ART OF MAKING PREFORMED DEPOSITED BRASSIERES 7 Sheets-Sheet 1 Filed Aug. 9, 1952 INVENTOR.

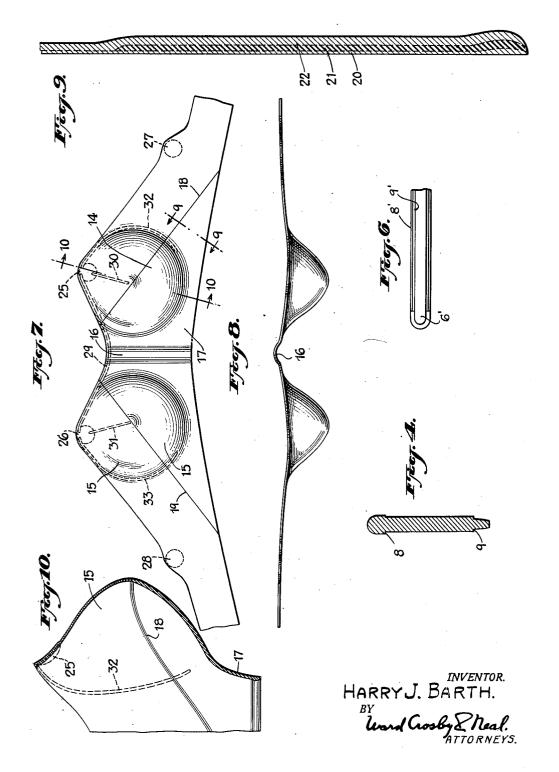
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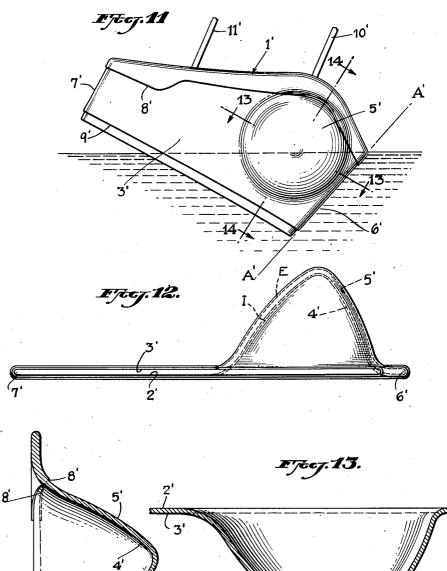
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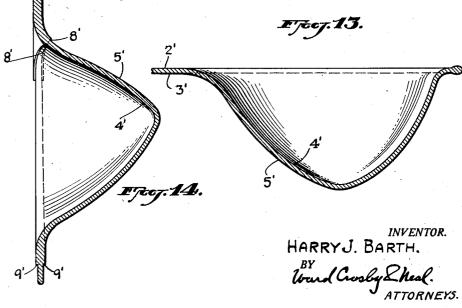
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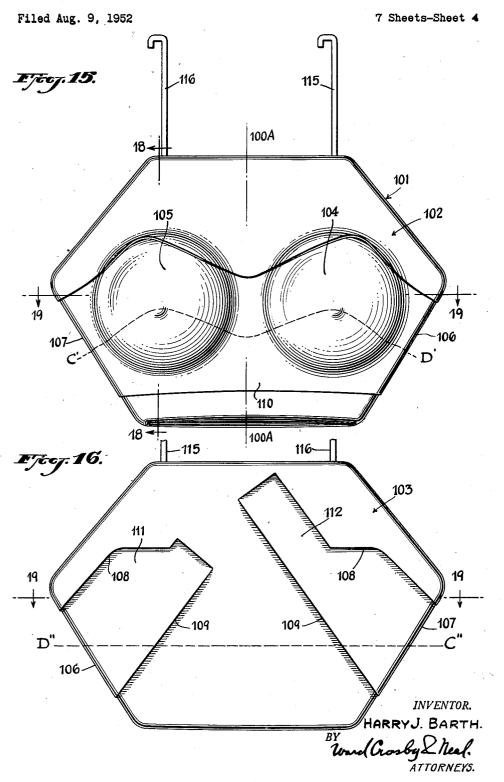
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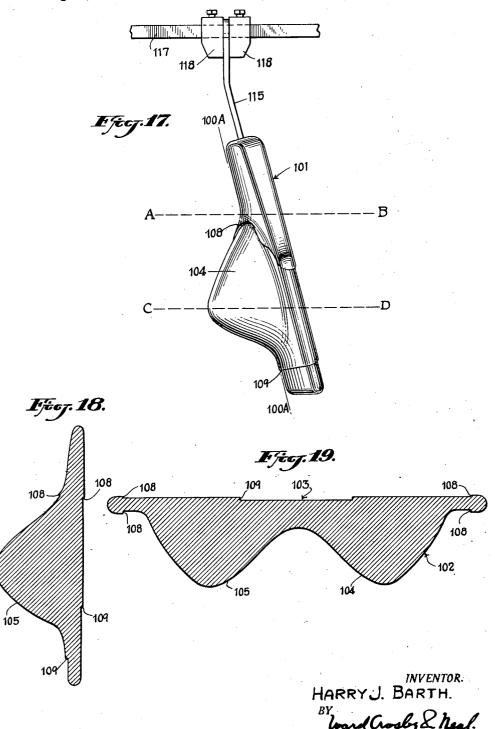
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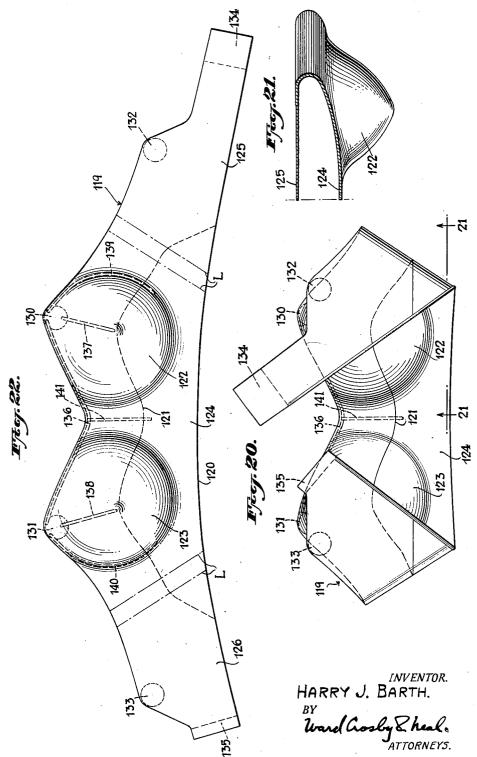




