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(54) **A method of forming and dyeing cushion articles.**

(57) A novel process is disclosed for forming cushion articles with a cloth covering dyed and set as the cushion forms a male mold for the covering. The process entails placing unfinished cloth over a three-dimensional mold and dyeing and teating the cloth while on the mold so that the cloth will be colored and will retain the predetermined shape when removed from the mold. The cloth may be an undyed polyester product which is dyed by optionally first chemically treating the cloth to lower the fabric heat history characteristics and hence its ability to absorb dye and then by dipping the cloth and mold into a dye bath. The dye bath may be heated above the heat set threshold of the polyester fabric so that the dyeing step is performed at the same time as the step to effect the set or dimensional stability of the fabric.

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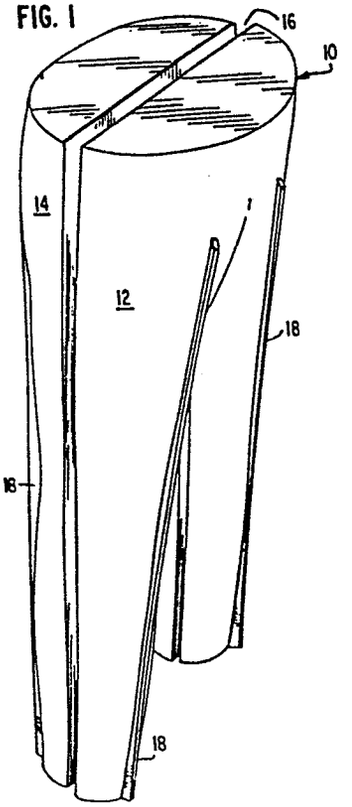
FIG. 1



A METHOD OF FORMING AND DYEING CUSHION ARTICLES

Background of the Invention

This invention relates to a method of forming and dyeing cloth and, more particularly, to a method of forming and dyeing cloth into garments or other three dimensional articles such as covers for vehicle seating, molded carpeting for vehicle interiors, or coverings for acoustical or decorative panelling.

In recent years there has been an ever increasing demand for relatively low cost, ready-to-wear garments that have a fine, tailored appearance and that are capable of retaining that appearance after extended wear. As a result, a variety of synthetic materials have been incorporated into cloth, either alone or blended with natural fibers, to produce such garments. These fabrics, however, along with natural fabrics such as cotton and wool, must still be made into a garment by conventional cutting, sewing and pressing techniques that are both time consuming and labor intensive. Thus, the costs of manufacturing garments having a fine appearance have not been satisfactorily reduced. Likewise, upholstery coverings used in vehicle seating and elsewhere are conventionally produced by cut and sew techniques that result in higher costs and unsatisfactory appearance in areas where the cloth is gathered or wrinkled.

The conventional method of making cloth articles begins with cutting the cloth, in the flat, into a number of pieces which are arranged according to a predetermined, often complex pattern. In order to minimize cutting costs, many layers of cloth are cut to the desired pattern at one time. This procedure, however,

introduces size variations in the pieces, since the cutting knife may not hold precisely to the true garment pattern through the multiple layers of cloth. As a consequence, undesirable variations in the size and configuration of the final garment occur. Conventional manufacture of cloth articles also requires that the cloth pieces of the pattern be joined or seamed, by sewing or welding, and darts are typically employed where necessary to shape the garment. This is followed by pressing to improve fit and remove wrinkles. All of these steps are labor intensive and therefore expensive.

Because of the inherent disadvantages in conventional fabrication of cloth articles, attempts have been made in the past to form these products by molding processes. If a practical and efficient method of molding cloth products could be developed, many of the inherent drawbacks of the present cutting and sewing or welding techniques could be eliminated. Molded garments, for example, would be more economical to produce than garments produced in accordance with traditional manufacturing techniques since the number of labor intensive steps employed in conventional techniques would be reduced, and consistency of sizing in the molded garments would be far superior to traditionally manufactured garments, since size variations in the garment prior to molding would be eliminated.

Molded cloth articles require far fewer seams and darts than traditionally manufactured products. This reduces the problem of opened and puckered seams, and greatly improves the article's comfort and durability, particularly after extended use and cleaning.

In addition, molded manufacture of cloth articles can provide improved appearance in the final product, particularly with plaids and other patterned fabrics, while at the same time reducing costs by minimizing both labor and the amount of material required to produce a finished product.

