Title: MALLEABLE COMPOSITION FOR BRA PAD

Abstract: A push-up bra (10) has a sleeve between the front panel (20) and the rear panel (22) of the bra cups (12, 14) that receives a flexible pouch (38, 40) containing a body (42) of malleable material such as a major amount of a liquid polyl such as glycerine reacted with a vegetable starch, a small amount of a finely divided mineral such as AEROSIL as a suspending agent, a water scavenger such as magnesium oxide, a lightweight, water-soluble organic filler such as a cellulose ether and a water soluble preservative. The malleable material can be molded into a shape under and/or to either side of a breast to control the shape, amount of lift and the cleft between breasts.
Description

MALLEABLE COMPOSITION FOR BRA PAD

Technical Field

The present invention relates to an improved pad for a brassiere and, more particularly to a pad comprising a flexible envelope containing a body of malleable material that can be incorporated into a push-up bra or into a pad for placement in a conventional bra.

Background of the Invention

Brassieres are worn not only to provide support for women’s breasts, but also to enhance the shape of the breasts within the brassieres, to enhance the shape of the portion and amount of the breasts above the brassieres and to modify the cleavage between the breasts.

Push-up bras are designed to shape and elevate the breasts. Push-up bras usually contain a rubber pad received in a pocket in the lower front panels of the bra cups. The pad is formed by molding into a complex arcuate shape. Rubber pads are both stiff and uncomfortable and do not exhibit the natural feel of breast tissue. Rubber pads also cause insecurity due to straying of the pads. Other push-up bras used a more yielding silicone foam and some use Nylon (polyamide) padding to shape and lift.

Push-up bras with liquid filled envelopes have recently appeared on the market. These pads more clearly emulate the consistency of breast tissue. However, the liquids used to fill the envelopes are not satisfactory. Silicone oil liquids are very expensive and are hard to seal. Hydrocarbon oils have also been utilized as the liquid either alone or in a mixture with water. Hydrocarbons can attack the envelope. The liquids in the envelope are heated to body temperature of about 99°F. At this temperature, evaporation is increased and the hydrocarbon vapors can permeate through the wall of
the envelope, creating offensive, unpleasant odors. Furthermore, water vapor is also able to permeate through the wall of the envelope decreasing the liquid volume in the envelope. The envelope could rupture on impact or when pierced by a sharp object causing embarrassment, discomfort and destruction of the pad.

An improved push-up pad is described in copending application Serial No. 09/132,572, filed August 11, 1998, the disclosure of which is expressly incorporated herein by reference. The pad contains a flexible envelope filled with a mixture of water and an odorless, organic hygroscopic agent in specified proportions providing no unpleasant aroma and little evaporation of water through the film of the envelope. The envelope is formed of a film of a tough synthetic resin resistant to puncture, preferably a thermoplastic resin capable of being heat-sealed. The film has a low transmission rate for water vapor. The hygroscopic agent is able to drive water vapor from outside the envelope through the film into the envelope so that liquid volume is maintained.

This push-up bra looks and feels more natural and the bra eliminates discomfort and insecurity caused by stiff, sharp edged or straying inner pads. The inner cup lining adjacent the skin is soft and wicks moisture away from the skin.

However, though the push-up pad does not stray, the liquid in the pad, will distribute throughout the envelope depending on the compression forces applied to the envelope during wearing the bra. Even if a portion of the pad is positioned on the sides of a cup, most of the liquid will tend to position at the bottom of the cup.

In an earlier experiment, a body of malleable material was synthesized from water thickened with a small amount, usually about 0.5% by weight, of a polyacrylamide thickener and containing about 20% by weight of a filler such as silica microspheres. The material was malleable. However, when placed in a thin film pouch for use in a bra pad, the movement
of the hard filler particles against the inner wall of the film abraded the film of the pouch until it failed.

