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TOBACCO COMPOSITION

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This invention relates to an improved tobacco composition. More particularly, it relates to a plasticizer which imparts improved properties to compositions containing fragmented tobacco and to the coherent sheets formed therefrom which are suitable for the production of products for smoking such as cigarettes, cigars and the like.

Many proposals have been made for the reconstitution of fragmented tobacco, such as tobacco fines and dust, in coherent sheet form. In general, the fragmented tobacco is combined with a binder and formed into a sheet which resembles leaf tobacco and which can be employed in the same manner as leaf tobacco. Suitable adhesive materials which have been employed as components of the binder include cellulose derivatives, such as carboxymethyl cellulose, carboxymethyl hydroxymethyl cellulose, methyl cellulose and water soluble salts thereof. Other adhesive materials which have been found satisfactory include alginic or pectinic acid polysaccharides, for example sodium alginate, as well as plant gums such as galactomannan. However, in order to be completely satisfactory, a cohesive sheet of fragmented tobacco, which may also be referred to as a reconstituted tobacco sheet, should be sufficiently soft and pliable to be readily handled in subsequent operations without fragmenting.

We have discovered that, by incorporating lithium chloride, lithium bromide or a mixture of those two materials with the binder employed in reconstituted tobacco sheet, all of the above-recited advantages are obtained. Additional advantages obtained by operating in accordance with the present invention are found in the flexibility and moistness of the final tobacco product.

Lithium chloride and lithium bromide are particularly advantageous as additives in reconstituted tobacco, since they have high boiling points and are not driven from the tobacco by the heat employed during processing of the tobacco and since they do not break down into deleterious products during the burning temperatures of smoking and thus impart no irritating or undesirable qualities to the smoke. Lithium chloride and lithium bromide possess these additional advantages: (1) they have very high water holding properties, approximately five times as high as glycerine for example; (2) they possess the ability to go through processing operations without being removed from the tobacco and without having their mechanism for absorbing and retaining moisture destroyed; (3) they remain in the ash formed by burning the final tobacco product and do not add to the organic portion of the smoke.

The lithium salt (for convenience, this term will be employed in this specification to mean either lithium chlorde, lithium bromide or a mixture of lithium chloride and lithium bromide) may be employed in any method which is generally employed in the preparation of reconstituted tobacco sheets.

For example, the lithium salt can be incorporated directly into a process of the type set forth in U.S. Patent 2,708,175 to Samfield. Under such circumstances, for example, the lithium salt can be admixed with dry-ground tobacco and an adhesive material, such as described earlier, each in the form of a dry finely divided powder, mixing these materials without wetting to disperse them in each other with substantial uniformity; dampening the mixture while agitating or tumbling it (if desired, the lithium salt may be added at this point, instead of earlier); subjecting the dampened mixture to mechanical shearing action, for example by passage between one or more pairs of steel rollers revolving at different speeds; spraying moisture on the rollers while the mixture passes between them; forming the worked mixture into thin, damp sheets on a support and heating the sheets whereby most of the water is evaporated, thus producing flexible sheets which may be shredded for use in cigarettes and the like or used in sheet form for the manufacture of cigars and the like.

As another example, the lithium salt can be incorporated into the binder layers of the so-called "sandwich-type" of reconstituted tobaccos which are prepared in a manner such as is described in U.S. Patent 2,734,513 to Hungerford et al. Under such circumstances, for example, tobacco dust is applied to a moistened surface to which it adheres, a thin layer of an adhesive composition comprising a film forming material (binder material) and a lithium salt is then applied to the layer of tobacco to form an adhesive layer, a second layer of tobacco is formed by applying tobacco dust to the exposed surface of the adhesive layer, and the three-layered sheet is dried to provide a flexible sheet which may then be shredded for use in cigarettes or the like or used in sheet form for the manufacture of cigars and the like. When this method is employed, suitable fibers may also be added to the adhesive material to provide a stronger end product. These fibers, as set forth in detail in U.S. Patent 2,734,509 to Jurgensen, may include, for example, glassine pulp, tobacco stem fibers, cigarette paper fibers and similar innocuous fibers.

