Jan. 22, 1952 C. ALBINI-COLOMBO 2,583,286

PROCESS FOR PRINTING TEXTILE FABRICS

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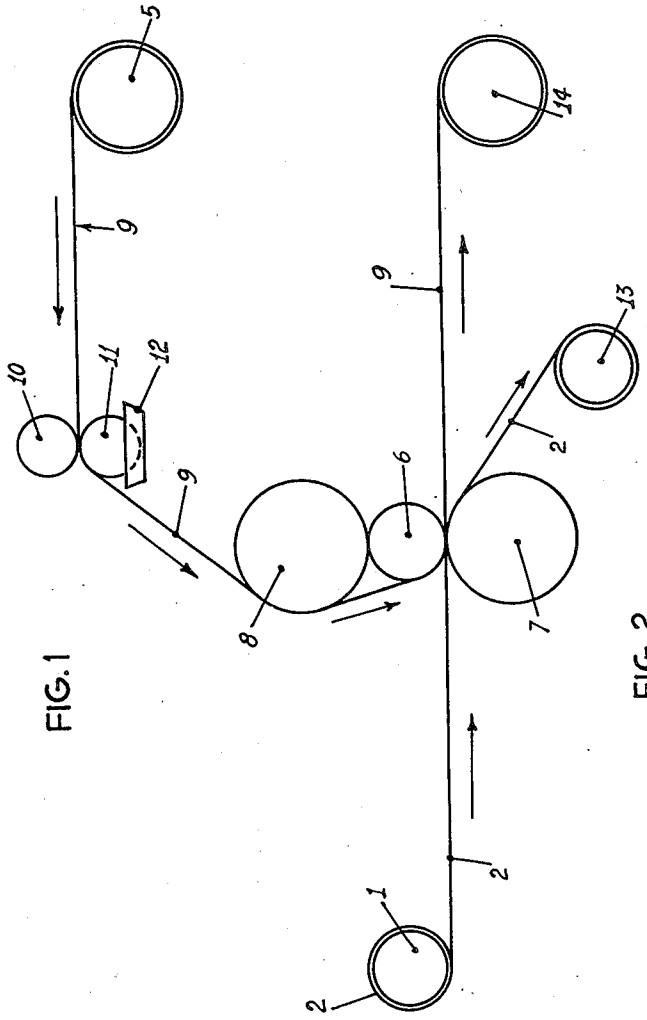


FIG. 1

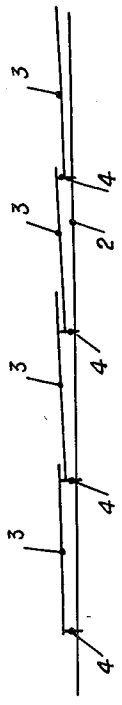


FIG. 2

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PROCESS FOR PRINTING TEXTILE FABRICS

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7 Claims. (Cl. 154—97.5)

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The present invention relates to a method for printing textile fabrics of any fibre and kind, which is a considerable improvement over commercial and handicraft methods employed heretofore, inasmuch as it affords the possibility of reproducing miniatures, coloured images taken direct from nature, technicolor photograms, wood engravings and art reproductions of paintings.

The invention enables these exquisite patterns to be reproduced on cloth by the use of the latest methods of photomechanical reproduction such as colour photography, direct photography, photoengraving in three or four colours, photolithography, etchings on copper, zinc or steel for intaglio printing, using as mechanical printing means a lithographic, typographic of the direct or offset type or intaglio printing machine.

According to this invention, the pattern is applied on a support such as a sheet of paper or other suitable material by one of the usual typographic, lithographic or intaglio printing methods.

Before receiving the pattern, the paper undergoes a special treatment, as described hereafter, which is of essential importance. The colours used should meet special requirements, which will be specified hereafter, to enable removal of the support from the coloured pattern in order to transfer the latter to the cloth. Once the fabric has received the coloured material, it is subjected to a steaming, developing, fixing or finishing treatment according to requirements.