While others have suggested various methods for molding garments and other cloth products, these methods all suffer serious drawbacks. These prior art processes are directed primarily to molding or forming knitted fabrics, and they all suffer from the disadvantages that (1) the shell of cloth made before molding does not conform to the general shape of the final molded article, (2) finished fabrics that have already been tentered in the flat are used in the molding process and (3) the garment is not molded under uniform tension and the finished garment therefore includes variations in the density of the fabric and an irregularity in sizing. These prior molding techniques have generally failed to produce garments which retain their molded shape, particularly after extended wear and cleaning. Moreover, because these prior art processes are directed to molding finished cloth which has already been subjected to dimensional-setting treatments while in the flat, the molding process does not provide either a precise sizing of the finished garment or satisfactory stretch and comfort characteristics.

Other prior art processes which relate to molding of certain special kinds of cloth do not recognize the advantages attendant to both forming and dyeing cloth articles in a single manufacturing process.

Two particularly important finishing steps typically performed at the mill are the dyeing and tentering of the cloth. The dyeing step in some instances involves the application of heat to the fabric, which in thermoplastic fabrics tends to set the intersections of the individual yarns. The tentering process involves the application of both tension and heat to set the intersections of the individual yarns. In either case, however, the fabric is not set, dyed, or tentered while in the general shape of the finished garment itself. Prior art molding processes typically utilize dyed and/or tentered goods, failing to recognize the advantages of working with goods which are not completely finished or greige goods which come off the loom

or knitting machine prior to the application of any finishing processes.

In summary, none of the prior art molding processes for cloth articles provides either a practical or efficient method for their manufacture, and the articles resulting from these prior art processes are generally aesthetically unappealing, have insufficient stretch characteristics and are generally ill-fitting, and none of these prior art molding processes contemplates both forming and dyeing unfinished cloth in a single operation.

Summary of the Invention

The present invention provides a dramatic departure and advance over the prior art. Whereas the prior art has attempted to actually reshape the cloth via heat molding processes alone, the present invention utilizes unfinished cloth which may be cut into a specially configured pattern or blank, and then forming, finishing and dyeing the cloth to completely finish and set its dimensional memory.

Accordingly, it is an object of the present invention to provide a method of forming and dyeing cloth to produce cloth articles of excellent appearance which will reliably hold their color and original shape.

Another object of the present invention is to provide a method of molding and dyeing woven and unfinished cloth to form cloth articles of a predetermined three-dimensional shape.

It is a further object of the present invention to provide a method of forming cloth articles in which the processes for dyeing and effecting the set or dimensional stability of the fabric is performed as the cloth article is maintained in a predetermined shape on a mold.

Yet another object of the present invention is to provide a method of forming garments from greige or partially unfinished cloth in which the garments

are dyed during the forming process, before they are removed from the mold.

A further object of the present invention is to provide a method of forming cloth articles whereby dyeing and at least some of the finishing treatments conventionally applied to the cloth in the flat are performed only while maintaining the cloth on a mold in the final shape of the article.

Still another object of the present invention is to provide a method of forming cushion articles with a cloth covering dyed and set as the cushion forms a male mold for the covering.

In accordance with these and other objects and advantages of the present invention which will become apparent upon reading the following detailed description, the present invention comprises a method of forming and dyeing cloth in predetermined three-dimensional articles. More particularly, the method entails placing unfinished cloth over a mold and dyeing and treating the cloth while on the mold so that the cloth will be colored and will retain the predetermined shape when removed from the mold.

The cloth used in the practice of the present invention is preferably a one-piece flat "blank" or three-dimensional shell constructed from the fewest possible number of pieces (preferably one) and joined by the least amount of stitching or welding possible. The shape of the cloth blank or shell generally follows the shape of the mold.

In an important embodiment of the invention, the cloth is an undyed polyester product which is dyed by first chemically treating the cloth to lower the fabric heat history characteristics and hence its ability to absorb dye and then dipping the cloth and mold into a dye bath. The mold is preferably perforated or otherwise designed to facilitate the movement of dye across the mold and cloth article and to thereby assure uniform coloring both inside and outside, and in many instances

the chemical treatment prior to dyeing is unnecessary, and hence not utilized. In this embodiment of the invention, the setting step may be performed at the same time the cloth is dyed by heating the dye bath above the heat set threshold of the polyester fabric.

Brief Description of the Drawings

The novel features which are believed to be characteristic of the invention are set forth in the appended claims. The invention itself, however, together with further objects and attendant advantages thereof, will be best understood by reference to the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of a mold which may be used in the practice of the present invention.

