Sept. 2, 1969 A. SILVERMAN 3,464,418

MOLDED SEAMLESS BRASSIERE PADS

Filed Jan. 3, 1967 4 Sheets-Sheet 1

FIG. 1

FIG. 3

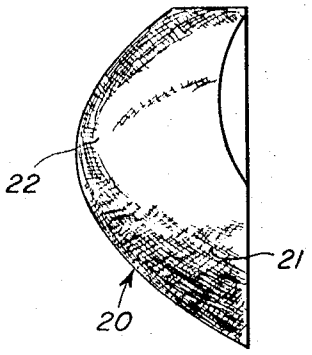


FIG. 2

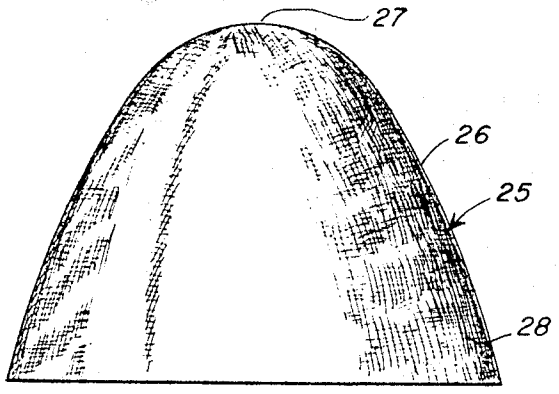


FIG. 4

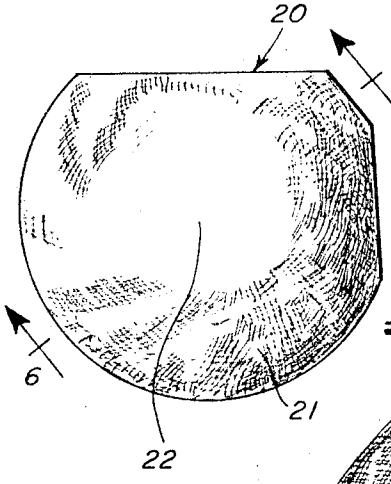


FIG. 6

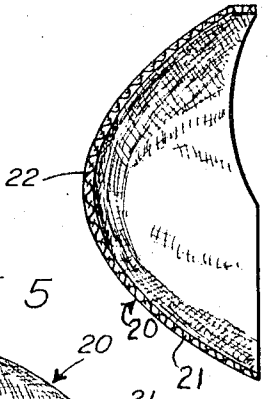
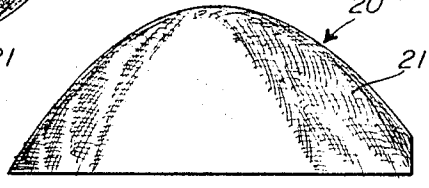


FIG. 5



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Sept. 2, 1969 A. SILVERMAN 3,464,418

MOLDED SEAMLESS BRASSIERE PADS

Filed Jan. 3, 1967 4 Sheets-Sheet 2

FIG. 7

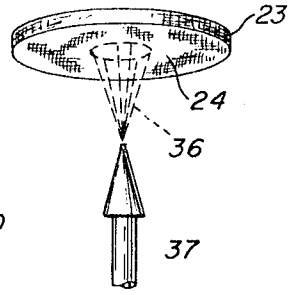


FIG. 8

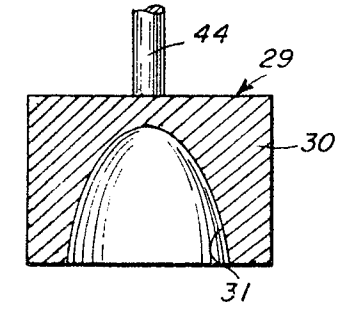
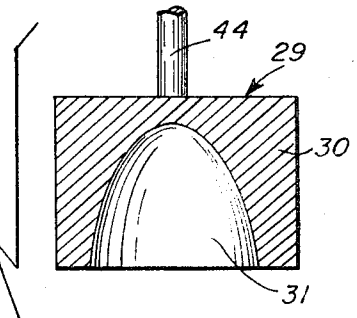


