PROCESS FOR THE TREATMENT OF TOBACCO

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ABSTRACT OF THE DISCLOSURE

This disclosure relates to a process for the separation from tobacco stems and other tobacco plant parts of a low porosity, paper-like parenchymous tissue sheet bound by solubilized pectin suitable for wrapping cigars, cigarillos, and the like. Separation of the fibro-vascular tissue from the parenchymous tissue and solubilizing of the pectin is accomplished by a process comprising the steps of (1) treating or cooking the tobacco plant parts in an aqueous solution containing from 0.05% to 10% of a water-soluble alkali metal or ammonium phosphate or a mixture thereof, said phosphate or mixture of phosphates is employed in an amount corresponding to from about 1 to about 50% by weight of the amount of the tobacco plant parts, at a temperature of from about 50° C. to about 100° C. for a period of from about 5 minutes to about 25 hours, (2) straining the resulting product through openings of from about 1/32 to about 1/4 inch, (3) slurring the strained product in water and (4) casting or otherwise forming a sheet.

BACKGROUND OF THE INVENTION

This disclosure relates to a process for the treatment of tobacco. More particularly, the invention relates to a process for the production from tobacco plant parts of a strong, low porosity, paper-like parenchymous tissue sheet which can be employed as a wrapper for cigarettes and the like or which can be employed as a base for reconstituted tobacco.

Cigars have been held together by a binder, for example sometimes an off-grade wrapper leaf or a reconstituted tobacco sheet, and by an outer wrapper, which consists of good tobacco leaf for the better cigars, and reconstituted tobacco sheet for some of the less expensive cigars. Employing good tobacco leaves as binders and wrappers has the obvious disadvantage of being quite expensive. However, reconstituted tobacco binders and wrappers have generally been found to be too porous and to have too little wet strength to be wholly satisfactory. Cigarillos conventionally have been wrapped with brown paper or with reconstituted tobacco sheet. Neither type of wrapping has been as satisfactory as could be desired. When the reconstituted sheet has been used, it has generally been necessary to counteract its lack of wet strength by applying a plastic mouthpiece. In addition, it is often sticky or gummy when wet. Neither type of wrapping is particularly flexible, translucent nor uniform in thickness. Thus, there has been a long-felt need for an improved reconstituted tobacco sheet, having lower porosity characteristics and greater wet strength.

Tobacco stems are made up of two major types of tissue: the fibro-vascular bundles and the cortex. The fibro-vascular portion consists largely of thick-walled cells, with some lignin, forming a tough, fibrous structure. The cortex which surrounds the fibro-vascular portion comprises a collection of thin-walled parenchymous cells, together with a few collenchymous cells, bound together by pectins.

Essentially, the present invention comprises a process for the separation of parenchymous tissue from tobacco plant parts and the manufacture of a sheet containing the parenchymous cells and substantially no vascular tissue.

Processes have been described for separating tobacco pectins from the tissues of tobacco plant parts. For example, a process has been described for the separation of the stem cortex from the fibro-vascular bundles, whereby the stems are moistened and softened and when the cortex is removed manually, the cortex is converted to an aqueous slurry by milling and the slurry cast into a sheet and dried. In one embodiment of such a process, phosphoric acid may be added to the slurry in order to make the product blander and to regulate the rate of burn. Such a procedure is not as effective as the present process, since the pectins associated with the cells in that process remain insoluble and are thus unavailable to provide strength to the resulting sheet.

SUMMARY OF THE INVENTION

This invention relates to a process for the treatment of tobacco. More particularly, the invention relates to a process for the production from tobacco plant parts of a strong sheet or film which sheet can be employed as a wrapper for cigars and the like or which can be employed as a base for reconstituted tobacco. The process comprises the steps of (1) treating or cooking the tobacco plant parts in an aqueous solution containing from 0.05% to 10% by weight, and preferably 0.2 to 2.0% of a water-soluble alkali metal or ammonium phosphate or a mixture thereof, said phosphate or mixture of phosphates is employed in an amount corresponding to from about 1 to about 50% by weight of the amount of the tobacco plant parts, at a temperature of from about 50° C. to about 100° C. for a period of from about 5 minutes to about 24 hours, (2) straining the resulting product through openings of from about 1/32 to about 1/4 inch, (3) slurring the strained product in water and (4) casting or otherwise forming a sheet. Preferably the phosphate which is employed is aqueous diammonium phosphate used in a concentration of from about 0.5 to 10% or more preferably from 0.5 to 2%, and employed in an amount corresponding to from about 1 to 50% and preferably from about 3 to about 25%, by weight of the amount of tobacco plant parts being treated.

