

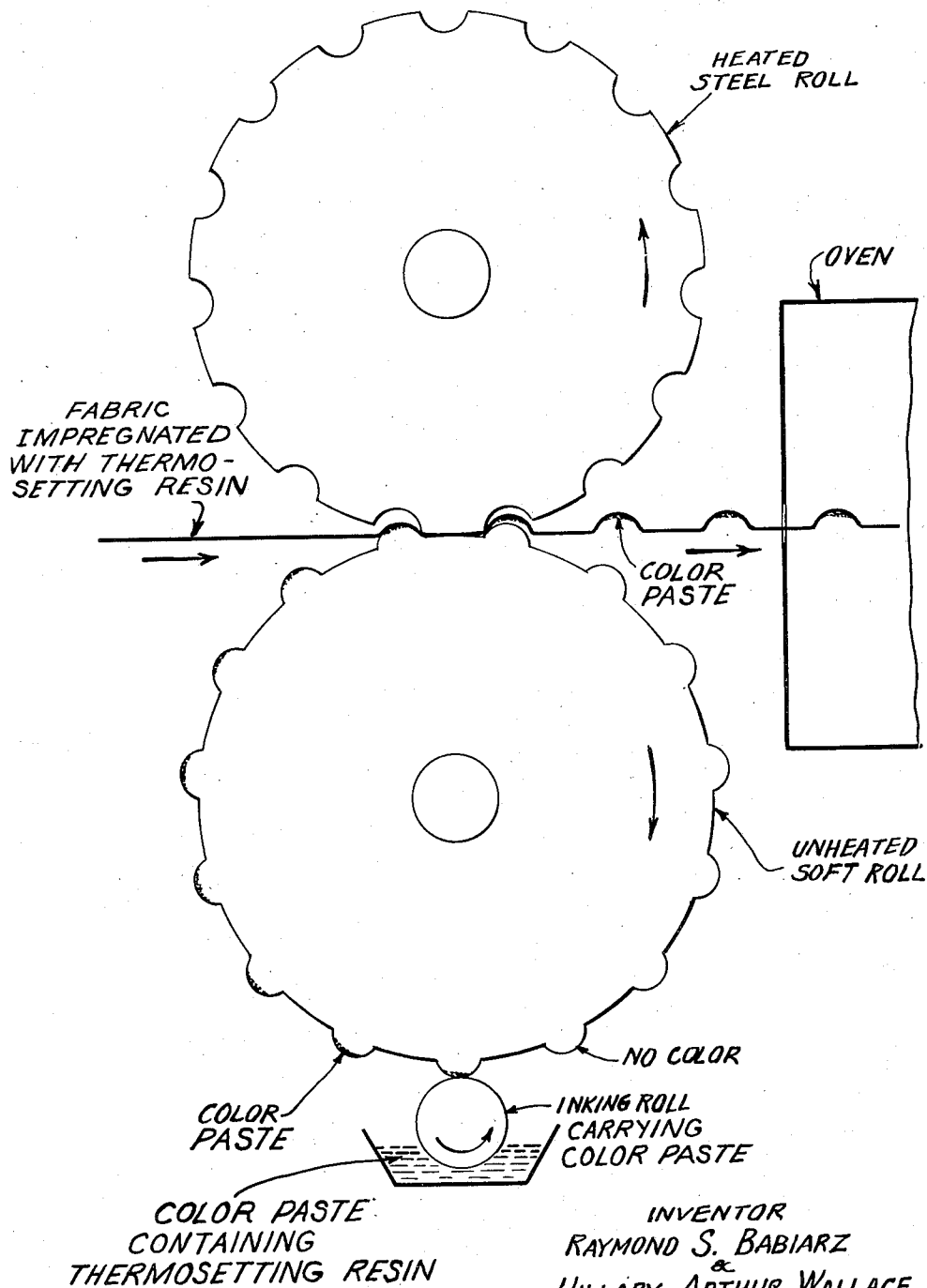
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PRODUCTION OF INLAY EMBOSSED FABRICS

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PRODUCTION OF INLAY EMBOSSED FABRICS

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This invention has to do with the production of color inlays in embossed fabrics, which inlays are durable to repeated washings and dry cleanings. We are aware that others have proposed, prior to the filing hereof, to produce a durable inlay. The objective of this invention is to produce such inlays in a simple, economical, effective and widely accommodative way (i. e. full range of color, etc.) without the accompaniment of difficulties and disadvantages heretofore concomitant in the production of such finishes, as will further appear.

Of course, the production of durable embossed finishes per se, without disadvantage, is well known, but, insofar as we are aware, we are the first to produce a durable inlay in such finishes, in a way to realize the objective above set forth. In the production of such finishes, the pattern has been formed on the face of the fabric by the engraved metal bowl of the calender which has the male engraving. The female counterpart is produced on the "soft" bowl by the engraving of the metal bowl.