List of References

<table>
<thead>
<tr>
<th>Patentee</th>
<th>Patent No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block, et al.</td>
<td>3,620,222</td>
</tr>
<tr>
<td>Kirby, et al.</td>
<td>3,845,507</td>
</tr>
<tr>
<td>Lynch</td>
<td>3,986,123</td>
</tr>
<tr>
<td>Miller</td>
<td>5,235,974</td>
</tr>
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</table>

Statement of the Prior Art

Block, et al. discloses a foam, push-up brassiere pad. Kirby, et al. discloses a breast prosthesis to be worn inside a brassiere cup containing an inner bag. A gel-like liquid such as carboxymethyl cellulose is sealed within an outer bag containing air. Miller discloses an electrically heated bra for lactating mothers containing a fluid impermeable chamber filled with water. Lynch discloses a breast prosthesis filled with a low density silicone gel. The gel used by Lynch is not malleable.

STATEMENT OF THE INVENTION

In the present invention, a push-up bra pad contains a body of malleable material. The pad can be placed in any position, under or to the sides of the breast and molded into a desired shape. The malleable material will retain the desired shape during normal usage. The malleability of the material is similar to natural tissue. Unlike a prosthesis which has a volume and shape equal to the volume of a breast, the push-up pad of the invention has a volume less than that of a breast, usually from 10% to 40% of the volume of a bra cup.

The malleable material has no elastic memory. It does not flow unless placed under pressure. In copending international application no. PCT/US99/02700, filed 9 February,
1999, a body of lubricious malleable material is provided by forming a partially cross-linked, self-lubricating polymer such as a silicone resin containing a dispersion of lightweight, inorganic, reinforcing filler. Suitably, cross-linking less then 10% of the material is sufficient to form a 3-dimensional matrix when cross-linked. The size of the molecules of cross-linked polymer is too large to permeate through the wall of the pouch containing a body of the material.

The silicone based composition is difficult to effectively seal in a polymer film envelope. If the envelope is pierced or the seams leak, the composition can stain lingerie and outer clothing. Furthermore, silicone polymers are relatively expensive materials.

A gel-like material is produced according to the invention that does not soil or stain clothing. It is capable of being shaped like a modeling clay into a stable form that remains in the modeled form until compressive forces are purposefully applied to the body of material to change its shape.

The material of the invention has less tendency to leak from edge-sealed polymer pockets. The material is made of less expensive, readily available components.

The material contains a major amount of a liquid hydrocarbon polyol, a small amount of a thickener, a moisture scavenger, a suspending agent, and optionally a lightweight, organic filler and a preservative.

The pads of the invention can also be used in outerwear such as bathing suit tops and athletic tops.

These and many other features and attendant advantages of the invention will become apparent as the invention becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings.
Brief Description of the Drawings

Figure 1 is front view in elevation illustrating the push-up bra of the invention with the malleable material in a lower central position in a cup;

Figure 2 is a view in section taken along line 2-2 of Figure 1;

Figure 3 is a front view in elevation of a bra with the malleable material molded to the outside of the cup;

Figure 4 is a view in section of a bra pad taken along line 4-4 of Figure 3;

Figure 5 is a front view in elevation of a push-up pad molded to position the malleable material higher in the cup;

Figure 6 is a view in section taken along line 6-6 of Figure 5;

Figure 7 is a perspective view of a malleable bra pad according to the invention; and

Figure 8 is a view in section taken along line 8-8 of Figure 7.

Detailed Description of the Invention

Referring now to Figures 1 and 2, a push-up bra 10 useful with the malleable material pouch 38 of the invention is formed of two cups 12, 14, a stretchable strap, not shown, connected to the outside periphery of each cup 12, 14 with releasable fastener, not shown, and optional shoulder straps 16, 18.