Preferably, the pH of the slurry of tobacco plant parts, water and phosphate should be adjusted, for example, by the addition of ammonia to a value of from about 6.8 to about 9.5, most preferably to a value of from about 8 to 9. The resulting product is then passed through a strainer or sieve comprising, for example, substantially circular openings of 1/4 to 1/16 inch in diameter, to remove the fibro-vascular bundles, which do not pass through the openings. The portion of the product which passes through the openings is filtered and may then be washed with from about 1 to about 10 volumes or more of water per volume of product to remove a portion of the now solubilized pectins, the product being washed on a filter or the like whereby the parenchymous cells and a portion of the pectins remain on the filter. The material remaining on the filter may then be suspended in ethanol or the like to dry the same and may then be filtered or may be taken directly from the filter at the initial phosphate treatment step and combined with water to form a slurry, having a solids content of about 10 to 30% by weight, and cast on a plate or belt.

The resulting product can be employed as a wrapper or can be employed as a base for reconstituted tobacco, as for example by applying tobacco solubles to the finished sheet before final drying. The parenchymous cell material, with accompanying pectins, could also be used, for example, by the paper industry as a beater addi-
tive to increase the wet strength of paper, replacing guar gum and similar materials. Sheets prepared according to this invention do not stick when wet and have a high wet strength. Their color re-
sembles that of tobacco leaf; in fact, their appearance is more tobacco-like than is the brown paper often used for wrapping cigarette-length little cigars. They are much less porous than the conventional reconstituted tobacco sheet used for cigar wrapping. Their toughness, flexibility, and uniform thickness make them satisfactory for use in the semi-automatic cigar wrapping process and in cigarette wrapping machines. By contrast, sheet made from refined variegated wood pulp is porous, opaque, and brittle.

Furthermore, by employing the present process, sheets can be manufactured easily from the parenchymous cells of the tobacco stems, without manual stripping. In addition, no milling or refining is required in preparation of the slurry for casting or paper making.

DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Preferably, the first step of the present process comprises treating or cooking tobacco plant parts, such as tobacco stems or stalks, in aqueous diammonium phospho-
phosphate preferably at a pH of 8 to 9, maintained by the addition of concentrated aqueous ammonia, in order to facilitate separation of the parenchymous cells from the fibro-vascular tissue and to solubilize the pectin present in the parenchymous tissue. Preferably, the tobacco plant parts to be treated are first shaken on a 20 mesh screen, or thelike, in order to remove the sand which is often deposited on the lower leaves of the tobacco plant as a result of raindrop erosion. If desired the plant parts may also be washed with water.

The tobacco stems or stalks to be treated should preferably be not less than ¾ inch, preferably ½ inch or more in length, that is, they should be of such size that at least 95% of them will be retained on a 20 mesh screen. There is no upper limit on length but practically the stems or stalks should be about one or two inches in length.

The second step of the process, wherein the resulting product is strained, may involve passing the product through a strainer which may, for example, be a sieve, a screen or a pulper-strainer having holes measuring from ⅝ to ⅛ inch, and preferably ⅜ to ⅞ inch, in order to remove the vascular tissue. For example, a pulper-strainer may be used having circular openings no larger than ⅜ inch in diameter. Holes larger than ½ inch in diameter should not be used and very small holes should be avoided since too much energy would be required to force the product through. A practical upper limit of ⅜ inch and a practical lower limit of ⅛ inch may be taken for the diameter of the openings. The openings of the strainer need not be round, but may be square, rectangular, oval or other shapes. Woven screening may be employed as the strainer, but punched holes are preferred, since they are less likely to become plugged up with trapped vascular tissue. Long slits may be employed to serve as the strainer, in which case the slits may be longer than the tobacco parts, e.g., the tobacco stems, and in fact may be a number of inches or feet in length. However, one dimension of the openings should be not larger than ⅛ inch and not smaller than ⅜ inch and no dimension of the openings should be smaller than ⅛ inch. For example, if the openings are rectangular slits, the slits may be as long as desired, but if the potassium oxide in the wood of the slits is no narrower than ⅜ inch and no wider than ⅛ inch. The optimum size of strainer openings will, of course, depend on the nature of the tobacco plant parts being treated and on the amounts of treating agents employed in the first step of the process.

