006SR. The material of the stretchable component **24** preferably has an elongation in a range from about 50% to about 130% in either or both of the length and width directions under an 8.8 lb load. The material of the stretchable component **24** also preferably has a modulus in the range from about 0.9 to about 2.5 when the elongation of the material is about 30%. The stretchable component **24** so formed can expand to provide a stretchable fit to different shaped and/or sized body portions across different shape and/or size groups while allowing the inner layer **12***b* to remain substantially unchanged and to maintain its predetermined shape.

[0022] The stretchable component **24** can also be formed into various shapes and sizes. In one example, as shown in FIG. **1**, the stretchable component **24** can have a crescent shape. In another example shown in FIG. **4**, the stretchable component **24** can be in a wedge shape and located adjacent to a side portion of a bra cup **12**. The stretchable component **24** preferably forms from about 5% to about 50%, or most preferably from about 5% to about 30%, of the area of the inner portion of the bra cup **12**. In the embodiment shown in FIG. **1**, the stretchable component **24** is about 20% of the area of the inner portion of the bra cup **12**.

[0023] The stretchable component **24** can be joined to the other portion(s) of the brassiere **10** in various ways. For example, the inner layer **12***b*, the stretchable component **24** and the bottom bra rim **22** can be sewn together by various conventional methods, or formed as a single piece of material but with different (i.e., varying) stretchabilities. It will be appreciated that the stretchable component **24** can be formed and/or joined to the bra cups **12** in various other ways, such as attachment directly to the wire channel **20**, which are also within the scope of the present invention.

[0024] The elongations of materials discussed herein were measured under the noted load during the third cycle at the outgoing stretch, similar to the various test procedures specified in the ASTM D4964 Standard. As will be understood, the aforementioned elongation or modulus ranges are merely examples and are not limiting.

[0025] The bra wing **14** of the brassiere **10** can be formed in various manners. For example, the bra wing **14** can be formed as a single continued piece (not shown) or two separate pieces releasably joined to each other. Each bra wing **14** can have front and rear end portions **26** and **28**. Each of the front end portions **26** of the bra wing **14** can be adapted to join to one of the bra cups **12** in various manners. The rear end portions **28** can be adapted to join to each other in various ways, such as by various fasteners **30**. In another embodiment, the single continuous wing (not shown) can have its free ends joined to the bra cups **12**, which are releasably joined to each other in the front of the brassiere. It will be appreciated that various the bra wing **14** can be formed in various other manners, which are also within the scope of the present invention.

[0026] As described above, the inner layer **12***b* is less stretchable than the stretchable component **24** and less stretchable than the outer layer **12***a*, and the outer layer **12***a* is preferably the same as or more stretchable than the stretchable component **24**. The bra wing and optional shoulder straps are also preferably formed of a fabric containing the same stretchable fiber as the outer layer **12***a*. This combination of stretch characteristics in the fabrics of the various brassiere components unexpectedly provides a brassiere with a stretchable and/or customized fit that accommodates differently shaped and/or sized body portion(s) across different shape and/or size groups to enhance comfort, support, and/or flexibility to many different users.

[0027] There are many unexpected advantages to the above-described construction. Namely, the use of the fabrics

in the inner layer, outer layer, stretchable component, bra wing and straps creates a brassiere that fits many users across different shape and/or size groups. For example, brassieres can be made in a standard sizes 34B, 34C and 34D, and comfortably flex and self-adjust to fit wearers across sizes 34A, 36A, 32C and 34B (for the 34B size); across sizes 34C, 36B, 38A and 36C (for the 34C size); and across sizes 34D, 36D, 34D and 38C (for the 34D size). This in turn allows a manufacturer to greatly reduce the number of items in the product line, and thus significantly reduce manufacturing costs.

[0028] Although the above description of the present invention is made in connection with an exemplary article of garment in the form of a brassiere, one skilled in the art will appreciate that the present invention is applicable to various other articles of garments including, but not limited to, briefs, tops and other shapewear garments.

