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 [33] **Great Britain**  
 [31] **48738/67**

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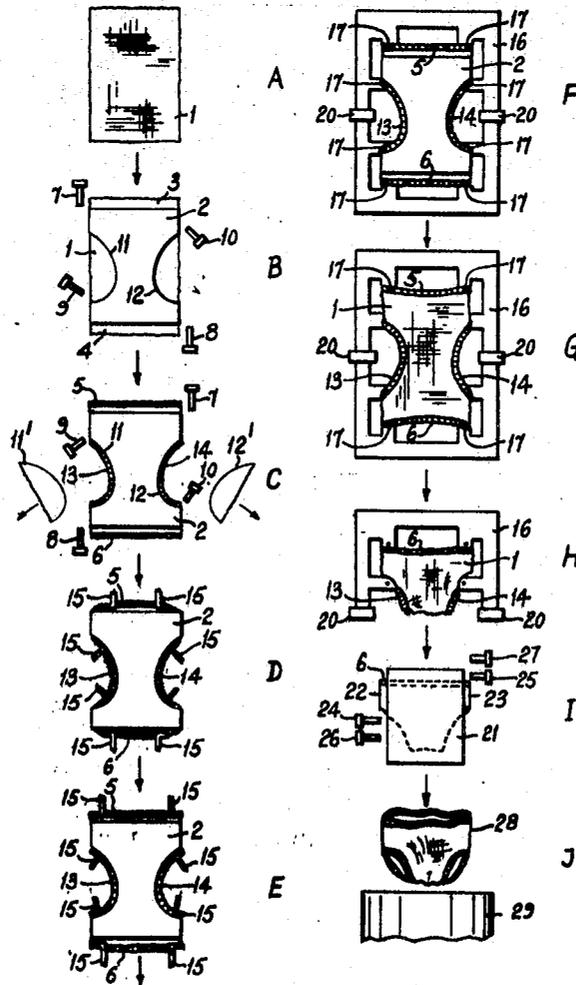
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[54] **WEARING APPAREL**  
 7 Claims, 3 Drawing Figs.

[52] U.S. Cl. .... 2/224,  
 2/243  
 [51] Int. Cl. .... A41b 9/04  
 [50] Field of Search ..... 2/224 A,  
 224, 243, 225, 226; 112/121.12; 128/288

**ABSTRACT:** A continuous process for manufacturing briefs in which a flat blank is formed having side edges with leg-shape cutouts and end edges destined to form the waist. Elastic is bound to the leg holes and the end edges under controlled tension, and the blank is folded and the sides joined to form the garment.