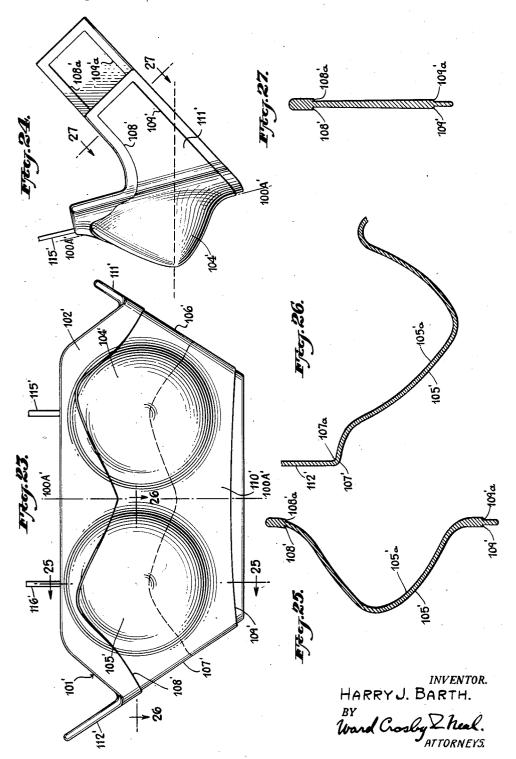
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United States Patent Office

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ART OF MAKING PREFORMED DEPOSITED BRASSIERES

Harry J. Barth, Dover, Del., assignor to International Latex Corporation, Dover, Del., a corporation of Delaware

Application August 9, 1952, Serial No. 303,503 3 Claims. (Cl. 18—41)

This invention relates to the art of making preformed deposited brassieres from suitable film forming liquids, such for example as rubber latex. While certain features of the invention are deemed useful in making deposited brassieres in general the invention is especially directed to the making of brassieres made of rubber latex.

