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WATERPROOFING SIZE AND METHOD OF MAKING SAME

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My invention relates to a water-proofing size or agent and more particularly to a method of and means for making water colors or water inks resistant to water after printing or other application to the carrying medium.

The main object of my invention is to provide a decorative paper, such as wallpaper, which is washable.

Another object is to provide a printed water color or water ink which is soap and water proof to a remarkable degree.

Still another object of my invention is to provide a water-proofing size or agent for water colors or water inks, and a method of making the same.

In making washable wallpaper in the past it has been necessary to subject the printed web to a chemical treatment to fix a binder in the coating and water colors or water inks to render the latter water resistant and washable. The fixing or hardening agent is expensive and must be sprayed or rolled on the printed web. Further the resulting paper is brittle and the colors are liable and have a tendency to crack and peel off.

Therefore, the main purpose of my invention is to provide a washable wall-paper which is inexpensive to make, is soft and pliable, and which has no tendency to curl or crack with age. In fact, the longer my product ages, the more resistant to washing it becomes, the old step of chemically fixing a binder in the coating or water color by treating the web being entirely eliminated by my invention. The wallpaper or other medium carrying my water-proof printing has a pleasant odor and is remarkably resistant to soap and water.

In trying to make water colors waterproof I encountered many difficulties, such as foaming of the colors, turning to "liver" and worst of all, I could not match any certain colors. It was a great problem. I then conceived the idea of making a waterproof sizing material for the water colors. After experimenting with various bases for the size, I found that a neutral casein is most satisfactory for my purpose.

As solvents for the casein, I prefer tri-sodium phosphate and ammonia. The preferred casein preservatives are borax and carbolic acid. Pine oil is used as a deodorizer. These ingredients together with those mentioned below, added to the casein result in a water-proofing size for water colors. After the colors have been printed on or otherwise applied to the carrying medium, the product is preferably aged for five or ten days, the desired properties improving with age. However, no matter how long it is aged, the carrying medium remains soft and pliable, and the colors have no tendency to crack or peel.

In making my water-proofing size or agent, and by way of a preferred example, I first pour 400 lbs. of cold water into a steam jacketed kettle. To this water is added 100 lbs. of a neutral casein, the mixture being allowed to soak for at least 30 minutes.

While the casein is soaking, 5 lbs. of borax and 5 lbs. of tri-sodium phosphate are dissolved in 100 lbs. of hot water in another kettle, the water being preferably boiling. The steam is then turned on at the first kettle, and while the contents thereof is stirred, the solution in the second kettle is added thereto. One quart of ammonia (90%) is also added and the whole mixture is cooked until the temperature reaches 140 degrees F.

At such temperature, I add two quarts of pine oil and one quart of carbolic acid, the mixture being agitated for 15 minutes. I then add 25 gallons of a water wax dispersion, 15 gallons of high grade linseed oil, 15 gallons of a wax solution, 5 gallons of an 18% solution of gum copal cut with aqua-ammonia, and 10 gallons of gum copal. The temperature of the resulting mixture is raised to 150 degrees F., and mixed or agitated for 15 minutes. It is then ready for use as a water-proofing size, and is added to the stainers or clays in the desired proportions, this being best determined by trial and error.

The neutral casein which I prefer to use is a very good adhesive and is a standard article of manufacture. By experiment I have found that it is highly desirable for my use. The water in the second kettle is heated to dissolve the borax and tri-sodium phosphate. The borax preserves and sweetens the casein, while the tri-sodium phosphate acts as a dispersing and emulsifying alkali. The ammonia adds to the properties of the tri-sodium phosphate. At 140 degrees F. the paste changes to a liquid, and is then a good adhesive size.

The pine oil is used as a deodorizer, and while I prefer it, other deodorizers may be used. The carbolic acid is a preservative for the casein. If desired formaldehyde may be susbtituted for the carbolic acid. The mixture is cooked for 15 minutes at 140 degrees F. to prevent foaming.

The aqueous wax dispersion is preferably an aqueous emulsion of paraffin wax employing soap as the principal dispersing agent. The quantity used affects the time required to age the final product. I, therefore, prefer to use not over 30

gallons and not less than 10 gallons in my mixture.

The high grade linseed oil is light in shade so as not to affect the color of the final product, and I prefer to use between 10 and 20 gallons in my mixture.

The wax solution is used as a water-proofing agent. It consists of bees wax, a vegetable wax, a mineral wax and a mineral wax solvent. The vegetable wax in carnauba and/or candelilla wax. The mineral wax is paraffine wax, petroleum wax, ozocerite wax, chlorinated waxes, and/or chlorinated wax compounds. The mineral solvents are one or more of the following, naphtha, benzine, gasoline, kerosene, mineral spirits, coal tar naphthas xylol, solvent naphtha, and the like. The wax solution may be called a waxy compound containing a mineral solvent. I prefer to use between 10 and 20 gallons in my mixture.

