United States Patent

Craig

[15] **3,696,445**

[45] **Oct. 10, 1972**

[54] **GARMENT-MAKING METHOD**

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[73] Assignee: **Paper Converting Machine Company, Inc.,** Green Bay, Wis.

[22] Filed: **Dec. 11, 1970**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 28,571, April 15, 1970.

[52] **U.S. Cl.** **2/243,** 2/114

[51] **Int. Cl.** **A41d 00/00,** A41b 9/00

[58] **Field of Search** 2/243, 114

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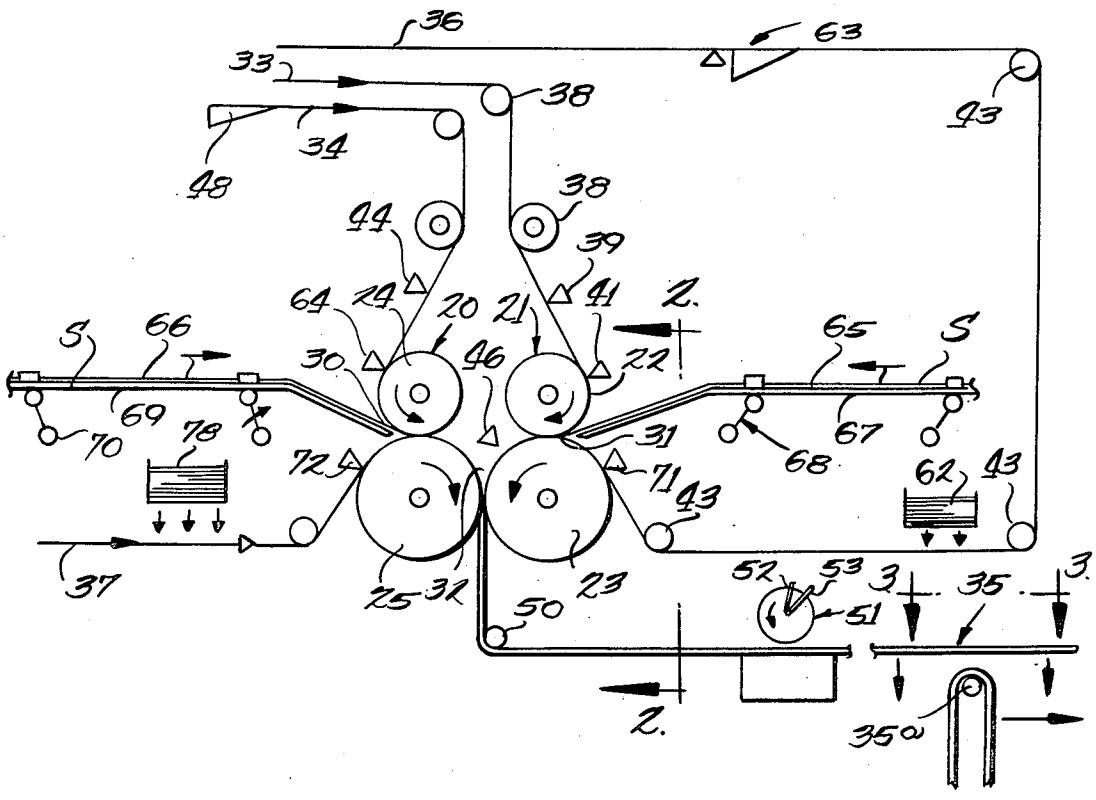
Primary Examiner—Patrick D. Lawson

Attorney—Dawson, Tilton, Fallon & Lungmus

[57] **ABSTRACT**

The making of garments from continuous webs wherein at least four webs are advanced simultaneously in two sets to provide left and right garment portions, each portion being approximately one half and including a portion of the front and a portion of the back.

8 Claims, 15 Drawing Figures



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Fig. 1.