FIG. 10



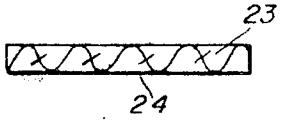
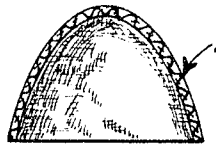


FIG. 9



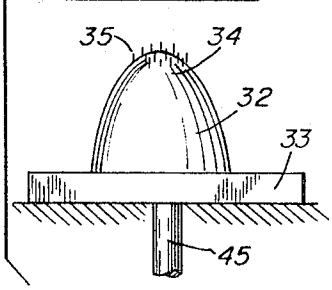


FIG. 11

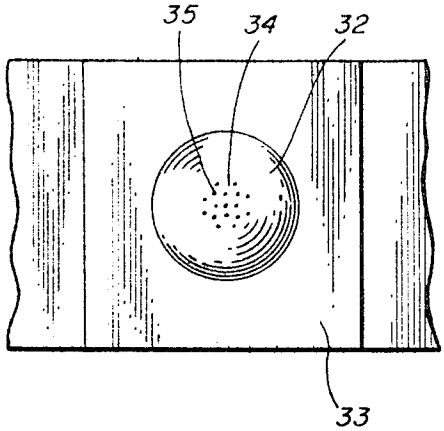
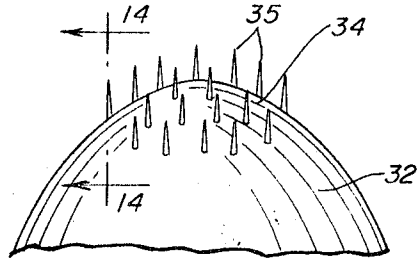


FIG. 12



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Sept. 2, 1969 A. SILVERMAN 3,464,418