The coarse fibers may be rewashed to recover additional water-soluble pectins and may be used as by-produ-
ts. If desired, the present product may be passed through a series of strainers. For example, it may be passed first through a pulper-strainer of standard dimensions, i.e., having circular holes of ⅜ to ⅛ inch in diameter and then passed through a finisher screen of from ⅝ to ⅛ inch.

The crude parenchymous tissue slurry which passes through the pulper-strainer openings is filtered so as to remove the water which contains some of the solubilized pectin. The product may then be combined with water to form a slurry having a solids content of from about ½ to 30% by weight, or even higher, and may then be processed by any conventional sheet-making method. For example, it can be made into sheet form on a paper maker's hand-made machine, cast on a plate or belt, or processed by other conventional sheet forming methods. The dried sheet is a thin non-porous, brown "paper" weighing for example 7 g./sq. ft.

Alternatively, the filtered product may be washed on a filter or the like, as indicated above to remove part of the now soluble pectins; the parenchymous cells and a portion of the pectins remaining on the filter may be suspended in ethanol or the like to dry the same and may then be filtered and slurried with water to produce a slurry having a solids content of from about ½ to 30% by weight and cast on a belt or plate.

The present invention provides for the separation of the parenchymous cells from substantially all of the remaining components of the tobacco plant parts except the pectins, for the production therefrom of a thin, uniform paper containing at most very few fibers, i.e., fibro-vascular tis-
sue. The sheet may be made casting on a belt or by laying it on a paper-making wire or by other well-known meth-
ods. The step of suspending the product in ethanol and filtering may be replaced by other drying procedures, such as conventional hot air drying, or may be omitted alto-
gether.

The water washing of the tissue is a preferred step, since it removes enough of the pectins so that the sheet while wet is not too sticky to handle on paper machines and the like. If stickiness is a problem, the water washing may be dispensed with after the separation from the fibro-vascular tissues. The pectins are necessary for sheet mak-
ing, unless some substitute binders are supplied. None need be removed if stickiness is not a problem. Approxi-
mately 10% of the original pectin present in the tobacco is, in the absence of a substitute binder, such as carboxy methyl cellulose, desirable for sheet formation. For other purposes, for example where the parenchymous tissue is to be employed as a paper additive, the pectins might not be needed.

A good water washing generally leaves from about to about 30% of the original tobacco pectins in the paren-
chymous tissue preparation. Substantially complete removal of the pectin, i.e., about 99%, if desired may be attained by retreating the parenchymous tissue three times with the phosphate and refiltering each time. Water wash-
ing of the tissue also removes the greater part of the alkali metal or ammonium phosphates.

Phosphates which may be employed in the present process includes the alkali metal orthophosphates and the ammonium orthophosphates, such as ammonium orthophosphate, sodium orthophosphate, potassium orthophosphate, sodium dihydrogen orthophosphate, ammonium dihydrogen orthophosphate, potassium dihy-
drogen orthophosphate, diammonium monohydrogen ortho-
phosphate, disodium monohydrogen orthophosphate and dipotassium orthophosphate.

If desired, the finished sheet may be washed or sub-
jected to dialysis to remove salt residues.

