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EPC.

(54) **METHOD FOR MANUFACTURING TRANSFER PAPER**

(57) The present disclosure relates to a method making transfer paper. Surfactant is applied either after the step of refining and before the paper sheet formed or on the surface of paper sheet. The surfactant includes aqueous wax emulsion or fluorochemical. The present disclosure accomplishes papermaking by paper machine, with no need of coater.

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Description

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of priority to Chinese patent application No. 201510404084.X, titled "METHOD FOR MANUFACTURING TRANSFER PAPER", filed with the Chinese State Intellectual Property Office on July 10th, 2015, the entire disclosure of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present disclosure relates to the manufacture of low-surface-tension transfer paper, which belongs to the technical field of papermaking.

BACKGROUND OF THE INVENTION

[0003] Making ink jet transfer printing paper includes the production of basepaper by paper machine and a layer on the surface of the basepaper by coater. The coating layer allows inks or paints to remain on the surface of the basepaper, resulting in a high transferring rate. FIG. 1 schematically depicts the procedure to obtain basepaper by the paper machine. The procedure sequentially comprises the following steps: pulp preparation, dissolution, refining, filtering, blend, dilution, pump, forming paper sheet, press, pre-drying, surface sizing, and after-drying. In detail, pulp preparation preliminarily makes pulp from wood, cotton, line or other sources and then presses the pulp into a board to ease transfer. Dissolution refers to the mixing of recycled water, often called white water, with the pulp board. By refining, the dissolute pulp is mechanically grinded to get strengthened. Filtering removes insoluble masses from the pulp. Blend mixes various pulps at mixing chest. Dilution adjusts the concentration of the pulp mixture by adding white water. Then the pulp mixture is pumped to a moving former, at which some water is drained. Paper sheet is formed at this point and gets transferred to press section of the paper machine to further remove water. After that, the paper sheet is steamed for pre-drying. Starch or other sizing agents are exerted on the surface of the dried paper sheet. Finally the paper sheet is steamed again for after-drying. Basepaper, the final product of the paper machine, is then carried to a coater to get coated and dried. The coating layer should cover the surface of the basepaper as much as possible to prevent the penetration of inks or paints to the interface of the basepaper. The coating weight of coating color should be no less than 4g/m² to completely cover the paper surface. However, the materials of coating color are comprised of H₂O-absorbing chemicals, such as carboxymethyl cellulose. Transfer paper coated with these substances absorbs H₂O and gets curling under humid conditions. In addition, the conventional art needs coater besides the paper machine, which complicates the paper making process.

[0004] Coating basepaper at the step of surface sizing by the paper machine is capable to simplify the process by eliminating the coater. However, the thickness of the coating layer is restricted due to the paper machine. Therefore, the coating layer cannot completely prevent ink or paints from penetrating into the interface of paper. Transfer paper produced with this method is low at transferring rate and unqualified for high-resolution transfer printing.

BRIEF SUMMARY OF THE INVENTION

[0005] The present disclosure provides a method for manufacturing transfer paper including the operation of adding surfactant. The surfactant is either added into the pulp at wet end of the paper machine or coated on the surface of the basepaper during the surface sizing. The present disclosure finishes papermaking in the paper machine and a coater is not necessary in this process.

[0006] The foregoing has outlined rather broadly the features and technical advantages of the present disclosure in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The components in the drawing are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the described embodiments. In the drawings, reference numerals designate corresponding parts throughout various views, and all the views are schematic.

FIG. 1 is a flow chart of a conventional method for papermaking by paper machine;

FIG. 2 is flow chart showing a method for manufacturing transfer paper in accordance with an embodiment of the present disclosure.

FIG. 3 is flow chart showing a method for manufacturing transfer paper in accordance with another embodiment of the present disclosure.

DETAILED DESCRIPTION OF ILLUSTRATED EMBODIMENTS

[0008] Reference will now be made to the drawing figures to describe the embodiments of the present disclosure in detail. In the following description, the same drawing reference numerals are used for the same elements in different drawings.

