

[54] METHOD FOR APPLYING ELASTIC RIBBON TO FABRICS

3,329,116 7/1967 Attwood et al.....112/262
3,248,463 4/1966 Wiley et al.....264/210 R
3,022,543 2/1962 Baird et al.....264/210 R

[72] Inventor: William H. Burger, Neenah, Wis.

[73] Assignee: Kimberly-Clark Corporation, Neenah, Wis.

[22] Filed: Sept. 25, 1970

[21] Appl. No.: 75,495

FOREIGN PATENTS OR APPLICATIONS

783,726 9/1957 Great Britain.....2/237

Primary Examiner—H. Hampton Hunter
Attorney—Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.

[52] U.S. Cl.2/224 A, 2/237, 2/243 R, 2/270, 112/262

[51] Int. Cl.A41b 9/04, A41d 1/00

[58] Field of Search.....264/210, 288, 289, 290, 258, 264/263, 28; 28/77; 2/243 R, 243 A, 237, 270, 224, 224 A; 112/121.27, 413, 262

[57] ABSTRACT

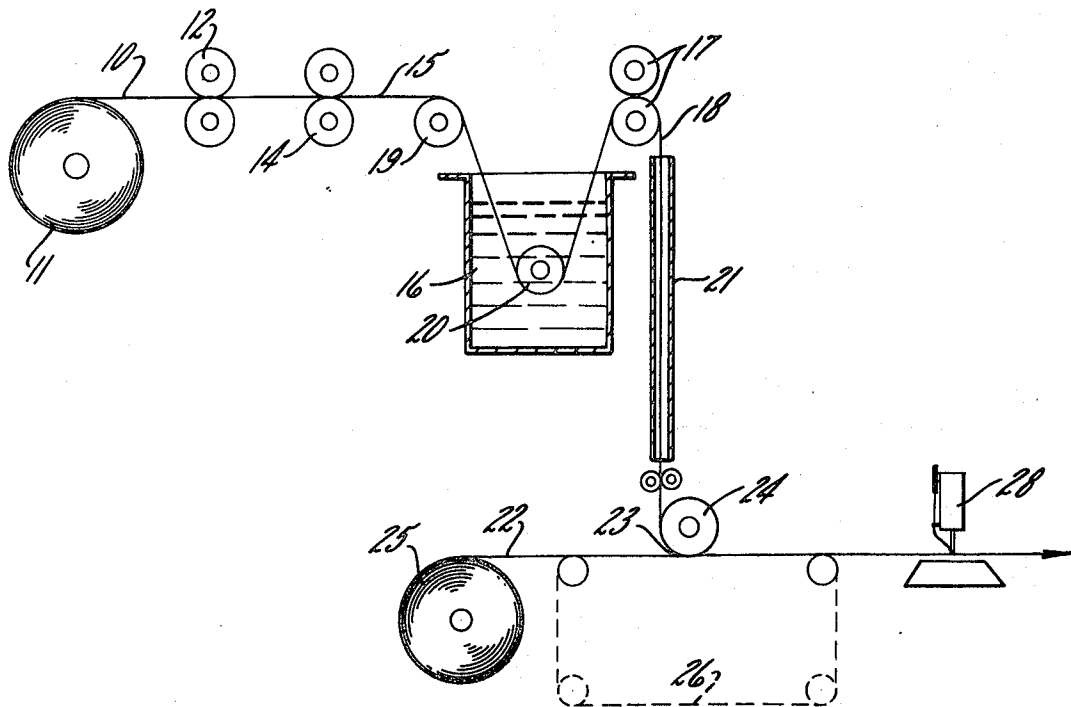
A method for attaching a garment gathering elastic ribbon comprising the steps of stretching the elastic ribbon, internally immobilizing the elastic ribbon in a stretched state, attaching the stretched elastic ribbon to the garment and causing the attached elastic ribbon to return to its original contracted state.