MOLDED SEAMLESS BRASSIERE PADS

Filed Jan. 3, 1967 4 Sheets-Sheet 3

FIG. 13

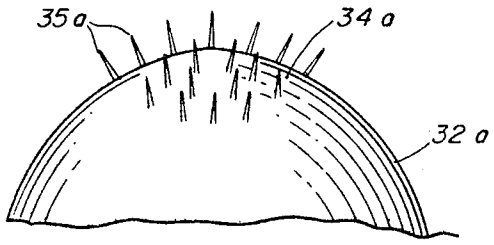


FIG. 14

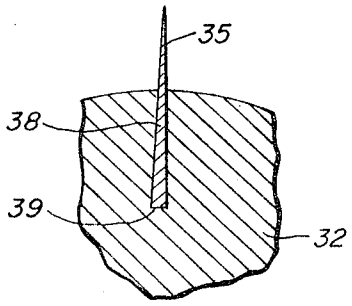


FIG. 15

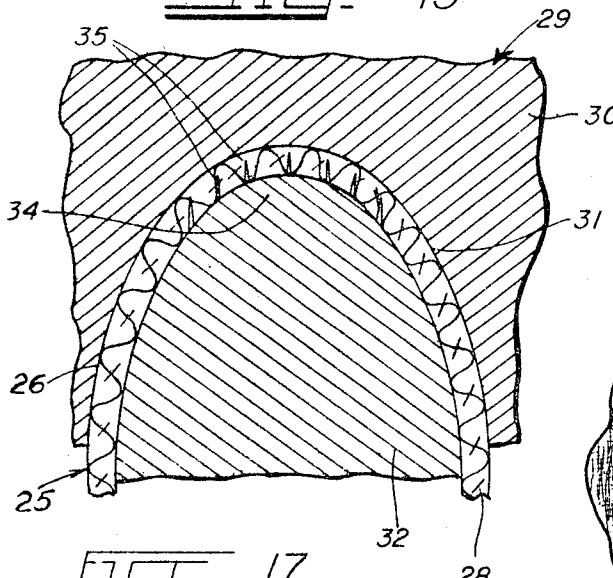


FIG. 16

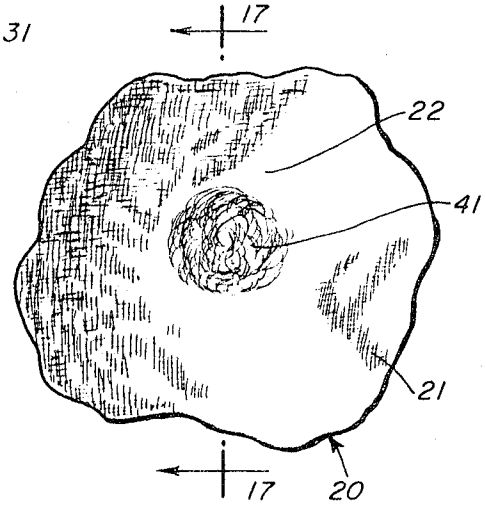
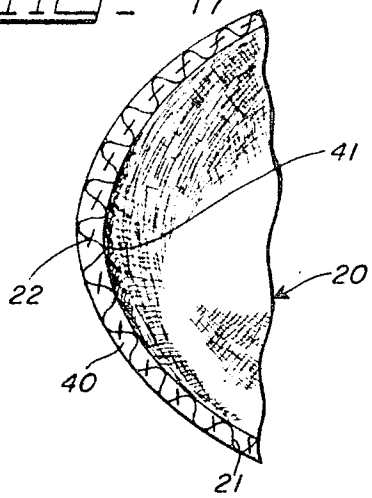


FIG. 17



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MOLDED SEAMLESS BRASSIERE PADS

Filed Jan. 3, 1967 4 Sheets-Sheet 4

FIG. 18

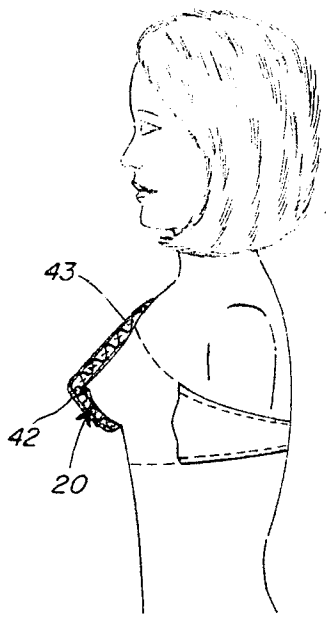
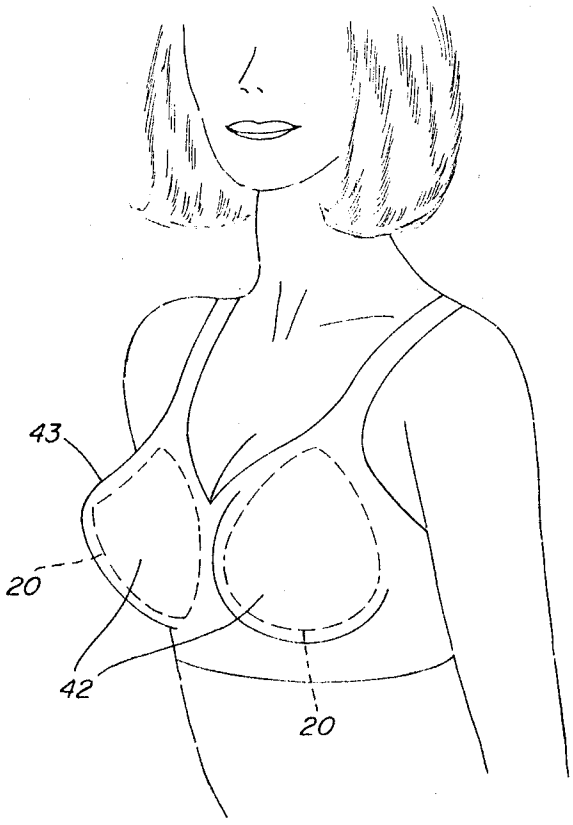