[0009] The present disclosure refers to the method of manufacturing transfer paper with additive agent to decrease the surface tension. The additive agent which is added to the interior or exterior of the transfer paper allows the inks and paints to remain on the surface of the

paper.

[0010] In an embodiment, the additive agent is added at the wet end of the paper machine. Thereby, the agent is mixed to the interior of transfer paper. In another embodiment, the additive agent is added during surface sizing when the paper sheet is formed. Thereby, the agent is coated on the surface of the transfer paper.

[0011] FIG. 2 schematically depicts that the additive agent is applied at the wet end of the paper machine, more particularly, after the step of refining and before the paper sheet is formed (illustrated by the dashed line box).

[0012] The additive agent is surfactant that includes but is not limited to an aqueous wax emulsion or a fluorochemical. The surfactant is applied individually or with a combination of two or more types of surfactants.

[0013] The aqueous wax emulsion may be a paraffin wax emulsion or water-based polyethylene wax. The fluorochemical may be C3 or C6 or C8 (3/6/8 carbon atoms) organic fluorine oil repellent or silicofluoride.

[0014] 1-30 kilograms of the surfactant can be applied to a ton of basepaper.

[0015] FIG. 3 schematically depicts that the surfactant is added during surface sizing at the dry end of paper machine (illustrated by the dashed line box). Surfactant is applied individually or with a combination of sizing agents to the surface of the formed paper sheet. The sizing agents include but are not limited to starch, carboxymethyl cellulose and polyvinyl alcohol. If applied with a sizing agent, the weight ratio of surfactant to sizing agent(s) is from 1 : 0.5 to 1 : 20. In a preferred embodiment, the weight ratio of surfactant to sizing agent(s) is from 1 : 5 to 1 : 10.

[0016] The present disclosure is based on the capillary reaction which occurs between inks and the surface of a paper during the printing process. The present disclosure reduces the surface tension of the transfer paper to resist the penetration of inks. Paper obtained in this method improves resolution and transferring rate in printing.

[0017] Six embodiments will be given hereinafter.

First embodiment

[0018] A bleaching chemical pulp mixture is utilized to make paper. The pulp mixture, for example, includes 30 percent by weight of soft wood pulp with 400 ± 20 ml Canadian Standard Freeness (CSF) and 70 percent by weight of hardwood pulp with 420 ± 20 ml CSF.

[0019] Other pulp articles are also applicable for the pulp mixture.

[0020] The softwood pulp and hardwood pulp are digested, refined, as well as filtered respectively, and then flow into a mixing chest to get combined. At the outlet of the mixing chest, a fluorochemical is added in the amount of 30 kilogram per ton of the basepaper.

[0021] The fluorochemical is also capable to be applied at sites between the outlet of the refiner and the inlet of the fan pump. Pumping is performed by the fan pump. More specifically, the sites are either at the mixing chest,

or at the over headbox which is located between the mixing chest and the fan pump, or at the inlet of the fan pump. At these sites, it is easy to control the adding amount of additive agent.

[0022] After adding regular chemicals, the pulp mixture flows away from the head box onto a moving former of the paper machine to form a paper sheet. The formed paper sheet leaves from the wet end of the paper machine to a press section and sequentially to the dry end of the paper machine to be further treated.

[0023] At the dry end of the paper machine, the pre-dried paper sheet is applied with tapioca starch in an amount of 3g/m^2 on the surface for sizing. The sized paper is then after-dried and wound on a reel to become the final product. In this process, the tapioca starch can be replaced by other sizing agents.

[0024] This embodiment reduces the amount of sizing agent to less than 4g/m^2 and still can prevent inks to penetrate into the interface of the transfer paper. All these above processes are finished in the paper machine. Transfer paper produced in this embodiment is smooth and not easy to get curled. The paper is qualified for high-resolution transferring print, and the transferring rate reaches 90%.