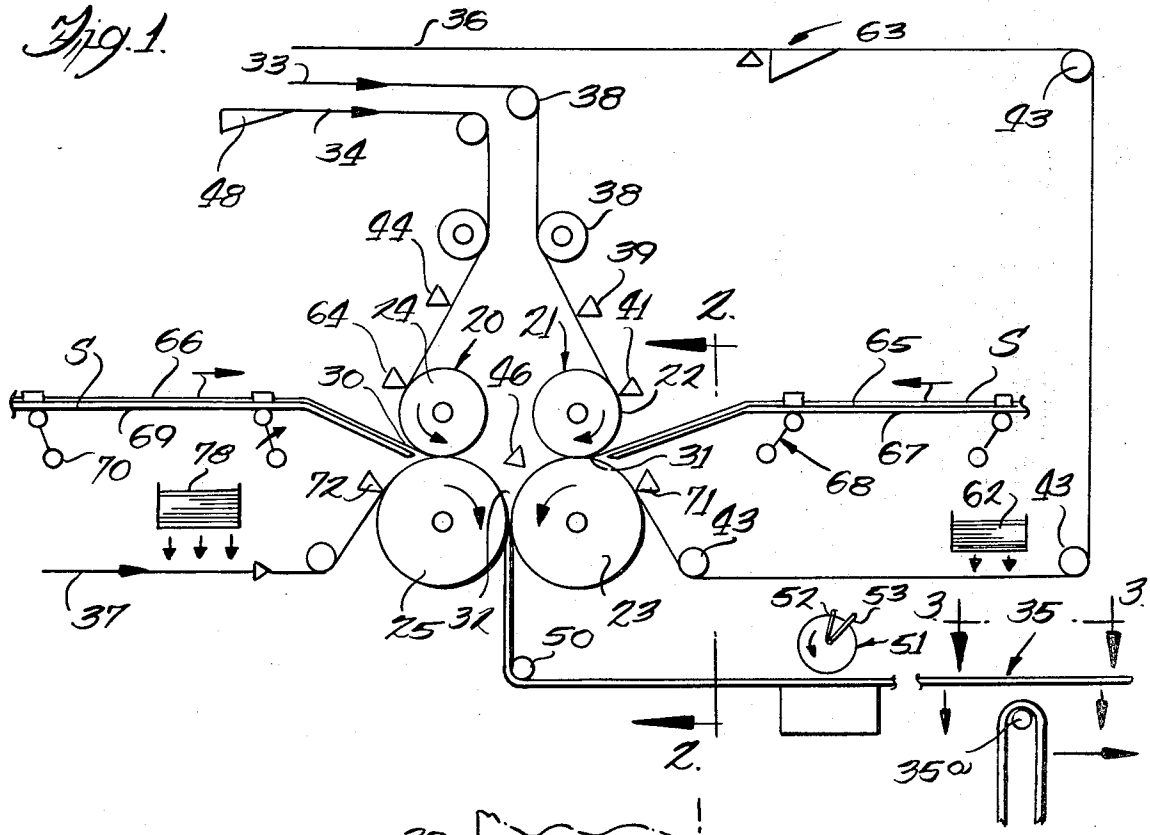
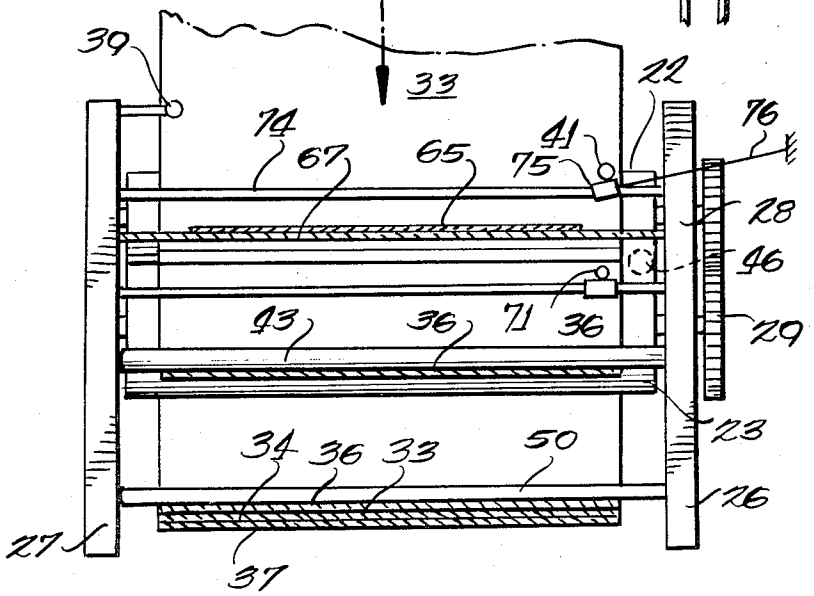


Fig. 2.