Other tobacco plant parts than stems may be used as the raw material for the process. The advantage of em-
ploying stems, however, is in the upgrading of the stems to a paper-like sheet product without refining. If leaf dust alone is employed in the process, separation of the fibro-
cular bundles might be unnecessary, since relatively few bundles would be present.
The conditions for treating or cooking the tobacco materials in the presence of the phosphate are, of course, interdependent within the ranges specified. Thus, while a temperature of from 50° C. to the boiling point for a period of from 5 minutes to about 24 hours is practical, with a temperature of from 50° C. to 90° C. being preferred, various temperatures will be preferred for various cook times. For example, at a temperature of 65° C., a 3 hour cook is generally preferred. At a temperature of 95° C., ½ to 1 hour cook is preferred. The lower temperatures, while, they are operable, require increased time.

The invention may be illustrated by the following example:

EXAMPLE 1

Bright tobacco stems, cut 1 to 2 inches in length and weighing 50 g., were cooked in 500 g. of 2% aqueous diammonium phosphate containing a little added ammonia, at 65° C. for 3 hours. The pulp was passed through a strainer with ½ inch openings with gentle working by hand. The portion which passed through was filtered on cheese cloth and washed several times there with water. The solids were suspended in ethanol and filtered to facilitate drying. A suspension in water was converted on a papermaker's handsheet machine to a thin sheet which when dried was tough, translucent, dense and non-porous, weighing 7 g./sq. ft. Only occasional fibers were visible.

I claim:

1. A process for treating tobacco plant parts which comprises the steps of:

(1) contacting tobacco plant parts with an aqueous solution of an alkali metal or ammonium phosphate or a mixture thereof for a period of from about 5 minutes to about 24 hours at a temperature of from about 50° C. to about 100° C., said solution being employed in an amount sufficient to provide said phosphate in an amount corresponding to from about 1 to about 50% by weight of the amount of the tobacco plant parts, to form a pulp comprising the parenchymous cells or tissue, the fibro-vascular bundles and pectins released from the tobacco;

(2) passing the resulting pulp through a strainer to deposit the fibro-vascular bundles on the strainer while an aqueous slurry, consisting of the phosphate or phosphate salts, the parenchymous tissue and the released pectins, passes through the openings of the strainer, said strainer having a plurality of openings, one dimension of which is no larger than ½ inch and no smaller than ¼ inch and no dimension of which is less than ½ inch; and

(3) forming the resulting material into a sheet.

2. A process for treating tobacco plant parts which comprises the steps of:

(1) contacting tobacco plant parts of a particle size such that 95% would be retained on a 20 mesh screen with an aqueous solution of an alkali metal or ammonium phosphate or a mixture thereof for a period of from about 5 minutes to about 24 hours at a temperature of from about 50° C. to about 100° C., said solution being employed in an amount sufficient to provide said phosphate in an amount corresponding to from about 1 to about 50% by weight of the amount of the tobacco plant parts, to form a pulp comprising the parenchymous cells or tissue, the fibro-vascular bundles and pectins released from the tobacco;

(2) passing the resulting pulp through a strainer to deposit the fibro-vascular bundles on the strainer while an aqueous slurry, consisting of the phosphate or phosphate salts, the parenchymous tissue and the released pectins, passes through the openings of the strainer, said strainer having a plurality of openings, one dimension of which is no larger than ½ inch and no smaller than ¼ inch and no dimension of which is less than ½ inch; and

(3) forming the resulting material into a sheet.

3. The process of claim 1, wherein the phosphate is diammonium monohydrogen orthophosphate.

4. The process of claim 2, wherein the phosphate is diammonium monohydrogen orthophosphate.

5. The process of claim 3, wherein the phosphate is diammonium monohydrogen orthophosphate.

6. The process of claim 1, wherein the first step is conducted at a pH of from 6.8 to 9.5.

7. The process of claim 2, wherein the first step is conducted at a pH of from 6.8 to 9.5.

8. The process of claim 3, wherein the first step is conducted at a pH of from 6.8 to 9.5.

9. The process of claim 1, wherein the first step is conducted at a pH of from 6.8 to 9.5.

10. The process of claim 2, wherein the first step is conducted at a pH of from 6.8 to 9.5.

11. The process of claim 3, wherein the first step is conducted at a pH of from 6.8 to 9.5.

12. The process of claim 4, wherein the first step is conducted at a pH of from 6.8 to 9.5.

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