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METHOD FOR WET-CREPING PAPER SHEET

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This invention relates to the creping of paper sheet and pertains more specifically to an improved wet-creping process.

In the wet-creping of paper as conventionally carried out, the wet sheet of freshly formed paper as it comes from the cylinder or from the Fourdrinier wire is applied by means of a pressure roll to a smooth, polished, heated surface of a drying drum, as for example, a Yankee Drier, the sheet temporarily adhering to the face of the drum. As the Yankee Drier rotates carrying the wet sheet on its surface, the sheet comes in contact with a creping blade which scrapes it from its adherent contact with the heated surface while simultaneously compressing the sheet lengthwise to form the desired creping. The creped sheet is then passed around additional drying drums in conventional arrangement, the tension exerted on the sheet during its passage around the drying drums being insufficient to remove the creping.

In such a conventional process, it is necessary to rely upon impurities naturally present in the pulp to provide the desired temporary adherence of the paper sheet to the polished surface of the Yankee Drier. In the case of pulp of ordinary purity, there are usually sufficient impurities present to provide the desired temporary adherence, although local variations in adherence frequently occur with consequent local variations in the extent of creping. In the case of bleached pulps which are of high purity, the adherence is frequently insufficient for completely satisfactory wet-creping. Furthermore, in the case of ordinary pulp where sufficient adhesive material is present to provide the desired temporary adherence, it is found that the adhesive material tends to build up or accumulate on the face of the Yankee Drier, destroying its smooth finish and necessitating re-polishing or re-grinding of the surface at periodic intervals.

One object of the present invention is to provide an improved temporary adherence of the wet paper sheet to the drying surface in the wet-creping process.

Another object is to provide a process for the wet-creping of paper sheet to produce creping of improved uniformity and reproducibility.

Still another object is to reduce the accumulation of dried adhesive material on the polished surface of the drier in the wet-creping process and to extend the useful life of the drier surface between re-polishing operations.

Other and further objects will be apparent from the description which follows.

It has been discovered that the introduction of a small amount of a water-insoluble metal soap into the paper sheet provides, especially in the case of paper made from bleached pulp, better and more uniform temporary adherence to the smooth polished drier surface, resulting in more uniform creping.

Although a wide variety of water-insoluble metal soaps may be employed in the process of the present invention, particularly satisfactory results have been obtained with polyvalent metal salts of long chain fatty acids containing from 10 to 20 carbon atoms, as for example aluminum, magnesium, calcium, barium, etc., salts of such fatty acids as lauric, myristic, palmitic, oleic, ricinoleic, stearic, linoleic, linolenic, arachidic, arachidonic, and the like.

The quantity of such water-insoluble metal soap required to provide the desired results in quite small, entirely satisfactory results being obtained using from 0.005% to

0.015% by weight of the soap based on the dry weight of the paper fibers.

The method of the present invention is applicable to paper made from any conventional pulp, including sulfate or kraft pulp, sulfite pulp, and soda pulp. When the water-insoluble metal soap of the present invention is employed with paper made from ordinary unbleached pulps, the uniformity and reproducibility of the end creping effect is greatly improved. However, the invention is particularly applicable to paper containing bleached pulps inasmuch as these pulps, because of their greater purity, display less temporary adherence to the smooth polished drier surface and thus papers made from bleached pulp alone are very difficult to crepe by the conventional wet-creping process. The present invention, on the other hand, renders paper sheets made from such bleached pulps or mixtures of bleached and unbleached pulps in any proportion readily amenable to a wet-creping process.

The water-insoluble metal soap may be introduced into the pulp furnish at any convenient point during its preparation or after the sheeting out of the pulp. The water-insoluble metal soap may be pre-formed and supplied as a dispersion in water, or the separate components making up the soap may be separately introduced into the pulp furnish or separately applied to the paper sheet so that the water-insoluble metal soap is formed in situ. For example, the water-insoluble metal soap may be introduced into the furnish while the fibers are being slushed in the pulper or in a beater, or it may be introduced at any other convenient stage of stock preparation. When the water-insoluble metal soap is formed in situ, a solution of a water-soluble salt of the desired fatty acid, e.g., a sodium or potassium soap, and a solution of the desired polyvalent metal salt, e.g., papermaker's alum, are separately introduced into the furnish with the soap preferably being introduced first. The water-insoluble soap may also be applied to the preformed sheet of paper, as by spraying a dispersion of the insoluble soap onto the sheet as it leaves the wire, or by spraying onto the sheet separate solutions of water-soluble soap and of alum to form the insoluble soap in situ. When the water insoluble metal soap is formed in situ, the order in which the ingredients are introduced is not critical, although it is preferred to introduce the polyvalent metal salt last.

The following specific example is intended as an illustration of the nature of the invention, but not as a limitation upon its scope.

Example

There was added to a highly bleached kraft pulp in the beater a 1% aqueous solution of sodium stearate, the amount of sodium stearate being equal to 0.010% by weight of the fibers (dry weight) present in the pulp. After sufficient time to permit thorough dispersion of the sodium stearate throughout the pulp furnish there was added slowly a 10% aqueous solution of papermaker's alum until the pH of the furnish reached 4.8. The furnish was then passed to a Fourdrinier machine and formed into a paper sheet in the usual manner. From the Fourdrinier wire the sheet passed to the highly polished heated surface of a Yankee Drier against which it was laid by means of press rolls in the usual manner, the paper sheet exhibiting excellent adherence to the polished surface. After being partially dried the sheet was creped and removed from the surface by means of a conventional creping blade, the creping being of excellent uniformity, and passed to a train of conventional drying drums to complete the drying of the sheet. Continued operation of the machine showed that the surface of the Yankee Drier remained clean and highly polished for a longer time than was the case when no water-insoluble metal soap was present.

Similar results were obtained with stock furnishes containing unbleached pulp or mixtures of bleached and unbleached pulp.

Although specific embodiments of the invention have been described herein, it is not intended to limit the invention solely thereto, but to include all of the obvious variations and modifications within the spirit and scope of the appended claims.

What is claimed is:

1. In the process of wet-creping freshly-formed unsized paper sheet which comprises temporarily adhering said wet sheet to a smooth surface, creping the sheet while scraping it from said surface, and subsequently drying said creped sheet, the step which comprises applying to said paper sheet, prior to its adherence to said smooth surface, from 0.005% to 0.015% by weight, based on the dry weight of the paper fibers, of a water-insoluble metal soap.

2. A process as defined in claim 1 in which said metal soap comprises a polyvalent metal salt of a long-chain fatty acid having from 12 to 20 carbon atoms.

3. A process as defined in claim 2 in which said metal soap comprises the aluminum salt of a long-chain fatty acid having from 12 to 20 carbon atoms.

4. A process as defined in claim 3 in which said aluminum salt is formed in situ in said sheet by reacting alum with said long chain fatty acid in an aqueous medium in said sheet.

5. In the process of wet-creping freshly-formed unsized paper sheet made from bleached pulp which comprises temporarily adhering said wet sheet to the smooth heated surface of a drying drum, creping the sheet while scraping it from said surface before said sheet has been dried, and subsequently completing the drying of the creped sheet, the step which comprises impregnating said wet sheet, prior to its adherence to the surface of the drying drum, with a water-insoluble aluminum salt of a long-chain fatty acid having from 12 to 20 carbon atoms, the amount of said salt being from 0.005 to 0.015% by weight of the paper fibers.

6. A process as defined in claim 5 in which said aluminum salt is formed in situ in said sheet by reacting an aqueous solution of alum with said fatty acid in said sheet.

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