

UNITED STATES PATENT OFFICE.

JOSEPH WEISS, OF HEIDENHEIM-ON-THE-BRENTZ, GERMANY.

PRINTING AND MERCERIZING COTTON.

SPECIFICATION forming part of Letters Patent No. 586,750, dated July 20, 1897.

Application filed January 12, 1897. Serial No. 618,928. (No specimens.) Patented in France December 11, 1895, No. 252,377; in Austria May 8, 1896, No. 457,170, and in Italy June 30, 1896, XXXI, 41,360, LXXXO, 189.

To all whom it may concern:

Be it known that I, JOSEPH WEISS, a citizen of the Republic of France, residing at 33 Brenzstrasse, Heidenheim-on-the-Brenz, Württemberg, in the German Empire, have invented a chemical process for the production of white or colored crêpe-like designs on cotton, linen, and other fabrics or yarns of vegetable origin, of which the following is a specification, and for which I have obtained patents in Austria, No. 467,170, dated May 8, 1896; in France, No. 252,377, dated December 11, 1895, and in Italy, Vol. XXXI, No. 41,360, LXXXO, No. 159, dated June 30, 1896.

The well-known property possessed by concentrated caustic alkalis of contracting or shrinking vegetable materials has been employed in various ways for manufacturing fabrics or yarns which are partially or wholly crimped or provided with crêpe-like patterns or designs. One process for producing patterns of this kind on fabrics consists in first covering certain parts of the stuff (which is of vegetable origin) with a resist-paste and in then treating it with a concentrated alkaline solution, which has no action on the parts covered with the resist-paste. As resist-paste a gummy or gelatinous mucilage of the fatty bodies or of combinations of the fatty bodies or a resinous solution, sacutcheon, gutta-percha, or the like may be used. This resist-paste acts, therefore, simply in a mechanical manner by preventing the alkaline solution coming into contact with the parts of the fabric which are covered by the said paste. In another process it is stated that, instead of an alkaline solution, an acid bath (sulfuric acid) can be employed, and that the bath should have a temperature of about 0° centigrade, in order to allow it to act for a considerable time on the fabric. The resist-paste is employed in the same manner as in the previous case. According to another process the fabric, before being treated with an alkaline solution, is printed with a coagulable substance, such as albumen, casein, or a mixture of gum-water with chromium salts. These substances also act only in a mechanical manner—that is to say, they protect the printed portions of the fabric from contact with the

alkaline solution with which the fabric is afterward treated.

The present invention differs essentially from these known processes in that the fabric is first treated with an alkaline solution and that the parts of the fabric which are to form part of the design are not protected against the action of the alkaline solution by a mechanically-acting protective material, but by a chemically-acting substance, such as acids or suitable salts or oxides.

This process is carried out in one operation—that is to say, the neutralizing substance is printed on the wet fabric, impregnated with the alkaline solution in such a manner that the said alkaline solution is neutralized before the contractile action, which sets in after the lapse of a few seconds, has commenced at the parts which are to receive the impression.

The operation is substantially as follows:

1°. The fabric or yarn, which is raw, white, or evenly mordanted, evenly dyed or previously printed, is placed on a machine for printing in several colors and is then impregnated by means of an engraved block cylinder over its whole surface with a thickened or non-thickened 30° to 50° Baumé solution of caustic soda and is at the same time on the same machine printed in colors by means of one or several successive rollers on which the crêpe-like effect to be produced is engraved, the said color being, for instance, composed of one liter of water and six hundred grams of British gum or roasted starch with the addition of an acid or acids, such as acetic acid, tartaric acid, or hydrochloric acid, which partially or wholly neutralize the caustic soda and thereby prevent the action of the latter.

1°. Instead of adding acids to the colors suitable salts may be employed as the neutralizing material—such, for example, as aluminium sulfate, chlorid of magnesium, tin salt or stannous chlorid, perchlorid of iron, acetate of aluminium, acid chromates, acetate of chromium, lead nitrate, and the like—which by a double reaction partially or wholly neutralize the caustic soda and thereby prevent the action of the same on the parts of

the fabric or yarn which are printed with the neutralizing liquid.

Certain oxids—such as aluminium hydrate, oxid of chromium, and oxid of lead—have the same action on the caustic solution as the acids.

After the impregnation by means of the blocks and the printing described in 1^a and 1^b the material is either dried or immersed directly in a water or acid bath without drying, so as to remove the caustic soda.

In this process described in 1^a and 1^b raw, white, evenly-dyed, or previously-printed fabric or yarn is treated so as to have a crêpe-like effect produced on it; but by modifications of the process new crêpe-like effects in one or several colors can be produced as follows:

2. Some of the salts mentioned under 1^b as neutralizing substances to be added to the dyestuffs—such, for instance, as acetate of chromium—possess colored oxids, (green oxid of chromium,) which are precipitated by the caustic soda in the fabric, and so produce directly-colored crêpe-like effects. From others of these salts—such, for instance, as ferric chlorid—the caustic soda precipitates oxids, which produce colored double salts, (ferric oxid with potassium ferrocyanid gives, for instance, a blue color,) whereby further colored crêpe effects can be produced. If the fabric or yarn with the salts mentioned in 1^b be passed through a sal-ammoniac (ammonium chlorid) bath, the corresponding oxids—such as, for instance, aluminium hydrate—are fixed and the caustic soda is neutralized. The oxids now fixed in the fibers can be colored in the usual manner—for instance, alumina with alizarin to produce a red coloration and stannic oxid with buckthorn-berry to produce yellow, and so on.

3^a. To enable basic dyestuffs, such as methylene blue, to be used for the production of crêpe-like effects on white ground, tannin is added to the coloring-matter, which contains acetic acid as the neutralizing substance. The tannin is then fixed by a salt of antimony and colored with basic dyestuffs.