FIGURE 2 is a perspective view of a cloth blank used in forming the preformed cloth shell in the practice of the present invention;

FIGURE 3 is a perspective view showing the fabrication of a cloth shell from the blank illustrated in FIGURE 2;

FIGURE 4 is a top view of the mold of FIGURE 1 in the retracted position with a cloth shell positioned on it;

FIGURE 5 is a top view similar to that of FIGURE 4, but showing the mold in expanded position with the cloth shell in uniform tension on the mold.

Description Of The Preferred Embodiments

The forming method of the present invention may utilize a wide variety of cloth materials, such as that woven or knitted from man-made or natural yarns or fibers, including nylon, polyester, acrylic, linen, cotton, rayon, wool, silk or blends

of these fibers. The present invention is particularly well suited to molding woven fabrics, but its advantages apply to knitted fabrics as well. The invention is particularly suited to the treatment of unfinished cloth. In the context of the present invention, "unfinished cloth" is intended to mean cloth that has not been subjected in the flat to the conventional treatments which impart to the cloth a permanent dimensional or shape memory or to set or fix the intersections of the yarn. For example, common finishing procedures such as tentering, crabbing, preshrink processes, chemical cross-linking processes and others well known in the art are not to be performed on the cloth prior to its used in practicing the present invention, to the extent that such procedures impart a permenant dimensional or shape memory to the cloth. On the other hand, "finished cloth" is intended to mean cloth that has been subjected to such permanent dimensional and shape memory procedures. Since unfinished cloth is preferably employed in the process of the present invention, in practice, any thermoplastic synthetic cloth used will be exposed to its highest temperature during the molding and dyeing processes. Typically, the cloth used in accord with the present invention will have sufficient dimensional integrity to facilitate any prior cutting operations which may be required, but will otherwise have relatively little dimensional memory and the intersections of the yarn will not be permanently set or fixed.

In accord with a preferred embodiment of the invention, the cloth is subjected to a special treatment in the flat prior to use in the molding process in order to achieve a superior appearance free from even incidental wrinkling. In this preconditioning step, the cloth is lightly tensioned in the warp direction but left without tension in the fill direction and then heated to an elevated temperature, but one that is below the heat set temperature or conventional tentering temperature of the cloth. It has been found that this preconditioning of the cloth prior to the

molding process eliminates any light wrinkling that might otherwise appear in the finished article.

The use of finished cloth - that which has been treated in the flat to impart permanent dimensional memory to the cloth - is less desirable for a number of reasons. First, since the dimensional memory is set with the goods flat, the resetting of the cloth in contour is made more difficult, if not impossible. Second, finished goods have less inherent stretch than unfinished goods and, therefore, finished cloth is very difficult to place on a mold. And third, unfinished cloth, having yarn intersections that are free to move in both direction and dimension, can be properly orientated on the mold with the cloth distributed generally uniformly and without wrinkles, whereas finished cloth with relatively fixed yarn intersections prove difficult, if not impossible, to orientate without wrinkles on the mold. As a consequence, the use of finished cloth has proven to be less effective in the practice of the present invention.

An exemplary expandable mold for use in forming a pant garment is shown in FIGURE 1 and is designated generally as 10. The mold 10 includes front and rear portions, 12 ands 14 respectively, which are mechanically joined and capable of expansion along parting line 16. The mold is shaped to faithfully conform to the size and shape of the actual garment to be produced and includes edges 18 to form appropriate creases in the garment The mold 10 can be made from a variety of materials, including metals, plastics, ceramics or even wood. The mold may also be perforated or constructed from screening or mesh. While the particular material is not important to the practice of the invention generally, mold material may be relevant to specific processing parameters in a specific application. For example, heat insulating materials may be preferred for heat setting processes, and a specific mold material may be required when it is contemplated that various dye solutions,

and other chemical agents may be applied to the shell while on the mold. The specific details of the mechanical structure used to support, expand and retract the mold 10 and portions 12 and 14 does not form a part of the present invention and it is not illustrated in the drawing.

The cloth shell utilized in the practice of one embodiment of the present invention is constructed from a blank 20, shown in FIGURE 2. The blank is designed to ultimately arrive at a shall having a shape which conforms to the contours of the mold and a size which will accommodate the mold on which it is finished. For example, if a fixed mold is used, the cloth shell will have a size slightly smaller than that of the mold. When using an expandable mold like that shown in FIGURE 1, the shell has a size equal to or larger than the retracted mold but smaller than the mold when expanded. The shell must, however, have a shape that approximates or conforms to the shape of the mold in order to avoid undesirable variations in tensioning in different parts of the garment during the finishing or setting treatment.