FIG. 19



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United States Patent Office 3,464,418
Patented Sept. 2, 1969

3,464,418

MOLDED SEAMLESS BRASSIERE PADS

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Filed Jan. 3, 1967, Ser. No. 606,601
Int. Cl. A41c 3/10; B29c 5/00; A61f 13/14
U.S. Cl. 128—481 5 Claims

ABSTRACT OF THE DISCLOSURE

Molded seamless brassiere pads or cups are made from thermoplastic adhesive bonded non-woven fibrous batting without thining or weakening of the cross sectional area of the apex portion of the brassiere pad or cup relative to the cross sectional thickness of the remaining wall portions of the pad or cup. A molded seamless brassiere pad or cup is formed in which the cross sectional thickness of the apex portion of the pad or cup is not reduced relative to the cross sectional thickness of the remaining wall portions of the pad or cup and the apex portion of the pad or cup is not otherwise weakened.

Description

This invention relates to brassiere pads or cups and a method and apparatus for making the same.

More particularly, this invention relates to molded seamless brassiere pads or caps made from fibrous materials known as bonded non-woven fibrous batting, made of polyester fibers, or other suitable fibers, typical examples of such non-woven fibrous batting materials being those made of polyester fibers such as Kodel (Eastman) and Dacron (Du Pont).

One of the problems heretofore experienced in the art of making molded seamless brassiere pads or cups from bonded non-woven fibrous batting, including full brassiere pads and so-called contour pads is the problem of preventing thinning of the material in the outer apex portion of the generally conical-shaped pad during the molding operation, and when heat and pressure are applied to the blank during the molding operation. Various ways have been suggested heretofore to overcome this problem, but many of these have been complex and unsatisfactory.

Accordingly, as object of the present invention is to provide a new and improved molded seamless brassiere pad or cup of suitable materials such as fibrous non-woven batting made of polyester fibers such as Kodel (Eastman) and Dacron (Du Pont).

Another object of the invention is to provide a new and improved generally conical-shaped molded seamless brassiere pad or cup which is not substantially thinned in cross section or otherwise weakened in the appex portion thereof as an incident to or as a result of the molding operation.

Other objects will appear hereinafter.

In the drawings:

FIG. 1 is a perspective view of a typical blank of fibrous non-woven material which may be employed in the practice of the present invention in making the new molded seamless brassiere pad;

FIG. 2 is an elevational view of the new molded seamless brassiere pad form prior to the time it is trimmed after the molding operation;

FIG. 3 is a side elevational view of a typical form of the new molded seamless brassiere pad or cup in completed form;

FIG. 4 is a top plan view of a typical form of the new molded seamless brassiere pad;

FIG. 5 is a front elevational view of the molded seamless brassiere pad shown in FIGS. 3 and 4;

FIG. 6 is a transverse sectionial view on line 6—6 in FIG 4;

FIG. 7 is a schematic view illustrating a preliminary step inthe method of making the new molded seamless brassiere pads;

FIG. 8 is an exploded view, partly in section, of the new molding apparatus employed in the practice of the present invention;

FIG. 9 is a sectional view showing the parts of the new molding apparatus illustrated in FIG. 8 and the blank of fibrous non-woven batting material as they appear during the molding operation;

FIG. 10 is an exploded view, partly in section, showing the molding apparatus of FIGS. 8 and 9 with the untrimmed molded seamless brassiere pad unit; as shown in FIG. 2, removed therefrom after the molding operation;

FIG. 11 is a top plan view of the new male mold unit, on line 11—11 in FIG. 8;

FIG. 12 is a fragmentary elevational view of the new male mold unit illustrated in FIGS. 8, 9, 10 and 11;

FIG. 13 is a fragmentary elevational view of a modified form of the new male mold unit;

FIG. 14 is an enlarged sectional detail view of the new male mold unit, on line 14—14 in FIG. 12;

FIG. 15 is an enlarged fragmentary sectional view of the new molding apparatus with the fibrous non-woven batting blank unit disposed therein during the molding operation;

FIG. 16 is a fragmentary bottom plan view of the new molded seamless brassiere pad;

FIG. 17 is a transverse sectional view on line 17—17 in FIG. 16;

FIG. 18 is a diagrammatic view partly in section, showing a typical use of the new molded and seamless brassiere pad made in accordance with the present invention; and

FIG. 19 is a perspective view of the parts shown in FIG. 18.