The cups 12, 14 are formed of an outer layer 20 of fabric and an inner layer 22 of fabric. The outer layer 20 of fabric can be covered with a layer of decorative material such as lace. The surface 24 of the inner layer 22 is preferably covered with a layer of a soft material 27 which absorbs and wicks moisture such as woven cotton or polypropylene cloth. A long narrow sleeve 26 following the curved outline of the bra cup can be formed along the lower periphery 29 of the bra cups 12, 14. A curved metal stiffening rod 28 can be received
in the sleeve 26.

The outer layers 20 are stitched around their common peripheries 30, 32 to form pockets 34, 36 for receiving flexible pouches 38, 40 containing a body 42 of malleable material as shown in Figure 2. The pouches 38, 40 can have the general exterior shape of a bra cup 12, 14. The pouches 38, 40 are formed of a front film 43 heat sealed at their common perimeters to a rear panel 44 forming a lip 46. The pouches 38, 40 are preferably anchored to the outer layer 20 or inner layer 22 of fabric. The lip 46 could be formed by adhering the outer peripheries of the two panels by adhesive or stitching. However, stitching or adhesive could make the lip 46 more susceptible to tear. It is preferred that the pouches 38, 40 be provided with an extended tab, not shown, which before thermal bonding serves as a filling spout. The two layers 20, 22 of the pouch are completely thermal sealed within the tab into a unitary film. Two thermally generated beads, not shown, can be provided normal to the axis of the pouches to reinforce the tab from tearing.

The tab can be sewn into the edge of the outer layer of fabric 20 near the outside periphery of the pockets 34, 36. The pouches 38, 40 are then inserted into the pockets 34, 36. The edge of the inner layer 22 of fabric is then stitched to the edge of the outer layer 20.

The skin of the pouch is a tough, puncture-resistant, flexible film such as a 0.01 to 5 mm thick film, preferably a film having a thickness from 0.05 to 0.5mm. Suitable films are thermoplastic, thermally bondable films such as polyethylene, vinyl, silicone resins or polyurethane which can be in the form of a closed cell foam. The surface of the pouch has good wetability for water, is resistant to hydrolysis, has flame retardence and resistance to U.V. radiation. It is stable to being agitated with hot soapy water in a washing machine. The film can have a Shore A Hardness from 50 to 100, a Specific Gravity of 1.1 to 1.3, an
elongation of at least 300% and a minimum tear strength of 200 Lb/in. The film should have a high melting temperature above 180° C. in order to be capable of surviving temperatures encountered in washing and drying machines. However, hand washing and air drying of the bra are preferred.

The malleable material is preferably formed of a liquid polyol which is reacted with a gelling agent such as a vegetable starch. The malleable material also contains a finely divided mineral filler to promote suspension and reinforce the material and a lightweight organic filler to reduce the weight of the material. A preservative can be added to prevent spoilage. A water scavenger such as magnesium oxide can be present to bind the water released during the reaction between the polyol and vegetable starch.

The major ingredient of the composition is a liquid polyol such as glycerine or liquid polyalkylene glycols such as polymers of ethylene oxide and/or propylene oxide. The polyol can contain 5-20% water and have a pH from 4.5 to 6.5.

The vegetable starch is suitably a corn starch present in an amount of 1 to 25 parts based on 100 parts of polyol. A water scavenger such as anhydrous magnesium oxide can be added to bind the water formed as a by product of the reaction of the polyol with the starch. Addition of 0.1 to 10% based on 100 parts of polyol of a finely divided mineral such as fumed silica can be added to the material to improve suspension of the thickened polyol. A preservative such as a 1 to 100 ppm of a bactericide such as Albumine may also be added to the material. The preservative should be soluble in hard water, such as a quaternary ammonium compound which also has low toxicity to mammals. The filler-thickener can be a cellulose ether.

The malleable material is formed by mixing the liquid polyol, starch, the scavenging agent, the suspending agent, the filler and the preservative at an elevated temperature of from 80° C to 130° C for 1 to 5 hours, generally from 2-4
hours. A uniform suspension of the ingredients is formed which progresses to a malleable paste as the polyol reacts with the starch. The finely divided mineral such as Aerosil (finely divided silica) keeps the polyol in suspension and prevents it from leaking through the envelope. The Aerosil particles are believed to form a chain structure preventing the paste from separating.

