Feb. 20, 1940. A. J. STEINBERGER 2,190,807

METHOD OF MAKING WEARING APPAREL

Filed May 29, 1935

Fig. 1.

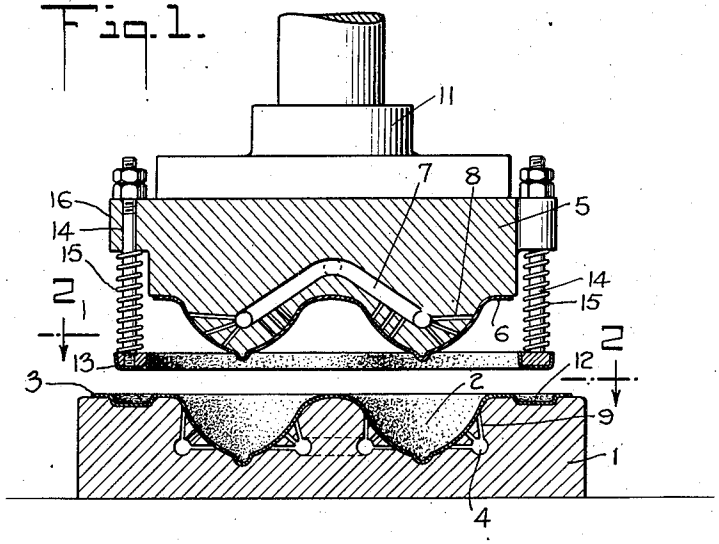
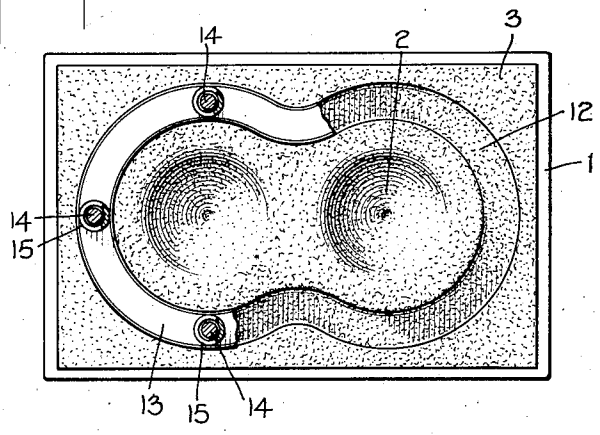


Fig. 2.



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2,190,807

METHOD OF MAKING WEARING APPAREL

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2 Claims. (Cl. 18—56)

This invention relates to articles of wearing apparel and other articles, and relates more particularly to the formation of wearing apparel by shaping textile materials, comprising thermoplastic derivatives of cellulose, while the same are at least partially plastic.

An object of my invention is to form wearing apparel in an economical and expeditious manner by shaping the textile materials, comprising filaments of thermoplastic derivatives of cellulose, with the aid of pressure and means for making the material at least partially plastic. Another object of my invention is the construction of a device for imparting shape to textile materials in such a manner that the textile material is not weakened and the shape placed therein is made permanent. Other objects of my invention will appear from the following detailed description and drawing.

In the drawing, wherein like reference numerals refer to like or similar elements in the respective figures;

Fig. 1 is a side elevation in cross-section of a shaping device constructed in accordance with this invention, and

Fig. 2 is a plan view, partially in section, taken on lines 2—2 of Fig. 1.

The formation of wearing apparel, such as brassières, suspensories, girdles, glove gauntlets, shoes, hats, caps, stockings, etc., or parts thereof such as linings, bands, etc., having shapes in three dimensions are difficult to form from relatively flat textile materials, since in order to obtain the desired shape it is necessary to form them from a relatively large number of small pieces of fabric, generally by cutting and sewing small pieces together.

I have found that such wearing apparel can be formed very simply and expeditiously by shaping, with the aid of pressure and means for making the textile material at least partially plastic, relatively flat textile materials, such as fabrics comprising filaments of thermoplastic derivatives of cellulose. The shaped or three dimensional portions of the article may then be formed of a single piece of textile material eliminating any necessity of sewing the article. However, the shaping action does not preclude the possibility of finishing the article with hems, taping, decorations, etc., around the edges or in the body portion of the same.

Shaped articles embossed or pressed from a relatively flat textile material containing thermoplastic derivatives of cellulose under the influence of heat and pressure have been formed. This was accomplished by subjecting flat textile material to a shaping operation between metallic molds. This operation has a tendency to flatten certain of the filaments forming glazed or shiny places and/or to exert so much pressure on the fabric that localized areas of the article become very much weakened. In accordance with my invention, however, the articles are not directly pressed between two metal surfaces during the embossing action but are shaped against a yielding pad, for instance felt, cotton duck or similar padding. A further advantage of my invention is that the padding may be moistened or wetted with a substance that is a plasticizer at the temperature of the pressing operation, temporarily placing the textile material in a partially plastic condition such that the individual filaments may be stretched and/or distorted at temperatures and pressures below those formerly required.