2 Claims, 2 Drawing Figures

[56] References Cited

UNITED STATES PATENTS

3,639,917 2/1972 Althouse2/270



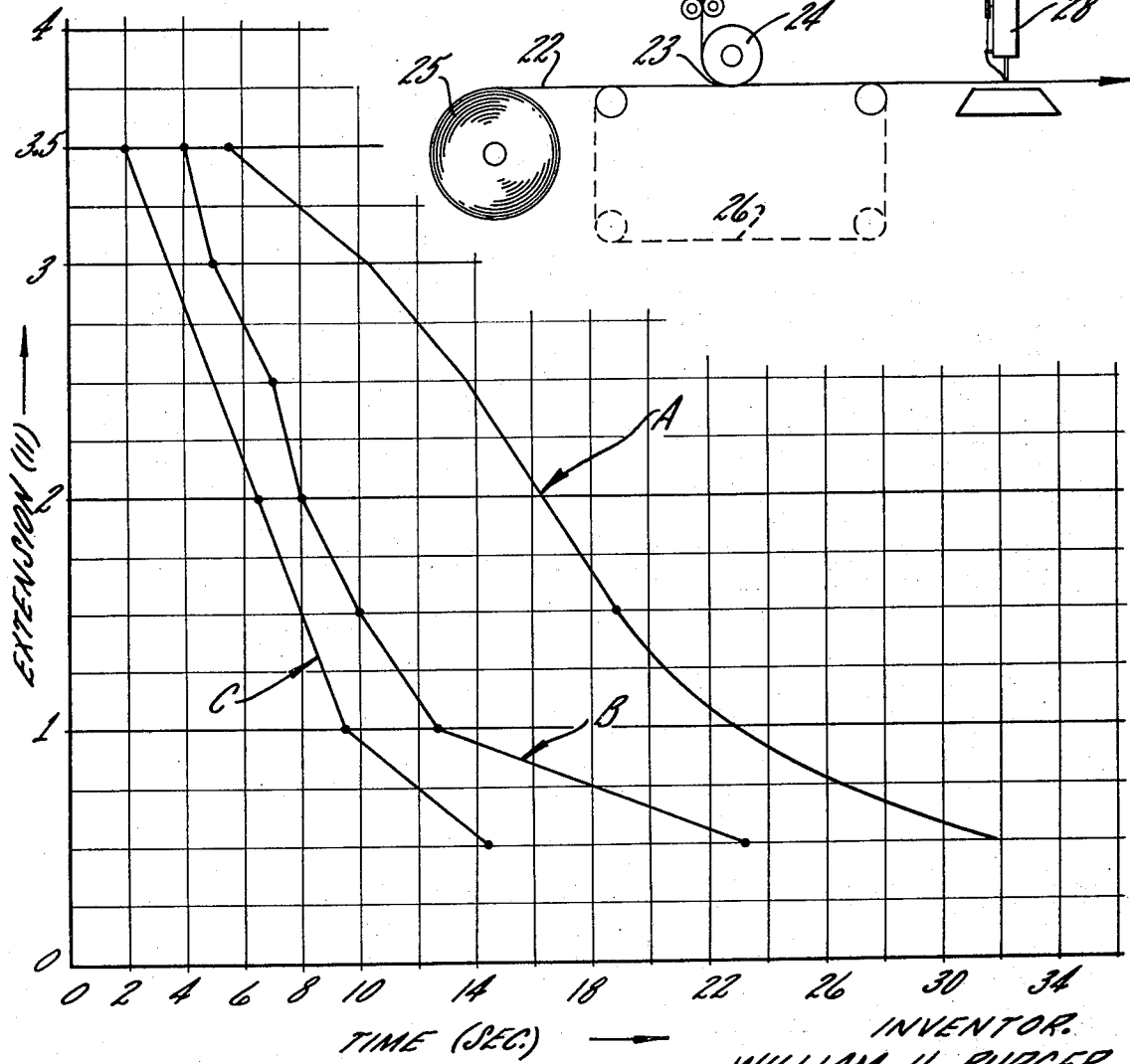
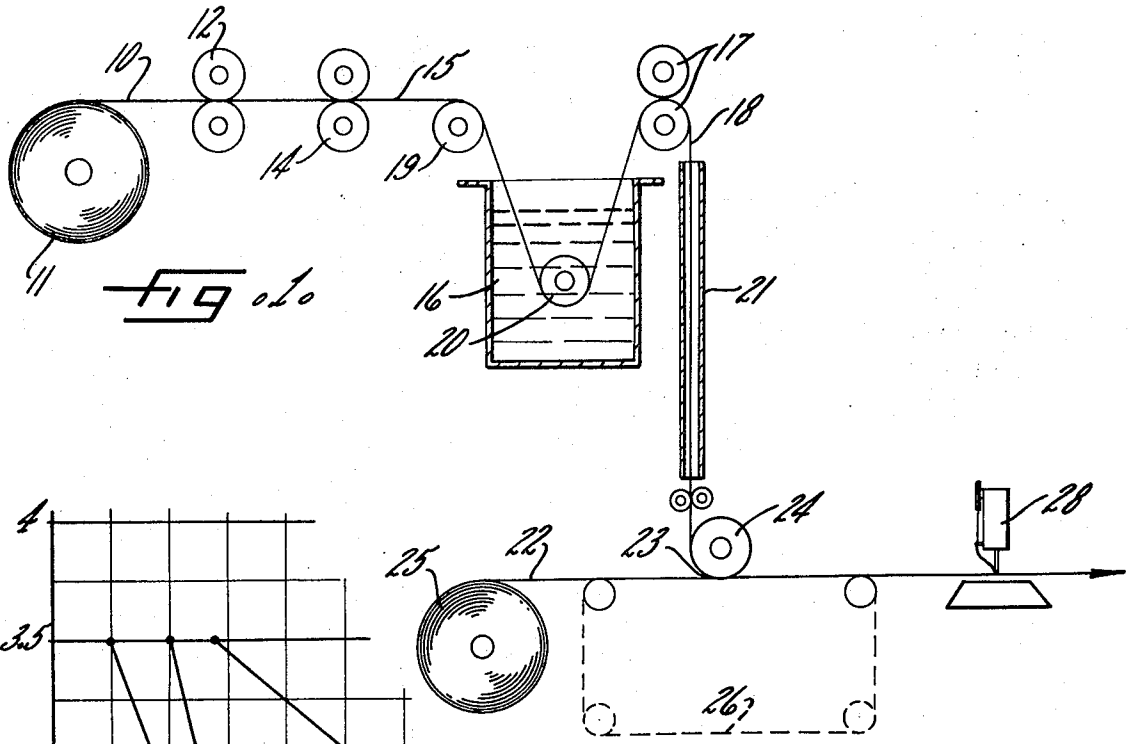


