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COLOR DISCHARGE PRINTING

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The present invention relates to a process of color discharge printing and to the colored discharge printing pastes employed therein. The process is applicable to any textile fabric, whether of animal or vegetable origin. It is particularly suitable for silk and rayon fabrics.

It has hitherto been customary to prepare colored discharges by printing a fabric which has been dyed with a reducible ground color by means of a paste comprised of a reducing agent, such as hydrosulfite, formaldehyde-sulfoxylate, or other combinations of hydrosulfite and formaldehyde, etc., a coloring matter which is unaffected by the reducing agent and one of the usual thickeners, such as gums, dextrines and the like. The reducing agents are found on the market under various trade names, such as Rongalite, Discolite, Sulfoxite and Hydrosulphite, A. W. C.

This process was not fully satisfactory because when printing medium and pastel shade intensities is attempted, the resultant shade on silk, rayon and the like has a tendency to show a washed out character, sometimes changing in cast or color, as, for instance, from a luminous medium blue to a washed out greenish blue. There is also the difficulty of unevenness in so far as given surfaces have a tendency to show white rings around the area where the colored mixture of reducing agent thickener and unreducible dye has been applied. Sometimes a mottled or speckled appearance develops. Again there exists the constant risk of irregularity of developing finely fixed tones in the aging process, which, in many cases, causes the same coloring matter made with identical formulas to appear in successive printings either dark, medium or sometimes so light that for all practical purposes it has disappeared. The latter effect has never been definitely accounted for, but it is commonly known that it is as good as impossible to keep a definite cast of color on silk which passes through the aging process.

I have found that these disadvantages can almost completely be avoided in a very simple manner. According to my new process a substantial amount of finely divided titanium dioxide is added to the colored discharge paste. The titanium dioxide, thus added, may serve to replace part of the thickening agent formerly used in the preparation of the colored discharge paste. The essential constituents of my improved colored discharge paste are a reducing agent, such as hydrosulfite, formaldehyde-sulfoxylate, or other combinations of hydrosulfite and formaldehyde and the like, a coloring matter which is unaffected, i. e., not reduced, by the reducing agent and titanium dioxide. Further additions, such as are customary in the preparation of printing paste, may also be present, such as thickeners, glycerine, etc. One may substitute zinc oxide for part of the titanium dioxide, and this will in most cases be advisable, owing to the higher cost of the titanium dioxide. However, the quality of the colored prints obtained is improved by the use of a greater proportion of the titanium dioxide and, therefore, a substantial amount thereof is always used in the preparation of my improved colored discharge pastes. The titanium dioxide present in the colored discharge pastes has a delustering effect on rayon, which makes the color stand out. Thus, the quality of the colored prints obtained is improved by the delustering effect of the titanium dioxide present and the possibility of mechanical defects during the printing process is strongly reduced by the presence of a substantial proportion of titanium dioxide in the colored discharge paste.

The amount of the titanium dioxide, or mixture of titanium dioxide and zinc oxide, present in the colored discharge paste may vary within wide limits. Preferably it will constitute from 3 percent to 24 percent by weight of the colored discharge paste.

The particular coloring matters suitable for use in the process can readily be selected by those skilled in the art. As has been pointed out above, the ground color should consist of a dischargeable, i. e., reducible, dyestuff, whereas the coloring matter contained in the colored discharge paste should consist of the dyestuff which is unaffected, i. e. not

reduced, by the reducing agent present in the paste.

As typical examples of such dyestuffs the following may be mentioned:

Dischargeable ground colors

DIRECT COLORS

Name of color	Rowe's Color Index No.	Schultz No.
Amanil blue 2B	406	337
Chloramine red 3B	382	319
Direct black	581	462
Direct blue 3B	477	391
Direct green B	593	474
Direct sky blue FF	518	424
Erie fast brown GR	598	477
Erie fast scarlet YA	326	279
Fast acid green B	667	503
Triazol yellow G	365	304

DEVELOPED COLORS

Diazamine blue BR	316	273
Diazo black BH	401	333
Diazo fast green BL	532	----
Diazol fast violet NN	394	327
Diazo indigo blue B	316	273
Plutoform black L	545	----
Rosanthrene O	324a	----

Non-dischargeable print colors

BASIC COLORS

Euchrysine RDX	797	608
Methylene blue B	922	659
Nigrosine water soluble	865	700
Nile blue B	914	654
Phosphine O Ex	793	606
Rhodamine B Ex	749	573
Rhodamine 6G Ex	752	571
Rhoduline blue GO	926	661
Safranine A	841	679
Thioflavine T	815	618