Second embodiment

[0025] A pulp mixture is prepared in a similar manner as the first embodiment.

[0026] The soft wood pulp and the hardwood pulp are digested, refined, as well as filtered respectively, and then pumped into the mixing chest to get combined. After adding regular chemicals, the pulp mixture flows away from the head box onto the moving former of the paper machine to form a paper sheet. The formed paper sheet leaves from the wet end of the paper machine to the press section and afterwards moves to the dry end of the paper machine to be further treated.

[0027] At the surface sizing section, C3 or C6 or C8 (3/6/8 carbon atoms) organic fluorine oil repellent or silicofluoride is applied on the coating surface of the pre-dried paper sheet in an amount of 20 kilogram per ton of paper.

[0028] The paper sheet is then coated with regular sizing agents. After that, the paper sheet is post-dried and wound on a reel to get the final product.

[0029] Transfer paper produced in this embodiment reaches transferring rate of 95%.

Third embodiment

[0030] Pulp mixture is prepared in the same manner as that in the first embodiment.

[0031] The soft wood pulp and the hardwood pulp are digested, refined, as well as filtered respectively, and then flow into the mixing chest to get combined. After added with regular chemicals, the pulp mixture flows away from the head box onto the moving former of the

paper machine to form paper sheet. The formed paper sheet leaves from the wet end of the paper machine to the press section and afterwards moves to the dry end of the paper machine to be further treated.

[0032] At the dry end of the paper machine, a fluorochemical is applied together with regular sizing agents on the surface of the pre-dried paper sheet in an amount of 6 kilogram per ton of paper. In the mixture of the sizing agents, the weight ratio of fluorochemical to starch is 1:10. And the mixture is applied in an amount of 3g/m² on the surface of paper sheet. After that, the paper is post-dried and wound on a reel to get the final product.

[0033] Transfer paper produced in this embodiment reaches a transferring rate of 88%.

Forth embodiment

[0034] Paper sheet is obtained in a similar manner as the third embodiment.

[0035] At the dry end of the paper machine, a fluorochemical is applied together with regular sizing agents on the surface of the pre-dried paper sheet during sizing procedure. The difference between this embodiment and the third one is that the fluorochemical is added in an amount of 1 kilogram per ton of paper. In the mixture of the sizing agents, the weight ratio of fluorochemical to starch is 1:10. And the mixture is coated in an amount of 3g/m² on surface of the paper sheet. After that, the paper is post-dried and wound on a reel to get final product.

Fifth embodiment

[0036] Pulp mixture is prepared in a similar manner as the first embodiment.

[0037] The soft wood pulp and the hardwood pulp are digested, refined, and filtered respectively, and then flow into the mixing chest to get combined. After adding regular chemicals, the pulp mixture flows away from the head box onto the moving former of the paper machine to form a paper sheet. The formed paper sheet leaves from the wet end of the paper machine to the press section and afterwards moves to the dry end of the paper machine to be further treated.

[0038] At the dry end of the paper machine, water-based polyethylene wax is applied with a mixture of regular sizing agents to the coating surface of the pre-dried paper sheet. The water-based polyethylene wax is added in an amount of 20 kilogram per ton of paper. In the mixture of the sizing agents, the weight ratio of water-based polyethylene wax to starch is 1:5. And the mixture is coated with the amount of 3g/m² on the surface of the paper sheet. After that, the paper is post-dried and wound on a reel to get the final product.

[0039] Transfer paper produced in this embodiment reaches a transferring rate of 88%.

Sixth embodiment

[0040] Paper sheet is obtained in a similar manner as the fifth embodiment.

[0041] In the embodiment, water-based polyethylene wax is applied with a mixture of regular sizing agents to the coating surface of the pre-dried paper sheet. The difference between this embodiment and the fifth one is that the weight ratio of water-based polyethylene wax to starch is 1:8. And the mixture is coated in an amount of 3g/m² to the surface of paper sheet. After that, the paper is post-dried and wound on a reel to get the final product.

