

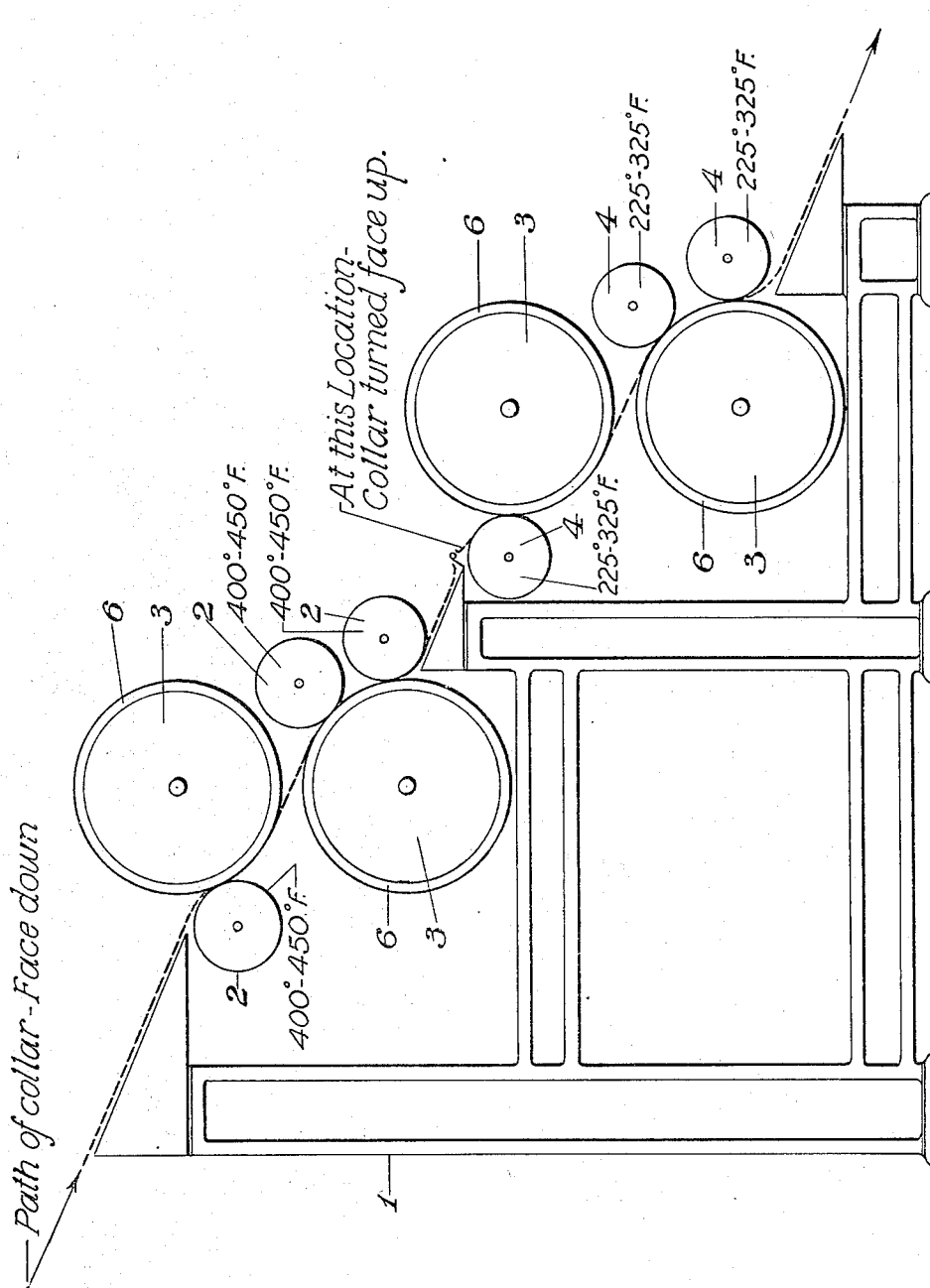
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PROCESS FOR MANUFACTURING WEARING APPAREL AND PRODUCT THEREOF

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PROCESS FOR MANUFACTURING WEARING APPAREL AND PRODUCT THEREOF

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This invention relates to wearing apparel of the type to be laundered and more particularly to wearing apparel such as collars, cuffs and the like of a three-ply construction.