In the production of durable inlays, it has heretofore been necessary to employ special resins and procedures with their accompanying difficulties and disadvantages. Surprisingly we have found that by proceeding as herein-after pointed out, essentially the same resins as have heretofore been successfully used in the production of durable embossed finishes may also be used in the production of durable inlays.

Heretofore durable inlays have been produced by applying to the tips of the elevations of the heated engraved steel bowl of the embossing calender, at a relatively elevated temperature, in advance of the nip of the bowls in the direction of rotation of the engraved bowl, a printing color paste containing special resins capable of withstanding the conditions of the process, and thereafter simultaneously embossing the fabric and transferring the paste to the shallow-most portions of the depressions in the fabric, followed by heating to harden or set or polymerize the resins to the insoluble stage, as by passing the fabric through an oven.

Because of the temperature, the usual water solutions (or dispersions) could not be used, and, instead, a high boiling liquid was used as the vehicle for the pigment and resin. The resin had to withstand the temperature of the heated bowl without premature hardening and the vehicle had to be such as not to be flammable, i. e., to have too low a flash point, if dangerous fires and explosions were to be avoided. The ingredients of the inlay paste employed must be of the non-volatile variety, otherwise substantial evaporation would occur, which would produce a health hazard and possible bad dermatological effects.

Heretofore the amino-plast resins could not be employed in the production of durable inlay finishes in order to overcome many of the above objections, because of the relatively high temperature of the engraved steel roll necessary to obtain a durable embossed pattern caused premature hardening of the resin. We have discovered how these may be successfully used in the production of durable inlays.

The accompanying drawing schematically illustrates the production of a durable inlay according to one embodiment of the invention.

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An embossing calender, as previously indicated, is composed of a heated steel bowl engraved in such a manner as to impart the desired pattern to the face of the fabric, herein called the male pattern and an unheated, so-called "soft" composition bowl. These two bowls or rolls are first "run in," until the pattern engraved on the steel bowl is, in counterpart, imparted to the soft roll. In this invention, we engrave the pattern on the steel bowl in reverse so that the pattern is imparted to the face of the fabric by the soft roll instead of the engraved steel bowl. In other words, the pattern is produced on the face of the fabric by the soft bowl now having the male pattern, instead of vice versa, as has been the customary practice. Instead of applying the color paste to the tips of the engraved metal bowl, we now apply it to the tips of the unheated soft bowl in advance of the nip, by means of a printing roll. Since the bottom filled roll carrying the color to the fabric does not reach beyond 200° F. in normal operation, it is possible to use the usual water phase color pastes containing a pigment, the resin binder (such as the amino-plast resins of the melamine types, of the urea types, nylon 8—DV—55 of Du Pont de Nemours, and the like, well known in the textile art), a catalyst, such, for example, as hydromethylpropanolamine hydrochloride, and a gum thickener, such as polyvinyl alcohol, locust bean gum, karaya gum and the like, thus making it possible to overcome the aforesaid difficulties and disadvantages and to realize the objective of the present invention with a wide range of applicability as to colors and shades.

This invention consists of applying a solution of the usual well known amino plast and other resins customarily employed in producing durable embossed finishes to a pure or dyed fabric, as by impregnation, and squeezing, and then drying to a moisture content of approximately 10%. Alternatively, the fabric may be fully dried and conditioned by adding moisture, or allowed to receive moisture from the surrounding atmosphere by coming into equilibrium therewith. This fabric is then passed through an embosser having an inlay attachment associated with the bottom bowl. The inlay attachment consists of a printing roll or a series of rolls furnishing the color paste to the tips of the bottom filled roll, which in turn applies and transfers it to the fabric during the embossing operation. The embossing pattern imparted to the fabric is such that the face of the fabric is next to the bottom filled roll. No objectionable premature polymerization, such as would render the inlay non-durable, occurs on the soft roll. The embossing and inlaying occur simultaneously. After embossing and inlaying, the fabric is cured as by heating in an oven, washed and dried. The result is a durable embossed fabric having its shallow-most portions or recesses colored on the face of the fabric. This coloration is also durable to washing and dry cleaning. The pigments may be organic or inorganic.

The resin or mixture of resins may constitute from about 1% to about 25% of the paste by weight. The paste also contains a thickener such, for example, as polyvinyl alcohol or customary textile paste thickener, a customary textile softener, such, for example as s-di-[1-(2-steoroamidoethyl)] urea mono acetate (sometimes hereinafter referred to as "Ahcovel G"), and a suitable (usually acid delaying) catalyst in small amount, as is well known in the art, and may contain diluents and a lubricant (if the softener is not already a lubricant) and water. The lubricating material is desirably used in an amount sufficient to greatly minimize sticking, say from about 0.25% to about 5% by weight of the paste.

The paste should, of course, have a consistency such that it will not run on the soft bowl and be capable of transfer to the shallow portions of the pattern.