[0042] The surface repellency of transfer paper obtained by the present disclosure is tested by KIT standard (TAPPI 559 cm02) and the KIT grade scale is 1-12.

[0043] The present disclosure does not need a coater. Therefore, it is able to finish all the papermaking process steps in the paper machine. Moreover, the coating color is not applied in the present disclosure, which solves paper-curling issue.

[0044] It is to be understood, however, that even though numerous characteristics and advantages of preferred and exemplary embodiments have been set out in the foregoing description, together with details of the structures and functions of the embodiments, the disclosure is illustrative only; and that changes may be made in detail within the principles of present disclosure to the full extent indicated by the broadest general meaning of the terms in which the appended claims are expressed.

Claims

1. A method for manufacturing transfer paper, comprising steps of pulp preparation, dissolution, refining, filtering, blend, dilution, pump, forming paper sheet, press, pre-drying, surface sizing, and post-drying, wherein surfactant is added after refining and before the paper sheet is formed or wherein surfactant is applied at the step of surface seizing.
2. The method according to claim 1, wherein the surfactant comprises aqueous wax emulsion or fluorochemical.
3. The method according to claim 2, wherein the aqueous wax emulsion comprises paraffin wax emulsion or water-based polyethylene wax.
4. The method according to claim 2, wherein the fluorochemical comprises C3 or C6 or C8 organic fluorine oil repellent or silicofluoride.
5. The method according to claim 1, wherein the surfactant is applied in an amount of 1-30 kilogram per ton of body paper.
6. The method according to claim 2, wherein the fluor-

ochemical comprises silicofluoride.

7. The method according to claim 1, wherein the surfactant is applied individually to the surface of the paper sheet. 5
8. The method according to claim 1, wherein the surfactant is applied with a mixture of sizing agents to the surface of paper sheet. 10
9. The method according to claim 8, wherein the weight ratio of surfactant to sizing agents is from 1:5 to 1:10.
10. The method according to claim 1, wherein the surfactant is applied on a paper machine. 15

Amended claims in accordance with Rule 137(2) EPC.

1. A method for manufacturing transfer paper, comprising steps of pulp preparation, dissolution, refining, filtering, blend, dilution, pump, forming paper sheet, press, pre-drying, surface sizing, and post-drying, wherein surfactant comprising aqueous wax emulsion or fluorochemical is added after refining and before the paper sheet is formed 20
or wherein surfactant comprising aqueous wax emulsion or fluorochemical is applied at the step of surface sizing, and 30
wherein the aqueous wax emulsion comprises paraffin wax emulsion or water-based polyethylene wax, or
wherein the fluorochemical comprises C3 or C6 or C8 organic fluorine oil repellent or silicofluoride. 35
2. The method according to claim 1, wherein the surfactant is applied in an amount of 1-30 kilogram per ton of body paper. 40
3. The method according to claim 1, wherein the fluorochemical comprises silicofluoride.
4. The method according to claim 1, wherein the surfactant is applied individually to the surface of the paper sheet. 45
5. The method according to claim 1, wherein the surfactant is applied with a mixture of sizing agents to the surface of paper sheet. 50
6. The method according to claim 5, wherein the weight ratio of surfactant to sizing agents is from 1:5 to 1:10.
7. The method according to claim 1, wherein the surfactant is applied on a paper machine. 55