Shaped articles made by prior methods when subjected to repeated vigorous washings, particularly in heated baths, had the tendency to lose their shape. This loss of shape was due in part to the stresses remaining in the material, which stresses tended to right themselves when the material became softened in the heated bath. Articles shaped in accordance with my invention, however, have relatively permanent shape and they may be subjected to repeated washings, even in heated liquids, without substantially losing their shape.

In accordance with my invention, I form shaped wearing apparel or other similar articles from relatively flat pieces of textile materials comprising filaments of thermoplastic derivatives of cellulose by imparting the desired shape to such textile materials while holding the same against creasing, and under such conditions that the filaments are rendered at least partially plastic, such shaping operation being performed in such a manner that the filaments are not weakened nor flattened by direct pressure between two metal or other hard surface mold members. Also, in accordance with my invention, I construct a device that is simple in operation for carrying out the method above described.

Any suitable wearing apparel or similar article may be made by this invention. However, it is of particular importance in connection with the formation of wearing apparel or similar articles that have shapes in three dimensions. Examples of such wearing apparel are brassières, suspensories, girdles, gloves, hose and the like. It is also applicable to the shaping into three dimensions of wearing apparel formed of textile ma-

terial having filaments of an organic derivative of cellulose that are stiffened or of sufficient thickness to remain rigid in use. Examples of such wearing apparel are hats, visors for caps, hat bands, glove gauntlets, shoes or parts thereof. It is also applicable to articles made in three dimensions that are not normally classed as wearing apparel, for instance, rigid or semi-rigid containers, soft and flexible bag-like structures, pouches, etc.

The filaments contained in the textile material to be treated in accordance with this invention may be made of any suitable thermoplastic derivative of cellulose, particularly organic derivatives of cellulose, such as the organic esters of cellulose and cellulose ethers. Examples of the organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of cellulose ethers are ethyl cellulose, methyl cellulose and benzyl cellulose. The filaments may be present in substantially continuous lengths or they may be in the form of short staple lengths associated together to form spun yarn. The spun yarn may be formed by either the cotton or woolen method of spinning yarns. The textile material may consist wholly of such filaments or yarns containing such filaments, or it may contain yarns of substantially continuous fine filaments of organic derivatives of cellulose. On the other hand, the textile material may be heavier material such as may be made by weaving or braiding heavier filaments such as artificial hair, bristles or straw of the organic derivatives of cellulose. Further, the material to be shaped may consist of either a single thickness of material, or two or more thicknesses of material may be laminated together for the purpose of thickening and stiffening the same prior to the shaping operation.

The shaping of the textile materials may be done while they are heated to such a degree that they are at least partially plastic under the prevailing conditions. The temperature of the treatment will vary not only with the nature of the particular thermoplastic derivative of cellulose present in the textile material, but also with the amount of water and/or organic compounds having a plasticizing action present. Thus, if a fabric made of yarns of acetone-soluble cellulose acetate is shaped between or on forming devices in the absence of water or steam or other plasticizer, the temperature of such devices should preferably be above 100° C. However, the upper temperature limit should be below 180° C. if it is desired to avoid coalescence of the cellulose acetate filaments and the consequent stiffening of the material; while temperatures above 180° C. but below the temperature of decomposition may be employed when coalescence of the filaments and stiffening of the material is desired.

In shaping articles in accordance with my invention, I prefer to have between the solid molding members and the fabric a yieldable material, for instance, felt, cotton duck, flannel, ground cork, mat, or similar material. It is also preferable to employ a padding that is porous. In employing porous padding, the same may be immersed in or wetted with water or a solution containing a plasticizer, softener or swelling agent for the organic derivative of cellulose in the filaments of the textile material, prior to or during the shaping operation. By this means, less pressure need be applied on the textile material as the same are more plastic during the molding operation due to the presence of the plasticizer, softening agent or swelling agent. The porous padding is also preferable, because in some cases, it is desirable to inject into the molding cavity during the molding operations water, steam, and/or plasticizers. This may be accomplished by forcing same by means of the conduits in the mold section against the back of the padding member. By regulating the type and amount of swelling or softening agent and the amount of heat and pressure, the hand of the resulting article may be controlled.

In carrying out my invention, it is also preferable to employ a device in which the female mold section is on the bottom, so that when the textile material is stretched over the mold prior to the shaping operation any tendency of same to drape or sag is in a direction toward the cavity of the female mold section. This expedient is found to greatly decrease the probability of creases being formed, i. e., where the material overlaps upon itself in the pressing operation. More uniform filament distortion and stretching is also produced when the female mold section is on the bottom.