This is achieved by designing the blank 20 (and thus the preformed shell) to have dimensions that duplicate or closely approximate the circumferential dimensions of the mold. By way of example, a typical women's size 10 pant has industry-accepted dimensions as follows:

Waist	26"
High Hip (4-1/2" below waist)	34.5"
Low Hip (6-1/4" below waist)	37"
Thigh (2" below crotch)	22-1/2"
Bottom (Lowest circumference of each leg)	21"

For this garment, the mold dimension in the collapsed or closed position are approximately as follows (assuming a uniform mold expansion of 0.78"):

Waist	22.44"
High Hip	32.94"
Low Hip	35.44"
Thigh	20.94"
Bottom	19.44"

A blank used with this mold to produce the specified size 10 garment would have dimensions, not including seam allowances, as follows (the letter references appear on FIGURE 6 to show the particular dimension on the blank):

Waist (A)	24.44"
High Hip (B)	32.94"
Low Hip (C)	35.44"
Thigh (D)	41.88"
Bottom (E)	38.88"

These blank and mold dimensions, coupled with a total mold expansion of 1.56", will result in a fabric expansion of from about 6% at the waist, to 4.2% at the lower hip and 7.4% at the bottom.

Alternatively, the blank can be dimensioned, without seam allowances, as follows:

Waist (A)	24.07"
High Hip (B)	31.94"
Low Hip (C)	34.96"
Thigh (D)	41.66"
Bottom (E)	38.88"

A shell constructed from this blank, when expanded on a mold of the dimensions stated previously, will also result in a size 10 pant, and in this case the fabric expansion is 8% circumferentially at each of the five specified garment locations.

FIGURE 3 illustrates the manner in which the blank 20 is formed into the cloth shell. In this particular illustrated embodiment, the garment is a pant and it will have only an inseam on the legs and a front seam. A waistband 22 and other final trim are also applied to the shell before processing on the mold.

FIGURES 2 and 3 of the drawings are only intended to illustrate the general design principles employed in constructing a cloth shell for use in the practice of the present invention. The specific dimensions of blank 20, of course, will vary depending upon the particular garment being formed, and figures 2 and 3 do not purport to precisely illustrate such specific dimensions.

One of the significant advantages to the use of the expandable mold in the practice of the present invention is that the process cycle time is reduced by facilitating the placement of the shell onto the mold and its removal from the mold due to the relatively small size of the mold when retracted. In other words, a great deal of time and effort is required to stretch the shell over a fixed-size mold, and this problem is eliminated with the expandable mold.

In accordance with the present invention, the cloth is treated and dyed while on the mold to both color the cloth and to set the cloth, that is, to impart to the fabric a permanent shape and dimensional stability or memory. As mentioned previously, the dyeing and treating steps may include heating the cloth or applying chemical agents or other well known finishing procedures.

Heat setting of the cloth on the mold may be accomplished by passing the mold and cloth through an oven at a temperature sufficient to heat the cloth above

its heat set threshold, which varies with the nature of the fabric. Alternatively, the mold itself may house heating elements, such as resistance wire or infra-red calrod heaters. In yet another approach, heating liquids or high pressure steam may be circulated through or around the mold and cloth in order to raise the temperature of the fabric above its heat set threshold.

It is also necessary in accord with the present invention to leave the cloth on the mold until it cools sufficiently to insure that it will retain its heat set shape. For example, when forming garments from woven polyester, it has been found that the cloth retains its dimensional stability when removed from the mold at temperatures approximately 75° - 125° Fahrenheit below the heat set temperatures. Of course, the specific temperature to which the garment should be cooled will depend upon the particular cloth employed in practicing the invention. Also, in order to expedite the garment forming cycle, cooling may be enhanced by passing cooling fluids through or around the mold.

As noted above, the use of expandable mold 10 greatly facilitates the practice of the present invention. FIGURES 4 and 5 serve to illustrate the expansion of the mold 10 with a cloth shell 24 properly positioned over it. The mold and shell are dimensioned such that the shell will rest on the mold as shown in FIGURE 4 to permit uniform distribution of the shell on the mold. Once the shell has been properly oriented, the mold is expanded as shown in FIGURE 5 to tension the cloth shell to give it a smooth, unwrinkled and finished appearance. The amount of expansion will vary depending on the type of cloth used and will be apparent to those skilled in the art. For example, a conventional tentering process for common woven polyester fabrics will tension the cloth such that its dimension will increase by about 8%. Thus, the expansion of the mold when practicing the present invention can be set to increase the circumferential dimension of the mold and shell by a like 8%.