The curing of the resin to the insoluble stage is a func-

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tion of temperature and time, the higher the temperature the shorter the time and vice versa. Usually a temperature of from about 250° F. to about 400° F., with a residence time of from about 8 minutes to about 1 minute or a fraction thereof, is about suitable for practical operations.

Example 1

A pure cellulosic fabric is impregnated with a resin solution such as:

80 lbs. methylated methylol melamine (80%)
15 lbs. Ahcovel G
12 lbs. methylhydroxypropanolamine hydrochloride
Made to 100 gals. with water

Squeezed so as to have a pick-up of about 70%, partially dried, embossed and inlaid with a paste of the following formula:

	Parts
Polyvinyl alcohol (11%)	45
Methylated methylol melamine (80%)	8
Ahcovel G (s-di[1-(2-stearoamidoethyl)] mono acetate	2
Methylhydroxypropanolamine hydrochloride	2
Color (Aridye Pigment Padding Blue 2G)	4
Ammonia	1
Water	38

engraved steel at 375–400° F.

After inlaying, the fabric is cured in a conventional ager for 3 mins. at 300° F. and then washed and dried. (As is well understood in the textile art, these temperatures and times may be somewhat departed from, as it is known that the lower the temperature the longer the time, and vice versa.)

An embossed fabric is obtained which has a beautiful medium blue shade in the depressions of the patterns. Both the embossing and color are durable to numerous washings and dry cleanings.

Example 2

The fabric is treated as in Example 1 except that a dyed fabric was used and the following inlay paste:

	Parts
Polyvinyl alcohol (11%)	45
Methylated methylol melamine (80%)	1½
Ahcovel G	2
Methylhydroxypropanolamine hydrochloride	1
Color (Aridye Pigment Padding Green B)	2
Water	48½

Satisfactory results were obtained.

Example 3

The fabric was handled as in Example 1 except that the following inlay paste was used:

	Parts
Polyvinyl alcohol (11%)	45
Sesqui-methylol-urea (100%)	25
Sulfonated castor oil	2
Ahcovel G	2
Methylhydroxypropanolamine hydrochloride	2
Rubber Red 2BL	1½
Water	22½

The finish obtained was durable to several washings and dry cleanings.

Example 4

The fabric was handled as in Example 1 except that the following inlay paste was used:

	Parts
Dimethylol ethylene urea (100%)	6
Locust bean gum (4%)	45
Aridye Pigment Padding Red B	3
Polyethylene glycol	2½
Methylhydroxypropanolamine hydrochloride	2
Water	41½

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The finish obtained was durable to several washings and dry cleanings.

Example 5

A fabric is handled as in Example 1 except that the following inlay paste was used:

	Parts
Polyvinyl alcohol (11%)	60
Methylated methylol melamine (80%)	6
Methylhydroxypropanolamine hydrochloride	2
Color (Indanthrene Blue GGDS)	4
Water	23
N-Butyl alcohol	5

The finish obtained is durable to several washings and dry cleanings.

The percents in the foregoing examples signify solids content.

The examples were repeated on rayon fabrics, mixed fabrics of rayon and cotton, and nylon fabrics with success.

We claim:

1. The method of producing durable inlay effects in embossed fabrics, which comprises passing a fabric through the nip of an embossing calender having a heated metal roll and an unheated soft roll, said heated roll having a female pattern engraved therein, and said soft roll having a male pattern corresponding to the female pattern of the metal roll; applying a heat hardenable color paste containing as essential ingredients a pigment, a thermosetting resin, a catalyst and a vehicle, to the tips of the relief imparting surfaces of the male pattern of the soft bowl in advance of the nip of the calender, whereby on passage of the fabric through the calender the paste is transferred from the tips of the relief imparting surfaces of the soft roll to the fabric, in the valley areas of the pattern, and thereafter heating the fabric at a temperature and for a time sufficient to harden the resin.

2. In a process for imparting a durable embossed effect to fabrics involving calendering a moist fabric impregnated with a heat hardenable resin solution and thereafter hardening the resin in the presence of a catalyst the improvement which comprises, passing said fabric through the nip of an embossing calender having a heated metal roll and an unheated soft roll, said heated roll having a female pattern engraved therein and said soft bowl having a male pattern corresponding to the female pattern of the metal roll, applying a heat hardenable paste, containing as essential ingredients a pigment, a thermosetting resin and a vehicle, to the tips of the relief imparting surfaces of the male pattern in advance of the nip of the calender whereby, on passage of the fabric through the calender, the paste is transferred from the tips of the relief imparting surfaces of the soft roll to the fabric in the valley areas of the pattern, and thereafter heating the fabric at a temperature and for a time sufficient to harden the resin.

3. The process according to claim 1 in which the resin in the paste constitutes from about 1% to about 25% by weight of the paste.

4. The process according to claim 2 in which the resin in the paste constitutes from about 1% to about 25% by weight of the paste.

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