A further advantage of my invention resides in the fact that the material is held around the areas being shaped in such a manner that the material is prevented from folding upon itself in being pulled into the mold cavity, thus limiting the shaping to the stretching and distorting of the filaments over the area being shaped. It is not essential, however, that the fabric be rigidly retained about the areas being shaped, but the gripping action of the holding means may be such as to allow a slight slipping of the fabric or textile material into the mold as the molds are closed.

For the purpose of further describing my invention, the same will now be described with reference to the drawing wherein is shown a device also forming a part of my invention. In the drawing, 1 is a female mold section having cavities 2 corresponding to the shape of the article desired. There may be provided over the upper surface of the mold section 1 and over the interior of the cavities 2 a padding material 3. The padding material may be of any suitable material of sufficient resiliency to prevent a flattening of the filaments, for instance, felt, cotton duck, flannel and the like. In the mold section 1 may be suitable ducts 4 through which may be circulated steam, hot water, or other suitable heating medium. If desired, the duct 4 may act as a header having branch lines 9 leading to the cavities 2 of the mold in such a manner that steam or other fluid injected into the header 4 may be forced into the cavities 2. Besides steam, solvent vapors, etc., may be injected into the mold cavities. In place of ducts 4, there may be provided openings in which may be placed any suitable type of heating elements such as electric conductance or resistance coils or open flame burners and the like. If desired, there may be provided two sets of ducts 4, one of which acts as a header for supplying fluids to the mold cavities, while the other acts merely as a means for heating the mold section.

Suitably mounted upon the mold section 1 may be a male mold section 5 adapted to fit in and register with the female mold section 1. That surface of the male mold section that will contact with the textile material that is being shaped may be covered by a pad 6 of resilient material. Mounted in the male mold section 5 may be a header 7 that may or may not be connected by a plurality of small ducts 8 to the

working surface of the mold for the purpose of supplying heat to the mold and/or steam, water or plasticizer to the resilient pad. The smaller ducts 8 or branch lines 9 of the mold members may be provided with closure members, if desired, in such a manner that the fluid in the lines 4 and 7 may be prevented at the will of the operator from coming in contact with the article being shaped. Any suitable means may be provided for raising and lowering the male member of the mold. For instance, there may be employed a shaft 11 connected with a hand or mechanically operated raising and lowering mechanism (not shown). If desired, the male mold section may be stationary and the female mold section caused to move to open and close the mold.

Formed in the upper surface of the female mold section may be a groove 12. Adapted to register and fit in the groove 12 may be a gripping member 13 resiliently attached to the male mold section by means of the shafts 14 that are held in their lowermost position by springs 15. Any suitable number of these shafts may be employed and the same attached to brackets or ears 16 attached to or formed integral with the male section of the mold. The groove 12 and the gripping member 13 may run around the entire area of the textile material being treated or the same may be limited to localized areas spaced about the edge of the textile material. If desired, where more than one cavity is employed the groove 12 and the corresponding gripping member 13 may be caused to surround each cavity in the mold section.

If desired the gripping member 13 may be attached to the bottom mold in such a manner that they are slightly above the surface thereof when in an extended position.

In operation of the device disclosed, a piece of fabric formed substantially of thermoplastic material is laid upon the female mold section 1, heat is supplied to both the male and female member through the means 4 and 7. The shaft 11 is then caused to lower, moving the male mold section into the female mold section. Just prior to contact of the male mold section with the textile material to be shaped, the gripping means 13 is caused to enter the groove 12 and prevent the textile material from folding or buckling. Downward movement of the shaft 11 causes the male mold section to distort, stretch and/or extend the material into the form corresponding to the cavity of the female mold section.

It is to be understood that many modifications may be made without departing from the spirit of my invention.

What I desire to secure by Letters Patent is:

1. In a method of forming articles of wearing apparel or other similar articles, the step of imparting a three dimensional shape to textile materials comprising filaments of organic derivatives of cellulose, by distorting a substantially flat piece of the material by means of a padded form containing a plasticizer, while the textile material is at least partially plastic.

2. In a method of forming articles of wearing apparel or other similar articles, the step of imparting a three dimensional shape to textile materials comprising filaments of cellulose acetate, by distorting a substantially flat piece of the material by means of a padded form containing a plasticizer, while the textile material is at least partially plastic.

ALFRED J. STEINBERGER.

CERTIFICATE OF CORRECTION.

Patent No. 2,190,807. February 20, 1940.

ALFRED J. STEINBERGER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 53, for the word and comma"However," read and; line 57, for "material; while" read material. However,; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of March, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)