[0029] While the foregoing description and drawings represent an illustrative embodiment of the present invention, it will be understood that various additions, modifications, and substitutions may be made therein without departing from the spirit and scope of the present invention as defined in the accompanying claims. Therefore, the present invention is not limited to only the embodiments specifically described herein. In particular, it will be clear to those skilled in the art that the present invention may be embodied in other specific forms, structures, arrangements, proportions, and with other elements, materials, and components, without departing from the spirit or essential characteristics thereof. One skilled in the art will appreciate that the invention may be used with many modifications of structure, arrangement, proportions, materials, and components and otherwise, used in the practice of the invention, which are particularly adapted to specific environments and operative requirements without departing from the principles of the present invention. The presently disclosed embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims, and not limited to the foregoing description.

What is claimed is:

1. A brassiere comprising:

bra cups and a bra wing for supporting the bra cups on a user, the bra cups each comprising:

a stretchable outer layer;

an inner layer; and

a stretchable component attached to the inner layer, the stretchable component having a stretchability greater than the inner layer and less than or the same as the outer layer,

wherein the stretchable outer layer is attached to the inner layer and the stretchable component along a periphery of the bra cups.

2. The brassiere of claim **1**, wherein the inner layer is formed so as to define a predetermined shape and maintain the predetermined shape during the use of the brassiere.

3. The brassiere of claim **1**, wherein the inner layer comprises a foam material.

4. The brassiere of claim **1**, wherein the stretchable component comprises up about 5% to about 30% of an inner area of a respective cup of the bra cups.

5. The brassiere of claim **1**, wherein the inner layer is made of a material having an elongation between about 0% to about 115% under a 10 lb load.

6. The brassiere of claim **1**, wherein the stretchable component is made of a material having an elongation between about 50% to about 130% under an 8.8 lb load.

7. The brassiere of claim **1**, wherein the stretchable outer layer is made of a material having an elongation between about 95% to about 153% under an 8.8 lb load.

8. The brassiere of claim **1**, further comprising bra straps connected to the bra wing and the bra cups.

9. A brassiere comprising:

bra cups each being defined at least partially by a bra rim, each of the bra cups including an outer stretchable layer and an inner layer;

a bra wing for supporting the bra cups on a user; and

a stretchable component located on each of the bra cups adjacent to at least a portion of the bra rims and attached to the inner layer, the stretchable component comprising a stretchable fabric, the stretchable component having a stretchability greater than the inner layer and less than the outer layer,

wherein the inner layer, the outer layer and the stretchable component are structured so as to allow the bra cups to expand to accommodate differently shaped and/or sized body portion(s) across different shape and/or size groups.

10. The brassiere of claim **9**, wherein the stretchable component is joined to a portion of the bra rims.

11. The brassiere of claim **9** further comprising:

a wire channel formed along at least a portion of each bra rim; and

a bra underwire encased in the wire channel,

wherein the stretchable component is joined to the wire channel.

12. The brassiere of claim **9**, wherein the inner layer is formed so as to define a predetermined shape and maintain the predetermined shape during the use of the brassiere.

13. The brassiere of claim **9**, wherein the inner layer comprises a foam material.

14. The brassiere of claim **9**, wherein the stretchable component comprises up about 5% to about 30% of an inner area of a respective cup of the bra cups.

15. The brassiere of claim **9**, wherein the inner layer is made of a material having an elongation between about 0% to about 115% under a 10 lb load.

16. The brassiere of claim **9**, wherein the stretchable component is made of a material having an elongation between about 50% to about 130% under an 8.8 lb load.

17. The brassiere of claim **9**, wherein the outer layer is made of a material having an elongation between about 95% to about 153% under an 8.8 lb load.

18. The brassiere of claim **9**, further comprising bra straps connected to the bra wing and the bra cups.

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