EXAMPLE

A representative malleable paste is formed from the following ingredients:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Parts per 100 parts of glycerine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycerine</td>
<td>100</td>
</tr>
<tr>
<td>Corn Starch</td>
<td>10</td>
</tr>
<tr>
<td>Mg O</td>
<td>5</td>
</tr>
<tr>
<td>Aerosil</td>
<td>1.5</td>
</tr>
<tr>
<td>Q Cel</td>
<td>1.5</td>
</tr>
<tr>
<td>Albumine 2016*</td>
<td>20 ppm</td>
</tr>
</tbody>
</table>

* N-alkyl dimethyl benzyl ammonium chloride where the alkyl groups contain 10-20 suitably 12-16 carbon atoms. Albumine 2016 contains 63% of C_{12}, 14.3% of C_{14} and 16.7% of C_{16}.

The ingredients were mixed until a uniform suspension was achieved. The ingredients were then reacted at 100°C for 3 hours at 1200 rpm to form a malleable paste.

A prototype of the push-up bra of the invention was prepared by filling an elastomeric polyurethane pouch.

The pouch was formed from a closed cell polyurethane film having the following properties:

**Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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<tbody>
<tr>
<td>Color APHA</td>
<td>5</td>
</tr>
<tr>
<td>Thickness</td>
<td>0.1 mm</td>
</tr>
<tr>
<td>Hardness</td>
<td>87 Shore A</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.20</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>6525 psi</td>
</tr>
<tr>
<td>Elongation</td>
<td>480%</td>
</tr>
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</table>
Tear Strength 400 lb/in
Melting Temperature 180-190° C.

The malleable material containing pouch of the invention can also be incorporated into an uplift bra pad 100 as shown in Figures 7-8. The pad 100 has an oval-shaped front panel 102 and an oval shaped rear panel 104. The panels can be formed of woven or non-woven fabrics, preferably a soft woven synthetic fabric such as Nylon (linear polyamide) or polyester. The peripheral edges 106, 108 of the panels 102, 104 are joined, suitably by stitching 110 to form a cavity 118 for receiving a pouch 112 containing a body 114 of malleable material.

The panels may have a thin layer of flexible foam usually 1/16 to 1/4 inch thick attached to the inside surface, suitably by adhesive and/or thermal lamination. An optional strip 116 of flexible foam my extend across the upper portion of the cavity 118. The strip 116 is usually from 1/4 to 1/2 inch thick and occupies no more than 45% of the height of a cavity 118 usually about 30-40% of the cavity. The lower edge 120 of the strip 116 can be bound by stitching to the peripheral edges of the pad 100.

Another optional feature is to laminate the front panel 102, rear panel 104 and flexible foam strip 116 together by heat or adhesive to form a closed, flat upper portion 124 decreasing the size of the cavity 118 to form a smaller cavity 126. The upper portion 124 will have a convex front face 128 and a concave rear face 130. When the pouch 112 is inserted into the cavity 118 the lower portion 134 of the front face and lower portion 136 of the rear face will both have a convex shape. The pouch 112 has a tab 138 which can be placed between the outer edges of the panels 102, 104 and sewn to anchor the pouch 132 within the smaller cavity 128.

Referring again to Figures 1 and 2, the pads 100 contain pouches 38, 40 filled with a body 42 of malleable material.
The body 42 of malleable material shown in dotted lines, can be formed into a crescent shape and centrally positioned under a breast 150. The breast 150 will be uniformly lifted above the top edge 152 of the bra 154 to form a first cleavage 156. As shown in Figures 3-4, when the body of malleable material 42 is molded into a thicker, shorter body 158, placed toward the outside of each breast 150, the breasts will be lifted up and pressed closer together to form a second longer cleavage 160.