3^b. If a fabric or yarn which has been treated with a 30° to 50° Baumé solution of caustic soda be printed with a coloring-matter which has been treated with acetic acid and which contains indigo salt, (the soluble bisulfite compound of ortho-nitro-phenyl-lactone,) a blue crêpe effect is immediately produced by the partial neutralization of the caustic solution by the acetic acid together with the sulfurous acid derived from the bisulfite, whereby the action of the caustic soda is stopped and it forms indigo with the indigo salt.

3^c. If indigo (in powder) be added to the dyestuff containing acetic acid and then glucose and if the mixture be then printed on the fabric or yarn which has been impregnated with a 30° to 50° Baumé solution of caustic soda and the fabric or yarn be

then steamed, a blue crêpe effect is again produced, while the acids stop the action of the caustic-soda solution by partially neutralizing the same, and the indigo is simultaneously fixed by the said solution and the glucose.

3^d. The fabric or yarn is, as usual, impregnated with alpha or beta naphthol sodium or other phenol sodium salts, and dried. They are then treated with 30° to 50° Baumé solution of caustic soda, and simultaneously with a dyestuff containing acetic acid, with addition of diazotized alpha or beta naphthylamine, paranitroanilin, toluidin, or amidoazobenzene as well as other amido compounds. By this means colored crêpe-like effects are produced on a white ground.

3^e. If the coloring material be treated with a substantive dye-resisting acid and alkali, such as ericin, diamine-blue, diamine-yellow, and if then the fabric or yarn which has been impregnated with a 30° to 50° Baumé solution of caustic soda is printed with this die, a correspondingly-colored crêpe effect is directly obtained. In order to obtain this effect on a colored ground, the process is modified as follows:

4. Oxids, such as aluminium hydrate, oxid of chromium, stannic oxid, or oxid of lead or iron with or without the addition of glycerin, are dissolved in the 30° to 50° Baumé solution of caustic soda. In the case of iron oxid a solution of an iron salt mixed with glycerin is obtained in the soda solution. The mixed solution is then applied to the fabric or yarn to which at the same time a dye is applied containing an acid such as tartaric or citric acid. The oxids are then fixed by means of a sal-ammoniac (ammonium chlorid) bath, whereby a colored ground is directly obtained from the colored oxid—for example, a green ground from chromium oxid. The colored ground can also be obtained from oxids, which form colored double salts—such as, for instance, from iron a blue ground from potassium ferrocyanid, from lead a yellow ground from chromates, &c. Such oxids, however, as form lake colors are colored with the corresponding dyes—for example, alumina with alizarin to form a red ground, chromium with solid violet (Durand, Huguenin, Basle) to form a violet ground, &c.

5^a. If fabric or yarn evenly dyed with indigo-blue be treated with a 30° to 50° Baumé solution of caustic soda and then have applied to it thickenings containing acetic acid with the addition of ferricyanid of potassium and be then washed, a white or light-blue crêpe effect is obtained on a blue ground, the contracting action of the soda solution being stopped by the action of the acid and the double reaction with the ferricyanid of potassium and the oxidizing action of this double reaction decomposing the indigo.

5^b. If fabric or yarn dyed with indigo-blue and impregnated with a 30° to 50° Baumé solution of caustic soda be treated with dyes

containing acid chromates, such as acid potassium chromate, and the said fabric or yarn be then passed through a bath of hot sulfuric and oxalic acids, a white crêpe effect is obtained, as the action of the soda solution is stopped by the chromic acid of the said chromate and the indigo decomposed by the free chromic acid obtained in the acid bath.

6^a. The fabric or yarn impregnated with beta-naphthol sodium and the like, as described in 3^a, are treated with a 30° to 50° Baumé solution of caustic soda and then with dyes with the addition of acids—such as, for example, hydrochloric or acetic acid—with stannous chlorid, bisulfites, zinc powder, or other reducing substances, which prevent the formation of diazo dyes. The fabric or yarn is then dyed with diazotized amido compounds—such as, for instance, chlorid of naphthylamin. By this means a white crêpe effect is obtained on a colored ground, as the acids and salts contained in the dye stop the contracting action of the soda solution, and the reducing-salts at the same time prevent the formation of the diazo dyes.

6^b. If alkali-resisting substantive dyes, such as eriochrome, be dissolved in a 30° to 50° Baumé solution of caustic soda and be then applied to a fabric or yarn and if the said yarn or fabric is then treated with dye to which an acid, such as acetic acid, and a reducing substance, such as stannous chlorid or powder of zinc, are added, a white crêpe effect is directly obtained on a colored ground, as the acid present in the dye stops the contracting action of

the soda solution and the reducing substance in combination with the acid decomposes the dye in the caustic-soda solution.

I claim as my invention—

1. A process for forming crêpe-like patterns or effects on fabric or yarn of vegetable origin, consisting in impregnating the same with a caustic-alkali solution, and then printing with a neutralizing substance, such as specified, before the caustic alkali has commenced to act, substantially as described.

2. A process for forming crêpe-like patterns or effects on fabric or yarn of vegetable origin, consisting in impregnating the same with a caustic-alkali solution, and then printing with a neutralizing substance and dyestuffs, before the caustic alkali has commenced to act, substantially as described.

3. A process for forming crêpe-like patterns or effects on fabrics or yarn of vegetable origin, consisting in impregnating the same with a caustic-alkali solution, and then before the caustic alkali has commenced to act, printing with a salt, such as specified, the oxids of which become fixed in the fibers and colored by the reaction so as to obtain a colored crêpe effect, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH WEISS.

Witnesses:

AUGUST WINTER,

AUGUST GRASBERGER.