

UNITED STATES PATENT OFFICE.

PAUL JEANMAIRE AND HENRY SCHMID, OF MÜLHAUSEN, GERMANY,
ASSIGNORS TO ARNOLD PRINT WORKS, OF NORTH ADAMS, MASSA-
CHUSETTS, A CORPORATION OF MASSACHUSETTS.

PROCESS OF PRINTING FABRICS.

No. 808,987.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Application filed April 6, 1903. - Serial No. 151,312. (Specimens.)

To all whom it may concern:

Be it known that we, PAUL JEANMAIRE, a citizen of the Republic of France, and HENRY SCHMID, a citizen of the Republic of Switzerland, residing at Mülhausen, Alsatia, German Empire, have invented a certain new and useful Improvement in the Art of Producing Printed Designs Upon Vegetable Textile Fabrics, of which the following is a specification.

For the better understanding of the nature and scope of this invention certain preliminary explanations will be useful. Every design of two dimensions—that is to say, contained upon a plane surface—consists in its simplest elements of two configurations which are counterparts of each other. Usually one of these is particularly conspicuous by reason of its relatively greater continuity of delineation or definiteness of form, and is therefore recognized as the main figure or characteristic motive of the design, while the other, which surrounds or interpenetrates this throughout its contour, is regarded merely as a supplementary figure constituting the ground for the display of the principal decoration. Nevertheless these elements of design, consisting of figure and counter-figure, are sometimes, and especially in calico-printing, so delineated, proportioned, and arranged as to make it difficult to determine which is principal and which is subordinate, or, in other words, which exhibits the leading motive and which is intended to serve as mere environment; but the difference between the primary figure constituting the motive of the design and the secondary figure constituting the ground upon which such primary figure is displayed has only an artistic significance and is of no practical consequence in the application of the present invention. Whichever of them is selected as the field of the design to be printed in accordance with the improved method herein to be set forth it constitutes a figure of definite area and contour by which it is delimited and separated from its counter figure, whether, in fact, it is to serve as a leading motive or as a ground therefor. Such delimiting figure of a design is, in the art of calico-printing, usually engraved upon the printing-roller as an intaglio, while the counter figure is formed by the unengraved portions of the cylindrical surface of the same

roller. The depressions thus engraved upon the roller receive the paste to be printed and transfer the same under pressure to the surface of the cloth in the printing-machine. The paste thus impressed upon the cloth produces thereon a figure which is a reversed copy of that engraved upon the roller, and this figure is periodically and regularly repeated upon the cloth at every successive entire revolution of the roller. On the other hand, the counter figure upon the cloth is constituted by the unprinted portions which bound and environ the printed figure or which may be even partly or wholly surrounded by the latter.

In multiple printing fractions of the figure to be impressed upon the cloth are engraved upon separate rollers, constituting a set of two or more, which are so mounted and adjusted as to produce in succession the several imprints in such manner as to form together the integral figure, or several independent figures may thus be printed, so as to form a composite design of more or less complexity. For this purpose it is necessary that the rollers shall be so engraved as to cause all the fractions of a figure or the aggregate of separate figures to fit each other with exact nicety and to register in precisely the same relative positions at each repetition of the entire design, and one of the prerequisites to such a result is that all the rollers constituting a set for use in the same series shall be of equal diameter.

In the production of printed designs by the employment of the present invention advantage is taken of the fact that certain coloring-matters, constituting a very large class, require for their relatively stable fixation upon vegetable textile fabrics to be intimately combined with certain fixative agents adapted for the purpose and that when such coloring-matters without combination with their appropriate fixatives are applied to the same cloth or fabric they may be cleared or purged therefrom by operations and means well known in the art.

The designs which it is the object of this invention to produce are such that each contains within the area of its field and bounded by the contour of its outline details of form or of color, or of both, and the characteristic feature of this invention consists, essentially,

