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(54) Title:  
IMPROVED SPECIALTY PAPERS AND/OR METHODS FOR MAKING SPECIALTY PAPERS

(57) Abstract:  
A filter paper having a composition of softwood fibers in the range of about 50 to about 100 percent by weight, and synthetic fibers that are present in the range of about 0 to about 50 percent by weight. The softwood fibers can be divided between northern softwoods and southern softwoods. Pulp is present in an amount of about 95 to about 98 weight percent of the furnish.
Declarations under Rule 4.17:
— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(H))
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

Published:
— with international search report (Art. 21(3))
Improved Specialty Papers And/or Methods For Making Specialty Papers

CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to various kinds of papers and more particularly to various kinds of specialty papers (such as, paper for teabags, filter paper, paper for vacuum cleaner bags, etc.) and also to methods for making these kinds of papers.

2. Description of the Related Art

[0003] Filter materials are well known and widely used as filter paper or infusion packages, for example in making tea bags, and the like. Tea bags are typically in the form of a porous paper, silk or nylon sealed bag. The bag, which contains tea leaves for brewing, makes it easier to dispose of the tea leaves after brewing is complete, thereby performing the same function as a tea infuser.

[0004] The first tea bags were made from hand-sewn silk muslin bags, and later, the bags were made of paper fiber. Today, tea bag paper is typically fabricated of a blend of wood, plant, synthetic or non-wood fibers. Examples of plant fibers include abaca, bagasse, bamboo, cotton, flax, hemp, jute, kenaf, sisal and straw. The most popular plant fibers used in the fabrication of tea bag paper is the abaca fiber. Although sometimes known as Manila hemp, Cebu hemp, or Davao hemp, the abaca plant is not related to true hemp.

[0005] Abaca is a critical component of tea bag paper due to its relatively long length, high strength, and cellulose content. It is also find uses in other applications including vacuum bags, currency, handcrafts like bags, carpets, clothing and furniture. Abaca rope is very durable, flexible and resistant to salt water damage, allowing its use in rope, hawsers, ship's lines and fishing nets.

[0006] Abaca is grown as a small plantation tree, mostly in Ecuador and the Philippines. Year to year the abaca crop yield can fluctuate due to weather conditions (e.g., typhoons), thereby creating uncertainty as to the availability of this resource. As a result in those years where supply is low, the price of abaca increases, resulting in an increase in the price of products that utilize abaca, including the price of tea bag paper.
The process used in making filter paper and infusion packages typically involves the use of an inclined wire machine, also known as a "non-woven" machine. Nonwovens are typically manufactured by putting small fibers together in the form of a sheet or web, and then binding them mechanically, chemically, thermally, by use of a solvent, or a combination thereof. A non-woven fabric is a cloth-like material made of fibers longer than those normally used in papermaking which, instead of being woven on a loom, is formed on a fine mesh screen from an air or water suspension, with or without binder.

The use of an inclined wire machine is necessary for the making of infusion packages or tea bag papers due to the length of fibers used (up to 20 mm long), solubility, low stock consistency, more uniform fiber distribution (good formation) with long fibers, better pore size distribution (less big holes), and number of layers sometimes needed. In fact, in order to enter the tea bag paper manufacturing industry, many companies must upgrade flat wire paper machines (that are typically used to make graphic papers) to inclined wire paper machines or alternatively, purchase new inclined wire paper machines in order to manufacture tea filter papers. Either option is an expensive undertaking.

Horizontal or flat wire machines are used in the fabrication of graphic paper and are often referred to as paper machines. There are four main sections to the paper machine. The first section is typically known as the wet end. Pulp may be delivered to the paper machine in a slurry form (a mixture of fiber and water) directly from the pulping process. Alternatively, pulp may be supplied in dried sheets which are then broken down in water to produce a similar slurry, before being fed to the refiners in the wet end where the fibers are subjected to high pressure pulses between bars on rotating refiner discs. This action causes the fibrils of the fibers to partially detach and bloom outward. After refining, the pulp is mixed with some of the following: sizing, fillers, colors, retention aid and waste paper, and then passed on. Washing is done in pressurized screens and hydocyclones and deaeration is also performed.

The stock then enters the headbox, a unit that disperses the stock and loads it onto a moving wire mesh conveyor with a jet from an opening called the slice. The streaming in the jet causes some fibers to align. This alignment can be reduced in degree by adjusting the speed difference between the jet and the wire. The wire revolves around the paper table, under the headbox. In contrast to an
inclined wire paper machine, the wire in the paper machine is horizontal. Foils are positioned under the wire, creating low pressure pulses that will vibrate and partly deflocculate the fibers while water is removed. Suction boxes located below the wire gently remove water from the pulp with a slight vacuum.

