(a) *Reserves under Aluminium and Iron Mordants.—*For the production of this important class of goods, use is made of the fact that alkaline citrates prevent the fixation of the mordants. The cloth is first printed with citrate of soda (or sometimes citric and tartaric acids for iron mordants), then dried, and again printed over the previous impression, with either a fine “all over” pattern or flat uniform ground, in iron or aluminium mordants. The fabric is then aged, “ dunged,” washed and dyed as already described, with the result that wherever the “ reserve ” of citrate or acid was printed a white pattern is left on a figured or plain ground. The fine patterns printed over “ reserves ” are called “ covers ” and the plain grounds “ pads,” hence the name “ cover and pad ” style in cases where, as frequently happens, a dark “ cover ” and a light “ pad ” are both printed over a white "reserve.” The “ cover and pad ” style is, for the most part, restricted to dyed

alizarine purples under which red, black, dark purple and white can all be reserved at the same time, thus giving rise to very pleasing effects. For example : white cloth is first printed with four “colours,” viz., citrate of soda and citric acid for the white; log­wood and iron for the black; strong iron mordant for the purple; and aluminium acetate at 6° Tw. with 8 oz. per gallon of stannous chloride for the red. (The stannous chloride acts as a resist for iron mordants.) The whole is then “ covered ” in a fine pattern printed in a fairly strong iron mordant, dried, and again printed, in a very weak iron mordant, with a pad roller, that is, a roller which prints a uniform ground over the whole surface of the cloth. After this last printing, the cloth is “ aged ” for a day or two, by being hung as previously described, then “ dunged,” washed and dyed in a blue shade of alizarine. When finally washed, soaped and “ cleared ” in bleaching powder solution the first printed pattern in white, red, black and purple is seen to stand out, clearly and sharply, from a figured background in two lighter shades of purple. This “ cover and pad ” style of reserve printing constitutes one of the staple processes of nearly all print-works, and is produced in enormous quantities for both home and foreign markets. Red is not often introduced as in the above example, the usual colours being white, black and two purples. The same method of working can be adopted with aluminium mordants for red and pink covers and pads, but they are better produced with the steam alizarine colours as below.

(ò) *Reserves under Steam Alizarine Red and Pink.—*In this case a reserve composed of citrate of chromium alone, or in conjunction with citrate of soda, gives the best results. The goods are first prepared in alizarine oil and then printed with the following:—

io ìb china clay.

⅜ gal. citrate of soda, 540 Tw.

⅜ ,, citrate of chromium, 42o Tw.

⅜ ,, water.

2⅛ „ British gum paste.

After printing the above, the goods are dried and again printed either with “ cover ” or “ pad ” or both, in alizarine pink, dried, steamed for ι⅛ hrs., well washed and soaped. On leaving the steamer the parts printed with the resist are yellow, but become quite white on soaping. Like the purples, the alizarine pinks can be reserved in colours. For blue, green, yellow and violet the ordinary steam basic colours are used with additions of citric or tartaric acid.

Example :—

(7 îb china clay.

*Ί* ⅛ gal. water.

6⅛ „ British gum paste.

2 îb methylene blue.

I lb citric acid.

I gal. acetic acid.

Boil, cool, and add:—

ι⅛ gals. 50 per cent, tannic acid solution in acetic acid.

Red with steam alizarine red; yellow with thioflavine in place of methylene blue in above; green a mixture of blue and yellow. These colours with the white reserve may all be printed at once. Then steam as usual, pass through a solution of tartar emetic and chalk, wash well and soap.

(c) *Reserves under Insoluble Azo-Colours.—*These are based upon the action of stannous chloride, which prevents the combination between the 0-naphthol and the diazo bodies by reducing the latter to hydrazines. The β-naρhthol prepared cloth is printed with the following colours, then dried and passed through diazo­tized solutions of paranitraniline for red grounds; α-naρhthylamine for maroon; ortho-nitrotoluidine for orange, &c., &c. The cloth is then washed and soaped until the “ whites ” are clean.

*White Resist.* 5 gals, gum senega! solution.