A typical embodiment of the new molded seamless brassiere pad or cup which may take the form of a contour pad, or a full inflation pad, is generally indicated at 20 in the drawings and comprises a generally conical-shaped body 21 having an open inner end and a closed outer apex portion 22. The new molded seamless brassiere pad may be made from fibrous non-woven batting composed of thermoplastic adhesive bonded fibers such as polyester fibers of which Kodel (Eastman) and Dacron (Du Pont) are typical, and in the practice of the invention a blank of such material for use in molding the new seamless brassiere pads is illustrated in FIG. 1, where it is generally indicated at 23, and is shown as being generally circular or disc-shaped in form, and as having central portion 24, which will be referred to hereinafter. The blank 23 of bonded non-woven fibrous batting is composed of loosely arranged fibers, as are referred to hereinafter.

A typical embodiment of the new molded seamless brassiere pad form as it is formed in the mold and before it is trimmed to proper shape, is illustrated in FIG. 2 of the drawings wherein it is generally indicated at 25 includes a generally conical-shaped body 26 having an open and untrimmed inner end or skirt portion 28 and a closed outer apex portion 27.

A typical form of the new molding apparatus which may be used in the practice of the present invention is indicated at 29 in the drawings and comprises a female mold member 30 having a female mold cavity 31 therein, and a male member 32 which is suitably supported at

33 and is generally conical-shaped and has an apex portion 34 in which a plurality of sharp pointed needle-like piercing elements 35 are mounted. Each of the piercing elements 35 has an inner end or mounting portion 38 which is rigidly mounted in any suitable manner in a recess 39 formed in the apex portion 34 of the generally conical-shaped male mold member 32, as best shown in FIG. 14.

The piercing elements 35 may be made of steel, or like relatively rigid material, and their inner end portions 38 may be mounted in the recesses 39 in the male mold member 32 in any suitable manner as by soldering, swedging, or the like.

As shown in FIGS. 8, 9, 10, 11 and 12, the piercing elements 35 are spaced at intervals within and around the apex portion 34 of the generally conical-shaped male mold member 32 and they are preferably all disposed within the upper one-fourth (¼) of the external surface area of the male mold element 32.

In the form of the invention shown in FIGS. 8, 9, 10, 11 and 12, the piercing elements 35 extend generally parallel relative to the longitudinal axis of the male mold member 32 although, if desired, they may extend perpendicularly or at other angles relative to the external surface of the male mold member 32, as will be described further hereinafter.

Either or both of the mold members 30 and 32 may be electrically or otherwise heated, as desired, and for this purpose an electrical heating element 44 is shown as being attached to the female mold member 30 and an electrical heating element 45 is shown as being converted to the male mold member 32.

Operation

In the practice of the present invention, a disc-shaped or like blank of the relatively thick fibrous non-woven bonded batting material 23, which may be composed of adhesively bonded polyester fibers such as Kodel (Eastman) or Dacron (Du Pont) or other thermoplastic adhesively bonded fibers, is cut and shaped into the desired form and the bottom surface of the central portion 24 thereof is then sprayed or otherwise subjected to the action of a liquid vapor or gaseous coolant. For this purpose there may be employed a spray of water 36 or other coolant from a suitable spray unit 37 so as to moisten a part of the central area 24 of the blank 23 without causing the water or other coolant medium to penetrate through the entire body of the blank 23. The area of the blank 23 thus sprayed with the coolant 36 corresponds generally to the area of the external surface of the apex portion 34 of the male mold member 32 in which the piercing elements 35 are arranged, for reasons which will be pointed out hereinafter.

