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MANUFACTURE OF CIGARETTES

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This invention relates to the manufacture of cigarettes and, more particularly, to an improved process for manufacturing cigarettes from cornsilk and alfalfa. The invention provides an improved smoking composition which is composed essentially of chemically treated cornsilk and alfalfa fibers and which is particularly suitable for use in the manufacture of cigarettes. The smoking composition of the invention is completely free from nicotine and has been found to possess an appreciably lower tar content than that of tobacco.

The use of cornsilk fibers in the manufacture of cigarettes has never achieved commercial importance, primarily because the combustion of cornsilk results in the formation of an extremely irritating and acrid smoke, the pungency of which is so pronounced that all attempts to mask the odor by blending cornsilk with other combustible fibers have failed. Some diminution in the pungency of the smoke may be obtained by blending alfalfa with the cornsilk, but even this blended mixture of cornsilk and alfalfa is irritating and acrid for continued smoking.

When, however, a blended mixture of cornsilk and alfalfa fibers is sequentially washed with water and subjected to steam at either atmospheric or superatmospheric pressures to leach out the water-soluble pigments and other extractables from the fibers, and the fibers subsequently chemically treated with an aldose and then rehumidified and cased, the resultant smoking composition has none of the pungency or acridity normally associated with cornsilk smoke and is particularly suited for use in the manufacture of cigarettes. Cigarettes manufactured from this smoking composition have a very pleasant and mild aroma and taste, yet are completely free from nicotine and possess an appreciably lower tar content than cigarettes made from tobacco.

The invention provides an improved process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with water, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of about ½ to 3 hours, impregnating the fibers with an aqueous solution of an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers and then drying them at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent. Heating of the aldose-impregnated fibers at these temperatures causes the characteristic "browning" reaction to occur in the fibers which, in turn, contributes a very pleasant aroma and taste to the fibers. After the aldose-impregnated fibers have been dried, they are rehumidified to a moisture content of from 10 to 20 percent, using an aqueous casing solution containing a humectant and flavoring agents, and the cased fibers then formed into cigarettes using standard cigarette production machinery. By using a synthetic tobacco-like flavoring in the casing solution, these cigarettes can be made to taste exactly like tobacco-containing cigarettes, even though they are completely free from nicotine. Moreover, repeated tests have

demonstrated that cornsilk-alfalfa cigarettes made in accordance with the invention possess an appreciably lower tar content than cigarettes made from either blended or unblended tobaccos.

The wide variations in the composition of cornsilk and alfalfa, due to type characteristics, growing season, and soil in which the plants are grown, necessitate an elaborate system of blending, the fibers being blended and thoroughly mixed in rotating drums. The blend generally consists of from 75 to 99.9 percent by weight of cornsilk and from 25 to 0.1 percent by weight of alfalfa. Part of the alfalfa may be replaced, however, with other fibers, such as ramie, flax, or coconut fibers, or mixtures of fibers which alter the burning rate of the blend and contribute special aroma.

After thorough mixing and blending, the fibers are washed with either cold or hot water to leach out water-soluble pigments and other water-extractables from the fibers, since these compounds are frequently responsible for the acrid odor developed on burning the fibers. When warm or even hot water is employed in this preliminary wash, particularly hot water at temperatures of from about 180° to 200° F., the wash waters generally contain appreciable amounts of acidic compounds, the pH of the wash water ranging from 5.5 to 6.0. To more easily extract these acidic compounds from the fibers, a dilute aqueous alkaline solution containing either 0.5 percent of sodium hydroxide or 1 percent of sodium carbonate may be employed in the preliminary water wash of the blended fibers, in which case lower wash temperatures (generally about 70° F.) are used to prevent extensive hydrolysis of the fibers. Alternatively, the wash water may contain a minute quantity of a surfactant, such as sodium lauryl sulfate or a nonylphenoxypolyoxyethylene glycol, generally in amounts ranging from 0.01 to 0.1 percent by weight, to remove substantially all of the waxy cuticle which normally envelops the fibers in addition to leaching out the water-soluble pigments and other water-extractables from the fibers.

Following the washing of the fibers with water, the washed fibers are subjected to steam at either atmospheric or superatmospheric pressures for a period of time ranging from about ½ to about 3 hours, thereby leaching out more water-soluble pigments and solids from the fibers. Particularly satisfactory results have been obtained using steam at a pressure of from 45 to 200 pounds per square inch for periods of from ½ to 1 hour, during which time a dark yellow condensate having a pH of 3.5 is removed from the fibers. In addition to the water-soluble yellow and green pigments from which it derives its color, this steam condensate contains varying amounts of palmitic and myristic acids as well as several lower aliphatic acids, all of which are removed from the fibers by the steam treatment.