in printing with one of the said constituents of a fixed color a delimiting figure having an area and contour corresponding, respectively, to the field and outline of the ultimate design, and in printing with the other of the said constituents a decorative pattern of predetermined variegations having as a whole an extent sufficient and a shape adequate to cover the spaces to be occupied by the ultimate design in such manner as to superimpose one of these printings upon the other. Thus, for example, the delimiting figure which is to define and determine the area and contour of the ultimate design may be printed with a suitably-thickened fixative adapted to the purpose intended, and thereupon the covering-pattern, which is composed of such decorative details of predetermined variegations as are to be displayed in line or in color, or in both, within the area and bounded by the contour of the ultimate design, may be printed with a suitably-thickened coloring-matter adapted to be fixed upon the cloth when combined with the fixing agent employed in printing the delimiting figure, or the coloring-matter may be used for printing the delimiting figure and the fixative for printing the covering-pattern. In either case, of course, the order of the successive printings may be the reverse of that stated—or, in other words, the covering-pattern may be printed before the delimiting figure. Such alternative employment of the fixative and coloring-matter for printing the delimiting figure and the covering-pattern, respectively, and such reversal of the order of sequence in the successive printings are manifestly equivalent modes of practicing the present invention and are to be understood as so claimed herein. After these successive and superposed printings of the delimiting figure and the covering-pattern, respectively, the cloth so printed is to be subjected to such well-known treatment as is adapted to effect the intimate combination of the coloring-matter and its fixative wherever they have both been coincidentally deposited, and then the cloth is to be subjected to such well-known detergent treatment as is adapted to remove therefrom the coloring-matter at those places where it has remained isolated.

As a result of the entire mode of procedure thus described and indicated there will be produced upon the cloth a printed design having a field and outline coextensive and coincident with those of the delimiting figure, but also having such field within the limits of such outline filled by the decorative details of the covering-pattern.

This invention is practiced in its simplest form when there is employed in the printing-machine a single roller engraved so as to print the delimiting figure with one of two principal constituents essential to the formation

of a fixed color and another single roller engraved so as to print the decorative pattern with the other remaining principal constituent essential to the formation of the same fixed color over an area sufficient to cover and extend beyond that occupied by the delimiting figure. In such case the resulting design appearing after the fixing and clearing operations will be unicolored. It is manifest, however, that the delimiting figure need not necessarily be printed from a single roller, but may be produced in fractional components from two or more rollers of the same size so engraved and mounted as to cause the integral figure to be formed by the joint imprint of their several partial engravings properly matched and registered with each other. Under these conditions usual to multiroller-printing if different mordants appropriate to a given dyestuff are printed from such a set of rollers adapted to produce by their combined action the delimiting figure of the intended design and if upon this the dyestuff itself is printed from a single roller containing the covering-pattern for decorating the field of the delimiting figure there will result a multicolored design after the operation of steaming and clearing have been performed. In like manner the delimiting figure may be printed from a single roller with a mordant appropriate to several different dyestuffs, and these latter may be printed separately from a set of rollers corresponding in number and so engraved as to distribute among them the entire covering-pattern in matched and registered or in overlapped and blended component portions conformably to the usual conditions of multiroller-printing. Here also the resulting design after steaming and clearing will be multicolored, and the complexity of the result will be still further augmented if both the delimiting figure and the covering-pattern are printed from a plurality of rollers with corresponding multiplicity of the mordants and dyestuffs, respectively, employed, provided that these are all suited to each other for the production of fixed colors; but whether the designs printed in accordance with the present invention are unicolored or multicolored they are each the result of two successive and superimposed printings, one of which, whether performed with a single roller or with a set of rollers, determines the area and shape of a figure delimiting the field and outline of the ultimate design and the other of which, whether performed with a single roller or with a set of rollers, determines the character of decorative details constituting the definitely-variegated pattern to be displayed within the boundaries of the figure which delimits the design.

The following specific examples of producing unicolored designs will suffice to illustrate the simplest mode of practicing this invention. A rose-colored design may be pro-

duced by a preliminary printing of the delimiting figure with alizarin and a superposed printing of the decorative pattern with an aluminium salt. For producing the same design in violet color the aluminium salt is replaced by an iron salt. For producing yellow or green designs the preliminary printing of the delimiting figure is done with extract of buckthorn bark or with alizarin viridin, and the superposed printing of the decorative pattern is done with a chromium mordant.

