Nov. 27, 1934. W. J. DE WITT 1,981,949

METHOD OF MAKING A HOLLOW DISPLAY FORM

Filed March 5, 1929

Fig. 1

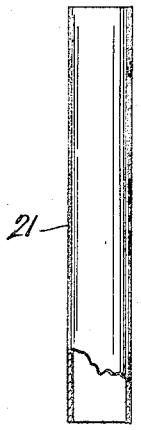


Fig. 2

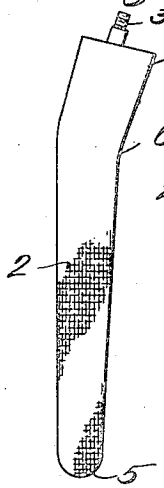


Fig. 3



Fig. 5

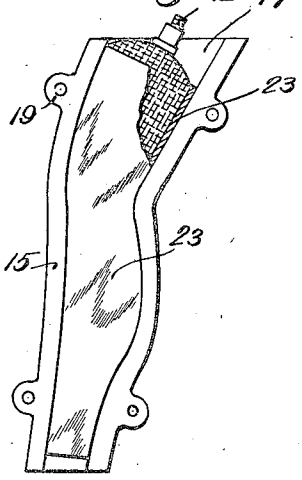


Fig. 4

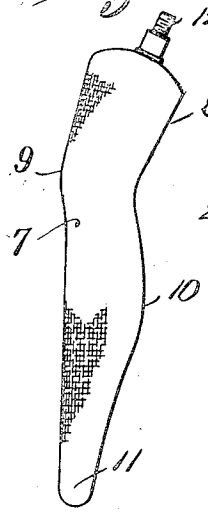


Fig. 7

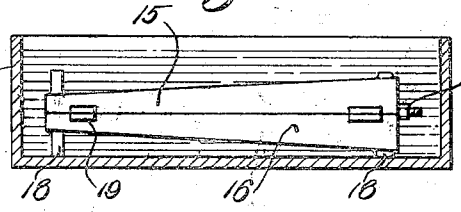


Fig. 8

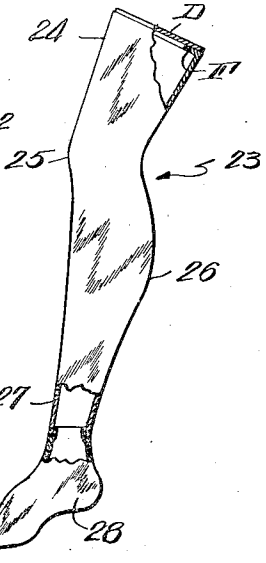


Fig. 6

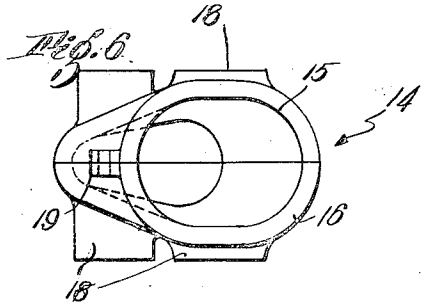
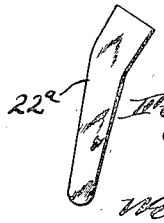


Fig. 9



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METHOD OF MAKING A HOLLOW DISPLAY FORM

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Application March 5, 1929, Serial No. 344,266

4 Claims. (Cl. 18—51)

This invention pertains to hollow hosiery forms such as are employed for the display of hosiery and to a process of making such forms, and relates more particularly to forms adapted to display substantially the full length of a woman's stocking. In my copending application Serial No. 290,252, filed July 3, 1928, of which this is a part continuation, I disclosed a hollow display form together with one mode of making it, but the invention forming the subject matter of said application had special reference to the production of a form capable of standing alone and to a method of uniting the leg and foot portions of such form and was illustrated as embodied in short forms such as are desirable, for example, to display half-hose or for showing the appearance of a shoe upon a stockinged foot, where the display of the shoe is the primary object. Recent developments in the production of women's hosiery, in which the finest and sheerest materials are used and wherein highly ornamental effects are often employed, have created a demand for hosiery forms capable of displaying the finer grades of women's stockings substantially in full length and in properly distended condition to simulate their appearance when worn.