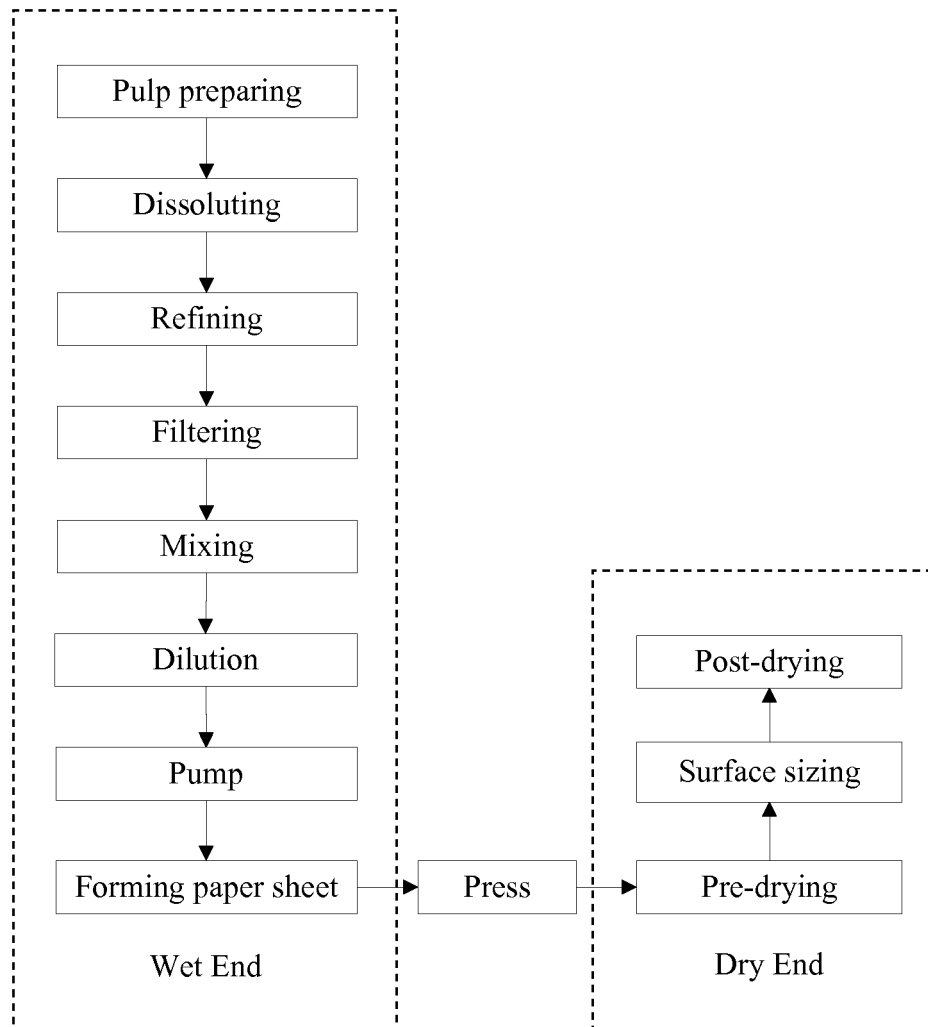


FIG.1

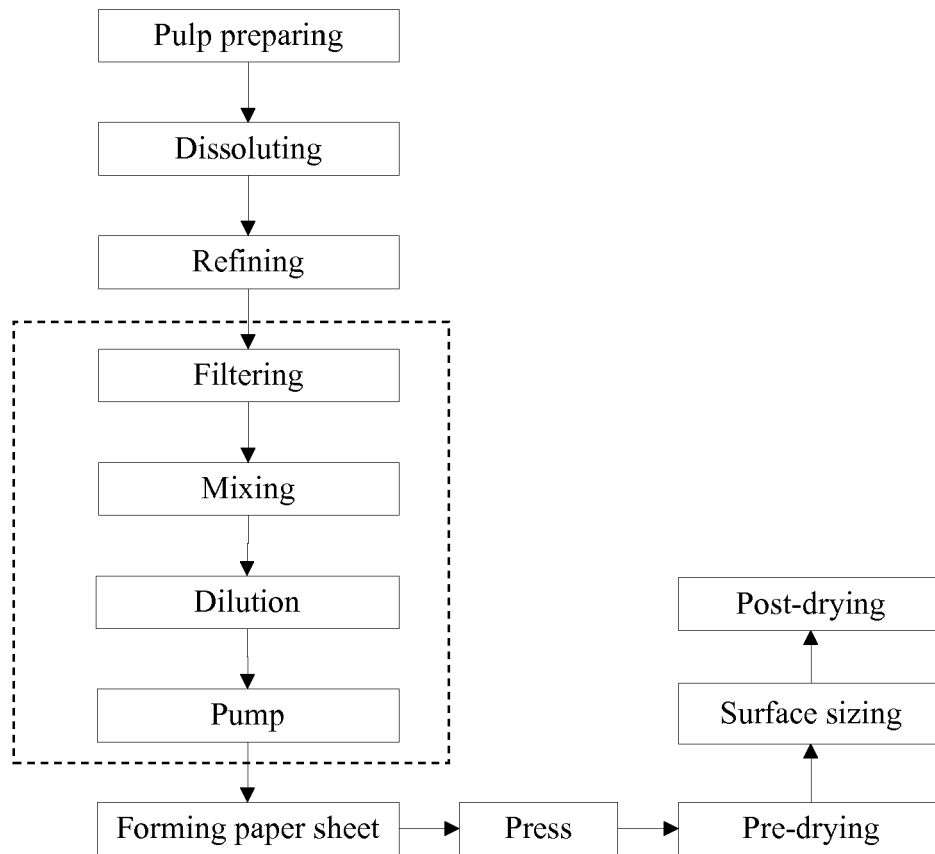


FIG. 2

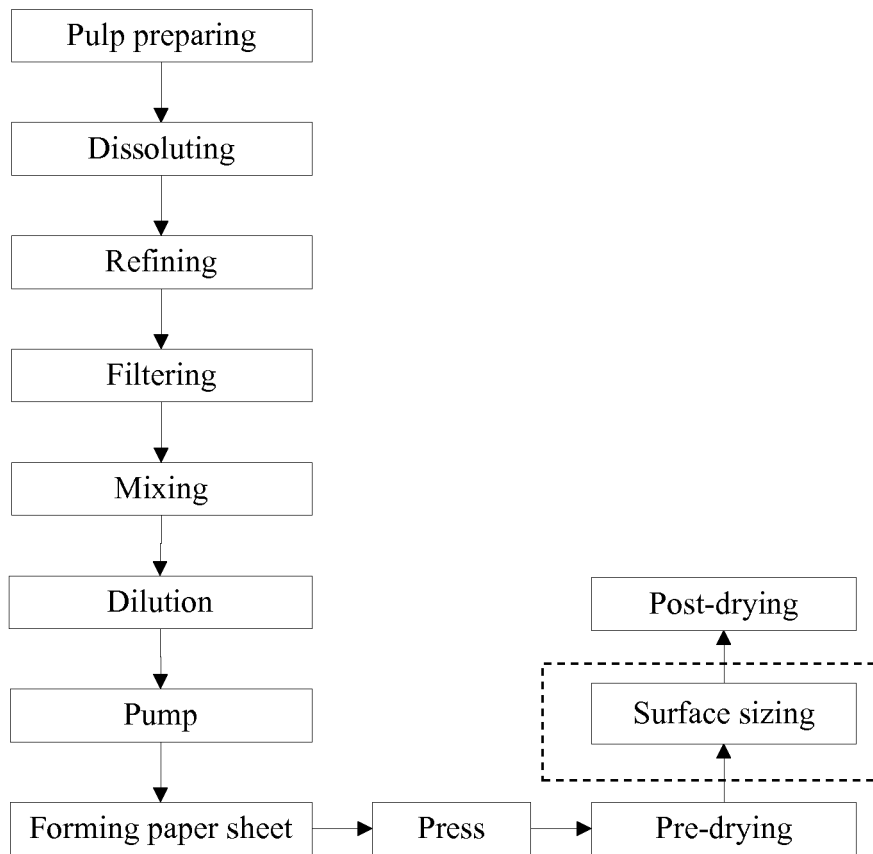


FIG. 3



EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 May 2016	Examiner Ponsaud, Philippe
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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