5 There are several types of fabric garments manufactured according to the present state of the art, for example, collars and cuffs having no stiffening agent; those having collar and cuff units stiffened with a temporary stiffening agent as starch; those stiffened by partially parch-
10 mentizing the fabric by means of suitable reagents; those in which pre-starched interliners are used as stiffeners; those in which cellulose derivative coated fabrics are used as stiffening interliners; garments in which the component
15 fabrics are laminated by means of cellulose derivative dispersions; and those in which collars and cuffs are made with an interliner of a so-called mixed weave fabric. By so-called
20 mixed weave fabric is understood a fabric in which some of the yarns are a cellulose derivative as cellulose acetate or cellulose nitrate as distinct from cellulose itself, as for example, cotton. When such a fabric is treated with an
25 organic liquid which is a softener or solvent for the cellulose derivative the cellulose derivative yarns are gelatinized and act as a binder or adhesive when the mixed weave fabric is united to another layer of material either of the same
30 or different construction.

Of the various types mentioned above none are entirely satisfactory. The garments which are made of untreated fabrics soil quickly and wrinkle easily. The starched type while present-
35 ing a very satisfactory initial appearance, is sensitive to spotting by water and becomes wilted and wrinkled especially in warm weather. The collars and cuffs of multi-ply construction in which the fabrics are laminated and stiffened by
40 partially parchmmentizing the fabric present the disadvantage of lowered tensile strength and consequent unsatisfactory wearing qualities. Where interliners pre-stiffened with starch are used, the treatment is effective only until the
45 first laundering which removes the starch. While the collar or cuff may be re-starched by treatment with starch it does not retain its appearance for any length of time particularly in summer weather.

50 When certain cellulose derivative coated interliners are used the result is not satisfactory because of the tendency of the coating to disintegrate and disappear and often to discolor when the garment comes in contact with some
55 of the commoner reagents used in laundering.

In the manufacture of three-ply detached collars the interliner has its edges turned with the face ply of the collar in a machine specially constructed for this purpose. Such machines
60 are known as turning machines and their con-

struction and use is well known in the art of making collars and cuffs. In the manufacture of three-ply collars where the interliner is coated on both sides with some sort of adhesive considerable difficulty is encountered in production
5 in the turning machine. The bed of the turning machine is heated to approximately 400 deg. F. and while the die is not directly heated it gradually becomes heated and approaches the temperature of the bed of the machine. This
10 condition results in the double coated interliner sticking to the die and prevents its removal without distortion of the collar plies. This difficulty is met in the use of various types of thermo-
15 plastic compositions which are used as stiffeners for the interliner whenever such material is applied to both faces of the interliner.

In the manufacture of separate or detached collars with the mixed weave fabric interliner, production difficulties are encountered due to the
20 suppleness of the mixed weave fabric interliner. In the manufacture of regular starch stiffened collars both the interliner and face ply are stiffened by means of suitable starch compositions. Such treatment causes the fabric to hold its
25 shape when the edges are turned in a turning machine. With the mixed weave fabric interliners, no starch can be used either in the interliner or in the face ply due to the effect of the starch on the adhesiveness of the plies when they
30 are finally combined. Mixed weave fabric interliner is not adapted for use in the three-ply collar produced in a turning machine on account of certain practical details necessary which cannot be satisfactorily met on a production basis;
35 for example, considerable difficulty is encountered when a mixed weave fabric interliner is fed in the turning machine due to the softness and lack of body of the interliner.

This invention has as an object the provision
40 of a method for producing multi-ply collars, cuffs and the like which are non-wrinkling, readily cleanable and are capable of retaining their shape after laundering without being subjected to a subsequent stiffening operation.

A further object is the provision of a method
45 for producing a three-ply collar at regular production rate using a standard turning machine without having the interliner adhere to the die after the edges are turned.

50 A still further object is the provision of a method by which satisfactory adhesion between the various plies of the collar may be obtained without the use of activators or solvents to soften the thermoplastic film or yarns in the so-called
55 mixed weave fabric.