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Fig. 3

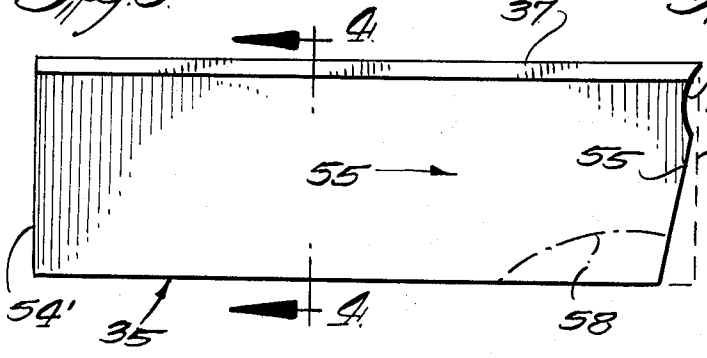


Fig. 4

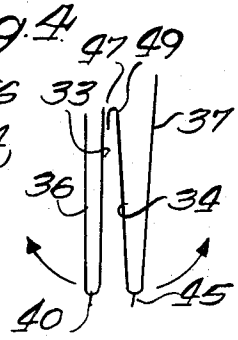


Fig. 5

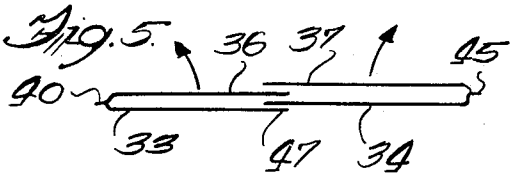


Fig. 6

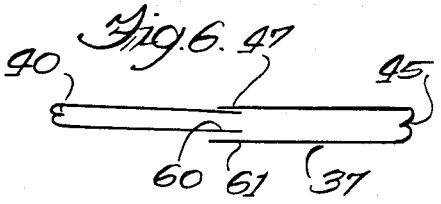


Fig. 7

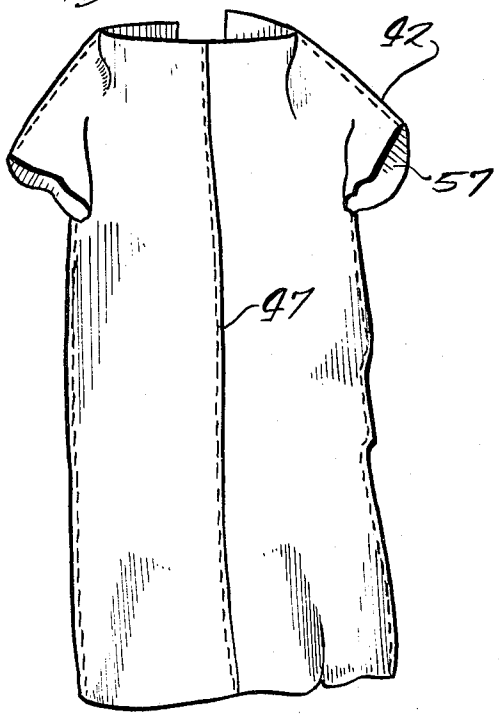
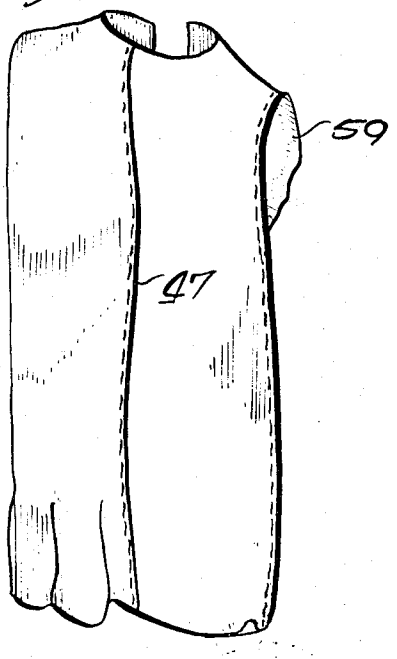


Fig. 8



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Fig. 9.

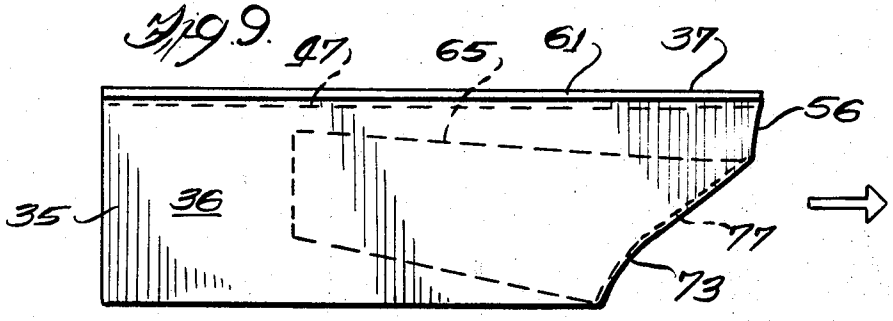


Fig. 10.

