Oct. 9, 1951 E. K. LaROE ET AL 2,570,352

BREAST COVERING FOR BRASSIÈRE

Filed Nov. 25, 1947 2 Sheets-Sheet 1

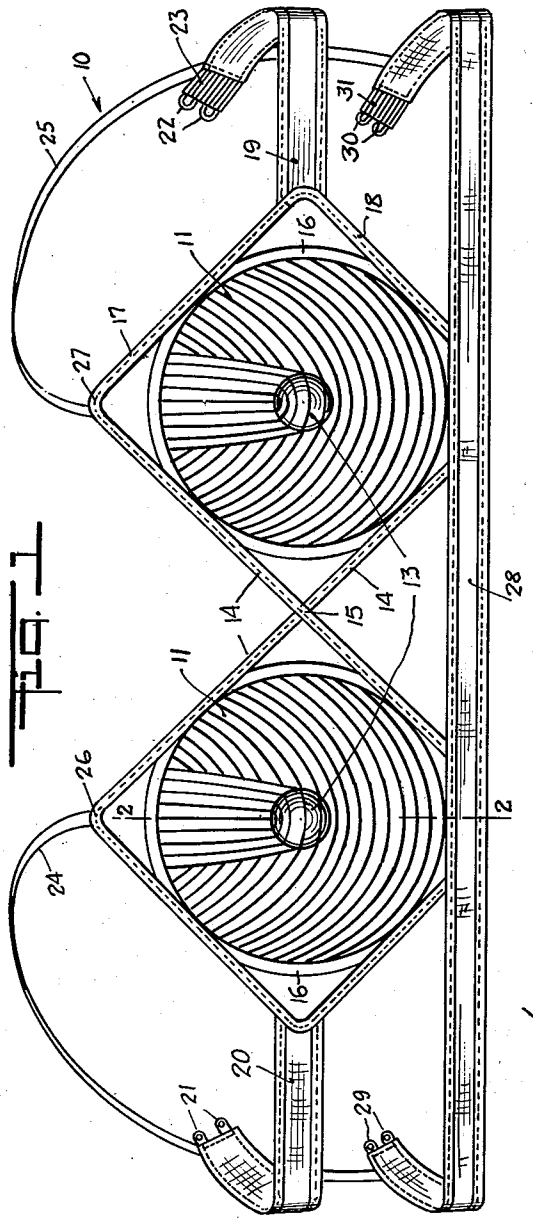


Fig. 1

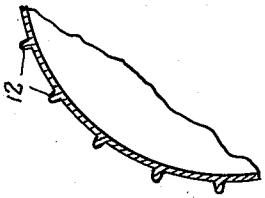


Fig. 3

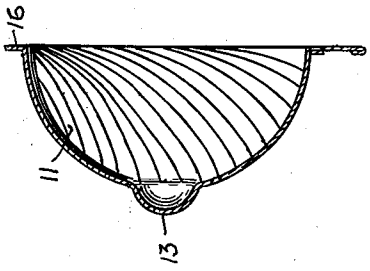


Fig. 2

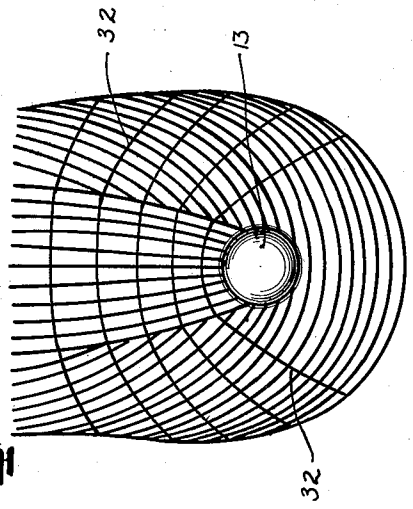


Fig. 4

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Oct. 9, 1951 E. K. LaROE ET AL 2,570,352