The steam-treated fibers, which are appreciably lighter in color than untreated cornsilk or alfalfa, are then dried to a moisture content of from 20 to 25 percent, using either a vacuum drier at temperatures of about 220° F. or a wringer to press water from the fibrous mass. When the moisture content of the fibers is lowered to from 20 to 25 percent, the fibers are impregnated with an aqueous solution of an aldose, using an amount equal to from about 10 to about 25 pounds of aldose per short ton of fibers. The aldose-impregnated fibers are then dried to a moisture content of from 1 to 10 percent at a temperature of from 200° to 230° F., at which temperature the aldose undergoes the characteristic "browning" reaction in the fibers which, in turn, modifies the aroma and taste of the blended mixture and is probably responsible for the pleasant and mild aroma developed on burning the treated fibers.

Although any aldose may be used to impregnate the

fibers and develop the characteristic odor resulting from the occurrence of the "browning" reaction in the fibers, particularly satisfactory results have been obtained by using aldohexoses, especially glucose, in concentrations equivalent to about 20 pounds of aldohexose per ton of fibers.

Following the treatment of the fibers with the aqueous solution of an aldose and subsequent drying to a moisture content of from 1 to 10 percent (during which the "browning" reaction takes place in the fibers), the fibers may be toasted to more fully develop the characteristic odor resulting from the "browning" reaction. When toasting is used, the fibers are generally heated to a temperature of from 200° to 250° F. for a period of from 2 to 4 hours, during which time a milder flavor develops in the blended mixture of fibers. Toasting the fibers is not necessary, however, where a stronger flavor is desired.

The fibers are then rehumidified to a moisture content of from 10 to 20 percent, preferably 15 percent, with an aqueous casing solution containing a humectant, such as sorbitol, diethylene glycol, triethylene glycol, or propylene glycol, as well as various flavoring agents, such as vanillin, maple extract, rum extract, licorice, or menthol. Rehumidification may be accomplished by immersing the fibers in a warm aqueous solution or suspension of the humectant and flavoring agents, and subsequently wringing them to the desired moisture content. Alternatively, the casing solution may be sprayed onto the fibers in a roller drum. The cased fibers are then formed into cigarettes on standard cigarette production machinery, using standard cigarette paper.

Cigarettes manufactured from a blended mixture of cornsilk and alfalfa fibers, the blended mixture of fibers having been sequentially (i) washed with water, (ii) subjected to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, (iii) impregnated with an aqueous solution of an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers and then dried at a temperature of from 200° to 230° F. to a moisture content of 1 to 10 percent, and finally (iv) rehumidified to a moisture content of 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, provide an exceptionally mild taste and aroma on smoking, yet are completely free from nicotine and contain an appreciably lower tar content than cigarettes made from tobacco.

The following specific example is illustrative of the applicability of manufacturing cigarettes from cornsilk and alfalfa in accordance with the process of the invention:

A blended mixture of cornsilk and alfalfa, consisting of 95 percent by weight of cornsilk fibers and 5 percent by weight of alfalfa, was thoroughly mixed in a series of rotary drums. The blended mixture of fibers was removed from the rotary drums and transferred to a vacuum steam chamber where it was washed with hot water at a temperature of from 180° to 200° F. to partially leach out the water-soluble pigments and other water-extractables from the fibers. The wash waters removed from the steam chamber during the hot water washing of the fibers was slightly acidic, the pH of the wash water ranging from 5.5 to 6.0.

Following the hot water wash, superatmospheric steam was passed through the vacuum steam chamber at a pressure of 150 pounds per square inch for a period of from ½ to 1 hour to further extract water-soluble pigments from the fibers and to substantially remove a waxy cuticle which normally envelops the fibers. The condensate collected from the steam treatment of the fibers was dark yellow in color and had a pH of 3.5 which increased to a pH of 5.5 towards the end of the steam treatment. Paper chromatographic analyses of the steam condensate showed it to contain palmitic and myristic acids as well as a number of lower aliphatic acids in addition to the

yellow water-soluble pigments from which the color of the condensate is derived.

The steamed fibers, which were somewhat lighter in color than the original fibers due to the extraction of water-soluble pigments, were removed from the vacuum steam chamber, passed through a wringer to reduce the moisture content of the fibers to from 20 to 25 percent, and then sprayed in a rotary drum with an aqueous solution containing 10 percent by weight of glucose, using 20 pounds of glucose per short ton of fibers. The glucose-impregnated fibers were then dried in a vacuum drier which was maintained at a pressure of 22 inches of mercury and at a temperature of 220° F., at which temperature glucose undergoes the "browning" reaction in the fibers, thereby imparting a pleasant aroma to the blended mixture of fibers. Drying was continued until the moisture content of the fibers was about 10 percent, at which point the fibers were transferred to a rotary oven and toasted at atmospheric pressure and a temperature of 248° F. for a period of about 4 hours.

The toasted fibers were then transferred to a humdification chamber where they were rehumidified to a moisture content of 15 percent, using an aqueous casing solution containing about 5 percent by weight of sorbitol. Following the rehumidification and casing, the cased fibers were manufactured into cigarettes on standard cigarette production machinery.