In addition to the heating and dyeing procedures disclosed above, other finishing or setting techniques are well known to those skilled in the art and may be employed in the practice of the present invention.

For example, resins or swelling agents can be applied to the cloth while on the mold by dipping the mold and cloth into a bath of the particular chemical being used, removing the cloth and mold from the bath and drying. Alternatively, the chemical may be sprayed onto the mold mounted cloth before the drying step. The desired chemical set may be obtained using a wide variety of different synthetic resins conventionally utilized in finishing the fabrics at the mill before they are cut and sewn or welded into garments. For example, chemicals typically utilized to impart crease resistance to fabrics may be applied to the cloth shell while on the mold using inpregnating resins which cross link with the molecules of the fiber of the fabric. Another class of chemical setting agents are the fluoro compounds used to provide water repellant finishes. Moreover, the present invention is not intended to be limited to any particular heat or chemical setting processes. Rather, the present invention is directed to the dyeing of cloth in combination with any finishing step which will effect shape and dimensional memory in the cloth while it is on the mold. Thus, in accord with the process of the present invention, the cloth article is not only dimensionally set on the mold, but also dyed on the mold. In practice, greige goods that have not been tentered or dyed may be cut into a properly shaped blank, mounted onto a suitable mold and then dyed and set to provide a finished article. Any of the commonly used and conventional dyeing techniques known in the art may be employed in accordance with this aspect of the present invention. This approach has the advantage that the manufacturer may inventory the greige goods and then color the articles during manufacture to match the given demands of the marketplace. In addition, the specific article will exhibit a greater color

uniformity at the seam lines. The sequence of processing (i.e. dyeing and then setting, vice-versa or simultaneous) will depend upon the specific fabric used in the process and the processing capabilities of the manufacturer. Where the dyeing procedures employ temperatures above the fabric's heat-set temperature, the dyeing and heat-setting steps may be advantageously effected simultaneously.

Although any number of conventional dyes and dye baths may be used in the practice of the present invention, it has sometimes been found desirable in the practice of the present invention to chemically treat the greige goods to lower their heat history characteristics and hence to lower the temperature at which the fibers making up the greige good will absorb dye. It should be noted, of course, that such chemical pretreatment is not necessary in all cases and that dyeing of the unfinished cloth article can be accomplished without any such pretreatment.

One particularly desired technique for simultaneously dyeing and finishing a polyester garment on a mold requires the construction of a preformed shell of cloth, as described above, from unfinished and undyed greige goods, the optional pretreatment of the cloth shell, either before or after it is put in shell form, and the immersion of the preformed shell, while on a mold, in a hot bath of dye. The preformed shell so treated is simultaneously tentered, because of the elevated temperatures and inherent tension applied, and dyed. Alternatively, the chemical agents may be incorporated in the dye bath and all the processing is effected in a single immersion step. Of course, other techniques well known in the art may be employed to apply the dye to the cloth article, including, for example, spraying, coating, foaming, misting or cascading the dye bath over the cloth while it is on the mold.

In summary, the preformed cloth shell may be treated while on the mold in a variety of ways to dye and complete the finishing of the cloth in the desired

predetermined shape. The particular treatment employed will, of course, depend on the kind of cloth used in the process. For example, synthetics such as polyester, nylon and acrylic may be effectively set by use of a tentering treatment; cotton cloth may be set by tentering and/or ammonia swelling processes; and wool by tentering or crabbing, dry finishing and decating. Those skilled in the art will appreciate, however, that many other setting treatments may be employed.

Various facets of the practice of the method of the present invention will be described in Examples 1 to 6 below. These Examples are all intended to be illustrative of the present invention, and not to be limiting in any way. Examples 3 through 6 illustrate the application of the present invention to the use of unfinished cloth in the manufacture of an upholstery covering such as that used to cover a cushion used in an automotive seat. These Examples demonstrate the utility of the process of the present invention in forming and dyeing a flat blank into a three-dimensional cloth article.

Example 1

A polyester greige woven fabric which has been bulked was set and dyed on the mold in the following manner. A preformed shell is constructed and mounted on a mold, which is preferably perforated, the mold and its shell are then slowly dipped into dye bath maintained at 190° C. After thirty seconds, the mold and shell are removed from the bath and the fabric is rinsed with perchlorethylene, while it remains on the mold, to remove excess dye. The dyed and finished garment is then dried and removed from the mold, and exhibits exceptional color and dimensional stability.