The term "latex" is used herein in its broad sense and is intended to comprehend natural rubber latex, synthetic rubber latex, or latices or dispersions of any rubber-like material, or a combination of two or more of the same with or without suitable additional ingredients.

While the functional requirements of brassieres have long been known the structure for meeting these requirements is far from simple and has resulted in compromise in one or more respects. It has been and is common in the various forms and types of prior brassieres to make a mosaic garment of pieces of greatly varying characteristics to meet these functional requirements. In the copending application of Lois A. Spanel, Harold A. Owen, and Harry J. Barth, Serial No. 303,501, filed on even date herewith, for "Preformed Latex Brassieres," there is disclosed and claimed a preformed latex brassiere having the desirable characteristics.

The present invention provides suitable apparatus and method for producing such brassieres in an economical and practical manner.

An object of this invention is to provide an economical method of making a preformed deposited brassiere having the desired characteristics.

Another object is to provide a method of making a unitary preformed deposited brassiere relatively elastic throughout its major area and whose elasticity is inhibited in limited zones.

Another object is to provide a form suitable for carrying out said method.

A further object is to provide a form suitable for 50 fashioning a preformed deposited brassiere.

The invention consists in the novel features of forms on which brassieres of the character described may be deposited and the method of making said brassieres.

Further objects and advantages will be more apparent 55 from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view showing one face of a form suitable for carrying out the method;

Fig. 2 is a similar view of the opposite face of the form 60 shown in Fig. 1;

Fig. 3 is a bottom plan view of the form shown in Figs. 1 and 2;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a view similar to Fig. 1 showing the form supported in dipping position and indicating two dipping levels employed in the preferred process;

Fig. 6 is a bottom plan view of the rear end of a

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modified form, otherwise the same as Fig. 3, for making a brassiere which is discontinuous girthwise;

Fig. 7 is a front elevational view of a brassiere body made according to may invention with the rear portions folded out into the plane of the front panel and with parts of the same broken away;

Fig. 8 is a top plan view of the development of the brassiere as shown in Fig. 7;

Fig. 9 is a cross-sectional view taken on line 9—9 of 10 Fig. 7, greatly enlarged to emphasize certain features;

Fig. 10 is a cross-sectional view taken on line 10—10 of Fig. 7;

Fig. 11 is a view similar to Fig. 1 but showing a somewhat different form;

Fig. 12 is a bottom plan view of the form shown in Fig. 11;

Figs. 13 and 14 are cross-sectional views taken on the respective lines 13—13 and 14—14 of Fig. 11;

Fig. 15 is a front elevational view of a modified type 20 of form made in accordance with the invention;

Fig. 16 is a rear elevational view of the form shown in Fig. 15;

Fig. 17 is a side elevational view of the form shown in Figs. 16 and 17 illustrating the means of supporting the 25 form in dipping position;

Fig. 18 is a horizontal cross-sectional view taken on line 18—18 of Figs. 15;

Fig. 19 is a vertical cross-sectional view taken on line 19—19 of Fig. 15;

Fig. 20 is a rear elevational view of a brassiere in the folded position as deposited on the form shown in the preceding figures;

Fig. 21 is a sectional view taken on line 21—21 of Fig. 20:

Fig. 22 is a front elevational view of the brassiere shown in Fig. 20, with the rear portions folded out into the plane of the front panel;

Fig. 23 is a front elevational view, similar to Fig. 15, but showing a modified type of the form shown in Fig. 15, and is illustrative of another embodiment of the invention;

Fig. 24 is a side elevational view of the form shown in Fig. 23 supported in dipping position similar to that shown for the previous embodiment illustrated in Fig. 23; and

Figs. 25, 26 and 27 are cross-sectional views taken on respective lines 25—25, 26—26 and 27—27 of Fig. 24.