FIG. 20

INVENTOR.
 WILLIAM H. BURGER
 BY
 Wolff, Hubbard, Lyndig, Veit & Osborn
 ATTORNEYS.

METHOD FOR APPLYING ELASTIC RIBBON TO FABRICS

DESCRIPTION OF THE INVENTION

This invention relates generally to a facile and efficient method for attaching a stretched elastic ribbon to a garment or garment fabric and more particularly concerns the attachment of stretched elastic ribbons to fabrics which are to be converted into disposable panties.

Elastic ribbons or bands have been attached to garments or garment fabrics at such locations as the waist, arm and/or leg openings for many years. The elastic ribbons are often attached to the garments while the elastic ribbons are in an expanded state, and then after attachment they are allowed to return to their normal relaxed or unexpanded state. When the garment is worn, of course, the attached elastic ribbon is expanded by that portion of the body with which it is related by way of its attachment to the garment being worn. Its natural resistance to such expansion will cause a snug fit of that portion of the garment to the body at the location of its attachment.

Unfortunately, many problems are encountered in attaching an elastic ribbon to a garment or garment fabric while the elastic material is in its expanded or stretched state; these problems are due primarily to the fact that such elastic ribbons are generally expanded by external mechanical means. The attachment problem becomes even more acute when relatively narrow elastic ribbons are used since it then becomes very difficult to keep the ribbons flat on the garment fabric surface to produce a uniform seam. This particular attachment problem becomes amplified when the narrow elastic ribbons are to be attached to garments along curved or non-linear lines. As a result it is often necessary to employ extremely sophisticated machinery for a seemingly simple expanded elastic ribbon attachment operation.

It is therefore a general object of this invention to provide an improved method for efficiently and rapidly securing a stretched elastic ribbon to a garment fabric.

It is yet another object of this invention to provide a stretched elastic ribbon which may be easily and efficiently attached to curved or non-linear portions of garment fabrics.

Another object of this invention is to provide a method for the attachment of an expanded elastic ribbon to a garment fabric without the use of unduly complex or sophisticated machinery.

A still further object of this invention is to provide a method for securing an elastic ribbon to a disposable garment which is to be converted into disposable panties.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. 1 is a schematic illustration of one method for attaching elastic ribbons according to the present invention; and

FIG. 2 is a graph showing the contraction rate of several stretched frozen elastic ribbons upon being exposed to room temperature.

