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3,102,065 METHOD AND COMPOSITION FOR DISPERSING OF PITCH

John F. Thurlow, Gorham, Maine, assignor to Virginia Chemicals & Smelting Company, a corporation of Maine
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The present application is directed to a method and composition for dispersing of pitch from pulp and paper in mill operations.

Pitch is normally considered as deriving from pine and other "pitchy" woods; however, pitch occurs also in hardwood mill operations. To the paper maker pitch is a dark brown or black deposit which he finds around the edges of his beaters and chests, clogging his Fourdrinier wires, accumulating on his press rolls, and clogging or appearing as dark specks in the finished sheet of paper. In both pulp and paper mills the occurrence of pitch depends upon the kind of pulp used, as well as many additional factors which are detailed below.

A mill which cooks by the sulfite process or which manufactures groundwood may very easily have a pitch problem; the same applies if a mill purchases either of these pulps. Mills using a semi-chemical or partial cook process, usually sulfite, followed by mechanical disintegration—may have pitch problems, but other mitigating conditions in the manufacturing process sometimes make these pitch problems relatively minor. The sulfite process is acid and, therefore, not as successful in removing pitchy materials as the alkaline processes. The groundwood process uses no cook at all and, consequently, removes only those constituents which are freed in finely divided form during the grinding operation.

According to the present invention a composition containing water soluble cationic starch, glycerol monostearate and a non-ionic surface active agent, such as nonylphenol polyethylene glycol ether, alkyl phenol polyethylene glycol ether (iso-octyl) or the like and deodorized kerosene is added to the moving pulp in advance of individual trouble points where the pitch has agglomerated. This composition also assures complete dispersion in the pulp slurry or in hot water of the cationic starch which ordinarily does not perform well when used by itself. The composition thus facilitates use of water soluble cationic starch without cooking. Furthermore, the composition retains unagglomerated pitch particles in the sheet paper which particles are conventionally too minute to be detected easily by the naked eye. Thus, by continuously removing pitch from the system there is prevented a buildup of pitch in the paper making machinery. Conventional dispersants merely keep the pitch dispersed, but do not assist in purging the mill system and in consequence build up may occur.

Accordingly, it is an object of invention to provide a pitch dispersing composition for use in pulp and paper mill systems.

Another object of invention is to provide a pitch dispersing composition which enhances dispersion of cationic starch in pulp and paper mill systems.

Another object of invention is to provide a pitch dispersing composition which prevents pitch build up in paper mill systems.

Another object of invention is to provide pitch dispersing composition which is useable with uncooked cationic water dispersible starches.

Yet another object of invention is to provide a pitch dispersing composition which effectively purges paper mill systems.

Yet additional objects of invention will become apparent from the ensuing specification.

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Pitch as it occurs in pulp and paper mills behaves as a negatively charged, hydrophobic colloid. Chemically, pitch consists primarily of a mixture of fatty acids and rosin acids, the former being largely combined with glycerine in the form of esters. The fatty acids, primarily oleic and linoleic, are subject to oxidation with a resulting change in tackiness. The rosin acids are of two types: the abietic acids which are subject to oxidation and the pimaric acids which are not subject to oxidation, as a result of having non-conjugated double bonds; here too oxidation results in a change in tackiness. In most pitches small amounts of waxes (esters of higher alcohols) are probably present.

Repeated experimentation has shown that pitch taken from wounds on spruce, pine and other conifers only partially resembles the material causing trouble in pulp and paper mills. There is considerable disagreement as to the best way to isolate pitch for scientific study in the laboratory because of the tendency of the isolated material to behave in a manner different from pitch which occurs in mill operations.

As hereinbefore stated, pitch troubles depend upon the kind of pulp used and may depend, as well, upon any of the following known contributing factors:

(a) Presence of calcium and magnesium ions in the mill process water, which ions react with the pitch acid to give insoluble, sticky deposits.

(b) Beating of pulp in order to develop hydration and strength may result in the entrapment of pitch in the crushed fiber.

(c) Hard sizing by means of rosin size and alum may aggravate the pitch problem since the rosin contains abietic acids, itself, and as pointed out below, alum creates special problems.

(d) Foaming by means of air and CO₂ resulting in the accumulation of colloidal particles of pitch in the foam.

(e) Variation in pH. Around pH 6 or 7 pitch is not readily dispersed by water and may float to the surface or precipitate to the bottom of the reaction vessel. At higher and lower pH dispersion occurs more readily.

(f) The use of green or unseasoned wood, the use of alum in low pH ranges, increased temperatures, reuse of water in the mill systems and the use of a high percentage of virgin sulfite pulp, particularly in tissue mill operations, all may result in pitch buildup in the system and the formation of pitch deposits.