Referring to the drawings and more especially to Figs. 1-3, a form made in accordance with this invention is designated in general as 1 and is provided with respectively opposite faces designated in general as 2 and 3 which are substantially identical and are symmetrical about a plane passing through the line X-X (Fig. 3). The opposite faces 2 and 3 are provided with brassiere cup forming portions, such as the protuberances 4 and 5 disposed closely adjacent the front end 6 and extending outwardly in opposite directions. As can be seen from the drawing, protuberances 4 and 5 are generally conically shaped and their axes are perpendicular to the respectively contiguous planar surfaces. The other or rear end 7 extends a substantial distance beyond said protuberances 4-5. A brassiere generating surface is formed continuously around said faces 2-3 and interconnecting ends 6-7 and is defined in any suitable manner, such as by an outwardly extending shoulder or lip 8 at its upper edge and by an inwardly extending shoulder or undercut portion 9 at its lower edge. This generating surface includes the protuberances and corresponding body panels disposed on respectively opposite faces and joined together around the ends 6-7 to jointly form the girthwise extent 3

of the brassiere. The forward end 6 forms the zone of the front panel of the brassiere intermediate the cups and the end 7 is spaced therefrom a distance to provide for a girthwise length required for the desired size.

It will thus be seen that each of the faces 2—3 provides a part of the generating surface for forming a brassiere cup and a body panel portion including a part of the front panel of the brassiere body and an interconnected portion of the side and back of the brassiere body.

In Fig. 6 I have shown the modified rear end of the 10 form shown in Fig. 3 to illustrate how the form may be adapted in the event that it is desired to make a brassiere which is discontinuous girthwise, such for example as one in which the panel portions extending rearwardly from the front panel are provided at their terminal ends with suitable fastening means, such as hooks and eyes. Where this type of brassiere is desired the brassiere generating surface may be terminated at the end. For example, the end 6' may be extended beyond the upper and lower shoulder, such as 8' and 9' and be of such thickness as to form an end shoulder transverse to the shoulder 8'.

In order to facilitate the carrying out of the process of this invention the form 1 is provided with supporting hooks or struts, such as 10 and 11; the forward strut 10 being substantially longer than the rear strut 11 so that when the form is supported on bars, such as 12-13 (Fig. 5), the form will be suspended with its forward end lowermost and its rear end inclined upwardly in a substantially vertical plane. In this position the axis A-A of the form (Fig. 5) will be inclined forwardly to the vertical, the axis A-A being disposed along the generating surface at about the center between the cup generating surface portions 4 and 5. The reason for this will be more apparent from the description of the process given below. It is of course understood that other means for supporting the form in the desired position may be employed, such for example as making the supporting struts of the same length and having the forward supporting rail at a lower level than the rear supporting rail.

METHOD

In the carrying out of the preferred method the form 1 (Fig. 5) is first dipped into a bath of relatively low modulus of elasticity latex compound of the character well known for depositing latex film, to a sufficient depth to cover the 45 brassiere generating surface of the form so as to deposit a film or layer of latex of suitable thickness say about .003". If desired, the liquid latex compound for this dip may be the composition for the brassiere described and claimed in Harry J. Barth copending application Serial No. 303,504, filed on even date herewith, for "Deposited Latex Brassiere." The latex level for this dip is indicated by the line A-B (Fig. 5). In the event that reinforcing inserts are desired, such as patches, tapes, threads, etc., these are preferably first coated with latex and may be 55 placed in desired position on the first layer or on the form prior to the first dip. The form with the over-all layer of latex film deposited thereon is then dipped into a suitable liquid to the depth indicated by the lines C-D (Fig. 5) and while supported in the inclined position indicated so 60 that the lower portion of the previously deposited latex film is coated. The portion thus covered by the second last mentioned dip covers only a limited zone comprising lower segments of the cups, preferably not more than about one-half the cup areas, and the adjacent panel areas. 65 This liquid is of a character adapted to modify the modulus of elasticity of the limited zone in the finished body. In the preferred embodiment this liquid produces a film of a higher modulus of elasticity than the previous over-all dip in order to provide a layer in this limited zone having 70 substantially more resistance to stretch than remaining portions of the brassiere. The thickness of the additional deposited layer in this limited zone varies as is hereinafter explained and for an average size may provide an aggregate thickness at this stage of say about .012".