In order to serve as a base sheet for the pattern to be transferred, the paper should be manufactured from a smooth resinous half-size pulp weighing 60–70 grams per square meter, and aged on suitable racks, whereupon it is coated on one side only with an insoluble glue which is prepared as follows:

The following substances are boiled in the proportions indicated:

600 gr. wheat starch
400 gr. water
20 gr. formaldehyde
5 gr. acetic acid

which form a thick paste that is easily applied to the paper by means of a standard gluing machine.

The paper is dried whereupon it receives a further coating of a fatty material which is prepared by boiling the following substances in the proportions indicated in a water bath:

500 gr. mucilaginous oleic resins
50 gr. semifluid oleic resins obtained from larch
500 gr. zinc stearate

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Before the mass cools, it is admixed with 100 gr. essence of turpentine or refined petroleum, whereupon a paste resembling the usual printer's varnish is obtained. This preparation is applied to the paper on the first coating by means of printing machines.

The purpose of applying the two different layers to the paper is to neutralize it in order to prevent absorption of the printing inks, so that the latter may readily be removed for transfer on the cloth. In other words, the colours laid on the paper retain the property of ready removal therefrom even after a long period of time.

The colours should be suitable for printing on cloth from the standpoint of penetration of the textile fibres for the fixing and steaming operations, in order to form washproof lacquers resisting deterioration. The substantive basic and acid colours may be employed in suitable proportions for this purpose. Mineral colours such as Berlin blue, manganese brown, chromium yellow, suitably mixed together will be useful, more particularly in lithographic printing.

In order to make these colours suitable for printing, they should be previously subjected to the following treatment:

The following substances are treated in a tightly closed vessel in the following proportions:

1 kg. linseed oil boiled at 300° and admixed with 1.500 kg. of high-grade turpentine (Bordeaux); the mixture is allowed to rest over 24 hours, then stirred in order to fully dissolve the contents till a slimy liquid is obtained. 10 gr. borax are added and dissolved therein whereupon ¼ of a litre of distilled water is added for emulsifying. The liquid, which becomes whitish in aspect, will be referred to as No. 1. A mixture of the following substances in the proportions indicated is then cooked in a boiler; 200 gr. colophonium ($C_{20}H_{30}O_2$), 20 gr. zinc stearate, 10 gr. paraffin. The substances dissolve under the action of heat. 50 gr. of turpentine are added after cutting off heat. The mixture, which sets without hardening on cooling, will be referred to as No. 2.

Three parts of No. 2 and two parts of No. 1 are mixed and dissolved and placed into a closed vessel, the contents of which will be referred to as No. 3.

The following substances are now mixed together; 500 gr. dextrin of potato fecula and 400 gr. water, which are cooked without boiling. The cooled mixture is admixed with 20 gr. glycerine and 5 gr. acetic acid. This thickener will be referred to as No. 4.

A part of thickener No. 4 is taken and stirred

incorporating therein a quantity of dyestuff sufficient for obtaining the desired hue, whereupon the mixture is again cooked without boiling. The result is a basic product which will be referred to as No. 5. A printer's ink is now prepared from:

4 parts of No. 3
2 parts of No. 5

In order to obtain a thorough homogeneousness, the mixture is treated in a kneading machine and next in a refining mill. An excellent printer's ink is obtained for use in applying the pattern to the paper base sheet.

For intaglio printing it is advisable to use mineral dyes which are submitted to the same treatment and admixed with 20% of a conglomerate formed by 20 gr. zinc stearate, 10 gr. paraffin and 5 gr. rubber solution and diluted with 5 to 10 gr. refined petroleum.

The paper is now printed by using the mechanical means known in the art. After a multichrome print has been obtained on paper, the pattern may be transferred at any time from the paper to the cloth.

The sheets of paper are joined in register and are fixed on a web of strong paper by mechanically milling them with the web along one of their edges, said web conveying the patterns in register with one another along the desired length.

The web carrying the patterns is coiled to form a spool.

Transfer on cloth is effected by means of a calender having three superposed rollers; the central roller is smaller in diameter than the other two and is provided with heating means of electric or any other type.

The other two rollers are lined with paper wool and are larger than the central one, the metallic surface of which is bare.