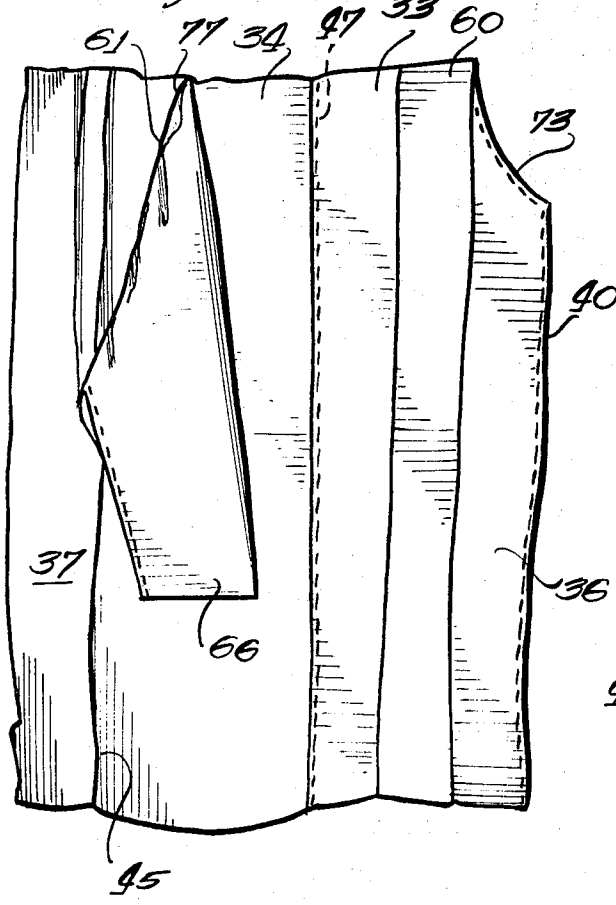
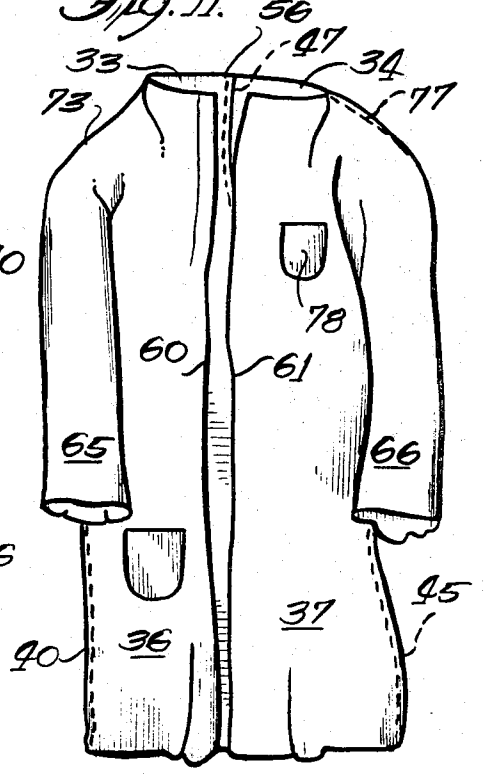


Fig. 11.



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Fig. 12.

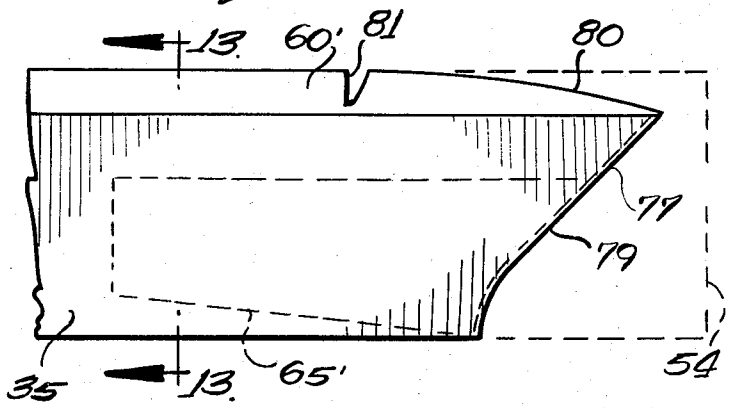


Fig. 13.

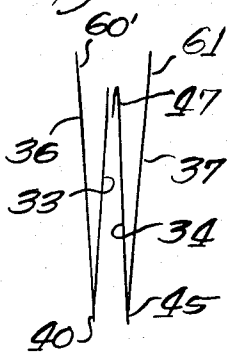


Fig. 14.

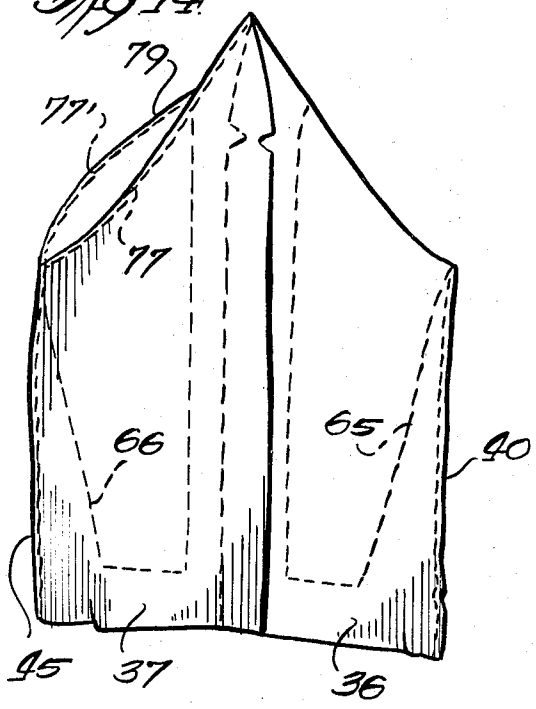
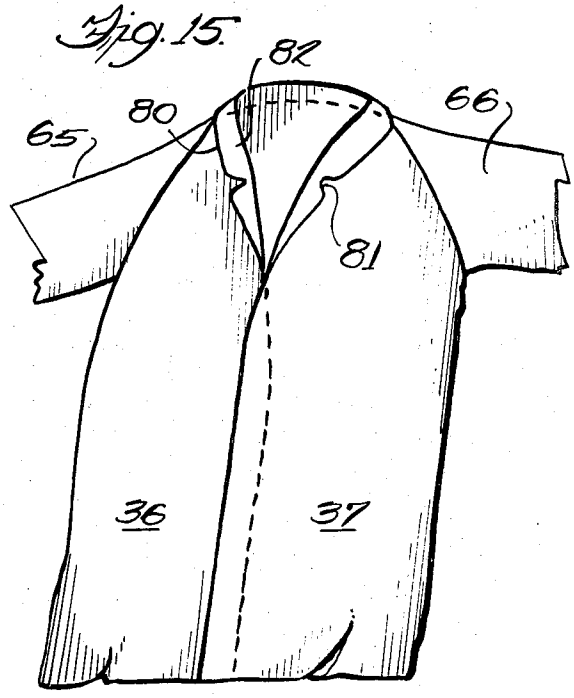