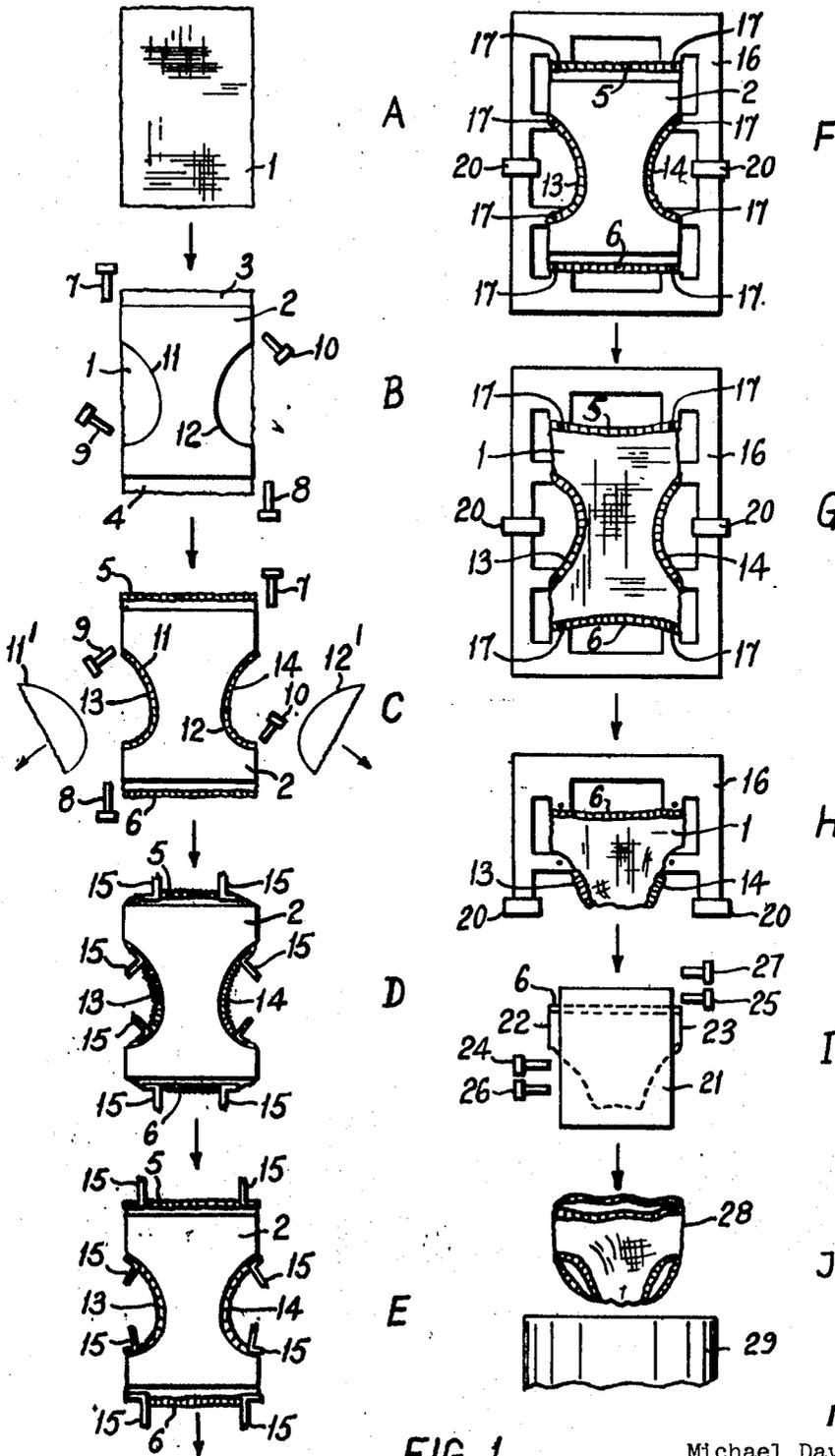


FIG. 1.

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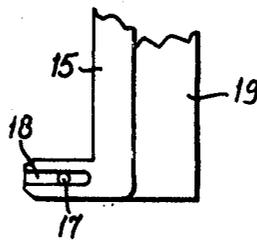


FIG. 2

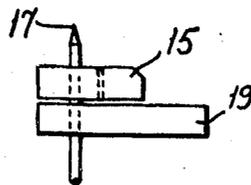


FIG. 3

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## WEARING APPAREL

This invention relates to wearing apparel and in particular to a continuous process for the manufacture of briefs which hitherto have been made up by semimanual methods.

According to the present invention, a continuous process for the manufacture of briefs from substantially rectangular fabric pieces comprises forming a blank by cutting out portions from opposite sides of each piece to form leg-shape margins, fixing an elastic strip under tension to each leg-shape margin and to each of the opposite ends of the piece, then, with each elastic strip held in a stretched state sufficient to prevent any significant puckering of the fabric adjacent to the elastic strips, folding the piece about a line passing through the leg-shape margins to bring the ends of the piece into overlying relationship and joining the edges of the overlying sides to form the hip-clinging portions of the garment.

The expression "briefs" includes not only those women's undergarments which are also known as "panties" but also includes babies' pants and like articles having elastic strips at the waist and leg holes.

The expression "fabric piece" includes pieces of textile fabrics such as knitted, woven or nonwoven fabrics formed from natural or synthetic fibers or mixture thereof or pieces of films of synthetic plastics or cellulosic materials which are either plain or are perforated or embossed to simulate textile fabrics.

The piece may have two parallel end edges and two side edges substantially parallel to each other and orthogonal to the end edges.

The textile fabrics are preferably stretch fabrics, that is formed of stretch yarns which confer upon the fabrics an appreciable degree of elasticity and permit briefs formed therefrom to cover a large range of sizes without the necessity to alter the basic unstretched size of the garment. This reduces the number of interchangeable machine parts required to cover the whole range of sizes of briefs.

The fabric pieces may conveniently be cut from a roll at the start of the continuous process or they may be previously stacked in cut form.