Another object is the provision of a method for producing new and useful articles of wearing ap-
parel. Other objects will appear hereinafter.

These objects are accomplished in the present 60

invention by cutting out a front and back ply and an interliner. The latter is prepared by applying a suitable thermoplastic adhesive composition to one face of the interliner fabric, drying to remove the volatile material from the thermoplastic adhesive, and then cutting out the blank. The article is then assembled in a turning machine, the interliner being turned with the uncoated side in contact with the hot die and the face ply between the coated face of the interliner and the bed of the turning machine, stitching the back ply to the face ply and the interliner and uniting the three-ply material to form a composite by means of pressure and a differential temperature on the face and back of the article.

In the drawing, the single figure represents a side elevation of a machine suitable for joining the parts of a collar by means of heat and pressure. In the figure, 1 represents a frame upon which are mounted heating rolls, 2, usually made of steel, which are maintained between 400 and 450° F., 3 is a roll having a covering, 6, of a padding material similar to the well known mangle or ironing board. The collar passes through one series of rolls and is then turned over; that is, upside down as indicated in the figure and is then passed through a second series of rolls. This second series is substantially the same as the first except that the rolls indicated as 4 are maintained at a temperature between 225 and 325° F.

The term "turning machine" is well known in the collar manufacturing industry. An example of such a machine may be found in U. S. Patent #1,698,469 of January 8, 1929 to Walter J. Beattie. It is not intended, however, to limit the present invention to the use of this particular machine or any other particular collar folding or turning machine. The machine used at present in our experimental work in the manufacture of the three-ply semi-stiff collars was a modification of the Beattie machine.

In order that the present invention may be more fully understood the following definition of terms used is given:

By the term "three-ply collar" is meant a construction in which an extra layer of the fabric is interposed between the fabrics in a fold-over or other type collar, the function of the intermediate layer being to add stiffness and body to the collar.

The term "semi-stiff" collar is used to designate a collar having a pliability or "hand" intermediate to an unstarched, untreated soft collar on the one hand and a fully starched stiff collar on the other hand.

"Collar top" is that portion of the collar which is exposed to view when being worn.

"Collar neckband" is that portion of the collar to which is attached the collar top and is unexposed when worn being in contact with the neck of the wearer.

"Shirt neckband" is that portion of the shirt which comes in contact with the neck of the wearer and to which the collar is attached.

As a preferred embodiment of the practice of the present invention the following is given by way of illustration but not by way of limitation.

To one face of an interliner which may be a fabric weighing approximately 2½ ounces per linear yard 44" wide and having a yarn count of 48 in the warp direction and 48 in the filler direction is applied by any suitable means such as a doctor knife, squeeze rolls, spraying equipment or the like a film of a thermoplastic adhesive.

Satisfactory thermoplastic adhesive compositions may be prepared from the following formulae:

Example I

	Percent by weight	
Methylmethacrylate polymer	29.00	
Dicyclohexyl phthalate	16.00	
Toluol	45.87	
Ethyl alcohol	9.13	10
	100.00	

Example II

	Percent by weight	
Methyl methacrylate polymer	30.00	15
Tricresyl phosphate (Lindol grade)	16.00	
Toluol	45.04	
Ethyl alcohol	8.96	
	100.00	20

Example III

	Percent by weight	
Methyl methacrylate polymer	23.00	
Diethyl phthalate	14.90	
Toluene	51.60	25
Ethyl alcohol	10.50	
	100.00	

Example IV

	Percent by weight	
Vinylid resin	35.00	
Diethyl phthalate	13.00	
Pigment	6.50	
Methyl ethyl ketone	45.50	35
	100.00	

Example V

	Percent by weight	
Cellulose nitrate	16.00	40
Tricresyl phosphate	7.30	
Ethyl acetate	28.00	
Ethyl alcohol	42.10	
Barytes	6.60	
	100.00	45

Example VI

	Percent by weight	
Cellulose nitrate	18.70	50
Vinylite resin	15.30	
Tricresyl phosphate	16.30	
Methyl ethyl ketone	28.50	
Ethyl acetate	10.80	
Ethyl alcohol	10.40	55
	100.00	