Fig. 15.



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GARMENT-MAKING METHOD

This application is a continuation-in-part of my copending application, Ser. No. 28,751, filed Apr. 15, 1970.

BACKGROUND AND SUMMARY OF INVENTION

The increasing use of "disposable" materials (such as paper) has not occurred relative to garments, such as laboratory coats, hospital gowns, smocks, coveralls, etc., because of the difficulty of making such garments reliably and at high speed. This drawback has been overcome by the instant invention, wherein two sets of webs are delivered in superimposed relation to four rolls so as to develop simultaneously but independently a right hand portion and a left hand portion of the garment, each approximate half including about one half of the front and back of the final garment. The two portions are then integrated in a fashion to deliver a garment already longitudinally folded, which facilitates packaging and shipping. The arrangement of the machine is additionally advantageous in permitting simple adjustment for change in garment size.

DETAIL DESCRIPTION OF INVENTION

FIG. 1 is a side elevational view, essentially schematic, of the machine constructed according to the teachings of this invention;

FIG. 2 is an end elevational view of the machine of FIG. 1 such as would be seen along the sight line 2—2 applied to FIG. 1;

FIG. 3 is a plan view of a sleeveless garment produced on the machine of FIGS. 1 and 2 and in the form as it issues from the machine and prior to transverse folding, and showing the cutaway part in dotted line and an alternative cut in dot-dash line;

FIG. 4 is a sectional view of the garment of FIG. 3;

FIGS. 5 and 6 are views similar to FIG. 4, but showing the garment in successive stages of unfolding;

FIG. 7 is a perspective view (from the back) of the completely unfolded garment of FIG. 3, i.e., the condition depicted in FIG. 6;

FIG. 8 is a perspective view of a modified form of garment (without sleeves) and corresponding to cutting the garment of FIG. 3 additionally along the dot-dash line;

FIG. 9 is a view similar to FIG. 3, being a plan view of a longitudinally folded garment issuing from the machine, but with sleeves applied;

FIG. 10 is a perspective view of the garment of FIG. 9 after the same has been partially unfolded; while FIG. 11 is a perspective view of the fully unfolded garment;

FIG. 12 is a fragmentary plan view of a still further modified form of garment, this being provided with a collar and lapels achieved through a somewhat different cut;

FIG. 13 is a transverse sectional view of the garment seen in FIG. 12 and corresponding essentially to the showing of FIG. 4;

FIG. 14 is a fragmentary perspective view of the garment of FIGS. 12 and 13, but partially unfolded and corresponding essentially to the configuration depicted in FIG. 5; and

FIG. 15 is a fragmentary perspective view of the completely unfolded garment of FIGS. 12–14 and in a condition suitable for wearing.

In the illustration given, and with particular reference to FIG. 1, the essential operational parts of the machine include first and second roll sets designated generally by the numerals 20 and 21. For example, the roll set 21 includes an upper roll 22 (see also FIG. 2) and a lower roll 23. In similar fashion the roll set 20 includes rolls 24 and 25. Each of the rolls 22–25 is suitably journaled between side frames 26 and 27 (seen only in FIG. 2) and are rotated by means of intermeshed gears 28 and 29. The gears 28 and 29 in turn are coupled to a power source (not shown). The direction of rotation of each of the rolls 21–25 is indicated by arrows on the rolls. It will be seen that each roll set 20 and 21 is made up of rolls which are essentially tangentially related to form a nip therebetween. In the case of the roll set 20, the rolls 24 and 25 define a nip 30, while the rolls 22 and 23 of the roll set 21 form a nip 31. Still further, the bottom rolls, in the illustration given, as at 23 and 25, are tangential so as to form a further nip 32. It will be appreciated that the rolls in each set may be horizontally or angularly related, rather than vertically as shown.

To provide the garment seen in FIGS. 3–8, I provide four discrete webs which advantageously may be of paper or like disposable material. The webs 33 and 34 (see the upper portion of FIG. 1) are employed each to form about one half of the back of the garment seen in FIGS. 3–8, the garment being designated generally by the numeral 35. The complete garment 35 (which usually is to be further folded in the transverse direction) is seen in the extreme lower right hand portion of FIG. 1. The other two webs 36 and 37 are employed to provide portions of the front of the garment, and each of the four continuous webs 33, 34, 36, and 37 are advantageously supplied from parent rolls on unwind stands (not shown).