[0011] The machine also includes a press section, which removes water from the sheet, and a dryer section, which dries the sheet or paper using a series of steam-heated rollers that heats up the sheet, removing moisture. Some paper machines may further include a calendar stack, which is a series of rollers that the sheet is moved between in order to smooth it out to give it a uniform thickness. Due to the advantages of using an inclined wire machine, horizontal paper machines are not used in the manufacture of teabag papers.

[0012] US patent application 2006/01 88609 ("609 Jordan") discloses: "[T]he paper web contains cellulosic material and can be described as porous fibrous cellulosic material. This includes biodegradable papers of known type. . . . If desired, a proportion of the vegetable fibres of the web may be replaced by softwood fibres. Preferably the amount of softwood fibres does not exceed 75% by weight of the web. Softwood fibres are long, flat ribbon-like fibres which are readily distinguished by a person skilled in the art from vegetable fibres and hardwood fibres. The softwood fibres may have a length of 0.8 mm to 5 mm and a width of 12 to 60 microns. . . . The softwood fibres may for example be obtained from spruce, pine, cedar, western hemlock, fir or redwood."

and writing paper?”,

[0014] Description Of the Related Art Section Disclaimer: To the extent that specific publications are discussed above in this Description of the Related Art Section, these discussions should not be taken as an admission that the discussed publications (for example, published patents) are prior art for patent law purposes. For example, some or all of the discussed publications may not be sufficiently early in time, may not reflect subject matter developed early enough in time and/or may not be sufficiently enabling so as to amount to prior art for patent law purposes. To the extent that specific publications are discussed above in this Description of the Related Art Section, they are all hereby incorporated by reference into this document in their respective entirety(ies).

BRIEF SUMMARY OF THE INVENTION

[0015] The present invention recognizes that it would be beneficial to provide a substitute for abaca in tea filter papers. The present invention recognizes that it would be advantageous to fabricate tea filter papers without abaca, but having properties similar or better than properties of paper fabricated of abaca. The present invention recognizes that it would be beneficial to use a horizontal wire paper machine for the manufacture of tea filter papers and/or other types of specialty paper.
[0016] The present invention is directed to novel formulations for the "web" material. As used herein, "web" material means any flowing paper-making stock material suitable for making filter paper, a web can be characterized by identifying the mixture and proportions of ingredients used to make the flowing paper-making stock. For example, some embodiments of the present invention are directed to flowing paper stock and/or completely-manufactured specialty paper that include softwood fibers.

[0017] Various embodiments of the present invention may exhibit one or more of the following objects, features and/or advantages: consistency in the manufacture and availability of raw ingredients used in the manufacture. Other objects and advantages will in part be obvious and in part appear hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The present invention will be more fully understood and appreciated by reading the following Detailed Description in conjunction with the accompanying drawings, in which:

[0019] Fig. 1 is a flowchart of a process according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0020] One embodiment of the present invention provides a filter paper composition having a mixture of cellulosic fibers. The fibers may be bleached or unbleached. It is preferable that the cellulosic fibers are a non-vegetable or wood fiber such as softwood fibers and hardwood fibers. Hardwood fibers are finer and shorter than softwood fibers. Examples of hardwood fibers include birch, beech and eucalyptus. Softwood fibers are long, flat ribbon-like fibers that are readily distinguished by a person skilled in the art from vegetable fibers and hardwood fibers. The softwood fibers typically have a length of about 0.8 mm to about 5 mm and a width of about 12 to about 60 microns. A typical size of these fibers is 3.8 mm in length and 29 microns in width. The softwood fibers may be obtained from, for example, spruce, pine, cedar, western hemlock, fir or redwood. It is preferable that the wood fibers used herein are softwood fibers, either northern softwood, southern softwood or a mixture of both.

[0021] The wood fibers and synthetic fibers comprise the pulp of the paper making "furnish." The softwood fibers are present in the range of about 50 to about 100 percent by weight, preferably about 85 to about 100 percent by weight, and the synthetic fibers are present in the range of about 5 to about 50 percent by weight,
preferably about 0 to about 20 percent by weight of the pulp. The pulp is present in
an amount of about 80 to about 90 weight percent of the furnish and preferably about
85 to about 98 weight percent of the furnish.

[0022] In addition to the pulp, additives may be included in, or added to, the
flowing stock used to make the paper. These additives may, for example, aid in the
processing and/or provide additional properties to the finished product. These
additives include, but are not limited to, binders, hydrophilic additives, hydrophobic
additives, wet strength aids, drainage aids and antimicrobial agents or biocides.