The specific examples thus far described relate to the production of designs in each of which the decorative details displayed upon its field consist of variegations of form in a single color; but variegations of color may likewise be produced upon the field of a design by printing its delimiting figure with a suitably-thickened mordant and by printing upon the same a covering-pattern with two or more suitably-thickened coloring-matters appropriate to such mordant from a set of rollers corresponding thereto in number and adapted to apply each coloring-matter separately in fractional parts of the entire pattern, duly matched and registered with each other as required in multiroller-printing. Thus the delimiting figure may be printed with a chromium mordant and calcium acetate, while the covering-pattern may be printed in separate fractional areas with a mixture of alizarin orange and buckthorn-bark extract for wood shade, of alizarin for bluish red, of alizarin viridin for green, &c. Then follow the usual operations of steaming, soaping, and clearing. Again, the delimiting figure may be printed with thickened tannin of suitable concentration, and the covering-pattern may be printed with thickened basic coloring-matters, such as methylene-blue, rhoadmin, methylene-heliotrope, auramin, and the like, or the procedure may be reversed by first printing the covering-pattern with the basic coloring-matters and then printing over it the delimiting figure with the tannin. The cloth so printed is thereupon steamed, passed through a solution of tartar emetic, and thence into water heated to from 60° to 100° centigrade and containing antimonium tannate lake to clear the whites and is finally soaped. The passage through tartar emetic can be omitted by adding this to the basic coloring-matter employed or by adding to the latter any other metallic salt which forms with tannin an insoluble compound. Finally, a field in two colors or in two tones of the same color may be obtained by means of a delimiting figure printed with a mordant to which has been added a certain quantity of any suitable coloring-matter and a covering-pattern printed with coloring-matter of different quantity or kind appropriate to the same mordant. Thus for a graduated blue field the delimiting figure may be printed with twenty to forty grams of tannin per liter, to which has been added two to

four grams of methylene-blue, and the covering-pattern may be printed in methylene-blue at twenty grams per liter. In all cases the area and contour of the delimiting figure predetermine the extent of the field and the shape of the outline of the ultimate design, while the definite variegations of the covering-pattern predetermine the character and form of the decorative details which are to be displayed upon the field and within the outline of the ultimate design. The delimiting figure may occupy any portion or portions of the surface of the cloth less than the whole, according to the fancy of the designer, and the ultimate design resulting from the combination of the color ingredient with which such delimiting figure is printed and the supplementary color ingredient with which the covering-pattern is printed at the places where these two printings coincidentally fall, the one upon the other, may or may not be associated with other colored designs than white, differently produced outside of the same or surrounded by it or within the limits of its counter figure. Such associated designs would be independent of the present invention, although they might possibly be printed or developed wholly or in part in conjunction or simultaneously with the production of the design resulting from the practice of the hereinabove-described process.

It will thus be seen that by the several modes of procedure belonging to this invention there may be produced printed designs of very great variety wherein the form of outline and shape of field remain the same; but the decorative details within such outline and upon such field consist of predetermined variegations of line or of color, or of both, differing in each separate instance by using one roller or one set of mutually supplementary rollers, as the case may be, selected at will from a multiplicity of differently-engraved rollers or sets of rollers, respectively, to print the covering-pattern.

It is manifest that substantially the same modes of procedure as those hereinabove described can be practiced by block-printing as well as by roller-printing, and accordingly such a well-known substitute is to be regarded as an equivalent means for attaining the same end and is herein claimed as such.

We claim as our invention—

1. The method of producing designs upon vegetable textile fabrics, which consists primarily, in successively printing thereon, in either order of sequence, two separate constituents whose combination is essential to the formation of a fixed color, in such manner as to superimpose the one upon the other wherever the design is to be produced, that is to say: printing with one of these constituents suitably thickened, a delimiting figure having its area and contour, respectively,

corresponding to the field and outline of the ultimate design; and printing with the other remaining constituent suitably thickened, a pattern of decorative detail consisting of
5 predetermined variegations and having, in the aggregate, such extent and shape as, when printed, to cover the spaces occupied by the field of the delimiting figure; next
10 subjecting the fabric so printed to treatment adapted for effecting the combination of the said constituents in the formation of such fixed color, wherever they may have been coincidentally deposited; and finally clearing
15 from the fabric those removable portions of the said constituents which have remained isolated from each other.

2. The method of producing designs upon vegetable textile fabrics, by successively printing thereon, in either order of sequence,
20 but so as to superpose one imprint upon the other wherever the design is to be produced, on the one hand, with a suitably-thickened fixative for a coloring-matter, a delimiting figure having its area and contour, respec-

tively, corresponding to the field and outline 25 of the ultimate design, and, on the other hand, with a suitably-thickened coloring-matter appropriate for such fixative, a decorative pattern of predetermined variegations having, in the aggregate, such extent 30 and shape as, when printed, to cover the spaces occupied by the field of the delimiting figure; then subjecting the fabric so printed to treatment adapted for intimately combining the said fixative and coloring- 35 matter wherever they may have been coincidentally deposited; and finally, clearing from the fabric those portions of the coloring-matter which have remained isolated from the fixative. 40

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

PAUL JEANMAIRE.
HENRY SCHMID.

Witnesses:

MARIUS KURR,
M. SCHIESS.