As herein disclosed I provide a form desirable for displaying stockings at full length without detracting from their beauty of shape, texture, or ornamentation, and having certain characteristics common to the form of my aforesaid application capable of imparting to the stocking, so displayed, substantially the same visual and tactual characteristics as when worn.

In the accompanying drawing,

Fig. 1 is an elevation, partly in section, of a tubular blank of suitable material, for example, thin celluloid, for use in making the improved form;

Fig. 2 is an elevation of a tube shaping bag preferably employed at an early stage in the process of shaping the blank;

Fig. 3 is an elevation showing the form at an intermediate stage in the process;

Fig. 4 is an elevation of a tube shaping bag employed in completing the form;

Fig. 5 is an elevation showing one-half of a two-part mold which may be used in shaping the form, showing a form within the mold, partly broken away to show the shaping bag;

Fig. 6 is a plan view of the assembled mold;

Fig. 7 is a vertical section of diagrammatic character illustrating apparatus employed at a later stage in the operation;

Fig. 8 is a side elevation of a completed form, partly in section, showing the improved leg form united to a foot form; and

Fig. 9 is a side elevation, to smaller scale, illustrating a modification of the partially formed blank of Fig. 3.

Referring to the drawing wherein I have illustrated certain appliances useful in the practice of my process, the numeral 2 designates an inflatable bag, which I prefer to make of textile fabric, for example canvas, which is pervious to steam. This bag preferably tapers downwardly from its upper end 4 towards its lower end 5 and is closed at both ends, being provided at 3 with a filling nipple preferably furnished with an automatic valve (not shown) such as is commonly used in pneumatic tires. Preferably the upper part of this bag is disposed at an angle to the lower part, the junction between the upper and lower part being indicated at 6.

I also provide a second inflatable bag 7 which when inflated has substantially the contour of a human leg, comprising portions of the thigh as indicated at 8, the knee at 9, the calf at 10, and a portion at least of the ankle at 11. This bag, like the bag 2, preferably is made of pervious material and is closed at both ends, being provided at its upper end with a filling aperture preferably furnished with a nipple 12 provided with an automatic pressure retaining valve.

I also provide a multi-part mold 14, here shown as comprising two complemental parts 15 and 16, each providing a half of the mold cavity 17. This mold cavity conforms substantially to the shape of the desired display form, being a substantial replica of the inflated bag 7. If desired, the mold parts may be provided with outstanding foot portions 18 which prevent the rounded mold parts from rolling when inserting the tube or bag.

Having provided the appliances above described, or equivalent devices, I next prepare a tubular, preferably seamless blank 21 of the material to be employed in making the form. I find that thin celluloid is eminently well suited for this purpose, and for making leg forms of usual sizes I preferably employ a seamless celluloid tube of approximately 2¼ inches in diameter and having a wall thickness of from .060 to .075 inch. Having prepared this tubular blank 21 of the desired material and of proper length, I next introduce into this blank the bag 2, deflated sufficiently to permit ready introduction. If desired the blank may be softened before introduction of the bag, for example by heating it, or by the use of a suitable softening fluid, al-

though preferably I soften the blank concomitantly with the shaping operation. Assuming that the blank has not previously been softened and that the bag has been introduced, I next admit fluid under pressure into the bag 2 through the nipple 3. If desired, the blank may be softened concomitantly with inflation of the bag by immersing it in acetone or the like, but preferably I inflate the bag with a hot fluid, for example steam, and as this steam fills the bag and causes it to swell out to its full dimensions, some of the steam exudes from the pores of the bag and this moisture, together with the heat and pressure, rapidly softens the celluloid so that the celluloid substantially conforms itself to the shape of the inflated bag. When the bag has been fully inflated and the celluloid has assumed the form of the bag, I permit the parts to cool while keeping the bag inflated. This may be done, if desired, by admitting cool air to the interior of the bag to replace the steam, and when the partially shaped blank has become cool and resumed its original thickness, the bag is deflated and withdrawn from the blank. The blank now has substantially the shape shown at 22 in Fig. 3.