[0023] Examples of binders include polysaccharides such as, natural gums,
such as agar, agarose, carrageenans, furcelleran, alginates, locust bean gum, gum
arabic, guar gum, gum konjac, and gum karaya; cellulose, such as microcrystalline
cellulose, and modified celluloses or cellulose derivatives, such as hydroxyethyl
cellulose, hydroxypropyl cellulose, methyl cellulose, ethyl cellulose, methyl
hydroxypropyl cellulose, ethyl hydroxyethyl cellulose, and carboxymethyl cellulose;
starch and pectin derivatives, such as carboxymethyl starch, starch aldehyde, and
pectates; and animal product derivatives, such as carboxymethyl chitin and
carboxymethyl chitosan. The binder may be present in an amount up to about 5
percent and preferably present in an amount of about 0.5 to about 1.5 percent by
weight. The inclusion of the binder increases dry and wet tensile strength without
deleteriously affecting tissue properties.

[0024] Examples of wet strength aids include but are not limited to wet
strength resins such as urea formaldehyde polyamine, melamine formaldehyde,
polyamines, polyaminoamides and epichlorohydrin. The wet strength aid may be
present in an amount up to about 3 percent and is preferably present in an amount of
about 1 to about 2 percent by weight.

[0025] Examples of drainage aids include but are not limited to colloidal silica,
bentonite, and montmorillonite. The drainage aid may be present in an amount up
to about 2 percent and is preferably present in an amount from about 0.01 percent to
0.5 percent by weight.

[0026] A biocide is a biological control chemical such as fungicide or a
bactericide used in papermaking. Examples of biocides include but are not limited to
an inorganic or organic boron compound, a nitrogen or sulfur compound. The
biocide may be present in an amount up to about 2 percent and is preferably present
in an amount from about 0.01 to 0.5 percent by weight.
[0027] The various additive(s) for a given formulation under the present invention may be incorporated into the fiber furnish/stock mixture from which a web is formed, or by subsequent addition as by spraying or impregnating the web. The fibers may be nonentangled, non-hydroentangled or hydroentangled. It is preferably that the web or sheet formed herein is nonwoven in that the individual fibers may be interlaid, but not in an identifiable manner as in a knitted fabric. A sheet, made according to formulations of the present invention, may be creped using a creping doctor blade such as that process shown in U.S. Patent No. 6,074,526, which is listed in the Background section of this patent document. Wet creping includes jamming the wet paper into a blade on the bottom of a roll, and then drying it. This creates more void volume in the paper, improving the infusion properties of the paper. It could also be made using creping on a non-heated cylinder (wherein the sheet is dried after creping).

[0028] It is generally preferable that the paper herein be fabricated using a horizontal wire machine, and the formulations of the present invention will generally allow this preferable manufacturing process to be used. The use of the horizontal wire machine provides faster production rates and has the ability to align, or randomize, fiber orientation. It is possible to manufacture the paper described herein at speeds in the range of about 800 to about 2500 feet per minute, preferably at least as high as 1000 feet per minute. In addition, the paper may be fabricated using twin wire paper machines.

[0029] Reference is made to Figure 1, which shows an embodiment of the process of the invention used to make paper. Process 10 starts with a pulp of fibers. The pulp, which may be provided in bales, is made into a slurry at step 12 by mixing the pulp bales with water. At step 14, the slurry is refined. Following the refining step, the slurry is cleaned and applied onto a screen at step 16. The slurry is formed onto the screen at step 18 and pressed at step 20. Although horizontal or inclined wire screen may be used herein, it is preferable that a horizontal screen be used. Next, at step 22, the formed and pressed sheet is dried. At step 24, the dried sheet is applied onto a master roll. Samples of each batch are tested at step 26 to determine if the sheet meets certain standards. At step 28, the sheet is taken from the master roll and wound into smaller rolls for shipping. Next, at step 30, the rolls are wrapped and labeled for shipping. They may be stored at step 32 and shipped to a converter at step 34.
Non-limiting example(s) will be described in the following paragraph(s).

EXAMPLE 1: A tea bag paper example. A one ton batch (two thousand pounds) of pulp containing 1000 pounds (50%) northern softwood fibers and 1000 pounds (50%) southern softwood fibers and no synthetic fibers was mixed with 11 pounds (0.55%) of carboxymethylcellulose, twenty seven pounds (1.35%) of PAE wet strength, and an effective amount of biocide ingredient. The fibers were dispersed in a concentration of 99% percent by weight in water The dilute aqueous fiber furnish was fed to the headbox of a horizontal wire paper making machine and then to the fiber-collecting wire where the fibers were deposited to form a continuous nonwoven web or sheet. The sheet was dried by passing the newly formed sheet over a number of heated dryer drums. The resultant paper of the present invention is preferably excellent in hydrophilicity so that it is rapidly submerged under water without floating on the surface when it is placed in hot water.