Example 2

A polyester woven, undyed gabardine cloth (12 oz. per linear yard) was subjected to treatment on a tentering machine wherein the cloth was tensioned in

the warp direction but left without tension in the fill direction. The cloth was heated to a temperature in the range of about 275-325° (below the conventional tentering temperature of 350° F) as it was processed on the machine. These preconditioned goods were then used to manufacture a garment by the procedure described in Example 1. The resulting garment was properly colored, required no further pressing or finishing, was accurately sized, and exhibited no wrinkles and a fine, finished appearance.

Example 3

A woven polyester/nylon greige fabric (14 oz. per linear yard) was cut into a flat, generally rectangular blank. This fabric had not been previously subjected to any treatment which would impart a permanent dimensional memory to the cloth. It was, however, washed, bulked and dried prior to use. The cloth blank was then draped over a wire mesh mold in the shape of an automobile seat cushion and attached to the mold about the peripheral portion of the blank. The cloth was evenly distributed over the shell and wrinkles and plaits were removed to the extent possible. The cloth mounted on the mold was then immersed in a dye bath at 380° F for approximately 120 seconds. Next, the cloth, while on the mold, was rinsed thoroughly with a solvent such as perchlorethylene and then removed from the mold and washed in more solvent to completely remove all excess dye from the cloth. Finally, the cloth was centrifuged and dried in a commercial industrial tumble drier at about 120° F for approximately 5 minutes to evaporate all the solvent. The resulting cushion cover exhibited a very satisfactory color, had been permanently formed into the shape of the wire mesh mold, and the cloth was completely finished and ready for assembly into a complete seat cushion without further ironing or any other treatment.

Example 4

The process of Example 3 was repeated in its entirety with the exception that before cutting the blank, the cloth was laminated to a film laminate including a polyurethane film layer approximately 2 mils in thickness and a polyester open-cell foam layer approximately 90 mils in thickness. The cloth after being mounted on the wire mesh mold was immersed in a dyebath at 320° F for approximately 120 seconds. After completing the process, the cloth was properly colored and exhibited a permanent dimension and shape the same as that of the mold.

Example 5

A woven polyester/nylon, undyed cloth was prepared at the mill without any treatments that would impart a permanent set to the intersections of the yarn. This cloth was washed, bulked and dried, laminated to a film laminate including a polyurethane layer and an open-cell polyester foam layer, and then cut into a flat blank suitable for use as a seat cushion covering. The cloth blank was then drawn by vacuum into a mold and a polyurethane resin was poured into the mold and foamed, in situ, at relatively low temperature of approximately 120°-150° F to provide an integral cushion and covering. The cloth covered cushion was then removed from the mold and immersed in a dye bath at approximately 320° F for about 120 seconds. During this dyeing step, the polyurethane foam cushion serves as a mold and the cloth covering is both dyed and set in the shape of the cushion. After dyeing, the cloth covered cushion was washed in a suitable solvent and dried. The resulting cushion exhibited excellent color and the cloth was permanently shaped in the configuration of the foam cushion.

Example 6

A polyurethane resin is poured directly into a mold and cured to form the desired shape of a foam cushion article such as a seat cushion. The foam thereby

is poured into the mold in its liquid state and cold cured. The cured foam cushion is removed from the mold and a cloth covering is placed over the cushion. The covering is of unfinished and undyed cloth. The cloth preferably is preformed into a shell complementary to the three-dimensional shape of the cushion article. The shell is held onto the cushion by any of a variety of means such as mechanical means or adhesive. Or an open cell foam can be employed and vacuum applied to a vinyl backed covering. The cloth covering then is contacted with a dyebath and heated while on the cured foam cushion so that the cloth will be dyed and will retain the three-dimensional shape of the cushion. The cloth covering then is cooled while on the cushion. Here again, the cured foam cushion itself acts as a male mold to hold the fabric of the cloth in contour as it is dyed and set. The cloth covering is thereby heated to a temperature above the heat-set threshold and cooled to a temperature below the cloth heat-set temperature. However, any heat or chemical setting processes or any other finishing step which will effect shape and dimensional memory in the cloth while it is on the cured foam cushion and dyed is contemplated.

It can be seen in Examples 5 and 6 that the foam cushion article, which acts as a novel mold in treating or setting the cloth covering while dyeing, actually becomes part of the final product. Of course, the cured foam cushion must be sufficiently rigid to withstand the slight shrinking of the cloth during setting. It has been found that at least a 35 pound deflection rating is acceptable. In other words, an "indention load deflection" rating is determined by the weight required to deflect the foam one inch when spread over a fifty inch area.