Cigarettes manufactured from cornsilk and alfalfa in accordance with the process of the invention are completely free from nicotine, yet nonetheless taste and smoke like cigarettes manufactured from tobacco. In addition, cornsilk and alfalfa cigarettes manufactured in accordance with the invention possess an appreciably lower tar content than that of cigarettes made from tobacco, enabling them to be smoked without fear of inhaling excessive amounts of tars or other irritants.

I claim:

1. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with water, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, impregnating the fibers with an aqueous solution of an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers, and then drying them at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, rehumidifying the fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

2. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with water at a temperature of from 180° to 200° F., subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, impregnating the fibers with an aqueous solution of an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers, and then drying them at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, rehumidifying the fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

3. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with a dilute aqueous alkaline solution, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, impregnating the fibers wtih an aqueous solution an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers, and then drying them at a temperature of from 200° to 230° F. to a moisture content of from 1 to

10 percent, rehumidifying the fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

4. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with an aqueous solution containing from about 0.01 to about 0.1 percent by weight of a surfactant, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, impregnating the fibers with an aqueous solution of an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers, and then drying them at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, rehumidifying the fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

5. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with water, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, drying the fibers to a moisture content of from 20 to 25 percent and then impregnating them with an aqueous solution of an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers, drying the impregnated fibers at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, toasting the fibers at a temperature of from 200° to 250° F. for a period of from 2 to 4 hours, rehumidifying the toasted fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

6. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with water, subjecting the fibers to steam at a pressure of from 45 to 200 pounds per square inch for a period of from about ½ to about 1 hour, drying the fibers to a moisture content of from 20 to 25 percent and then impregnating them with an aqueous solution of an aldose in an amount equal to from about 10 to about 25 pounds of aldose per ton of fibers, drying the impregnated fibers at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, toasting the fibers at a temperature of from 200° to 250° F. for a period of from 2 to 4 hours, rehumidifying the toasted fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

7. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with water, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, drying the fibers to a moisture content of from 20 to 25 percent and then impregnating them with an aqueous solution of glucose in an amount equal to from about 10 to about 25 pounds of glucose per ton of fibers, drying the impregnated fibers at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, toasting the fibers at a temperature of from 200° to 250° F. for a period of from 2 to 4 hours, rehumidifying the toasted fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

8. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with water at a temperature of from 180° to 200° F., subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, drying the fibers to a moisture content of from 20 to 25 percent and then impregnating them with an aqueous solution of glucose in an amount equal to from about 10 to about 25 pounds of glucose per ton of fibers, drying the impregnated fibers at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, toasting the fibers at a temperature of from 200° to 250° F. for a period of from 2 to 4 hours, rehumidifying the toasted fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

9. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with a dilute aqueous alkaline solution, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, drying the fibers to a moisture content of from 20 to 25 percent and then impregnating them with an aqueous solution of glucose in an amount equal to from about 10 to about 25 pounds of glucose per ton of fibers, drying the impregnated fibers at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, toasting the fibers at a temperature of from 200° to 250° F. for a period of from 2 to 4 hours, rehumidifying the toasted fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

10. A process for manufacturing cigarettes from cornsilk and alfalfa which comprises washing a blended mixture of cornsilk and alfalfa fibers with an aqueous solution containing from about 0.01 to about 0.1 percent by weight of a surfactant, subjecting the fibers to steam at a pressure of from 15 to 200 pounds per square inch for a period of from about ½ to about 3 hours, drying the fibers to a moisture content of from 20 to 25 percent and then impregnating them with an aqueous solution of glucose in an amount equal to from about 10 to about 25 pounds of glucose per ton of fibers, drying the impregnated fibers at a temperature of from 200° to 230° F. to a moisture content of from 1 to 10 percent, toasting the fibers at a temperature of from 200° to 250° F. for a period of from 2 to 4 hours, rehumidifying the toasted fibers to a moisture content of about 10 to 20 percent with an aqueous casing solution containing a humectant and flavoring agents, and forming the cased fibers into cigarettes.

11. A composition adapted for smoking in cigarette-like form, said composition consisting essentially of cornsilk, alfalfa fibers, an aldose and a humectant.

12. A composition adapted for smoking in cigarette-like form, said composition consisting essentially of cornsilk, alfalfa fibers, an aldose in an amount of about 10 to 25 pounds per ton of said cornsilk and alfalfa fibers, a humectant and about 10 –20% of water.

13. A composition adapted for smoking in cigarette-like form, said composition consisting essentially of cornsilk, alfalfa fibers, glucose and a humectant.

14. A composition adapted for smoking in cigarette-like form, said composition consisting essentially of cornsilk, alfalfa fibers, glucose in an amount of about 10 to 25 pounds per ton of said cornsilk and alfalfa fibers, a humectant and about 10–20% of water.

No references cited.