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The following formula is given by way of example of a suitable high modulus latex compound:

	Parts dry we	ight
	Centrifuged latex	100
•	"Kralac" 1 latex	25
	Potassium hydroxide	
	Sulfur	1.0
	Zinc oxide	
n	Tetramethyl thiuram disulfide	1.0

A trade name (of Naugatuck Chemical Co.) for high styrene synthetic latex comprising about 85% styrene and 15% butadiene. Another high styrene synthetic latex of similar properties is sold under the trade name of "Pliolite" (Goodyear Tire & Rubber Company).

The potassium hydroxide is added in about 20% water solution and the sulfur, zinc oxide, and tetramethyl thiuram disulfide are added in conventional water dispersions known in the art.

It should be understood that other known methods of preparing a high modulus film might also be used, such as the incorporation of about 20 parts colloidal silica (e. g., "Ludox" as marketed by the du Pont Company), or 15 parts of a suitable water compatible formaldehyde resin, such as urea-formaldehyde, in place of the "Kralac" latex given in the formula above.

Next the form containing the two layers above referred to is dipped in latex, such as that used for the first dip, to a sufficient depth to provide an over-all deposit, i. e., to the level A-B (Fig. 5) up to final gauge. For example, the brassiere wall thickness should be made as thin as possible, consonant with the functional requirements. In the smallest size where such requirements are of a minimum, a wall thickness of about 0.012" may be used whereas in the larger sizes a desirable wall thickness might extend to 0.018" or more. In the smaller sizes the limited zone containing the higher modulus material may have a total thickness, including the lower modulus latex, of about 0.017" whereas in the largest size the total thickness requirement might extend to 0.043". These dimensions are exclusive of any lining added thereto. Further factors which bear on the latex wall thickness are its tear resistance and the ability to withstand the deleterious secretions of the upper portion of the female body as is taught in the said copending application of Harry J. Barth "Deposited Latex Brassieres." The desired thicknesses may be provided either by a larger number of thin coats or a lesser number of thicker coats, as is well understood in

Obviously the sequence of steps may be varied within the scope of this invention. It is also to be understood that the coating in the limited zone may be latex of the same character as that in the over-all coating but the additional thickness required to provide the restriction in stretch and produce the desired stiffness would be undesirable both because of its appearance and its discomfort.

In Figs. 7 and 8 the general outline and contour of the dipped brassiere is illustrated with the parts formed on the two faces of the form being folded out into a common plane. From this it will be seen that the thickened area is limited to lower segments of the cups, such as 14.15, and the interconnecting section of the panel comprising a median panel portion 16 intermediate the segments 14-15 and a marginal portion 17 extending below the segments 14-15 for a girthwise extent covering the front panel of the brassiere and extending in opposite directions slightly beyond. In front elevation, as shown in Fig. 7, the thickened zone takes the general form of an isosceles triangle whose base substantially coincides with the lower marginal edge of the brassiere and whose sides 18-19 if extended would intersect above the upper marginal edge of the brassiere and preferably pass over the cups at or below their center zones.

In the present embodiment the dipped brassiere body as taken from the form is turned inside out as shown 75 in Fig. 8 and this results in the slight rearward depres-

sion in the zone 16 intermediate the cups, due to the curvature on the front end 6 of the form. This feature is deemed desirable. In Fig. 9 there is shown an exaggerated enlargement of a section taken through the thickened area and in which the first dip above referred to is designated 20. The thickened area of the limited zone is designated 21 and the remaining over-all layer is designated 22.

A preferred brassiere body made in accordance with the apparatus and method previously described has fabric 10 reinforcements and stretch restricting members imbedded in the deposited latex in the manner previously described and arranged in the places now to be described. Patches, such as 25—26 (Fig. 7), are secured at the upper marginal edge of the front portion in substantial alignment 15 with the respective centers of the cups to provide points of attachment for the forward ends of shoulder straps (not shown). Similar patch reinforcements 27—28 are provided at the upper edge of corresponding rear portions to provide points of attachment for the rear ends of the respective straps. The ends of the straps may then be sewed to the respective points of attachment.