Before reaching the calendar, the cloth is passed through a wetting mechanism. For this purpose the calender may be fitted with a device composed of two superposed rollers covered by a soft or absorbing cloth. The lower roller dips into and receives from a basin the steam to be transmitted to the cloth which travels between the two rollers at the speed required for absorbing moisture.

The moistened fabric is automatically transferred to the top roller of the calender which conveys it between the central and lower rollers of the calender, at the same time as the web carrying the paper base sheets, which has been previously prepared on a table. Heat is supplied to the central roller, as mentioned above, in order to heat the cloth as it is pressed by the calender.

The web carrying the paper base sheets and the fabric issuing from the calender are independently coiled. The cloth fully absorbs the colour transferred from the paper and the exhausted web may be utilized for further operations, more particularly if it is made of washable material such as rubber, celluloid, etc. instead of paper.

The printed cloth is subjected to further treatments, such as steaming on the Mather-Platt machine, fixing and washing in hot water, and to a final treatment in an autoclave with dissolving vapors, such as trichlorethylene, benzol or other equivalent materials for eliminating fats, whereupon it is finished.

The drawing shows diagrammatically the apparatus for printing fabrics according to this invention.

Fig. 1 is an overall view.

Fig. 2 is a detailed view showing how the paper base sheets are fixed on the web.

1 denotes a roller on which the web 2 of strong paper is wound. The web 2 carries the printed sheets 3 fixed thereon in succession in the direction of motion by milling at 4 as shown in Fig. 2.

5 denotes the roller receiving the cloth to be printed by transfer.

6 denotes the central roller of the calender, which is located between a lower roller 7 and a top roller 8. The roller 6, which is smaller in diameter than the other two, is wholly of metal and is conveniently heated. The other two rollers 7 and 8 are lined with paper wool. The cloth 9 to be printed is previously passed through a wetting apparatus, consisting conveniently of two superposed rollers 10 and 11, lined with a soft or permeable cloth, the lower one 11 dipping into a basin 12 supplying the moistening water. The moistened cloth 9 travels over the top roller 8 of the calender by which it is directed between the central and lower rollers 6, 7, respectively.

At the same time, the web 2 of strong paper carrying the base sheets 3, unwinds from the roller 1 and passes between the rollers 6 and 7, the patterns 3 facing the cloth.

Under the action of heat from the roller 6 and of the pressure between the rollers 6 and 7, the print is transferred from the sheets 3 to the cloth 9.

The web 2 and printed cloth 9 are wound upon the rollers 13, 14, respectively.

The rate of feed of the cloth may be 2 to 3 metres per minute. The temperature of the central roller 6 is about 120° C. and the pressure between the rollers 6 and 7 varies according to the articles to be printed within wide limits and may reach a value up to 20,000 to 80,000 kilograms per square centimeter.

The printed cloth, of whatever fibre (silk, cotton, artificial silk, staple fibre, etc.) it may be made, is placed into a closed vessel or a steaming chamber in which it is impinged upon during the first 15 minutes by a jet of saturated steam at a pressure of about one and a half atmospheres. During this period of time, the physical-mechanical properties of the dyestuffs will produce the development of the printed subject enhancing the colour effects.

Hereupon, any fabric other than pure silk, is treated during approximately 35 to 40 minutes with a jet of dry steam at a pressure of about 2 atmospheres.

At this stage the print is definitely fixed and the fabric issuing from the chamber has a soft and full touch.

What I claim is:

1. In a method of transferring a colored design onto fabrics, the steps of applying a film of an insoluble glue to one side of a paper sheet, prepared from a resinous half size pulp weighing 60–70 grams per square meter, hereupon coating said glue film with a layer of a fatty substance, color-printing the design on the treated side of said paper sheet, supporting the designed paper sheet on a paper strip made of a stronger paper than that of the said sheet, superposing a wetted fabric on said designed paper sheets and subjecting the fabric and the strip to the simultaneous action of heat and pressure.

2. In a method of transferring colored designs onto fabrics, the steps of applying to the one side of paper sheets prepared from a resinous half size pulp weighing 60–70 grams per square meter a film of an insoluble glue produced by

cooking in 400 parts by weight of water, 600 parts by weight of starch, 20 parts by weight of formaldehyde and 5 parts by weight of acetic acid, coating said film with a layer of a fatty substance, color-printing the design on the treated side of said paper sheets, supporting said designed paper sheets successively on a paper strip made of a stronger paper than that of the said sheets, superposing a wetted fabric on said designed paper sheets and subjecting the fabric and the strip to the simultaneous action of heat and pressure.