BREAST COVERING FOR BRASSIÈRE

Filed Nov. 25, 1947 2 Sheets-Sheet 2

Fig. 7

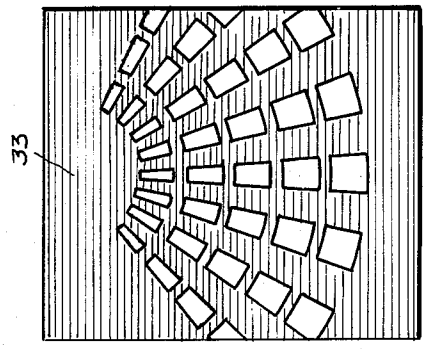


Fig. 6

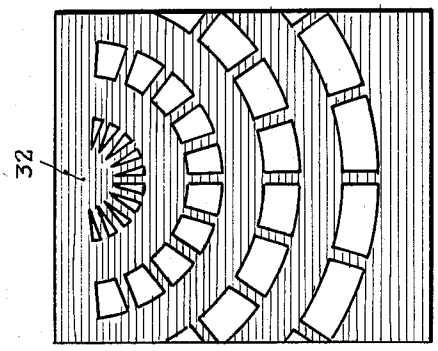
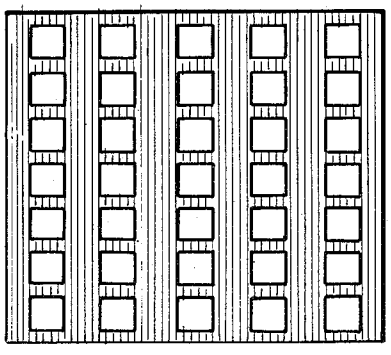


Fig. 5



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BREAST COVERING FOR BRASSIÈRES

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7 Claims. (Cl. 2—42)

1

This invention relates to brassières.

Broadly, it is the main object of our invention to provide a brassière which supports the breasts without pressure and does not amass the tissues of any portion of the breasts.

Another object of our invention is to provide cups for the breasts so formed that no seams across the central portions at the nipple area and avoid pressure between seams and the skin covering the breasts.

Heretofore, various brassières, both domestic and foreign have become fashionable which are constructed so that the breasts are encircled by whalebone, wires or plastic materials. Other modern brassières produce a fashionable appearance by techniques using seams, darts and insertions which involve the doubling of material. In either case injurious pressure is produced on the sensitive living tissue, the pressure being generally greatest where the darts and seams meet at the nipple area.

We have therefore provided an elastic covering for the breasts whose lines of minimum elasticity follow the so-called Langer skin tension lines. In stating this, we use "elasticity" as meaning "elongation under a load of unit weight." Said Langer lines are outlined by the alignment of elastic fibrous cells in the second and third layer of the skin, the derma and subcutaneous tissue. The Langer lines as shown in Figure 4 run in the lower and side segments of the breast outlining a circumferential pattern, while in the upper and central segment the outlined pattern spreads fanwise to the right and left of the perpendicular central line of the breast. An elastic covering whose minimum elasticity lies in the directions indicated will, by its very nature, eliminate the necessity of the use of whalebone, wires and plastic materials as well as of seams, darts and insertions. In designing a covering for manufacturing production, it is also an object of our invention to join the areas of the said two fields of different patterns without seams.

In order to throw more light on the above statements, we wish to add that another purpose of our invention is to have our breast covering so designed that it will distribute the pressure between the supporting covering and the living tissue as uniformly as feasible over the full area of the surface of contact, thus avoiding singular, small areas of excessive pressure. This will be better understood if the following brief description of the structure of the breast will be considered.

The breast is a highly differentiated organ of

2

the human body. It is composed of from twelve to eighteen individual glands, each one of which contains a system of tubes. These tubes are formed around the circular base of the breast like the spokes of a wheel, converging toward the center and meeting in the main tubes which feed directly into the nipple and through it supply the milk to the nursing child. Each one of these branching glands is embedded in fatty and connective tissue, which gives the breast its firmness; and each one of the glands is protected from its neighboring gland by connective tissue.

The whole arrangement is somewhat similar to a bunch of grapes. The milk ducts are found at the end of each one of the branching fibres. These fibres are like the small stems to be found on each grape, which connect with the main stem.

The great pectoral muscle appears as a large, partially open fan. The pointed end, beginning at each shoulder bone, spreads widely apart toward the center of the chest, in sheets of muscle fibres which reach in width from the collar bone to the breast bone.

From this description it appears that should the skin lose its elasticity, or should that elasticity be overtaxed by too great a stretch, which can be caused by too much weight and/or by too much of local pressure here and there, the breast may begin to sag, even though its base remains attached to the fascia of the great pectoral muscle by the connective tissue. In consequence the connective tissue between the posterior aspect of the breast and the great pectoral muscle would have to bear the whole strain of the excess weight, with no help from the skin, and so gradually its fibres will begin to stretch until the weight of the entire breast comes to rest upon the already weakened skin. This vicious circle is started, skin and fibres alternately sagging, which in the end leads to deformity.