For the cutting out of the portions from the fabric piece to form the leg-shape margins and for the operation of attaching the elastic strips by sewing or other means to the leg-shape margins and to the ends, the piece may conveniently be clamped in a flat state between two plate members with marginal portions of the piece exposed at the periphery of the plate members. The cutting out of each portion may be carried out by shaped guillotinelike knives but is conveniently carried out by a knife carried as a forward attachment upon a travelling thread-stitching machine which is guided by a template or other mechanism along a predetermined path and which sews the elastic strip to the newly formed leg-shape margin. Similarly, a travelling thread-stitching machine may be used for sewing an elastic strip to each end of the piece. Conveniently, the end may be trimmed immediately prior to an elastic strip being attached, this trimming being effected with a knife mounted as a forward attachment upon the thread-stitching machine.

The elastic strips fastened to the leg-shape margins and to the ends of the fabric piece are tensioned while undergoing fastening to the piece to ensure that when released they confer the property of elasticity and cling to the waistline edge and leg-hole edges of the finished garment. This tensioning, however, has the disadvantage that when the elastic strips are released and relax, they pucker the fabric so that the piece cannot lie flat and consequently cannot readily be folded into an edge to edge relationship as required for the next joining operation. It is therefore an important feature of the invention that during at least the folding operation, each elastic strip is held in a stretched state sufficient to eliminate any significant puckering of the fabric so that the piece can be smoothly folded to bring the ends and the sides together in a neat flat overlying relationship.

Each elastic strip fitted under tension to the leg-shaped margins and to the opposite ends of the piece may be maintained in the stretched state after being fastened under tension to the piece, for the folding and sides-joining operation. Alternatively, each elastic strip may be permitted to relax after being fastened to the piece and is then brought to a stretched state prior to the folding and sides-joining operation to eliminate puckering of the piece during folding. In one preferred form of the invention, each elastic strip is stretched longitudinally to the required degree by grippers which grip the elastic strip adjacent each end and then move outwardly. The fabric piece is then transferred to a folding frame member having holding means mounted thereon which hold the elastic strips and maintain them in the stretched state during the folding operation. The frame member is conveniently made in two parts which may be hinged so that the piece can be folded as required. Convenient holding means for holding the elastic strips in the required stretched state are pins which pierce the elastic strips. Other holding means such as clamps, toothed bars or serrated bars may be used.

For the operation of joining the edges of the overlying sides it is preferable to clamp the pieces between two suitably shaped plates with the edges to be joined extending from the edges of the plates. The clamping is carried out while the elastic strips are still held by the holding means and then the holding means are withdrawn.

The joining of the elastic strips to the piece and the joining of the edges of the overlying sides are conveniently carried out by sewing. However, joining may be carried out by other means, such as by the use of adhesive, or if the fabric piece is thermoplastic, for example thermoplastic film, joining of the elastic strips and/or joining of the edges of the overlying sides may be carried out by heat welding.

One method of manufacturing briefs in accordance with the invention will now be specifically described with reference to the accompanying drawings, in which:

FIG. 1 is a series of diagrammatic plans of the processing steps of the method,

FIG. 2 is a plan of a gripper, and

FIG. 3 is a front elevation of FIG. 2.

Referring to FIG. 1, a rectangular piece 1 of stretch textile fabric is provided at step A, either by severance from a continuous roll of material or from a stack of pre-cut pieces. The piece 1 is brought to step B and clamped between two shaped plates 2 of which only the upper plate 2 can be seen in the drawing. The piece 1 is brought to the plates 2 by a transporting plate (not shown) or by one of the plates 2 to which it is held by suction or by outwardly inclined retractable pins, during the move.

Portions 3, 4 of the piece 1 protruding from each end of the plates 2 are trimmed and elastic strips 5, 6 (step C) are sewn under tension to the edge of each portion 3, 4 by three or four thread-stitching machines 7, 8 carrying cutters (not shown) immediately before the stitching needles. At the same time (step B) two similar three or four thread-stitching machines 9, 10 with cutters (not shown) and with a supply of elastic strip are caused to follow the profile of cutouts 11, 12 in the plates 2 whereby leg-shape margins are formed in the piece 1 and are edged with elastic strips 13, 14 under tension as shown at step C. Waste fabric cutouts 11', 12' are drawn away by suction means (not shown) in which the suction effect can be adjusted as required to ensure efficient removal of the cutouts 11', 12' without undesirable stretching and displacement of the fabric in front of the cutters. On severance of the elastic strips 5, 6, 13, 14 from the supply at the thread-stitching machines 7, 8, 9, 10, the strips 5, 6, 13, 14 relax and pucker the portions of the piece 1, to which they are sewn, as far as the plates 2 allow. If the plates 2 were removed, the piece 1 would curl considerably under the influence of the relaxed elastic strips 5, 6, 13, 14.