Those skilled in the art will appreciate the significant advantages attendant to the practice of the present invention. The resulting cloth articles with few

seams and no darts provides a new "look" and gives stylists new concepts to work with in designing new products. For the first time, undyed, unfinished and woven cloth can be employed to form a completely finished article in one process. Moreover, substantial savings can be achieved in the costs of manufacture by reducing inventory and substantially lowering the labor content in the cloth article. In addition, the final product exhibits an outstanding appearance, precise sizing and enhanced wearability.

While particular embodiments of the invention have been described above, it will be obvious to those skilled in the art that changes and modifications may be made therein without departing from the invention in its broader aspects, and therefore, the object of the appended claims is to cover all such changes and modifications which fall within the true spirit and scope of the invention.

CLAIMS:

1. A method of forming and dyeing a cloth covering for a cushion article comprising the steps of:

(a) constructing a cushion assembly including a foam cushion and cloth covering made from a flat blank of unfinished and undyed cloth;

(b) contacting the cloth covering with a dyebath and heating the cloth covering while on said cushion so that said cloth will be dyed and will retain the three-dimensional shape of said cushion; and

(c) cooling the cloth covering while on said cushion.

2. A process for forming and dyeing a cloth-covered cushion article, comprising the steps of:

(a) constructing a foam cushion having the shape of the desired cushion article;

(b) placing a cloth covering over the cushion, the covering being of unfinished and undyed cloth;

(c) contacting the cloth covering with a dyebath and heating the cloth covering while on the cushion so that the cloth will be dyed and will retain the three-dimensional shape of the cushion; and

(d) cooling the cloth covering while on said cushion.

3. The process of claim 2 wherein said cloth covering is heated to a temperature above the cloth heat-set threshold and cooled to a temperature below the cloth heat-set temperature.

4. The proces of claim 2 wherein said dyeing is performed at a temperature above the heat-set threshold of the cloth to simultaneously dye and set the cloth.

5. The process of claim 2 wherein said dyeing is performed by dipping the cushion and the cloth covering into a bath containing the dye.

6. The process of claim 2 wherein dye is first applied to the cloth covering and then said heat is applied.

7. The process of claim 6 wherein said cloth covering is heated to a temperature above the cloth heat-set threshold and cooled to a temperature below the cloth heat-set temperature.

8. The process of claim 2 wherein the cloth covering is held onto the cushion during said heating step.

9. The process of claim 2 wherein the cloth covering is preformed into a shell complementary to the three-dimensional shape of the cushion.

10. The process of claim 9 wherein the preformed shell is held onto the cushion during said heating step.

11. A process for forming and dyeing a cloth-covered cushion article, comprising the steps of:

(a) constructing a foam cushion having the shape of the desired cushion article;

(b) placing a cloth covering over the cushion, the covering being of unfinished and undyed cloth; and

(c) contacting the cloth covering with a dyebath and heating the cloth covering while on the cushion so that the cloth will be dyed and will retain the three-dimensional shape of the cushion.

12. The process of claim 11 wherein said cloth covering is dyed and treated simultaneously.

13. The process of claim 11 wherein the cloth covering is held onto the cushion during said treating step.

14. The process of claim 11 wherein the cloth covering is preformed into a shell complementary to the three-dimensional shape of the cushion.

15. The process of claim 14 wherein the preformed shell is held onto the cushion during said treating step.

16. A method of forming and dyeing a cloth covering for a cushion article comprising the steps of:

(a) constructing a cushion assembly including a foam cushion and cloth covering made from unfinished and undyed cloth; and

(b) contacting the cloth covering with a dyebath and treating the cloth covering while on said cushion so that said cloth will be dyed and will retain the three-dimensional shape of said cushion.