The suggested composition and ranges are:

	Percent
Cationic starch, cold water soluble.....	25 to 75
Glycerol monostearate.....	5 to 15
Nonylphenol polyethylene glycol ether (non ionic surface active agent).....	0 to 5
Deodorized kerosene.....	20 to 50

Currently available commercial types of the foregoing ingredients are as follows:

Cationic starch—Cato CWS Starch
Glycerol monostearate—Aldo 33
Nonylphenol polyethylene glycol ether—Neutronyx 622
(or equivalent with 4 to 6 (OCH₂CH₂) groups)
Deodorized kerosene—Bayol D

Methods of application of the pitch dispersing composition are as follows:

(1) A solid pitch dispersing composition is added to the pulp.—The addition of the solid composition directly to the pulp in the beaters or pulpers is widely practiced with good success. It is unlikely that this method should be employed except where agitation is strong or where the pulp is at least 4% consistency, if the agitation is slow; otherwise, the dissolution will be incomplete or too slow. Pulp in beaters is normally at 4% consistency or more

and the agitation in beaters or hydropulpers is always strong.

(2) *Pitch dispersing composition is dispersed in warm or hot water to form a 3 to 5% dispersion, which is metered into the pulp.*—Normally, and especially in ground wood, the present pitch dispersing composition may be added at the rate of 2 ounces per ton; however, extreme conditions may require use rate as high as 10 pounds per ton. Multipoint addition is practiced where pitch agglomerates are detected at more than one location in the mill system. The pitch dispersing composition should be added just ahead of each trouble point, when a single point addition in the system fails to accomplish the job.

Although experimentation is not yet complete a suggested possible effect of the present composition is that it serves to peptize the negatively charged colloid which is pitch. The peptized colloid remains dispersed, that is it does not form agglomerates, and under favorable circumstances is carried out in the finished paper, but in particles so small as to do no harm. Paper thus has a higher pitch content when made with the pitch dispersing composition than when made without it.

Manifestly, proportions of ingredients in the present composition may be varied and the method of application of the composition may be varied without departing from the spirit and scope of invention as defined in the subjoined claims.

I claim:

1. A method for dispersing pitch within pulp comprising dissolving in water a solution consisting of cationic starch 25 to 75%, glycerol monostearate 5 to 15% and kerosene 20 to 50% and adding said solution to said pulp at the rate of 2 ounces to 10 pounds of said starch, glycerol monostearate and kerosene per ton of pulp.

2. The method according to claim 1, wherein said solution is multi-point added to a moving stream of said pulp.

3. A method for dispersing pitch within pulp comprising dissolving in water a solution consisting of cationic starch 25 to 75%, glycerol monostearate 5 to 15%, nonylphenol polyethylene glycol ether 0.1 to 5% and deodorized kerosene 20 to 50%, and adding said solution to said pulp at the rate of 2 ounces to 10 pounds of said starch, glycerol monostearate and kerosene per ton of pulp.

4. A method for dispersing pitch within pulp comprising strongly agitating said pulp and adding to said pulp at the rate of 2 ounces to 10 pounds per ton of pulp a composition comprising water soluble cationic starch 25 to 75%, glycerol monostearate 5 to 15%, nonylphenol polyethylene glycol ether 0.1 to 5% and kerosene 20 to 50%.

5. The method according to claim 4, including maintaining said pulp at a consistency in excess of 4%.

6. A method for dispersing pitch within pulp comprising maintaining said pulp at 4% consistency, agitating said pulp and directly adding to said pulp a solid composition at the rate of two ounces to 10 lbs. of composition per ton of pulp, said composition consisting of cationic starch 25 to 75%, glycerol monostearate 5 to 15%, a non-ionic surface active agent 0.1 to 5% and deodorized kerosene 20 to 50%.

7. A pitch dispersing composition comprising cationic starch 25 to 75%, glycerol monostearate 5 to 15% and kerosene 20 to 50%.

8. A pitch dispersing composition comprising cationic starch in the range 25 to 75%, glycerol monostearate in the range 5 to 15%, nonylphenol polyethylene glycol ether in the range .01 to 5% and kerosene in the range 20 to 50%.

9. A pitch dispersing composition comprising cold water soluble cationic starch 50%, glycerol monostearate 9.1%, nonylphenol polyethylene glycol ether .9% and kerosene 40%.

10. A pitch dispersing composition as in claim 9, wherein said kerosene is deodorized.

11. The method according to claim 4, wherein said kerosene is deodorized.

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