3. In a method of transferring a colored design onto fabrics by color printing the design on the fabrics in conformity with claim 1, the steps of preparing the printing colors by making a mixture referred to as product "*a*" from two parts by weight of a liquid obtained by mixing together one part by weight of cooked linseed oil, 1.5 parts by weight of turpentine, 10 parts by weight of borax and 0.25 part by weight of distilled water, with 3 parts by weight of a paste obtained by dissolving 200 parts by weight of colophonium, 20 parts by weight of zinc stearate, 10 parts by weight of paraffin and adding 50 parts by weight of turpentine, separately forming a basic product referred to as product "*b*" by incorporating the coloring matter in the required quantity for obtaining the desired shade in a thickener obtained by hot treating 200 parts by weight of dextrine from potato fecula with 400 parts by weight of water, 20 parts by weight of glycerine and the addition upon cooling of 5 parts by weight of acetic acid and finally mixing 4 parts by weight of the product "*a*" with two parts by weight of the product "*b*."

4. In a method of transferring a colored design onto fabrics by color printing the design on the fabrics in conformity with claim 1, the steps of preparing the printing colors for intaglio printing purposes by making a mixture referred to as product "*a*" from two parts by weight of a liquid obtained by mixing together one part by weight of cooked linseed oil, 1.5 parts by weight of turpentine, 10 parts by weight of borax and 0.25 part by weight of distilled water, with 3 parts by weight of a paste obtained by dissolving 200 parts by weight of colophonium, 20 parts by weight of zinc stearate, 10 parts by weight of paraffin and adding 50 parts by weight of turpentine, separately forming a mixture referred to as a product "*b*" by incorporating mineral coloring matter in the required quantity for obtaining the desired shade in a thickener obtained by hot treating 200 parts by weight of dextrine from potato fecula with 400 parts by weight of water, 20 parts by weight of glycerine and the addition upon cooling of 5 parts by weight of acetic acid and, finally mixing 4 parts by weight of product "*a*" with two parts by weight of the product "*b*" and adding 20 per cent of a mixture consisting of 20 parts by weight of zinc stearate, 10 parts by weight of paraffin, 5 parts by weight of rubber solution melted and mixed with 5 to 10 parts by weight of refined petroleum.

5. In a method of transferring a colored design onto fabrics, the steps of applying a film of an insoluble glue to one side of paper sheets prepared from a resinous half size pulp weighing 60–70 grams per square meter, hereupon coating said glue film with a layer of a fatty substance, color-printing the design on the treated side of said paper sheets, supporting said designed paper sheets on a paper strip made of a stronger paper than that of the said sheets, superposing a wetted fabric on said designed paper sheets, subjecting the fabric and the strip to the simultaneous action of heat and pressure, separating the fabric and the sheet supporting paper strip, subjecting the printed fabric for the purpose of developing the prints in a steam chamber to the action of a jet of saturated steam at a pressure of about 1.5 atmospheres and hereupon subjecting the fabric to a jet of dry steam at a pressure of about 2 atmospheres for definitely fixing the color and imparting to the fabric a smooth and full touch.

6. In a method according to claim 1, producing the insoluble glue film by cooking in 400 parts by weight of water, 600 parts by weight of starch, 20 parts by weight of formaldehyde and 5 parts by weight of acetic acid and producing the film coating layer by cooking in water 500 parts by weight of a mucilaginous oleic resin, 50 parts by weight of a semi-fluid oleic resin obtained from larch, 500 parts by weight of zinc stearate and admixing prior to cooling 100 parts by weight of turpentine.

7. In a method according to claim 1, the step of printing on the treated side of the paper sheet designs with the aid of printing colors adapted to penetrate the fabrics and to be fixed in the fibrous structure of the fabrics by transformation into lacquers, which are resistant to washing and wear.

CARLO ALBINI-COLOMBO.

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