In describing the practice of the invention, I will first deal with sleeveless or essentially sleeveless garments to facilitate understanding of the operation of the machine of FIGS. 1 and 2, viz., to provide the garments of FIGS. 3–8. Thus, I will defer description of the sleeve-providing means S located on the right and left side of FIG. 1.

Considering now the operation of the machine of FIG. 1 in producing the garment 35 of FIG. 3, the web 36 issues from the machine as the uppermost portion of the completed garment (see the lower central portion of FIG. 2). The front web 36 is first united with the back web 33 by the operation of the first roll set 21. For this purpose the web 33 is caused to pass around (be in partial wrapping engagement with) idler rolls 38. Between the idler rolls 38 and the upper roll 22 of the set of rolls 21, the web 33 passes by an adhesive applicator 39. The adhesive applicator 39 in the illustration given is a stationary member which lays down a longitudinal ribbon of adhesive (commonly referred to as "hot melt") along one longitudinal edge of the web 33 (see the upper left hand corner of FIG. 2).

This will provide one side seam or union in the garment, i.e., the joint designated 40 in FIGS. 4–6. Advantageously, the adhesive application can be achieved through an extruder nozzle such as a Model 1013 of Possis Machine Co., of Minneapolis, Minnesota. Alternatively, a printing roll can be employed for laying down a continuous ribbon of adhesive. It will be ap-

preciated that the invention develops two "V" configurations, and then unites them to form a "W", as seen in transverse section (FIG. 4). Each "V" includes a web portion providing approximately one-half of the garment front and another web portion providing approximately one-half of the garment back. In certain instances, these may be provided from a single roll source of wide web which is longitudinally folded. However, I prefer the arrangement depicted herein because of the advantageous manner in which the transverse seal lines can be laid down.

There is also provided a shoulder line of union by means of a line of adhesive laid down by a traveling or traversing nozzle 41 which will be described in greater detail in connection with the use of the sleeve providing means S. The use of the nozzle 41 (or a printing roll) lays down an angled line of adhesive which will result in the union of the webs 33 and 36 along the joint 42 (see FIG. 7).

While the nozzles 39 and 41 are applying adhesive stripes to the web 33, the web 36 has passed around the idler rolls 43 into partial wrapping engagement with the roll 23 of the roll set 21. By virtue of the webs 33 and 36 passing through the nip 31 (between the rolls 22 and 23), the longitudinal edges of the webs 33 and 36 are joined together to form the lines of union 40 and certain transverse portions joined to form line of union 42. Thus, I have developed, in effect, one half of the garment by uniting one half of the front (via the web 36) with one half of the back (via the web 33). Meanwhile, a simultaneous operation is occurring relative to the webs 34 and 37. The web 34, like the web 33, passes around idler rolls and past a stationary adhesive applying nozzle 44 which lays down a longitudinally extending seam of adhesive along the near longitudinal edge of the web 34.

The union of webs 34 and 37, by virtue of passing through the nip 30, results in the line of union 45 which, it will be appreciated, is aligned ultimately (or superposed) in the garment 35 with the line of union 40 (see FIG. 4). Thus, as the webs 33–36 and 34–37 leave their respective nips 31 and 30, there are provided right and left hand portions of the garment. These portions are joined in the nip 32 by virtue of having applied to one of the back-providing webs (33 in the instant case) a longitudinally extending line of adhesive from the nozzle 46. The nozzle 46, like the nozzles 39 and 44, is stationary and applies a seam or ribbon along a longitudinal edge of one of the back-providing webs 33 and 34. This results in a line of union 47 (see FIGS. 4 to 6). Thus, in viewing FIG. 1, the side seams 40 and 45 are nearer the viewer, while the back seam 47 is away. Alternatively, the view in FIG. 3 is a top plan view as indicated in FIG. 1. The nozzle locations can be reversed — the foregoing specific identification of parts being made for greater ease of understanding the practice of the illustrated embodiments.

For the seam 47 I prefer a lap joint, while in the cases of the unions 40 and 45 a flange or rib joint is employed. The joints or seams 40 and 45 are thus a species of butt connections. As can be appreciated from a consideration of FIGS. 4–6, the garment can be inverted, i.e., turned inside out, so that the flange joints 40 and 45 are turned inwardly. This could also be done relative to the line of union 47 between the back-providing webs 33 and 34, but I prefer the lap joint which may be more comfortable in the area of the spine. For that purpose, I provide a plow 48 in line with the web 34 so as to create a longitudinally extending fold 49 (see FIG. 4) adjacent one edge of the web 34. This then is applied to the edge of the web 33 which is equipped with adhesive from the nozzle 46.

