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PROCESS OF TREATING WOOD PULP TO REMOVE PITCH

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The invention relates, in general, to the art of pulp and paper manufacture and, in particular, to a method of eliminating pitch troubles in pulp and paper making operations.

Various woods, more particularly the coniferous woods, used in the manufacture of wood pulps of all types, such as sulphite, kraft, soda, groundwood and the like, contain a mixture of resins generally referred to as pitch. The amount of pitch present depends on the species of wood and likewise on the freshness of the cut. In the production of paper of various types, from pitch-bearing pulps, a serious manufacturing problem arises from the tendency of these pitch-bearing pulps to adhere to various parts of the paper machine. When this occurs, the pitch liberated from these pulps accumulates on the wires, felts and press rolls of the paper machine and other surfaces of the apparatus exposed to the pulp, thus making it necessary to close down the apparatus and clean the various parts by hand labor, resulting in considerable expense and loss of production.

The problem of obviating pitch troubles has received much attention and several proposals have been made in an attempt to solve this problem, but none of these has proven to be uniformly successful or commercially feasible. It has been found, for example, that pitch troubles may be lessened somewhat by seasoning or ageing the wood or the pulp before use. Such a process does not offer a satisfactory solution, and, furthermore, it is not practical on a commercial scale due to the storage space needed and the tie-up in materials which increases the overhead.

Other proposals have been made for eliminating pitch troubles such, for example, as adsorbing the pitch on particles of China clay, bentonite, talc, etc., but this process is limited to certain classes of papers, as well as by restrictions as to the amount of ash resulting in the final paper. Sodium thiosulphate has been added to cause a hardening of the pitch thus rendering its presence less objectionable, but this does not work in most instances. The addition of excess alum to the pulp stock is alleged to aid in dispersing the pitch, but this is doubtful; and, moreover, the increased acidity produced thereby has a harmful effect on the paper as well as the equipment. Various emulsifying and dispersing agents have been tried but it has been found practically impossible to directly emulsify the pitch. The pitch liberated during the processing of pulp may be gathered together or dissolved in a solvent such as kerosene. However, this process is also impractical as the resulting fluid mass very often causes more trouble in the sheet forming apparatus than the pitch per se.

The general object of the invention is to obviate the foregoing and other disadvantages.

Another object of the invention is to provide an effective and efficient method of removing troublesome pitch from pulp.

A specific object of the invention is to provide a method of eliminating pitch troubles during the continuous production of paper from pulp.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

In general the invention comprises dissolving the troublesome pitch liberated in a pulp during the shredding, bleaching, beating, disintegrating, jordaning, etc., operations, by means of a suitable organic solvent therefor and separating the pitch-solvent mixture, in an emulsified state, from the pulp or sheet produced therefrom. While the organic solvent may be added to the pulp in the form of an emulsion, it is highly preferred to admix the organic solvent directly with the pulp and subsequently introducing an emulsifying agent or agents into the pulp to emulsify the pitch-solvent mixture. The emulsified pitch-solvent mixture is preferably removed with the wash water in the pulp mill, or with the white water in a paper machine of either the Fourdrinier or cylinder type.

The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others thereof, which will be exemplified in the method hereinafter disclosed, and the scope of the invention will be indicated in the claims.

The invention is particularly adapted for practice in connection with processes of manufacturing unsized paper, such, for example, as facial tissues, toilet tissues, sanitary napkins, paper towels and napkins, paper felts, news print, etc. The invention is also adapted for use in processes for making sized papers where the sizing is not adversely affected by the presence of the solvent and/or emulsifier.

Any suitable organic solvent may be employed in the method of the invention such, for example, as kerosene, benzene, gasolene, naphtha, or similar aliphatic or aromatic hydrocarbons and their halogenated derivatives, as well as any other suitable substantially water-immiscible pitch-solvent or mixture of solvents. Kerosene has been found to function very satisfactorily, and in view of its low cost and low volatility, this solvent is pre-

ferred in commercial practice. In many instances it has been found highly desirable to employ deodorized kerosene, especially in those cases in which kerosene odors are objectionable.

The organic solvent may be added to the pulp at any suitable stage of its manufacture or during the continuous process of making paper therefrom, but for the best and most efficient results the solvent should be admixed with the pulp before any treatment wherein pitch is liberated so that the solvent may act upon the pitch immediately upon liberation.

The emulsifying or dispersing agent employed to carry out the method of the invention may comprise any suitable substance or substances which will emulsify the pitch-solvent mixture, such, for example, as soaps, sulfonated aliphatic or aromatic materials or appropriate mixtures of the same or other emulsifiers, any one or more of which should be selected according to the solvent employed. Sulfonated fatty acids, sulfonated fatty esters and fatty derivatives, such as oils, waxes, synthetic esters, etc., and sulfonated fatty alcohols have proved particularly advantageous in the performance of my invention and are, therefore, preferred. Mixtures of the preferred emulsifiers can also be used with advantage and mixtures of sulfonated fatty acids or glycerides and sulfonated waxes, for example, have proven particularly useful. The emulsifying agent may be incorporated into the pulp at any stage during the process after the solvent has been added. It is preferred to add the emulsifier just prior to the final washing step in the manufacture of pulp, or to the head-box in a paper making machine so that the pitch-solvent mixture is emulsified and withdrawn from the pulp or freshly formed paper web with the wash and white waters respectively.

The expression "pitch" is employed herein to connote the gummy or resinous mass contained in pulp, and which is liberated during the shredding, bleaching, beating, disintegrating, jordaning, etc., operations in the manufacture of pulp and paper. The expression "pitch-solvent mixture" is used herein to designate the mass or solution resulting from the admixture of the pitch with the solvent; and the term "dissolving" is employed to describe the action of the solvent on the pitch to form the pitch-solvent mixture. The expression "disintegrated" is used herein to generically include the following process steps: Shredding, beating, disintegrating, jordaning, etc.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following examples which are merely illustrative of some of the applications of the invention and in no way should they be construed in a limiting sense.