The skin tension lines as illustrated were established by Carl Ritter von Edenberg von Langer in 1881 as elastic fibres reinforcing the connective tissue in the derma and subcutaneous tissue. They are of essential importance in the skin covering the female breast as they represent the main support in the maintenance of the original shape.

The region of nipple and areola must be given special attention. In our breast covering the construction is such as to reduce to a negligible fraction the pressure in this area. Any construction forcing the nipple into a cone shaped cap is harmful and dangerous in the light of

recent medical and surgical experience and knowledge. We have provided a construction wherein the nipples are free of pressure thus preventing irritation to the open ducts of the nipple and the sensitive tissue of the areola.

Moreover, by our construction, a breast covering is provided wherein the central portion of the material covering nipple and areola is connected with the other areas of the covering without seams.

Prior to indicating technological means to design and produce a breast covering of the aforesaid nature, we wish to state that a number of possibilities exist to accomplish the purpose, many of which would involve a heretofore not used and therefore hard to obtain weaving pattern. There is, however, one way of attaining the required result which is easier to accomplish and may be done with purchasable means. We may point out in introducing the explanation of it that if one starts with an isotropic sheet, which is in the language of the industry, a sheet of "double stretch" of two equal stretches in two directions at a right angle to each other and possesses in all directions the maximum elasticity required in any area of the breast covering, one may reduce the "stretch" of the material along the Langer lines of minimum elasticity or required by providing reinforcements of a proper elasticity along the latter lines. A similar result may be obtained by punching properly designed and spaced holes according to a suitable pattern into the isotropic sheet. As an isotropic material, an elastic rubber sheet may be used. This, however would as such, not be apt to provide a good breast covering because of its objectionable, non-porous property. The latter difficulty, may be overcome by using foam rubber, e. g. latex, and/or by covering said sheet with a layer of suitably disintegrated fibre like cotton, silk, nylon, rayon etc., which may be printed or sprayed upon it. Instead of a so prepared rubber sheet, also a woven or knitted material of the indicated "two way stretch" property may be used. The indicated reinforcements may be produced in various ways. If an isotropic rubber sheet is used, one may vulcanize onto the outside of the breast covering reinforcing soft rubber strips or threads, or preferably by molding a pattern of raised ribs onto the outside of said covering in the process of manufacturing it. On the other hand, if a woven or knitted material is used, reinforcing threads have to be interwoven or interlocked with the structure of it.

Regardless of the specific kind of reinforcements, attention has to be paid to the fundamental requirement that the geometrical lines of maximum elasticity should physically possess that quality. The latter lines are represented by the orthogonal trajectories **32** shown in Fig. 4 to the Langer lines, that is by lines so drawn that wherever one of them intersects with a Langer line, it makes a right angle with it. Thus reinforcing threads or ribs should be much thinner than the spacing between them, so as not unduly to reduce the elasticity along the geometrical lines where it ought to be maximal.

Figure 1 is a front plan view of the breast covering incorporated in a brassière which is shown in perspective.

Figure 2 is a vertical cut of the breast covering showing the arcuate theoretical Langer lines indicated.

Figure 3 is an enlarged segmental section showing raised ribs upon the surface of the breast covering.

Figure 4 is a front view of a breast showing the skin tension lines reproducing the original figure of Langer's paper and showing the orthogonal trajectory lines at right angles to the Langer skin tension lines.

Figure 5 is a diagrammatic plan view of an isotropic sheet perforated so as to provide a preferential stretch vertically.

Figure 6 is a diagrammatic plan view of an isotropic sheet perforated so as to provide a preferential stretch radially as seen from a station point **32**.

Figure 7 is a diagrammatic plan view of an isotropic sheet perforated so as to provide a preferential stretch circumferentially around a station point **33**.

Referring to the drawing, numeral **10** represents a brassière comprising a pair of breast covering members **11** which may be formed of woven or knitted material of elastic yarn or may be of an isotropic sheet of elastic material such as rubber either reinforced along the Langer lines as indicated in Figure 1 or which may have raised ribs **12** as indicated in Figure 3. The elasticity of the breast covering **11** may be arranged or organized following the Langer skin tension lines by the use of a properly designed pattern of perforations. Figure 5 will help to understand this. It represents an isotropic sheet which has been rendered more stretchable in a vertical direction than in the horizontal one by reducing the cross section of the material in the vertical direction rather than in the horizontal. The same thing can be done for a preferential radial stretch as shown in Figure 6 or for a preferential circular stretch as shown in Figure 7.