While the invention will be described in connection with a preferred embodiment, it will be understood that

it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention.

Turning now to the drawings and referring first to FIG. 1, there is illustrated a method for attaching an elastic ribbon 10 to a garment fabric 22 for the purpose of gathering the garment fabric 22 in the area where the elastic ribbon 10 is to be attached. In order to stretch the elastic ribbon 10 so that it may be attached to the garment fabric 22 while the elastic material is in a stretched state, the elastic ribbon 10 is unwound from the supply roll 11 by a first pair of drive rolls 12 and then passed through a second pair of drive rolls 14 having a surface velocity greater than that of the first pair of rolls 12. Consequently, the elastic ribbon 10 is stretched between the two pairs of drive rolls 12 and 14, thereby producing a stretched elastic ribbon 15 exiting from the drive rolls 14. The degree of stretch may be varied by adjusting the surface speed differential between the two pairs of drive rolls 12 and 14. Typically, the speed differential should be set so that the elastic ribbon stretches from about 40 percent to about 200 percent of its original unexpanded length; this degree of stretching normally insures comfortable wearing of garments to which the elastic ribbon 10 is attached. The degree of stretching as referred to above and hereinafter is defined as $(L_1 - L_0)/L_0 \times 100$ percent where L_1 is the stretched length and L_0 is the length of the rubber ribbon in its normal contracted state.

The elastic ribbon may be any natural or synthetic rubber, so long as it is elastically capable of being stretched, preferably to about 400 percent of its normal length. The thickness and width of the elastic ribbon will vary with the particular application to which it is directed.

In accordance with one important aspect of the present invention, the elastic ribbon is attached to the garment fabric while the elastic ribbon is internally maintained or immobilized in its stretched state. Thus, in the illustrative method, the stretched elastic ribbon 15 emerging from the rolls 14 is held under tension and internally maintained or immobilized in its stretched state by subjecting the ribbon 15 to temperatures sufficiently low to freeze the stretched elastic material in its expanded state while maintaining sufficient flexibility so that the ribbon 15 can subsequently be manipulated without breakage. While various freezing methods can be used, a frozen stretched elastic ribbon 18 is produced in the process shown in FIG. 1 by passing the stretched elastic ribbon 15 through a bath 16 comprising a mixture of dry ice and ethyl alcohol in proportions to produce temperatures of about -100°F . The stretched elastic ribbon 15 is passed through the bath 16 by a pair of drive rolls 17, with transfer rolls 19 and 20 guiding the ribbon 15 through the bath; the stretched elastic ribbon 15 exits from the bath 16 as a frozen stretched elastic ribbon 18.

The frozen stretched elastic ribbon 18 must be maintained in its frozen state without any substantial contraction during the time period required to attach the ribbon to a garment fabric 22. This maintenance depends primarily on the low temperatures to which the stretched elastic ribbon 15 is subjected and the amount of time to which it is subjected to such low tempera-

tures. Additional variables which must also be taken into consideration are the dimensions and chemical and physical properties of the elastic ribbon being frozen and the heat exchange medium being used to remove the heat from the elastic ribbon. With most conventional elastic garment ribbons made of elastic materials such as natural and synthetic rubbers, freezing temperatures of about -60°F. to about -120°F. and preferably -80°F. to about -100°F. are normally used. It should be apparent that the higher freezing temperatures within the above range are less preferred due to the greater amount of time required for freezing the stretched elastic ribbon.

In order to permit handling and manipulation of the elastic ribbon while it is in the frozen state, care should be taken not to subject the stretched elastic ribbon to temperatures below or equal to its glass transition temperature, because at such temperatures the frozen elastic ribbon will tend to be rigid and therefore lose the necessary pliability required for process handling.