30 ìb tin crystals.

5 ìb tartaric acid.

For heavy rollers this may be reduced with more gum.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Blue.** | **Yellow.** | **Green.** | **Pink.** |
| New methylene blue N. . Auramine G. (B.A.S.F.) . | 2 ⅜tt> | ∙∙ . | 2 îb | •· |
| Brilliant green ....  Thcoflavinc T. .... |  | 2 ìb | Iì „ |  |
| Rhodamine 6 G. (extra) . | ... |  |  | I îb |
| Acetic acid | 2 gals. | 2 gals. | 2 gals. | 2 gals. |
| Citric acid | 2j lb | 2i îb | 2i îb | 2⅛ îb |
| Starch | IO M | IO „ | IO „ | 10 „ |
| Water | 2 gals. | ι⅛ gals. | 2 gals. | 2 gals. |
| Tragacanth mucilage . | I M | I „ | 1 ,» | I M |
| Tannic acid sol., 50 per cent.. | IÌ »» | 2 „ | IÌ M | 2 „ |
| Tin crystals | 20 îb | 20 îb | 20 îb | 20 îb |
| Make up to . | 10 gals. | 10 gals. | 10 gals. | 10 gals. |

Potassium sulphite is also used as a white reserve under insoluble azo-colours with good results.

(d) *Reserves under Steam Basic Colours.*—The white cloth is printed with :—

■ 20 ìb china clay.

2⅛ gals, water.

- 15 îb British gum.

20 îb sodium tartar emetic.

. 20 îb zinc sulphate.

All boiled well together,

and then covered, or over-printed, with any steam basic colour— steamed one hour, passed through tartar emetic, then washed and soaped, when the reserve white above comes away, bringing along with it the colour printed upon it and leaving a white pattern on a printed ground.

*{e) Reserves under Vat Indigo Blue.*—-This was formerly a very important style, but at present is only used in special cases. Resist or reserve effects are obtained by printing the white cloth with oxidizing agents, &c., and subsequently dyeing it in the indigo vat. In addition to oxidizing agents the reserve pastes contain lead sulphate, barium sulphate, resins, fats and thickenings in various proportions. The following is a good white reserve :—

15 îb flour.

6 gals, water.

Boil, cool a little, and add—

18 îb copper sulphate powdered.

2⅜ ìb copper nitrate, 90o Tw.

I pint alizarine oil.

*Yellow.* 2 J gals. British gum paste.

33 lb lead sulphate, 66 per cent, paste.

18 lb zinc sulphate.

22 îb lead nitrate.

Print the white and yellow, dry, dye in the indigo vat—sour slightly in sulphuric acid, wash, and pass into a hot solution of bichromate of soda, which develops the lead yellow. Reserve whites also contain lead salts when used for white alone, but obviously the w,hite given is best suited to white and yellow reserves, as its soluble copper salts wash out before the “ chroming ” stage is reached.

*, (/) Reserves under Sulphur Colours.*—These are obtained with zinc chloride. They are not much used, but are capable of yielding fine effects.

(g) *Reserves under Aniline Black.—*Reserves under aniline black are produced with caustic alkalis, alkaline carbonates, silicates and sulphites, sulphocyanides, oxide of zinc and the acetates of magnesia, zinc and soda. The white and coloured resists may be printed upon either the undeveloped black or upon the cloth before the black is applied.

In the former case the cloth is slop-padded through a mangle­box with the following black :—

7⅜ îb aniline hydrochloride.

3⅜ îb sodium chlorate.

4 îb potassium ferrocyanide.

10 gals, water.

It is then very carefully dried in hot air so that it becomes no darker than a pale yellow; if it is green before printing, the white is sure to be bad.

The dried padded cloth is then printed with the “ resist ” colours, dried and steamed 3 to 4 minutes in a rapid ager, chromed through warm bichromate 01 potash, and finally washed and soaped. During the steaming the black is developed all over the cloth except where the colours are printed. Here its development is prevented by the alkali or the reducing agent, whichever may be present, in the colour, and instead of a plain black dyed piece a coloured design on a black