As the four superposed, edge-connected webs issue from nip 32, they can be redirected by means of passing around an idler roll 50 and into a cutting station generally designated by the numeral 51. The cutter in station 51 is equipped with suitable knives for achieving two transverse cuts. In the illustration given, two knives 52 and 53 are employed to make transverse cuts 54 and 55 (see FIG. 3). In FIG. 3 the arrow 55 designates the direction of travel of the integrated webs 33, 34, 36, and 37 (which ultimately become the garment 35 — after cutting). The cut 54, in the next cycle, develops the bottom edge 54' of the garment 35, as indicated at the extreme left hand portion of FIG. 3.

The knife 53 acts on the integrated webs 33, 34, 36, and 37 shortly after the knife 52, and makes the transverse cut defining the upper edge of the garment 35. The upper edge cut is in two segments — a straight angled cut as at 55 just ahead of the shoulder line of union 42, and an arcuate cut 56 to provide the neck opening. With cut 55, a mini-sleeve 57 of the character seen in FIG. 7 is provided. By utilizing a three-segment knife at 53, I can make a further cut 58 — shown in dot-dash line in FIG. 3. This results in a sleeveless garment of the character seen in FIG. 8 where the open armholes are designated 59.

After the united webs are transversely severed to define the garment 35, the garment may be transversely folded, stacked, packaged, etc., and all of this is designated schematically in the extreme lower right hand portion of FIG. 1. For example, the garments 35 can be draped over successive conveyor bars 35a which convey the transversely folded garments to a packaging station (not shown).

In FIGS. 3–6 I have shown the web 37 to be somewhat wider than the web 36. This permits the left hand front panel to overlap the right hand front panel. Alternatively, both webs 36 and 37 could be wider than webs 33 and 34. If desired, closing means can be provided in the overlapped portions 60 and 61, and means for this have been illustrated schematically at 62 in FIG. 1 relative to the web 36. Further, if such fastenings are to be installed, I prefer to use a double thickness of web in the overlapped portions 60 and 61 — this advantageously achieved by longitudinally folding and gluing as at the station generally designated 63 relative to the web 36.

It will be appreciated that a further advantage accrues from being able to use webs of different widths. For example, by making the webs 33, 34, 36, and 37 wider, a larger garment can be provided. All that is required is relocating the stationary nozzles 39 and 44 further outboard of the frame 27 (or inboard for a narrower garment) to position the unions 40 and 45 further away from the union 47. In this instance I prefer to use traveling nozzles at 41 and 64 to develop the shoulder unions (as at 42). To obtain a wider garment, it is only necessary to traverse the nozzles 41 and 64 a greater distance, while, if a printing roll is employed, a different roll must be installed.

For the sleeve type garments seen in FIGS. 9 et. seq., the sleeve-providing mechanisms S are employed. A sleeve is provided for each garment half, viz., one sleeve 65 is introduced between the webs 33 and 36, while the other sleeve 66 is introduced between the webs 34 and 37.

This is done by feeding the sleeves 65 and 66 into the nips 31 and 30, respectively. For example, the sleeve 56 is positioned on a platform 67 which is moved at a predetermined time by mechanism 68 to feed the leading edge of the sleeve 65 into the nip 31. A similar platform 69 and mechanism 70 is provided for the sleeve 66.

When the sleeves are provided on garment 35, I employ a second traveling nozzle 71 relative to the web 36, and a second traveling nozzle 72 relative to the web 37. These nozzles lay down stripes which are aligned, i.e., superposed, relative to the stripes laid down by nozzles 41 and 64, respectively. Thus, one side of the upper edge of a sleeve 65 is secured to the web 33 and the other side to the web 36. The feeding of the sleeves is therefore coordinated with the laying down of the stripes by the nozzles 41, 64, 71, and 72. Exact synchronism is not required, however, so long as the sleeves 65 and 66 enter the nips 31 and 30 at or before the stripes from the nozzles 41, 64, 71, and 72 enter those nips. Any excess sleeve will be removed (adjacent its upper edge) by the knife 53 making the armhole cut 73 in FIG. 9. This corresponds to the cut 55 of FIG. 4. The same neck opening cut 56 is also made. A belated entry of the leading upper edge of the sleeve 65 into the nip 31, for example, will result in the webs 33 and 36 being joined together upstream of the cut 73 (see FIG. 9), resulting in an unusable garment. It will also be appreciated that sleeves 65 may be of different shapes of lengths — merely by changing the loading of the mechanisms S.

For the purpose of guiding the traveling nozzles 41, 64, 71, and 72, I provide guides as at 74 relative to the nozzle 41. The nozzle 41 is mounted on a carriage 75 actuated or moved under the influence of a connecting rod 76, which in turn is controlled by a camming mechanism (not shown). Similar guiding and moving means are provided for the other traveling nozzles 64, 71, and 72. The flow of adhesive to the nozzle is controlled by suitable valving (not shown) so as to deliver adhesive only during a portion of the cyclic movement of each nozzle.