FIG. 1

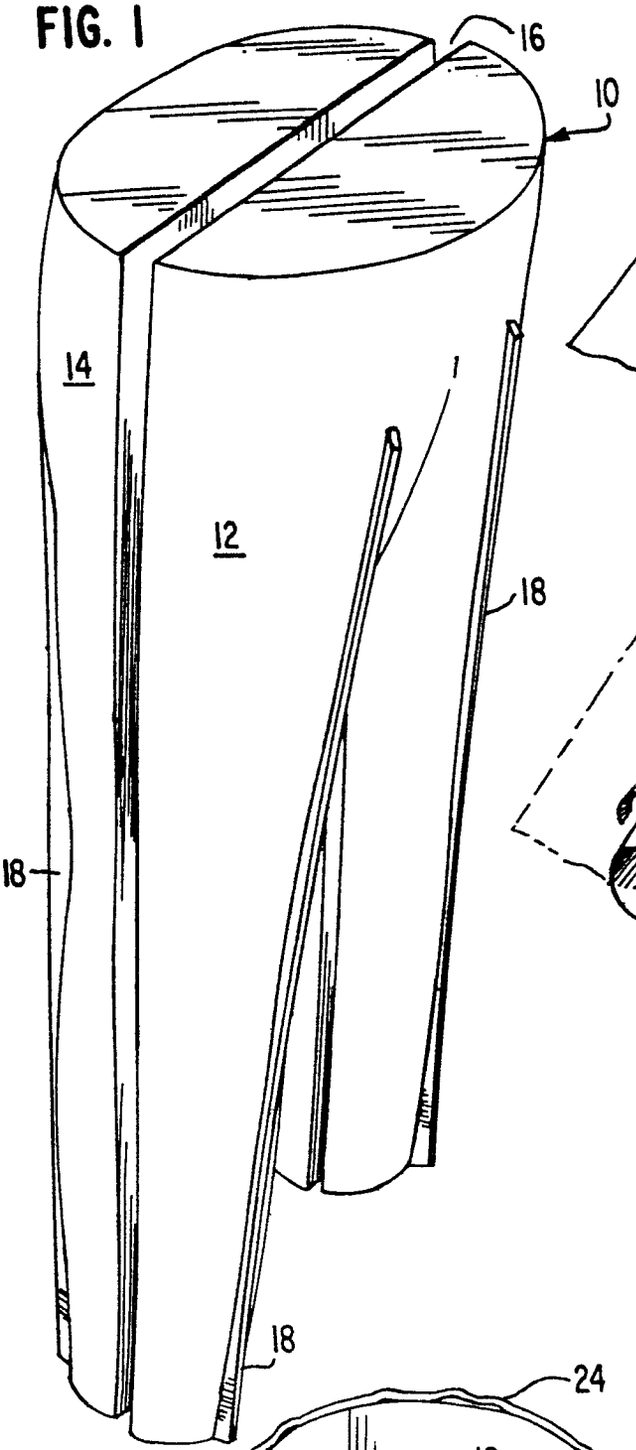
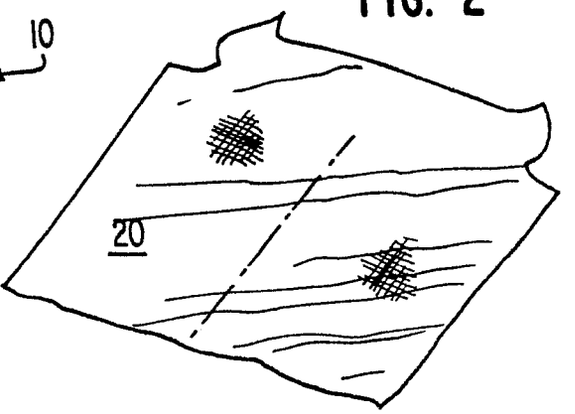


FIG. 2



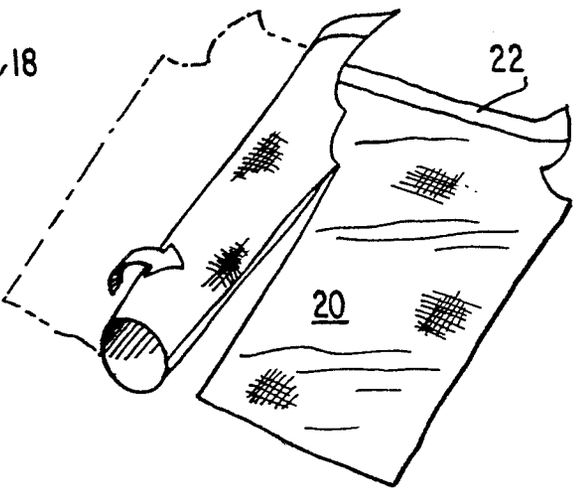


FIG. 3

FIG. 4

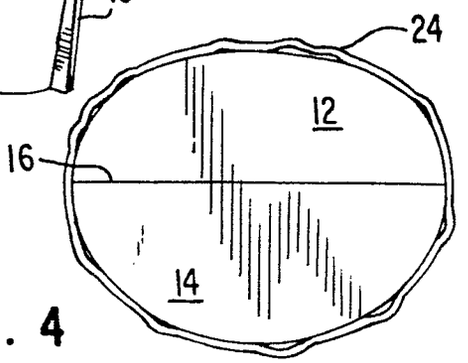


FIG. 5