The 18% solution of gum copal cut with aqua-ammonia contains 18% solid matter. It is used in my invention as a water-proofing and soap-proofing agent. The amount used may range between 5 and 15 gallons.

The preferred cooking temperature is 150 degrees F. but if the temperature is kept between 140 degrees F. and 160 degrees F. the oils and waxes are properly cooked in the casein. If cooked over 30 minutes the mixture has a tendency to foam, but I have cooked the mixture as little as 15 minutes with desirable results. It is essential that the mixture be thoroughly mixed during the cooking step.

The finished size is white, is of medium consistency, has a pleasant odor and mixes well with water colors, inks and stainers. After printing, the product is washable with water after 10 days aging, and after 20 to 30 days aging is washable with soap. The aged product is water proof and highly resistant to soapy water, this resistance increasing with aging. The paper does not curl in manufacture, does not become brittle with age, and the colors do not crack or peel. The water inks are pulp colors or stains, clay being the base coating of the web, as is well known to those skilled in the art.

In addition to making washable wall-paper my sizing material may be used to make textiles and papers water-proof. It is also useful for regular paper sizing as a water-proofing agent. For out-door bill board colors, my invention is particularly applicable. Also it is useful in connection with decorated paper known as Christmas stock. Also water paints may be made water and soap proof with my size.

The following table sets forth the optional and preferred range of the ingredients listed in making my size.

Ingredient	Optional	Preferred
Casein	100 lbs	100 lbs.
Borax	2 to 6 lbs	5 lbs.
Tri-sodium phosphate	2 to 6 lbs	5 lbs.
Ammonia	1 to 3 qts	1 qt.
Pine oil	1 to 4 qts	2 qts.
Carbolic acid	1 to 3 qts	1 qt.
Water wax dispersion	10 to 30 gal	25 gal.
Linseed oil	10 to 20 gal	15 gal.
Wax solution	10 to 20 gal	15 gal.
Solution of gum copal cut with aqua-ammonia.	5 to 15 gal	5 gal.
Gum copal	5 to 15 gal	10 gal.

Paper made in accordance with my invention is washable after being aged and requires no chemical treatment whatsoever after being decorated. It is resistant to water and soap and has the desirable properties referred to above. The adhesive properties of the casein are not impaired by the other materials which with age render the clays or pigments water and soap proof. Casein cut and added to clay and pigment normally cracks and peels. Wax alone makes the product water-proof but not soap-proof. The gum copal helps to make the product water-proof and soap proof, when used in the manner described.

I claim as my invention:

1. A water-proofing agent for water colors and the like, consisting of a solution containing 400 lbs. of water and 100 lbs. of casein, a solution containing 100 lbs. of water, 5 lbs. of borax and 5 lbs. of tri-sodium phosphate, 1 qt. of ammonia, 2 qts. of pine oil, 1 qt. of carbolic acid, 25 gals. of a water wax dispersion, 15 gals. of linseed oil, 15 gals. of wax solvent solution, 5 gals. of an 18% solution of gum copal cut with aqua-ammonia, and 10 gals. of gum copal.

2. A water-proofing agent for water colors and the like, consisting of a solution containing 400 lbs. of water and 100 lbs. of casein, a solution containing 100 lbs. of water, 5 lbs. of borax and 5 lbs. of tri-sodium phosphate, 1 qt. of ammonia, 1 qt. of carbolic acid, 25 gals. of a water wax dispersion, 15 gals. of linseed oil, 15 gals. of wax solvent solution, 5 gals. of an 18% solution of gum copal cut with aqua-ammonia, and 10 gals. of gum copal.

3. A water-proofing size for water colors, inks, stainers and the like, consisting of 500 lbs. of water, 100 lbs. of casein, 5 lbs. of borax, 5 lbs. of tri-sodium phosphate, 1 qt. of ammonia, 2 qts. of pine oil, 1 qt. of carbolic acid, 25 gals. of an aqueous wax dispersion, 15 gals. of light linseed oil, 15 gals. of a wax solution containing a mineral solvent, 5 gals. of gum copal cut with ammonia and containing 18% solid matter, and 10 gals. of gum copal.

4. The method of making a water-proofing size for water colors, inks, stainers and the like, comprising the steps of mixing 100 lbs. of casein in 400 lbs. of cold water and soaking for 30 minutes, dissolving 5 lbs. of borax and 5 lbs. of tri-sodium phosphate in 100 lbs. of boiling hot water, applying heat to the casein and water mixture, stirring the casein and water mixture and adding the mixture of borax, tri-sodium phosphate and water thereto, adding one quart of ammonia to the combined mixture, cooking the mixture until the temperature thereof reaches 140 degrees F., at such temperature adding two qts. of pine oil and one qt. of carbolic acid, agitating the whole mixture for 15 minutes, adding 25 gals. of an aqueous wax dispersion, 15 gals. light linseed oil, 15 gals. of a wax solution containing a mineral solvent, 5 gals. of gum copal cut with ammonia and containing 18% solid matter, and 10 gals. of gum copal, raising the temperature of the resulting mixture to 150 degrees F., and cooking for 15 minutes.