ACID COLORS

Azo carmine GX	828	672

VAT COLORS

Algol scarlet G	1129	815
Anthrene jade green	1101	----
Ciba orange G	1230	911
Ciba scarlet G Dbl. paste pat	1228	907
Indanthrene black B	1102	765
Indanthrene blue GCD Dbl. paste	1113	842
Indanthrene yellow G Dbl. paste	1118	849

The following are examples of discharge pastes to which the unreducible printing color may be added (parts by weight):

A

	Grams
Titanium dioxide	49
Zinc oxide	84
Glycerine	71
Olive oil	20
Water	138
Textile gum	265
Hydrosulphite (1:1)	280
Egg albumen (1:1)	93
Total	1,000

B

Titanium dioxide	140
Zinc oxide	32
Glycerine	72
Olive oil	20
Water	130
Textile gum	165
Hydrosulphite 50% solution	248
Egg albumen 50% solution	193
Total	1,000

C

Titanium dioxide	178
Zinc oxide	0
Glycerine	81
Olive oil	25
Water	162
Textile gum	118
Hydrosulphite 50% solution	210
Egg albumen 50% solution	226
Total	1,000

The discharge printing process is carried out in the usual manner. The textile material, for example, a silk or rayon fabric, is first dyed with the reducible ground color. It is then printed in the usual manner with the colored discharge paste. Thereupon the material is developed, for example, by steaming in a Mather-Platt apparatus, and finally washed and soaped.

Obviously my invention is not limited to the particular examples given above. As has already been pointed out, the crux of my invention resides in the use of titanium dioxide as one of the constituents of the colored discharge paste used.

I claim:

1. A process of obtaining colored discharges on textile materials which have been dyed with a dischargeable ground color which comprises printing said materials with a colored discharge paste containing a reducing agent, an unreducible coloring matter and titanium dioxide.

2. A process of obtaining colored discharges on textile materials which have been dyed with a dischargeable ground color which comprises printing said materials with a colored discharge paste containing a reducing agent of the group consisting of hydrosulfite, formaldehyde-sulfoxylate and other combinations of hydrosulfite and formaldehyde, an unreducible coloring matter and from 3 percent to 24 percent by weight of titanium dioxide.

3. A process of obtaining colored discharges on textile materials which have been dyed with a dischargeable ground color which comprises printing said materials with a colored discharge paste containing a reducing agent, an unreducible coloring matter, titanium dioxide and zinc oxide.

4. A process of obtaining colored discharges on textile materials which have been dyed with a dischargeable ground color which comprises printing said materials with a colored discharge paste containing a reducing agent of the group consisting of hydrosulfite, formaldehyde-sulfoxylate and other combinations of hydrosulfite and formaldehyde, an unreducible coloring matter and from 3 percent to 24 percent by weight of titanium dioxide and zinc oxide.

5. A process of obtaining colored discharges on silk fabrics which have been dyed with a dischargeable ground color which comprises printing said fabrics with a colored discharge paste containing hydrosulfite, a dyestuff which is not reduced by the hydrosulfite, and from 3 percent to 24 percent by weight of titanium dioxide and zinc oxide, developing said fabrics by steaming and then washing and soaping the fabrics.

6. A colored discharge paste which comprises a reducing agent and unreducible coloring matter and titanium dioxide.

7. A colored discharge paste which comprises a reducing agent of the group consisting of hydrosulfite, formaldehye-sulfoxylate and other combinations of hydrosulfite and formaldehyde, an unreducible coloring matter and from 3 percent to 24 percent by weight of titanium dioxide.

8. A colored discharge paste which comprises a reducing agent, an unreducible coloring matter, titanium dioxide and zinc oxide.

9. A colored discharge paste which comprises a reducing agent of the group consisting of hydrosulfite, formaldehye-sulfoxylate and other combinations of hydrosulfite and formaldehyde, an unreducible coloring matter and from 3 percent to 24 percent by weight of titanium dioxide and zinc oxide.

10. A colored discharge paste which comprises hydrosulfite, a dyestuff which is not reduced by the hydrosulfite and from 3 percent to 24 percent by weight of titanium dioxide and zinc oxide.

In testimony whereof I have hereunto set my hand.

FREDERICK R. BYROD.