In FIG. 10 the basic sleeve-equipped garment is seen in partially unfolded condition, i.e., a partial opening of the garment arrangement shown in FIG. 9. For example, the showing of the garment 35 in FIG. 9 corresponds essentially to the showing in FIG. 3, i.e., the interconnected webs 33, 34, 36 and 37 are disposed in superposed relation so as to form essentially a "W" in transverse section. This is the configuration or disposition of the webs as the garment issues from the machine and before transverse folding for packaging and shipment. When it is intended to be used, the "W" configuration is unfolded to the condition seen in FIG. 5, where the line of union 47 is used as the axis of unfolding and the webs 33 and 34 are brought into generally planar relation. This is the condition of the back-providing panels 33 and 34 in FIG. 10. One of the front providing panels 36 in FIG. 10 is almost in the same condition as that depicted in FIG. 5, except that the very front edge has been partially unfolded as at 60. HOwever, the other front panel 37 has been partially folded around the side seam 45 to approach the garment condition seen in FIG. 6. Only the front edge part 61 has not been completely unfolded. In FIG. 10 this, therefore, reveals the sleeve 66. As indicated previously, the various seams 40, 45, and 77 (this adjacent the cut 73) all become inverted, i.e., turned inside-out when the sleeves are exposed (as at 66 in FIG. 10), so that the flange seams face inwardly of the garment and do not provide any projecting flange-like aspects. Each sleeve has unions developed from two nozzles, 62 and 72, in the case of sleeve 66. In FIG. 10, the sleeve 66 is seen, insofar as the visible seam is concerned, to be united to the web 37. The seam 77 there indicated was developed by adhesive from the nozzle 72.

Also incident to manufacture, pockets can be applied as indicated at 78 in FIGS. 1 and 11. The pockets 78 are laid down and adhesively secured to the web 37 incident to the unwinding of the same.

The showing in FIGS. 12–15 is essentially the same garment as that depicted in FIGS. 9–11, but with the addition of a collar and lapels. The important differences between the sleeve-equipped garment of FIGS. 9–11 and the sleeve and collar-equipped garment of FIGS. 12–15 reside in the provision of an additional overlapping edge portion at 60' and the cutting effected relative to it. In FIG. 13, I have indicated that the front panel 36 is widened at the front edges thereof as at 60' so as to be generally equal in width to the other front-providing panels 37, this latter web having a front edge portion 61 already referred to.

At the time of cutting, there is again the transverse straight-line cut 54 which defines the bottom of a preceding garment. However, instead of making the segmented cuts 73 and 56 (see FIG. 9), I make a different segmented cut defined by the lines 79, 80, and 81. 81 provides a notch or V-shaped cutout to develop a conventional split lapel. This can be more readily appreciated from a consideration of FIG. 15.

In the process of utilizing the garment 35 of FIG. 12, it is unfolded from the "W" configuration of FIG. 13 to the arrangement seen in FIG. 14 — this corresponding essentially to the configuration of webs seen in FIG. 5. The cut 79 is seen to reveal the armhole opening of the sleeve 66 which is defined by the twin lines of union 77 and 77'. A similar arrangement exists relative to the sleeve 65. By pivoting the front panels 36 and 37 about the side seams 40 and 45, respectively, the final configuration seen in FIG. 15 is achieved.

The rounded cut 80 in the overlapped front edge portion of the webs 36 and 37 develops the collar 82 best seen in FIG. 15. The wearer, in converting the garment from the FIG. 14 to the FIG. 15 configuration, merely rolls the overlap down to a comfortable width. By providing a curved, generally longitudinally extending cut 80, I avoid providing too large or floppy a collar. Also by providing the notch cut 81 in the lapel area produces a distinguishable and distinctive collar area and lapel area. With the elimination of the notch cut 81, a continuous collar-lapel effect is developed.

I claim:

1. A method for making a garment comprising the steps of advancing two sets of elongated webs in superposed relation, each set comprising web portions

adapted to constitute approximately one half of a garment front and one half of a garment back, uniting the webs in each set along a line inclined to the direction of advance, and uniting the web sets along corresponding longitudinal edges of the web portions adapted to constitute one half of a garment back.

2. The method of claim 1 in which prior to the uniting of the web sets, the web portions in each set are united along one longitudinal edge.

3. The method of claim 1 in which subsequent to the uniting of the web sets, the united web sets are transversely severed along two spaced-apart lines, one line being generally perpendicular to the direction of web advance and defining a garment bottom and the other line being adjacent the line uniting the webs in each set and defining a garment top.

4. The method of claim 1 in which the united web sets are transversely folded subsequent to severing.

5. The method of claim 1 in which prior to uniting the webs in each set along said inclined line, a sleeve is introduced between the webs of each set.

6. The method of claim 1 in which the web in each set adapted to constitute approximately one half of the garment front is longitudinally folded along one edge thereof to provide a reenforced edge for mounting of fastening means.

7. The method of claim 1 in which each of the web portions adapted to constitute approximately one half of a garment front is wider than the other web portion in each set to provide an overlapped portion, and cutting said overlapped portion along a generally longitudinally extending line to provide a collar.

8. The method of claim 7 in which said overlapped portion is notched to define a discrete lapel separate from said collar.

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