Example VII

	Percent by weight	
Cellulose acetate	8.00	60
Toluene sulphonamide-formaldehyde condensation product	8.00	
Tricresyl phosphate	16.00	
Pigment	24.00	
Acetone	44.00	65
	100.00	

Example VIII

	Percent by weight	
Ethyl cellulose	27.30	70
Tricresyl phosphate	4.60	
Ethyl acetate	26.30	
Ethyl alcohol	41.80	
	100.00	75

Example IX

	Percent by weight
Poly ether resin.....	37.50
Tricresyl phosphate.....	12.50
Toluene.....	50.00
	100.00

The volatile constituent of the adhesive composition applied is then removed by drying at room temperature or by passing the coated fabric through a suitably heated drying chamber. After the adhesive composition has been dried by the removal of the volatile constituent the fabric containing the film may be rolled and stored if desired until it is required for use. The fabric plies or blanks which form the collar top as well as the single coated interliner are next cut from the respective fabrics in any convenient manner, for example, by means of suitable cutting dies. The ply selected for the face of the collar is then placed on top of the interliner in contact with the face having the thermoplastic adhesive film. The two blanks thus assembled are then edge turned in the turning machine. The bed of the turning machine is heated to approximately 400 deg. F. and while the die is not heated directly, it gradually becomes hot and approaches the temperature of the bed of the machine. The interliner is turned with the uncoated side next to the hot die and with the face ply of the collar, which is untreated, between the coated side of the interliner and the bed of the turning machine.

The edges of the blank, which is to be the back ply of the collar, are then similarly turned and stitched to the face ply and interliner to form the three-ply collar top. In detachable collars the collar neckbands should be made of the same stiffness as the collar itself. In the present invention the collar neckbands are fabricated in the same manner as the collars by turning in the same type of turning machine.

To form the complete collar the collar top is now inserted in the collar neckband. The buttonholes are then placed in the collar according to usual practices in the art. The assembled blanks which have been stitched as noted above are then passed through a series of heated rolls in order to secure the fabric layers together to form the finished collar. The first set of rolls are heated to a temperature of 400-450° F., and the plied material passed through these rolls with the face ply down. This operation softens the thermoplastic adhesive film which is on the face of the interliner and a portion of the softened adhesive passes through the interliner fabric to the back ply and securely adheres the back ply to the interliner. The laminated material is then passed through another series of rolls, with the face ply up, which operation securely adheres the face ply to the interliner and the back ply. These rolls are heated to a temperature of between 225-325° F. This last operation completes the fabrication of the collar.

It is not intended to limit the present invention to the particular thermoplastic adhesive described above. Other thermoplastic adhesives as disclosed and claimed in co-pending application of McBurney & Nollau S. N. 5,078, filed February 5, 1935, are also adapted to be used with the procedure set forth in the present application and also the modifications of the thermoplastic adhesives as noted in the above-men-

tioned co-pending application. The thermoplastic composition disclosed and claimed in the further co-pending application of Swan S. N. 5,105, filed February 5, 1935, may also be used as the thermoplastic film on the interliner.

The interliner fabric may be any light weight fabric preferably of the sheeting weave type. In addition to that previously noted, a fabric weighing approximately 2.73 ounces per yard 43 inches wide and having a yarn count of approximately 56 in the warp direction and 52 in the filler direction, weighing approximately 2.4 ounces per yard 40" wide and having a yarn count of 96 in the warp direction and 100 in the filler direction has been found satisfactory. The proper choice of other fabrics suitable for use as an interliner will be readily apparent to those skilled in the art.

No limitation is placed on the type of fabrics which may be used for the outer plies of the wearing apparel which is described in the invention. Common types of cotton fabrics ordinarily used for producing collars, cuffs and the like such as broadcloth, madras, oxford cloth, etc., may be used. Various types of fabrics woven from synthetic yarns such as are made from regenerated cellulose, cellulose acetate, cellulose nitrate, cuprammonium cellulose, etc., as well as linen fabrics and fabrics woven from other natural type yarns are included within the scope of the invention. Typical broadcloth fabrics which can be used satisfactorily as the front ply on the collars of the present invention are those having, for example, yarn counts of 96 in the warp direction and 92 in the filler direction; 96 in the warp direction and 116 in the filler direction; 96 in the warp direction and 100 in the filler direction, etc., for the back ply broadcloth fabrics having a yarn count of warp 80, filler 80; warp 96, filler 110; etc., have been used.