After the central bottom portion 24 of the blank of fibrous non-woven batting 23 has thus been sprayed with water, or like coolant, the thus sprayed blank 23 is inserted as in FIG. 8 between the male mold member 32 and the female mold member 30, whereupon the female mold member 30 is manually or otherwise lowered onto the upper surface of the blank 23, and as the female mold member 30 is further lowered it moves the blank 23 down onto the male mold member 32. During this operation the piercing elements 35 penetrate the lower portion 24 of the body of the fibrous non-woven batting blank 23, which has been sprayed with the coolant 36, until the parts assume the position in which they are shown in FIG. 15.

As the female mold member 30 is thus brought down onto the blank 23, one or both of the mold members 30 and 32 may be heated, as desired, and the blank 23 is thus shaped and molded between the male mold member 32 and the cavity 31 in the female mold member 30. During this operation the sprayed and cooled central portion 24 of the blank 23 is partially held against stretching and thinning by the engagement of the piercing elements

35 with the fibers of the fibrous non-woven batting in the sprayed and cooled central bottom portion 24 of the body of the fibrous non-woven batting blank 23.

Hence, as the molding operation continues, and is completed, a skin-like glazed crusted, relatively smooth surface 40 is molded-formed on the entire outer surface of the generally conical-shaped molded seamless brassiere pad 20, and throughout all of the inner area of the molded seamless brassiere pad 20 except the portion 24 of the inner surface of the apex portion 22 thereof, which has been sprayed with the coolant 36, and in the latter area the fluffy fibers of the fibrous non-woven batting 41 remain partially unencrusted, as is shown in FIGS. 16 and 17 of the drawings. Thus, the area 24–41 of the body of the blank 23 which has been subjected to the cooling action of water, or like coolant, does not become molded because the thermoplastic adhesive bond which is embodied in the fibrous non-woven batting material in the area 24–41 of the pad is not softened by the action of the heat and pressure to which the blank 23 is subjected during the molding operation.

The result of this is that the cone-shaped apex portion 22 of the new brassiere pad 20 is not thinned in cross sectional thickness, or stretched, or otherwise weakened during the molding operation relative to the remaining wall portions of the pad or cup, and a problem heretofore experienced in the art is thus overcome while, at the same time, no unsightly holes or like objectionable marks of the piercing elments 35 are formed in or appear in the completed molded pad 20. This is due to the fact that the piercing elements 35 engage only that part of the loosely arranged fibers 41 of the body of bonded non-woven batting material in the blank 23 which has been subjected to the action of the water spray or like coolant 36, and hence the thermoplastic adhesive bond in such fibers 41 is not softened under the action of heat and pressure during the molding operation with the result that such fibers 41 are not molded into a compact molded form but remain in their original unencrusted form, as shown in FIGS. 16 and 17.

After the completion of the molding operation the inner marginal edge or skirt portion 28 of the then molded pad form 25 (FIG. 2) is trimmed therefrom to provide the complete fully molded and shaped pad 20.

A modification of the male mold member is shown in FIG. 13 of the drawings, and those parts thereof which are similar to or correspond to parts of the male mold unit 32 shown in FIGS. 8, 9, 10, 11 and 12, are given the same reference numerals, followed by the additional and distinguishing reference character *a*.

Thus, the form of the male mold member 32*a* shown in FIG. 13 is substantially the same as that shown in FIGS. 8, 9, 10, 11 and 12, except that in this form of the invention the piercing elements 35*a* extend perpendicularly or at right angles to the external surface of the apex portion 34*a* of the male mold member 32*a* rather than vertically relative to the longitudinal axis thereof, as in the form of the invention shown in FIGS. 8 to 12, inclusive.

The new molded seamless brassiere pads 20 may take the form of so-called full brassiere pads or contour pads, and a typical form and use thereof are indicated in FIGS. 18 and 19 of the drawings, wherein one form of the new molded seamless brassiere pad 20 is shown in the form of a full inflation brassiere pad (or a contour pad) disposed within the cup 42 of a typical brassiere 43, as is well understood in the art.