To prevent undesirable stretch at the upper marginal edge of the front panel between the attachment zones 25 and 26 the normal elasticity of this portion of the relatively elastic latex is inhibited in a narrow marginal zone as by a thin narrow strip 29 of suitable material, such as nylon, whose opposite ends overlay the respective patches 25-26. Similar strips 30 and 31 have their upper ends anchored to and extend downwardly from 30 said points of attachment along the center line of the respective cups and terminate at the central zone or apex and closely adjacent the upper edges 18 and 19 of the lower cup segments. Similar strips 32 and 33 have their upper ends anchored to respective patches 25 and 26 35 and extend along arcuate paths around the outer base portions of the respective cups and slightly overlap the area of stiffening whose corresponding edges are defined by the lines 18 and 19. Further details as to the brassiere per se and the character of the reinforcing and 40stretch inhibiting members, etc., are more fully set forth in the aforesaid Barth and Spanel et al. applications.

VARIATION OF FORM (FIGS. 11-14)

In Figs. 11-14 I have shown a variation of the form 45 above described with reference to Figs. 1-5. In view of the many similarities between this form and that shown in Figs. 1-5, the detailed description need not be repeated and to facilitate a ready comparison the same numerals have been used for respectively corresponding 50 parts with the prime (') suffix added. In this embodiment the form is generally designated as 1'. The chief difference between this and the previously described embodiment is that instead of having oppositely facing protuberances providing the generating surface portions for 55 forming the respective cups the present embodiment has a hollow portion with a relatively thin wall the exterior or convex surface 5' of which provides the generating surface portion for one cup and the interior or concave surface 4' of which provides the generating surface por- 60 tion for the other cup. These two cup generating portions are interconnected around the end 6' (Fig. 12) to form the portion of the brassiere body intermediate the cups and the surfaces of the side panels 2' and 3' are interconnected around the opposite end 7'. Likewise, the 65 generating surface is defined at its upper edge by the shoulder 8' and at its lower edge by the shoulder 9': all in a manner quite similar to the arrangement heretofore described relative to the embodiment of Figs. 1-5. The method of using this form is substantially identical 70 to that previously described; the form axis A'—A' being inclined during the dipping of area A'.

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The position of a deposited body on the form is clearly seen in Fig. 12 in which the dipped article is shown on the form.

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From this it will be seen that the cup on the exterior surface is designated E and the cup on the interior surface is designated I. When the brassiere is stripped of the form the cup I is merely turned inside out and assumes the natural position of the cups in general contour similar to the contour of the form shown in Fig. 3. While the cup I is somewhat smaller than the cup E, due to the wall thickness of the form, this difference may be minimized by making the form wall relatively thin, and this may be readily done by making the form of metal, plastic, etc. An advantage of such a hollow form is that the hollow portions of these forms have the cup forming portions projecting from only one side and additionally may be partially nested so that many more forms of this type may be accommodated in a given size tank than is the case with the forms of Figs. 1-5.

MODIFIED FORM (FIGS. 15-22)

Apparatus

Referring to the drawings and more especially to Figs. 15-16, a form made in accordance with this invention is designated in general as 101 and is provided with front and rear faces designated in general as 102 and 103, respectively. The front face 102 is provided with brassiere cup forming portions, such as the protuberances 104 and 105, extending outwardly in the same direction. This front face may be described as a generally flat body from which the breast shaped cups 104 and 105 extend outwardly, the axes of these cups being substantially normal to the flat body. A brassiere generating surface is formed continuously around said faces 102-103 and interconnecting ends 106-107 and is defined in any suitable manner, such as by an outwardly extending shoulder or lip 108 corresponding to the upper edge of the brassiere to be formed and by an inwardly extending shoulder or undercut portion 109 corresponding to the lower edge of the brassiere to be formed. This generating surface includes the portions 104-105 and corresponding body panels disposed on respectively opposite faces and joined together around the ends 106—107 to jointly form the girthwise extent of the brassiere. Referring to Figs. 15 and 16, it will be seen that the front face 102 of the form contains that portion of the generating surface designated 110 corresponding in general to the front panel of the brassiere and comprising the two cup portions, while the rear face of the form comprises portions of the generating surface designated 111 and 112 and corresponding to the opposite ends of the brassiere adapted to extend over the rear of the body. The front portion 110 is interconnected at its opposite sides around the rounded edges 106 and 107 of the form with the respective rear face portions 111 and 112. In this connection, it is particularly noted that the form edges 106 and 107 are inclined at substantial angles downwardly and inwardly toward each other and the rear face portions 111 and 112 of the generating surface which act as strap-forming surfaces extend upwardly in a direction generally normal to the edges. As a consequence the strap-forming surfaces 111 and 112 are directed upwardly out of horizontal alignment with a line passing through the axes of the breast cups. Each of arcuate or rounded edges 106 and 107 smoothly merge into and connect a lateral end of the front face of the form with a strap-forming surface. The purpose of this is to place the major length of portions 111 and 112 above the corresponding portions on the front face, for reasons apparent from the description of the method to be given below.