I next insert the deflated bag 7 within the partially formed blank 22 and preferably place the latter within the cavity between the mold members 15 and 16, the mold parts being clamped together in any suitable manner as, for example, by means of bolts passing through openings in projecting ears 19. Steam or other suitable fluid under pressure is admitted to the bag through one of the nipples 12 or 13. As the bag is inflated the blank is softened (by the heat of the fluid or through treatment with a solvent) and conforms itself to the interior of the mold cavity, being held under compression between the walls of the cavity and the inflated bag. When the bag is fully inflated, the blank assumes the form shown at 23 in Fig. 5. The shaped blank now comprises the thigh portion 24 (Fig. 8), the knee portion 25, the calf portion 26 and the ankle portion 27. In order that the shaped blank shall retain its molded shape I now introduce through the nipple 12 a suitable cooling medium, preferably air, into the interior of the bag. I prefer to use air for this purpose when steam has been employed in the original inflation, since cool air does not condense the steam too rapidly, while its high elasticity maintains the pressure within the bag, and thus the bag does not tend to collapse as might occur if some other cooling fluid, for example water, were employed. It is obvious that if another medium than steam be employed for the intitial inflation of the bag, it may be desirable to use some other cooling medium or merely to permit the original inflating medium to become cool without introducing a secondary cooling medium. Preferably, to hasten the cooling operation, I immerse or partially immerse the entire mold in a bath of cooling fluid. For example, as shown in Fig. 7, the mold may be set into a receptacle 20 containing cold water or other refrigerant. After the parts have sufficiently cooled so that the celluloid has regained its original stiffness, the mold parts are separated, the bag is deflated and the form is removed.

The leg form when removed from the mold has the appearance indicated at 23 in Fig. 8, comprising the thigh, knee, cap and ankle portions above described and may be trimmed, colored or otherwise finished in any desired manner. While the top may be left open, I contemplate the presence of a closure, or partial closure therefor, if desired. If desired, this form may now be associated with a foot form 28 which is conveniently made as a separate independent member and secured to the leg form in any desired way. By making the leg and foot portions independent, it is possible to make leg portions of standard dimension for attachment to foot portions of varying style or size. For this purpose it is simply sufficient that the lower end of the leg portion and the upper end of the foot portion be made of a standard diameter or contour so that they may be fitted together and united in any desired manner, and if the parts be of celluloid they may be united by moistening their contacting surfaces with a celluloid softener, for example, acetone, and permitted by the evaporation of the solvent to become integrally united. As fully disclosed in my aforesaid application, a suitable weight may be arranged in the foot portion of the form to hold the form upright.

While it is preferred to make the leg and foot separate, as above described, I contemplate that a complete form, including both leg and foot, may be made in accordance with the above general process by using a mold and/or shaping bag of proper contour and employing a blank 22^a closed at its lower end as indicated in Fig. 9.

While I usually employ the mold and the interior bag, I contemplate that under some circumstances the mold may be dispensed with, it being simply sufficient to insert an accurately shaped bag 7 in the tubular blank or partially completed form and to inflate the bag thereby to cause the blank to conform substantially to the shape of the bag. Furthermore, as an alternative procedure I may employ a mold of proper contour and provide other means than an internal bag for blowing the tubular blank into contacting engagement with the inner surface of the mold.

Moreover, while I prefer to employ that preliminary step of the process in which the bag 2 is used, I may dispense with this preliminary step under some circumstances, using only the secondary bag 7 for performing the entire operation.