A typical form of the bonded non-woven fibrous batting material which may be used in the practice of this invention is exemplified by the material which is described in an article entitled "Fiberfill—What Is It?" which appears in Corset & Underwear Review magazine for June 1965, commencing at page 154, and a suitable quality of this material for use in the practice of the present invention is that which is therein referred to as

made by Kem-Wove Industries, Inc. This material is characterized by possessing strength in all directions, high resilience, and excellent washability.

Such a material includes a mass or body of multi-directional polyester fibers which intersect each other in random fashion at numerous points and such fibers are deep bonded together at their points of intersection, by means of a suitable thermoplastic resinous adhesive bonding material which is sprayed thereon and throughout the entire body of the material, as distinguished from surface spray penetration, as is well understood in the art.

In the practice of the present invention, the bonded non-woven fibrous batting material employed in making the new brassiere pads, and as referred to hereinbefore and hereinafter, may have a binder content of from approximately thirty (30) percent to approximately fifty (50) percent and a fiber content of from approximately seventy (70) percent to approximately fifty (50) percent.

In the practice of the present invention, the temperature of the female mold member **30**, or of the male mold member **32**, as desired, during the molding operation illustrated in FIGS. 8 to 12, inclusive, is preferably maintained in the order of from about 200° F. to about 450° F. depending, in part, upon the particular bonded non-woven fibrous batting material employed in making the new molded seamless brassiere pads, the characteristics desired in the resulting brassiere pad including its relative thickness, hardness, the glaze to be imparted to its outer surface, and other characteristics.

In making so-called full brassiere pads in accordance with the practice of the present invention, the bonded non-woven fibrous batting **20** employed in the blank **23** may have an initial thickness in the order of from about ⅝" to about 1" prior to the molding operation, and after the forming or molding operation the thickness of the molded body **21** of the pad **20** is preferably in the order of from about ⅜" to about ⅝".

In making the so-called contour molded seamless brassiere pads in accordance with the practice of the present invention, the initial thickness of the bonded non-woven fibrous batting employed is preferably in the order of from about ⅜" to about 1" and the preferred thickness of the finished molded contour seamless brassiere pad after the completion of the molding operation is in or about ⅛" to about ¼".

It will thus be seen from the foregoing description, considered in conjunction with the accompanying drawings, that the present invention provides new and improved molded seamless brassiere pads, and a new and improved apparatus and method for forming the same, and that the invention thus has the desirable advantages and characteristics, and accomplishes its intended objects, including those hereinbefore pointed out and others which are inherent in the invention.

I claim:

1. A molded seamless brassiere pad formed from a blank of non-woven bonded fibrous batting, cut, shaped and molded to provide

(a) a generally conical-shaped body having
  (1) an open inner end portion;
  (2) a closed outer apex portion;
(b) the said generally conical-shaped body having
  (1) a glazed skin-like outer surface;
  (2) a glazed skin-like molded inner surface extending throughout its inner surface; and
  (3) at least a part of the said apex portion of the said inner surface of the said generally conical-shaped body having
    (a) an unencrusted area.

2. A molded seamless brassiere pad as defined in claim **1** in which the said unencrusted area of the inner surface of the said apex portion of the said generally conical-shaped body is composed of

(a) unencrusted fibers which are embodied in the blank of bonded non-woven fibrous batting of which the said molded seamless brassiere pad is formed.

3. A molded seamless brassiere pad as defined in claim **1** in which the said non-woven bonded fibrous batting is composed of

(a) polyester fibers bonded together by a
(b) thermoplastic resinous adhesive bonding material.

4. A molded seamless brassiere pad as defined in claim **1** in which the said non-woven bonded fibrous batting is composed of

(a) a mass of multi-directional polyester fibers intersecting each other; and in which
(b) the said polyester fibers are bonded together at their points of intersection by means of
  (1) a thermoplastic resinous adhesive bonding material.

5. A molded seamless brassiere pad as defined in claim **1** in which

(a) the said unencrusted area extends throughout approximately one-fourth (¼) of the area of the said inner surface of the said apex portion thereof.

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U.S. Cl. X.R.

18—35