While reference is made in the present invention to three-ply detached collars which are machine turned, it is not intended to limit the invention to machine turned collars only, but it is to be understood that the process is applicable to the manufacture of three-ply attached collars which are hand turned.

In joining the collar top and the collar neckband to form the completed collar it is preferable, as previously noted, to do this before the plies of the collar are bonded by heat and pressure so that the two portions of the collar may be bonded at the same time. If desired, however, the collar top may be first bonded and then inserted into the collar neckband and the plies of the neckband then bonded by means of heat and pressure. The neckbands for attached collars may be fabricated from untreated materials if desired and the plies not bonded.

The application of the thermoplastic adhesive to only one side of the interliner greatly facilitates the turning and pointing operations in the manufacture of three-ply attached collars. This pointing operation consists in folding the collar plies to form the points and applying heat and pressure or otherwise treating the collar so that the increased thickness at the points is reduced to a minimum.

No restrictions are placed on the particular type of collar which may be produced according to the present invention since the various styles and types may be manufactured with equal adaptability by the process of the present invention.

Other modifications will be readily apparent to those skilled in the art of manufacturing collars and the like and may be used without departing from the spirit of the invention.

5 The process of the present invention is particularly adapted to the manufacture of three-ply detachable collars by means of the use of a turning machine. The process finds further application to the production of hand turned
10 three-ply detachable collars.

Further the process is adaptable to the manufacture of cuffs, shirt bosoms, shirt neckbands and the like and in fact wherever it is desired to produce a three-ply fabric construction material.

15 In the claims, the term "collar" is used generically to cover articles of the type disclosed.

The principal advantage of the process of the present invention is that the single coated interliner may be used in a standard turning machine at regular production speed which is not practical where the adhesive is applied to both sides of the interliner or where a so-called mixed weave fabric is used as the interliner. The economic advantages from the standpoint of production are obvious.
25

A further advantage is that the various plies of the collars, etc. may be bonded without the aid of solvents or softeners to render the thermoplastic composition adhesive. This eliminates
30 the cost of the solvents as well as the safety hazards which are inherent in the use of volatile solvents.

Another advantage is that the interliner in which the thermoplastic film has been applied
35 is sufficiently firm or "set up" to allow mechanical feeding to the turning machine which is not practical in the case of the interliners of the so-called mixed weave type fabric.

A still further advantage of the process of the invention is the production of collars, cuffs and the like having an interliner which imparts the desired stiffness without being sensitive to moisture such as is encountered from perspiration with the ordinary starch stiffened collars, cuffs
40 and the like.
45

A still further advantage is the production of collars, cuffs and the like which upon laundering retain their stiffened condition without any further stiffening treatment being necessary as is the case with starch stiffened apparel.
5

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.
10

I claim:

1. The process of making three-ply, semi-stiff collars which comprises coating an interliner on one side only with a thermoplastic adhesive, providing the same with a face and back ply, and applying sufficient heat and pressure to cause the said adhesive to migrate through the interliner and adhere to the ply on its opposite side.
15

2. The process which comprises assembling a collar having an interliner, a face and a back ply, said interliner being provided with a thermoplastic adhesive on one side only, applying heat and pressure to the collar by passing the same through at least two sets of heated rolls, the first set being about 400 to 450° F., and the second set being maintained at about 225 to 325° F.
20

3. Process of claim 1 in which the said adhesive contains a polymeric ester of methacrylic acid.
25

4. The process of claim 1 in which the adhesive is between the face ply and the interliner and the heat is applied to the back of the collar.
30

5. Process of claim 1 in which the adhesive is plasticized methyl methacrylate and the heat is applied by means of a hot roll pressing against the ply on the side of the interliner opposite from the adhesive.
35

6. Process of claim 2 in which the adhesive is plasticized methyl methacrylate and the heat is applied to the ply on the opposite side of the interliner from the side to which the adhesive was applied.
40

7. Process of claim 1 in which the adhesive is plasticized methyl methacrylate.
45

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