In order to illustrate the freezing of a typical rubber while it is in a stretched position the following example is given:

EXAMPLE I

Rubber elastic ribbons having a length of 3.5 inches, a thickness of 11 mils and a width of one-eighth inch were stretched to 7 inches on a device which held the sections by means of clips in their stretched positions. These ribbons were then individually submerged in a bath comprising a freezing medium made up of ethyl alcohol and dry ice. The temperature of the freezing medium was -100°F. The stretched elastic ribbons were each held submerged in the bath for 5 seconds after which time they were removed from the bath and the lower ends of the frozen stretched elastic ribbons were unclipped. Once removed from the bath the frozen stretched elastic ribbons were subjected either to still air or to moving air. Both still and moving air conditions were at room temperature, i.e., 70°F. In each case investigated, the stretched elastic ribbon exposed to moving air started to contract after approximately 4 seconds whereas the ribbon exposed to still air started to contract after 5 seconds. When similar runs were conducted with elastic ribbons subjected to freezing temperatures of -80°F. , the average time required for the beginning of contraction after removal from the bath and exposure to still air at room temperature was reduced to approximately 2 seconds.

In each case investigated, after contraction had begun, additional data relating to the amount of contraction versus time was also obtained, and mean curves A, B, and C identified below are given in FIG. 2 wherein the 3.5 inch ordinate scale represents the additional stretched length of the elastic ribbons; the elastic ribbons subjected to freezing temperatures of -100°F. and still air at room temperature, curve A, required approximately 32 seconds to return to about their normal unstretched state; the elastic ribbon subjected to freezing temperature of -100°F. and moving air at room temperatures, curve B, required approximately 21 seconds to return to about its normal unstretched state; and the elastic ribbons subjected to freezing temperatures of -80°F. and still air at room temperatures, curve C, required approximately 15 seconds to return to about their normal unstretched state.

Returning now to FIG. 1, after the frozen stretched elastic ribbon 18 leaves the bath 16 it is applied and attached to the garment fabric 22 at an area where the garment is to be gathered. In all cases the stretched elastic ribbon must be internally maintained in a stretched, substantially non-contracting state while it is being attached to the garment fabric. If desired, the ribbon may also be maintained in the frozen state until after packaging of the garment product on which it is attached, in order to facilitate the packaging operation. In order to prevent prolonged exposure of the frozen stretched elastic ribbon 18 to relatively high ambient or room temperatures after the ribbon exits from the bath 16 prior to reaching its point of application 23 to the fabric 22, it is passed through a refrigerated tube 21, exiting therefrom at its point of application 23, where the ribbon is passed under a roll 24 onto a garment fabric 22 being fed from a roll 25 onto a conveyor belt 26. While the temperatures within the refrigerated tube 21 are not necessarily equivalent to those in the bath 16, they should be low enough to delay the initial contraction of the frozen stretched elastic ribbon 18 for a period of time sufficient to attach the ribbon to the garment fabric 22.

From the roll 24, the garment fabric 22 and the elastic ribbon thereon are passed through a sewing machine 28 which stitches the frozen stretched elastic ribbon 18 and the garment fabric 22 together. While FIG. 1 shows a sewing step as the means for attachment, other attaching means such as adhesives and the like may also be employed.

Subsequent to the application and attachment of the elastic ribbon to the garment fabric 22 and preferably after the garment fabric 22 has been processed into the final garment product, the frozen elastic ribbon 18 is allowed to thaw and thereafter reacquire the soft, elastic properties which it had prior to freezing.

In order to illustrate typical applications of this invention in applying elastic ribbons to panty products reference is made to my copending application, U.S. Ser. No. 75,193, filed Sept. 24, 1970, the disclosures of which is incorporated herein by reference.

In conclusion, it should be noted that this invention provides an improved and novel method for efficiently and rapidly securing stretched elastic ribbons to a garment on both linear and curved portions thereof without using unduly sophisticated machinery.

I claim as my invention:

1. A method for attaching an elastic ribbon to a garment fabric for the purposes of gathering said garment fabric in the area of attachment, wherein said elastic ribbon comprises rubber capable of being stretched and internally maintained in its stretched state without breaking when subjected to low temperatures, said method comprising the steps of:

stretching the elastic ribbon;

subjecting said stretched elastic ribbon to a temperature sufficiently low to preclude contraction thereof, said temperature being in excess of its glass transition temperature value to permit flexing of the ribbon without breaking;

attaching the stretched elastic ribbon to the area of the garment where said garment is to be gathered while the elastic ribbon is in its stretched state; and increasing the temperature of said attached ribbon to enable it to return to its normal elastic condition.

2. The method of claim 1 wherein said low temperature is within the range of about -60°F. to about -120°F.

* * * * *

5

10

15

20

25

30

35

40

45

50

55

60

65