When the body 42 of the malleable material, as shown in Figures 5 and 6, is placed higher in the bra cup the cleavage 164 is still longer.

It is to be realized that only preferred embodiments of the invention have been described and that numerous substitutions, modifications and alterations are permissible without departing from the spirit and scope of the invention as defined in the following claims.
CLAIMS

1. A push-up pad for a bra comprising a flexible, sealed envelope containing a malleable body comprising a liquid polyol containing a dispersion of an inorganic, finely divided, suspending agent and a gelling agent.

2. A push-up bra according to claim 1 in which the gelling agent is a vegetable starch.

3. A push-up bra according to claim 2 in which the agent is corn starch.

4. A pad according to claim 3 in which the starch is present in an amount of 5 to 15 parts per 100 parts of polyol.

5. A pad according to claim 4 in which suspending agent is a finely divided silica.

6. A pad according to claim 5 in which the suspending agent is present in an amount of 1-3 parts per 100 parts of polyol.

7. A pad according to claim 6 in which the liquid polyol is glycerine or a polyalkylene glycol.

8. A pad according to claim 3 in which the body further contains 4 to 9 parts of a water scavenger based on 100 parts of polyol.

9. A pad according to claim 8 in which the water scavenger is an anhydrous metal oxide.

10. A pad according to claim 7 in which the metal oxide is magnesium oxide.

11. A pad according to claim 1 in which the body further contains 5-25 parts of a lightweight organic filler per 100 parts polyol.

12. A pad according to claim 11 in which the lightweight filler is a cellulose ether.

13. A pad according to claim 1 in which the envelope is formed of a heat sealable, flexible, tear-resistant film having a thickness from 0.01 to 5 mm.

14. A pad according to claim 1 further comprising two outer fabric layers joined at their peripheries forming a
pocket which receives the envelope.

15. A pad according to claim 14 in which the inner surfaces of the fabric layers contain a layer of cushioning material.

16. A pad according to claim 1 in which the material contains a small amount of preservative.

17. A push-up bra cup comprising in combination:
   a front panel in the shape of a bra cup and having a peripheral edge;
   an rear panel in the shape of a bra cup having a peripheral edge;
   the peripheral edges being joined to form a cavity;
   and
   a flexible pouch containing a body of malleable material received in the cavity said material comprising a major amount of liquid polyol containing a dispersion of finely divided mineral and a vegetable starch.

18. A push-up bra containing:
   two bra cups;
   means joining the cups;
   a strap connecting the cups;
   said cups containing a flexible pouch containing a body of malleable material as defined in claim 1.

19. A push-up bra according to claim 18 in which the push-up bra forms the top of a bathing suit.
INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/13526

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A61F 7/00
US CL : 450/57
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)


Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tbody>
<tr>
<td>X</td>
<td>US 4,731,081 A (TIFFANY et al) 15 March 1988, cols. 1-3.</td>
<td>17, 18</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>A</td>
<td>US 4,820,303 A (BRAUMAN) 11 April 1989, see entire document.</td>
<td>1-19</td>
</tr>
<tr>
<td>A</td>
<td>US 5,334,082 A (BARKER) 02 August 1994, see entire document.</td>
<td>1-19</td>
</tr>
<tr>
<td>A</td>
<td>US 5,411,554 A (SCOPELIANOS et al) 02 May 1995, see entire document.</td>
<td>1-19</td>
</tr>
<tr>
<td>A</td>
<td>US 5,676,698 A (JANZEN et al.) 14 October 1997, see entire document.</td>
<td>1-19</td>
</tr>
<tr>
<td>A</td>
<td>US 5,679,052 A (RUCKI) 21 October 1997, see entire document.</td>
<td>1-19</td>
</tr>
</tbody>
</table>

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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*P* document published prior to the international filing date but later than the priority date claimed

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**X** document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

**Y** document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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