DEFINITIONS

Any and all published documents mentioned herein shall be considered to be incorporated by reference, in their respective entireties. The following definitions are provided for claim construction purposes:

Present invention: means "at least some embodiments of the present invention," and the use of the term "present invention" in connection with some feature described herein shall not mean that all claimed embodiments (see DEFINITIONS section) include the referenced feature(s).

Embodiment: a machine, manufacture, system, method, process and/or composition that may (not must) be within the scope of a present or future patent claim of this patent document; often, an "embodiment" will be within the scope of at least some of the originally filed claims and will also end up being within the scope of at least some of the claims as issued (after the claims have been developed through the process of patent prosecution), but this is not necessarily always the case; for example, an "embodiment" might be covered by neither the originally filed claims, nor the claims as issued, despite the description of the "embodiment" as an "embodiment."

First, second, third, etc. ("ordinals"): Unless otherwise noted, ordinals only serve to distinguish or identify (e.g., various members of a group); the mere use of ordinals shall not be taken to necessarily imply order (for example, time order, space order).
Unless otherwise explicitly provided in the claim language, steps in method or process claims need only be performed that they happen to be set forth in the claim only to the extent that impossibility or extreme feasibility problems dictate that the recited step order be used. This broad interpretation with respect to step order is to be used regardless of alternative time ordering (that is, time ordering of the claimed steps that is different than the order of recitation in the claim) is particularly mentioned or discussed in this document. Any step order discussed in the above specification, and/or based upon order of step recitation in a claim, shall be considered as required by a method claim only if: (i) the step order is explicitly set forth in the words of the method claim itself; and/or (ii) it would be substantially impossible to perform the method in a different order. Unless otherwise specified in the method claims themselves, steps may be performed simultaneously or in any sort of temporally overlapping manner. Also, when any sort of time ordering is explicitly set forth in a method claim, the time ordering claim language shall not be taken as an implicit limitation on whether claimed steps are immediately consecutive in time, or as an implicit limitation against intervening steps.
What is claimed is:

1. A flowing paper stock mixture comprising:
   a plurality of fibers; and
   a liquid dispersant ingredient (for example, water);
   wherein:
   substantially all fibers are softwood.

2. The mixture of claim 1 wherein the mixture is formulated to make specialty paper suitable for use as at least one of the following applications: tea bag material; and filter paper material.

3. The mixture of claim 2 wherein the softwood fibers comprises northern softwood fibers.

4. The mixture of claim 2 wherein the softwood fibers comprises southern softwood fibers.

5. A method of making specialty paper comprising the following steps:
   providing a flowing paper stock mixture; and
   using the flowing paper stock mixture to make the specialty paper;
   wherein:
   at the providing step, the flowing paper stock mixture is comprised of a plurality of fibers and a liquid dispersant ingredient, with substantially all fibers being softwood fibers.

6. The method of claim 5 wherein the mixture is formulated to make specialty paper suitable for use as at least one of the following applications: tea bag material; and/or filter paper material.
S10: starts with a pulp made of fibers

S12: make a slurry by mixing the pulp bales with water, with the pulp and/or slurry being made according to a formulation within the scope of the present invention

S14: the slurry is refined

S16: the slurry is cleaned and applied onto a screen

S18: The slurry is formed onto the screen

S20: slurry pressed

S22: the formed and pressed sheet is dried.

S24: the dried sheet is applied onto a master roll

S26: Samples of each batch are tested to determine if the sheet meets certain standards

S28: the sheet is taken from the master roll and wound into smaller rolls for shipping

S30: the rolls are wrapped and labeled for shipping

S32: store rolls

S34: ship rolls to a converter
INTERNATIONAL SEARCH REPORT

PCT/US2014/033515

A. CLASSIFICATION OF SUBJECT MATTER

D21H 27/00(2006.01)

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D21H 27/00; D21F 11/00; D21H 27/08; D21C 9/00; D04H 1/04; C08L 1/02; D21H 11/18; B01D 39/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
KCOMPASS/KIPO internal & Keywords: softwood, fiber, tea bag, filter paper

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>US 6547999 BL (DUCHARME, JR., P. E. et al.) 15 April 2003; See abst ract: column 10, line 46 - column 11, line 16; and claims 1, 4.</td>
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<td>US 6488809 BI (PHILLIPS, A. F. et al.) 03 December 2002; See abst ract: and claims 1, 10.</td>
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<td>US 7905985 B2 (HEINRICH, G. et al.) 15 March 2011; See abst ract: and claims 1, 3, 14, 15.</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document published prior to the international filing date but later than the priority date claimed

"F" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"K" document member of the same patent family

Date of the actual completion of the international search 12 August 2014 (12.08.2014)

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FormPCT/ISA/210 (second sheet) (July 2009)
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