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PAD DYEING BATHS AND PROCESSES FOR PAD DYEING TEXTILE MATERIALS

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This invention relates to pad dyeing of textile materials in which the pigment is bonded to the material by a resin insoluble in water. In effecting the pad dyeing, the pigment may be dispersed in the resin and in the disperse phase of a lacquer-in-water emulsion, and squeeze rolls are employed to force the pigment and resin into or onto the textile material. The textile material may be passed through a bath of the pigment and resin containing emulsion, and then between the squeeze rolls, or one of the rolls may extend into the bath so that the emulsion is carried up to the nip of the rolls and the textile material passes between the rolls without previous immersion in the bath. A process of this character is disclosed in the Jennings Patent 2,334,199.

A serious drawback to the process of pad dyeing with pigments as disclosed by Jennings, and one which has kept the process from use by the dyers is the fact that the pigment dyed textile has what is described as "poor appearance," in other words, the dyeing is uneven, showing dark areas and light areas in the textile. One theory is that this unevenness is due to the migration of the pigment. In our opinion the "poor appearance" is due to unevening penetration of the dye bath into the textile threads, since some of the threads are more tightly spun than others.

We have discovered that when a water soluble alginate salt, such as sodium or ammonium alginate, is present in the emulsion, level dyeings of good appearance are obtained.

The reasons why the good appearance and level dyeing are obtained when an alginate salt is present are not definitely known, but in our opinion the alginate salt causes the disperse phase of the emulsion to flocculate, thus preventing uneven penetration into the threads of the textile material. The flocks are of such size that they are not free to move around too much while the solvent is being evaporated, and therefore they stay where they contact the threads and give uniform pigmentation. The degree of flocculation is controlled by the concentration of alginate salt in the emulsion. The type of textile material to be dyed and the degree of tightness with which the threads are spun determine the concentration of alginate salt to be used.

An example of an emulsion which may be treated with alginate is the emulsion claimed by Joseph Monroe Kuhn in his patent application Serial No. 609,035, filed August 4, 1945.

For instance, the emulsion may be made as follows:

One part is made by flushing 454 grams of Monastral Blue presscake (100 grams dry pigment) with 163 grams of Melmac 245–8. 294 grams of water are separated and removed as a result of the flushing.

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A second part is made by mixing 157 grams of Melmac 245–8, 330 grams of Sovasol 5A and 150 grams of Ethocel 10 cp. standard ethoxy, until the ethyl cellulose is dissolved. A cloudy thick liquid is produced.

The two parts so produced are then mixed together and roller milled until the product is a paste having a smooth consistency.

Monastral Blue constitutes the pigment, and is a phthalocyanine. Various other insoluble pigments may be employed. Melmac 245–8 contains 50 parts of melamine formaldehyde resin, 30 parts of butyl alcohol, and 20 parts of xylene. The resin alone might be used, or other resins such as urea formaldehyde might be used as the pigment binder. Sovasol 5A is a petroleum hydrocarbon having a boiling range of 154 to 194° C., and a Kauri-Butanol value of 67. Other solvents might be used. Ethocel is an ethyl cellulose, and that used preferably has a viscosity of 10 centipoises. The two resins, ethyl cellulose and melamine formaldehyde are each soluble in the organic solvent, but are incompatible in the solvent.

The paste described above may be manufactured and shipped to the point of use, and may be then readily emulsified in water by first mixing into the paste a solvent soluble emulsifying agent of either the anionic or nonionic type, such as Igepal CA extra concentrated, which is an ethylene oxide fatty acid condensation product, Triton X–120, which is a high molecular weight alcohol, or Tween, which is a polyoxyalkalene derivative of sorbitan laurate, palmitate, stearate, or oleate, or a triethanolamine soap of a fatty acid.

One part of emulsifier to 4 or 5 parts of paste is sufficient to produce a readily emulsified pigmented paste containing 1 part of ethyl cellulose for each 4 parts or less of the incompatible heat-curing solvent-soluble resin such as melamine formaldehyde.

To this paste water may be added to form an oil-in-water emulsion, and to this emulsion may be added an aqueous solution of a water soluble alginate salt. A level dyeing of a blue shade of medium depth is obtained by immersing a textile in a color bath prepared as follows, the parts being by weight:

	Parts
The above paste	1
Water	9
0.2% solution Kelgin in water	10

and then run through a padder. Kelgin is a trade name for sodium alginate. In this example the alginate constitutes .1% based on the total water content of the bath.

Alternatively, a concentrated solution of a water soluble alginate salt may be added to the paste, and water added to this mixture to form an oil-in-water emulsion.

The bath may be made according to the following formula, the parts being by weight:

	Parts
The above paste	2
2.5% solution Superloid in water	1
Mix thoroughly and add:	
Water	37
	40

In this example the Superloid constitutes .065% based on the total content of the bath. The textile is padded in the bath, and after drying, a level dyeing of good appearance is obtained. Superloid is a trade name for ammonium alginate.

Although only traces of alginate salt contribute to the "good appearance" of a pigment dyeing, we have found that the optimum amount depends on the weight per yard of the textile, and also on the degree of tightness with which the yarn, used in weaving the cloth, is spun. The practical limits lie between the smallest effective addition and 0.1% by weight on the water content of the bath.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A pad dyeing bath of the lacquer-in-water type having an insoluble pigment and a pigment binder in the disperse phase, and characterized by having an effective amount but not more than .1% of a soluble alginate salt dissolved in the water phase.

2. A pad dyeing bath as defined in claim 1, and in which the salt is sodium alginate.

3. A pad dyeing bath as defined in claim 1, and in which the salt is ammonium alginate.

4. A method of making a pad dyeing bath comprising making a lacquer-in-water emulsion including an insoluble pigment and a pigment binder in the dispersed phase and adding an aqueous solution containing an effective amount but not more than .1 percent, based on the water content of the resulting bath, of a soluble alginate salt thereto.

5. A method of making a pad dyeing bath comprising making a lacquer-in-water emulsion including an insoluble pigment and a pigment binder in the dispersed phase and a soluble alginate salt in the aqueous phase in an effective amount but not more than .1 precent, based on the final water content of the bath, and then adding water to form said pad dyeing bath.

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