The form 101 (Figs. 15 and 17) is provided with supporting struts 115 and 116 provided with hooks at their upper ends for engaging suitable supporting bars, such as 117, provided with spaced lugs, such as 118, for holding the engaging end of struts against tilting.

75 The struts are bent or offset (Fig. 17) with the result that

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when supported in the manner described the form 101 is held at a substantial angle so that its axis be inclined forwardly from the vertical. The purpose of this will be more particularly pointed out below.

Method

In carrying out the method with this type of form the same procedure is followed as above set forth with respect to Figs. 1-9. The form 101 (Fig. 17) is first dipped into the bath of relatively low modulus latex 10 compound to a sufficient depth to cover the brassiere generating surface of the form so as to deposit a film or layer of latex as heretofore described. For this dip the form obviously need not be inclined, but for convenience it is preferable to maintain it in inclined 15 position for all dips. The latex level for this dip is indicated by the line A—B (Fig. 17). In the event that reinforcing inserts are desired, such as patches, tapes, threads, etc., these may be applied as heretofore described. The form with the over-all layer of latex film 20 deposited thereon is then dipped into the high modulus latex bath to the depth indicated by the lines C-D (Fig. 17) and while supported in the inclined position indicated so that the lower portion of the previously deposited latex film is coated. The portion thus covered 25 by the second last mentioned dip covers only a limited zone comprising lower segments of the cups, preferably not more than one-half the cup areas, and the adjacent panel areas. In view of the fact that the form is held at a forwardly inclined angle, the upper limit of this dip 30 follows a contour line, such as that designated C'-D', on the front face of the form (Fig. 15) and a contour line, such as that designated C"—D", on the rear face. The upper extent of this dip may of course be varied as desired. The layer thus deposited in the limited zone 35 is sufficient to bring the aggregate thickness up to the desired gauge, as hereinabove set forth.

Next the form containing the two layers above referred to is dipped in latex, such as that used for the first dip, to a sufficient depth to provide an over-all deposit, i. e., 40 to the level A—B (Fig. 17) up to final gauge as described above.

In Figs. 20, 21 and 22 the general outline and contour of the dipped brassiere is illustrated. Figs. 20 and 21 show the deposited brassiere in the folded position corresponding to that while on the form; while Fig. 22 shows the brassiere corresponding to the two faces of the form being folded out into a common plane. From this it will be seen that the thickened area is limited to that zone extending between the lower edge 120 (Fig. 22) and the line 121. This area includes lower segments of the cups, such as 122-123, and the section of the panel comprising a panel portion 124 which joins the segments 122-123 and extends along the lower margin beyond the segments 122-123 for a girthwise extent covering the front panel of the brassiere and extending in opposite directions slightly beyond, i. e., over the portions deposited on the ends 106-107 of the form as indicated by the lines L (Fig. 22) and for a short distance into the portions 125 and 126. It will thus be seen that the thickened area defined by the lower margin 120 and line 121 includes a lower central area inhibited as to stretch and providing increased support in the lower cup segments to an extent preferably terminating at or below the apexes. The remaining area including the entire width of the upper front panel and the major length of the outwardly extending body encircling portions 125 and 126 are much more readily stretchable.