The preferred process may also comprise other desirable, though not necessarily, essential details. For example, after the initial shaping of the blank by the use of the bag 2, it may be desirable to trim the ends of the blank, either to obtain the proper angle relative to the axis of the blank or merely to smooth the edges. Moreover, the final molding of the blank is facilitated and may be performed more quickly if the mold comprising the parts 15 and 16 is heated, either before or during the molding operation. For example, the mold, which may conveniently be made of type metal, or the like, after insertion of the blank and the bag 7, may be immersed in a tank of water heated to boiling by a steam jet or the like.

When the steam is first admitted to the bag, the pressure should not greatly exceed twenty pounds per square inch as otherwise it may tear the blank, and this low pressure is maintained usually from four to six minutes until the blank has been thoroughly softened and stretched nearly to its final shape. The pressure is now raised and held at this higher point from two to three minutes so as to insure accurate conformation of the blank to the walls of mold. After the steam has been replaced by air, as above described, the mold is cooled, either by admitting cold water to the same tank, or by immersing the mold in a second tank containing cold water (as previously suggested) or by pouring cold water over the

mold. When the molded form is removed from the mold it may be desirable to subject its smaller end to shaping pressure to give it the exact, more or less oval, contour necessary to permit it to register with the top of a foot form.

After uniting the foot and leg forms and smoothing the joint between them the completed composite form may be sprayed, dipped, or otherwise coated with a suitable paint, lacquer, varnish or the like, preferably of quick drying type having a cellulose base. As above described the top of the form may be closed as, for example, by a plate or disk D of celluloid or other suitable material, cemented or otherwise secured for example to an inturned flange F at the upper end of the form.

I claim:

1. That method of making hosiery forms from a tubular blank of sheet celluloid, which comprises as steps, placing the tubular blank into a mold, the cavity of which conforms substantially to the shape of the finished form, inserting within the blank an inflatable bag of pervious material, immersing the mold, blank and bag in a tank of boiling water, and inflating said bag through the introduction thereinto of a heated fluid medium, thereby causing the bag to expand the blank into contact with the wall of the mold cavity, a portion of the medium exuding through the pores of the bag into contact with the blank to render it ductile and moldable during such expanding of the blank.

2. That method of making hosiery forms from a tubular blank of sheet celluloid, which comprises as steps, placing the tubular blank into a mold, the cavity of which conforms substantially to the shape of the finished form, inserting within the blank an inflatable bag of pervious material, immersing the mold, blank and bag in a tank of boiling water, and inflating said bag through the introduction thereinto of a heated fluid medium, thereby causing the bag to expand the blank into contact with the wall of the mold cavity, a portion of the medium exuding through the pores of the bag into contact with the blank to render it ductile and moldable during such expanding of the blank, and subsequently replacing the fluid medium with a cooling fluid to cool the blank and restore it to its normal condition.

3. That method of making hosiery forms from a tubular blank of sheet celluloid, which comprises as steps, placing the tubular blank into a mold, the cavity of which conforms substantially to the shape of the finished form, inserting within the blank an inflatable bag of pervious material, immersing the mold, blank and bag in a tank of boiling water, and inflating said bag through the introduction thereinto of steam, thereby causing the bag to expand the blank into contact with the wall of the mold cavity, a portion of the steam exuding through the pores of the bag into contact with the blank to render it ductile and moldable during such expanding of the blank.

4. That method of making hosiery forms from a tubular blank of sheet celluloid, which comprises as steps, placing the tubular blank into a mold, the cavity of which conforms substantially to the shape of the finished form, inserting within the blank an inflatable bag of pervious material, immersing the mold, blank and bag in a tank of boiling water, and inflating said bag through the introduction thereinto of steam, thereby causing the bag to expand the blank into contact with the wall of the mold cavity, a portion of the steam exuding through the pores of the bag into contact with the blank to render it ductile and moldable during such expanding of the blank, and subsequently replacing the steam with a cooling fluid to cool the blank and restore it to its normal condition.

WILLIAM J. DE WITT.