The breast covering **11** has a projecting central or nipple portion **13** so designed as to house the nipple without any pressure or irritation.

In order to join the two breast covering members **11**, a pair of crossed elastic members **14** are stitched together at their central or cross point **15**. Where the members **14** run tangent to the breast covering members **11**, the members **14** are attached to the upper part of a flange **16**. At the opposite sides of the breast covering members **11** are two tangential elastic members **17** and **18** so that the members **14**, **17** and **18** form a square. The ends of the elastic supporting members **19** and **20** which pass around the sides and back may be separably joined together at the back by hooks **21** and eyes **22**. The eyes **22** are attached to an elastic piece **23** which in turn is attached to the extreme end of the elastic supporting member **19**. Straps **24** and **25** are made of non-elastic material and are attached at points **26** and **27** where the members **14** and **17** intersect; the opposite ends are attached to the back of the lateral supporting band **28**. Band **28** is attached to the lower central part of the breast covering members **11** thus preventing the brassière from riding up. The free end of the band **28** have hooks **29** and eyes **30** attached to cooperate with one another, the eyes **30** being attached to a small elastic piece **31** which is joined to one end of the band **28** providing a fastening means to retain band **28** in position while the elastic piece **31** provides sufficient expansibility to resiliently retain the band **28** in position preventing restriction and providing free play for the muscles.

It is obvious that various modifications may be made in the details of construction and arrange-

ment of parts without departing from the general spirit of the invention.

We claim:

1. A brassière comprising a pair of breast coverings having lower and side segments, means joining said breast coverings, lateral body embracing members substantially along the horizontal medial line of said breast coverings, means for separably joining the ends of said body embracing members, a body supporting and embracing band attached to the bottom edge of said breast coverings, means for separably joining the ends of said body supporting band, shoulder straps attached at one end to the upper portion of said breast coverings on the vertical medial line thereof and at opposite ends at the rear portion of said body supporting band, said breast coverings being of two way stretch material whose lines of minimum elasticity run circumferentially in the lower and side segments and fan-wise to the right and left of the perpendicular medial line of said breast coverings.

2. The braissière according to claim 1, wherein said breast coverings of a two way stretch material are reenforced by elastic fibres running circumferentially in the lower and side segments and fan-wise to the right and left of the perpendicular medial line of said breast coverings so as to reduce elasticity along said lines.

3. The brassière according to claim 1, wherein said breast coverings are made of a sheet of two way stretch material of substantially equal elasticity and reenforced by elastic fibres running circumferentially in the lower and side segments and fan-wise to the right and left of the perpendicular medial line of said breast coverings so as to reduce elasticity along said lines and to produce a sheet of minimum elasticity along the said lines.

4. The brassière according to claim 1, wherein said breast coverings are made of a sheet of two way stretch material and reenforced by elastic fibres running circumferentially in the lower and side segments and fan-wise to the right and left of the penpendicular medial line of said breast coverings so as to reduce elasticity along said lines and to produce a sheet of minimum elasticity along the said lines, and continuing

the reenforcing fibres so as to form of them a cup to contain the nipples of the wearer.

5. The brassièrre according to claim 1, wherein said breast coverings are made of a sheet of two way stretch material of substantially equal elasticity and reenforced by elastic fibres running circumferentially in the lower and side segments and fan-wise to the right and left of the perpendicular medial line of said breast coverings so as to reduce elasticity along said orthogonal directions and to produce a sheet of minimum elasticity along said lines, and continuing reenforcing fibres so as to form of them a cup to contain the nipples of the wearer.

6. The brassière according to claim 1, wherein said breast coverings are made of a sheet of woven two way stretch material of substantially equal elasticity and reenforced by elastic fibres running circumferentially in the lower and side segments and fan-wise to the right and left of the perpendicular medial line of said breast coverings, said fibres being interlocked with said woven material.

7. The brassière according to claim 1, wherein said breast coverings have a foundation of two way stretch material whose lines of maximum stretch are produced by reducing the cross-section of the material along the path of such lines for a substantial part of the length of said path in relation to the path along the lines of minimum elasticity.

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