Example I

Add two gallons of kerosene (either plain or deodorized) per 1,000 pounds of pulp to the pulp in the beater or pulp breaker. The kerosene is preferably added before the pulp is furnished to the beater or pulp breaker, so that it is present while the pulp is being disintegrated or beaten. The kerosene is allowed to remain mixed with pulp until it reaches the head-box of the paper machine. At this point, the emulsifier is dripped into the stock and the pitch-kerosene mixture is then emulsified and passes out harmlessly with the white water. The amount of emulsifier added depends on the efficiency of the same and upon the individual mill conditions.

Example II

Add from 1 to 4 gallons of kerosene per 1,000 pounds of stock to the pulp after the cooking liquors are washed out of it. This kerosene is allowed to remain with the pulp during any subsequent operation as chlorination, bleaching or the like, thus dissolving the pitch as it is liberated. The pitch-kerosene mixture is then emulsified before the last washing or in the head-box of the sheeting machine.

Example III

Excellent results have been obtained by the process of Example I when an emulsifier comprising sulfonated sperm oil containing approximately 25% moisture is added to the pulp in the head-box in an amount of about 15%–35%, based on the weight of the solvent used.

Example IV

In the process recited in Example II, good results have been obtained by using as the emulsifier a 50—50 mixture of a sulfonated sperm oil and sulfonated castor oil. The amount of the emulsifier added is preferably about 15%–35%, based on the weight of the solvent used.

The method of the invention has the advantage of rendering the pitch non-sticky and then dispersing it in such a way that it will not cause the usual pitch troubles. Moreover, the method of the invention does not interfere with the usual paper-making operations, nor does it affect the quality of the paper produced. It is economical to practice as the cost of the materials employed is far more than saved by avoiding shut-downs of the paper-making equipment. Greatly improved machine operation also results, as well as a clean paper free from pitch spots.

While a sufficient amount of solvent under certain conditions may be added to the pulp to actually extract the pitch from the ray cells of the individual fibers, the prime purpose of this invention is to eliminate or dissolve only that pitch which is liberated during conventional processing as hereinbefore described, as the pitch that remains intact within the ray cells offers no difficulty in ordinary paper manufacturing processes.

Since certain changes may be made in carrying out the above method without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A method of removing pitch from wood pulp which comprises dissolving the pitch in a substantially water-immiscible organic solvent, emulsifying the pitch-solvent mixture with the aid of an emulsifying agent and then removing the emulsified pitch-solvent mixture from the pulp.

2. A process of removing natural occurring pitch from the exposed surfaces of wood pulp fiber which comprises treating the fiber with a hydrocarbon solvent to dissolve the pitch, emulsifying the pitch-solvent mixture with the aid of an emulsifying agent and then removing the

emulsified pitch-solvent mixture from the fiber.

3. In the continuous process of making paper, the method of eliminating pitch troubles which comprises dissolving liberated pitch in pulp in a substantially water-immiscible organic solvent, emulsifying the pitch-solvent mixture with the aid of an emulsifying agent and then withdrawing the emulsified pitch-solvent mixture with the white water in the paper making machine.

4. In the continuous process of making paper, the method of eliminating pitch troubles which comprises dissolving liberated pitch in the pulp in kerosene, emulsifying the pitch-kerosene mixture with the aid of an emulsifying agent and then removing the emulsified pitch-kerosene mixture with the white water in the paper making machine.

5. In the continuous process of making paper, the method of eliminating pitch troubles which comprises disintegrating pulp in the presence of a substantially water-immiscible organic solvent to dissolve pitch as it is liberated, emulsifying the pitch-solvent mixture with the aid of an emulsifying agent and then withdrawing the emulsified pitch-solvent mixture along with the white water in the paper making machine.

6. In the continuous process of making paper, the method of eliminating pitch troubles which comprises disintegrating pulp in the presence of kerosene to dissolve pitch as it is liberated, emulsifying the pitch-kerosene mixture with the aid of an emulsifying agent and then withdrawing the emulsified pitch-kerosene mixture along with the white water in the paper making machine.

7. In the process of preparing pulp from cooked wood fiber, the method of eliminating pitch troubles which comprises introducing a substantially water-immiscible organic solvent for the pitch, subjecting the pulp to a bleaching operation, subsequently emulsifying the pitch-solvent mixture with the aid of an emulsifying agent and then removing the emulsified pitch-solvent mixture from the pulp.

8. In the process of preparing pulp from cooked wood fiber, the method of removing liberated pitch therefrom which comprises adding kerosene to the pulp, treating the pulp with a bleaching agent, thereafter emulsifying the pitch-kerosene mixture with the aid of an emulsifying agent and then withdrawing the resulting pitch-kerosene emulsion with the pulp wash water.

9. In the continuous process of making paper, the method of eliminating pitch troubles which comprises introducing a substantially water-immiscible organic solvent into the beater to dissolve the pitch liberated in the pulp, introducing an emulsifier in the head-box to emulsify the pitch-solvent mixture and then withdrawing the emulsified pitch-solvent along with the white water during formation of the paper.

10. In the continuous process of making paper, the method of eliminating pitch troubles which comprises introducing kerosene into the beater to dissolve pitch liberated in the pulp, adding an emulsifier to the head-box of the paper machine to emulsify the pitch-kerosene mixture and then removing the emulsified pitch-kerosene mixture with the white water during formation of the paper.

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