By way of illustration of the reinforcing and stretch inhibiting inserts above referred to, reference is made to Fig. 22. Suitable patches 130, 131, 132 and 133 may be inserted at points of attachment for shoulder straps (not shown). At the outer ends of the strap portions 125 and 126 suitable pieces 134 and 135 serve as reinforce-

ments for hooks and eyes or other suitable fastening means (not shown). Along the upper edge a strip 136 is shown having its opposite ends anchored to the patches 130—131. Strips 137—138 are provided along substantially the center line of the cups and preferably terminate at about the apex, closely adjacent to the line 121. Similar strips 139 and 140 have their upper ends anchored to the respective patches 130 and 131 and extend downwardly along curved paths at the base of the cups with their lower ends extending over the line 121 into the thickened zone. Strip 141 also connects strip 136 to the thickened zone.

MODIFIED FORM (FIGS. 23-27)

Apparatus

Referring more particularly to Figs. 23-27: the embodiment of the invention shown in general is similar to the type of form shown in Figs. 15-17. To facilitate an understanding of this modification and its points of similarity with the said previous embodiment, similar parts will be designated with corresponding numerals with the added prime (') suffix.

The form is designated in general as 101' whose front face is designated 102'. In this embodiment the form is constituted of relatively thin material which may be metal, plastic, or ceramic. The cup forming portions are designated as 104' and 105' and are shown extending forwardly from the front wall 102'. A brassiere generating surface is formed across the front face 102' and around the respectively opposite edges 106'—107' and thence along the rearwardly and upwardly extending wings on which are provided surface generating portions 111' and 112', respectively. These rearwardly and upwardly extending portions correspond in function to the portions on the rear face of the portions 11 and 12 on the rear face of the embodiment as shown in Fig. 16, and are arranged and disposed in such manner as to effect the same dipping contour. The brassiere generating surface is defined by the outwardly extending shoulder or lip 108' corresponding to the upper edge of the brassiere to be formed and by an inwardly extending shoulder or undercut portion 109' corresponding to the lower edge of the brassiere to be formed. As will be seen from Figs. 23-27, this generating surface includes the cup forming portions 104'-105' and the front and rear body panels which together form the girthwise extent of the brassiere. The form is provided with supporting struts 115'-116' which are offset (not shown) in a manner identical with that previously shown and described with reference to the embodiment of Fig. 17, so as to support the form in the position shown in Fig. 24 tilted with its axis 100A'-100A' inclined to the vertical.

In this type of form it is possible to make one brassiere on the front or exterior surface and another brassiere on the rear or interior surface and it will be understood that a corresponding and similarly disposed brassiere generating surface may be provided on the rear surface. This will be clearly understood from an examination of Figs. 25-27 from which it will be seen that the rear generating surface is defined between the upper shoulder 108'a and the lower recessed portion 109'a.

The form shown in Figs. 23-27 is used in a manner quite similar to that above described with reference to Figs. 15-19 and the brassieres resulting from the use of the form shown in Figs. 23-27 are substantially the same as those shown in Figs. 20-22; hence these particulars need not be reported.

Having thus described my invention with particularity with reference to certain presently preferred apparatus and certain modifications thereof and in connection with the preferred method, and having referred to other possible modifications, it will be obvious to those skilled in the art, after understanding my invention, that various other changes and modifications may be made therein without departing from the spirit and scope of the invention, and

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I aim in the appended claims to cover such changes and modifications as are within the scope of the invention.

What I claim is:

1. A form for making a brassiere by deposition of suitable film forming liquid material thereon, which comprises a generally flat body having breast shaped cups extending outwardly from the front of said body, the axes of said cups being substantially normal to said flat body, strap-forming surfaces on rearward portions of said body directed upwardly out of horizontal alignment with a line passing through the axes of said breast cups, said body having side arcuate portions, each of which smoothly merge into and connect a lateral end of the front of the body with a strap-forming surface.

2. The form of claim 1 in said strap-forming surfaces 15 are rearwardly disposed on a plane generally parallel to

the front of said body.

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3. The form of claim 1 in which the front of said body, when in dipping position, is inclined rearwardly and downwardly at a substantial angle.

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