At step D, the relaxed strips 5, 6, 13, 14 are each gripped by pairs of grippers 15 near the ends of the strips 5, 6, 13, 14 and the grippers of each pair are then moved apart (step E) to stretch the strips 5, 6, 13, 14 until puckering is removed.

The piece 1 is now transferred to a center-hinged folding frame 16 having eight pins 17 which pierce the elastic strips 5, 6, 13, 14 held in the grippers 15 through slots 18 (shown in FIGS. 2, 3) formed in the grippers 15 and associated baseplates 19 (step F). The grippers 15 then relax and slide away from the pins 17 and the plates 2 are removed leaving the piece 1 pinned with the elastic strips 5, 6, 13, 14 in a tensioned state to the frame 16 as shown at step G.

The piece 1 is then folded along a line passing through the leg-shape margins by folding the frame 16 about its hinge 20 until the elastic strips 5, 6 lie one above the other (Step H). The folded piece 1 is then gripped between two further plates 21 (Step I) from the edges of which protrude the overlying sides 22, 23 of the piece 1. The pins 17 are now withdrawn from the piece and the frame 16 removed. The overlying sides 22, 23 and the ends of the ends of the elastic strips 5, 6 are joined by overlock sewing machines 24, 25 and the stitching bar tacked by machines 26, 27.

On removal of the plates 21 the finished briefs 28 are released, turned outside in and delivered to a collection receptacle 29 at Step J.

The procedure is performed as a continuous process, in which the various plates, sewing machines and frame perform their various functions on successive fabric pieces.

What is claimed is:

1. A continuous process for the manufacture of briefs, overlying substantially rectangular fabric pieces, comprising cutting out portions from opposite sides of each piece to form leg-shape margins, fixing an elastic strip under tension to each leg-shape margin and to each of the opposite ends of the piece, then, with each elastic strip held in a stretched state sufficient to prevent any significant puckering of the fabric adjacent to the elastic strips, folding the piece along a line passing through the leg-shape margins to bring the ends of the piece into overlying relationship and joining the edges of the overlying sides to form hip-clinging portions of the briefs.

2. A process as claimed in claim 1 in which the fabric piece is clamped in a flat state between two plate members with marginal portions of the piece exposed at the periphery of the plate members during the cutting out of the portions to form the leg-shape margins and during the operation attaching the elastic strips.

3. A process as claimed in claim 1 in which the elastic strips fitted under tension to the leg-shaped margins and to the opposite ends of the piece are permitted to relax after being fastened to the piece and are then brought to the required stretched state prior to the folding and side-joining operation by grippers which grip the elastic strip adjacent each end and then move outwardly.

4. A process as claimed in claim 1 in which the piece is folded by securing to a folding frame having holding means mounted thereon for holding each elastic strip in the stretched state during the folding operation.

5. A process as claimed in claim 1 in which the cutting out of each portion to form a leg-shape margin is carried out immediately prior to sewing the elastic strip on the leg-shape margin.

6. A process as claimed in claim 1 in which each end of the piece is trimmed immediately prior to an elastic strip being attached.

7. A continuous process for the manufacture of briefs which comprises forming from a fabric, a blank having first and second parallel edges and third and fourth edges substantially parallel to one another and orthogonal to said first and second edges, said third and fourth edges having cutout portions with leg-shape margins, fixing an elastic strip, under tension, to each leg-shape margin and to said first and second edges, then, with each elastic strip held in a stretched state sufficient to prevent significant puckering of the fabric adjacent said strips, folding the blank along a line passing through the leg-shape margins to bring said first and second edges into overlying relationship and joining portions of the third and fourth edges not cut out to form hip-clinging portions of the briefs.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,604,015

Dated September 14, 1971

Inventor(s) DOVE, MICHAEL DAVID

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 1, column 3, lines 28 and 29, change "overlying" to

-- from --.

Signed and sealed this 29th day of February 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.  
Attesting Officer

ROBERT GOTTSCHALK  
Commissioner of Patents