5. The method of making a composition of matter of the character set forth, comprising the steps of mixing 100 lbs. of casein in 400 lbs. of cold water and soaking, dissolving 2 to 6 lbs. of borax and 2 to 6 lbs. of tri-sodium phosphate in 100 lbs. of hot water, heating and stirring the casein solution while adding the borax and tri-sodium solution thereto, adding 1 to 3 qts. of ammonia, cooking the mixture until the temperature reaches 140 degrees F., then adding a deodorant and 1 to 3 qts. of carbolic acid, stirring the mixture for about 15 minutes at 140 degrees F., adding 10 to 30 gals. of an aqueous wax dis-

persion, 10 to 20 gals, of pale linseed oil, 10 to 20 gals. of a wax solution containing a mineral solvent, 5 to 15 gals. of gum copal cut with aqua-ammonia and containing 18% solid matter, and 10 gals. of gum copal, raising the temperature of the resulting mixture to between 140 degrees and 160 degrees F., and cooking it at this temperature for 15 to 30 minutes.

6. A water-proofing size consisting of a mixture of substantially 500 parts of water, 100 parts of neutral casein, 2 to 6 parts of borax, 2 to 6 parts of tri-sodium phosphate, 2 to 6 parts of ammonia, 2 to 8 parts of pine oil, 2 to 6 parts of carbolic acid, 80 to 240 parts of a water wax dispersion, 80 to 160 parts of high grade linseed oil, 80 to 160 parts of wax solution, 40 to 120 parts of an 18% solution of gum copal cut with aqua-ammonia, and 40 to 120 parts of gum copal.

7. A water-proofing size consisting of a mixture by weight of substantially 500 parts of water, 100 parts of neutral casein, 2 to 6 parts of borax, 2 to 6 parts of tri-sodium phosphate, 2 to 6 parts of ammonia, 2 to 6 parts of carbolic acid, 80 to 240 parts of a water wax dispersion, 80 to 160 parts of high grade linseed oil, 80 to 160 parts of wax solution, 40 to 120 parts of an 18% solution of gum copal cut with aqua-ammonia, and 40 to 120 parts of gum copal.

8. A water-proofing size consisting of a mixture by weight of substantially 500 parts of water, 100 parts of neutral casein, 2 to 6 parts of borax, 2 to 6 parts of tri-sodium phosphate, 2 to 6 parts of ammonia, 2 to 8 parts of pine oil, 2 to 6 parts of formaldehyde, 80 to 240 parts of a water wax dispersion, 80 to 160 parts of high grade linseed oil, 80 to 160 parts of wax solution, 40 to 120 parts of an 18% solution of gum copal cut with aqua-ammonia, and 40 to 120 parts of gum copal.

9. A water-proofing size consisting of a mixture by weight of substantially 500 parts of water, 100 parts of neutral casein, 2 to 6 parts of borax, 2 to 6 parts of tri-sodium phosphate, 2 to 6 parts of ammonia, 2 to 6 parts of formaldehyde, 80 to 240 parts of water wax dispersion, 80 to 160 parts of high grade linseed oil, 80 to 160 parts of wax solution, 40 to 120 parts of an 18% solution of gum copal cut with aqua-ammonia, and 40 to 120 parts of gum copal.

10. A water-proofing size consisting of a mixture by weight of substantially 500 parts of water, 100 parts of neutral casein, 2 to 6 parts of borax, 2 to 6 parts of tri-sodium phosphate, 2 to 6 parts of ammonia, 2 to 8 parts of pine oil, 2 to 6 parts of casein preservative, 80 to 240 parts of a water wax dispersion, 80 to 160 parts of high grade linseed oil, 80 to 160 parts of wax solution, 40 to 120 parts of an 18% solution of gum copal cut with aqua-ammonia, and 40 to 120 parts of gum copal.

11. A water-proofing size consisting of a mixture by weight of substantially 500 parts of water, 100 parts of neutral casein, 2 to 6 parts of borax, 2 to 6 parts of tri-sodium phosphate, 2 to 6 parts of ammonia, 2 to 6 parts of casein preservative, 80 to 240 parts of water wax dispersion, 80 to 160 parts of high grade linseed oil, 80 to 160 parts of wax solution, 40 to 120 parts of an 18% solution of gum copal cut with aqua-ammonia, and 40 to 120 parts of gum copal.

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