In addition to the various constituents mentioned above, other materials may be present in the reconstituted tobacco compositions of the present invention. These materials may include flavoring and coloring materials and other inert ingredients such as ash improvers.

The adhesive material employed in accordance with the present invention may be any one or more of the materials known in the art. For example, it may be a cellulose derivative, such as methyl cellulose, carboxymethyl cellulose, carboxymethyl hydroxymethyl cellulose or a water soluble salt thereof, or it may be a plant gum, such as a galactomannan gum or an alginic or pectinic acid polysaccharide, for example sodium alginate, or any gum which is softened by moisture. The adhesive material should preferably be employed in sufficient amount to comprise about 1 to 90 percent by weight of the total composition in a single layer or matrix-type of reconstituted tobacco sheet. When employed in sandwich-type sheets, the adhesive should be present in sufficient amount to form a film between about 3 and 20 mils thick, although other thicknesses may be employed.

The lithium chloride, lithium bromide or mixture of the two salts, may be present in the reconstituted tobacco composition in an amount comprising from about 0.07 to 1.5 parts by weight, and preferably from about 0.15 to 0.75 part by weight, per part of the adhesive material employed.

In either method the additive lithium chloride or lithium bromide is intimately mixed in and forms part of the adhesive binder material.

The following examples are illustrative:

EXAMPLE 1

Thirty-five pounds (1.5 parts), on a dry weight basis, of tobacco stem pulp (100%) which has been pulped by the conventional caustic-cooking treatment, 23.3 pounds (1 part) of medium viscosity sodium carboxymethyl cellulose (having a viscosity of 30–60 cps. as a 2 percent solution) and 5.82 pounds (0.25 part) of lithi-

um chloride were combined and thoroughly mixed in a mixing tank. The mixture was acidified with hydrochloric acid to a pH of 2.6–2.8. The resulting material was used as a binder for a reconstituted tobacco sheet, by being applied to a layer of tobacco fines, thereafter being coated with a second layer of tobacco fines and dried in accordance with the previously described general method for the preparation of sandwich-type sheets. The final dried sheet had an over-all thickness of about 8 to 10 mils. The plasticizing action of the lithium chloride in the sheet was determined by standard physical tests and was compared with that of the control. The sheet plasticized with lithium chloride was comparable to the control in tensile strength, filling power, burning rate, and in the percentage of material burned. It was significantly improved over the control in elasticity or elongation, and in breakage. Lithium bromide, as a plasticizer, produces similar results. The physical-test data for lithium chloride as shown in Table I gives the data for a control experiment employing a conventional plasticizer, propylene glycol (PG). The second two columns give the data for the experiments employing lithium chloride.

Table I

	Control Sheet		Test Sheet	
Plasticizer, part [1]	0.50 (PG)	0.50 (PG)	0.25 (LiCl)	0.25 (LiCl)
Binder weight,[2] gm./ft.[2]	1.6	1.6	1.6	1.6
Basis weight,[3] gm/ft.[2]	9.7	10.0	9.6	10.5
Moisture, percent [4]	12.8	12.8	12.1	13.2
Instron Tensile Strength, kg./in.[5]	0.890	0.874	0.858	1.001
Instron elongation, percent [6]	3.25	3.8	3.93	5.3
Calculated work [7]	67.0	87.0	88.0	139.0

[1] Plasticizer is in parts per parts of adhesive material employed.
[2] Binder weight is the weight of binder material, in this case carboxymethyl cellulose, plus pulp, humectant and acid, in grams per square foot.
[3] Basis weight is the weight of all of the ingredients, including tobacco pulp, essentially free of moisture.
[4] Moisture, percent, is the percentage of moisture contained in the entire sheet (wet basis).
[5] Instron tensile strength is the breaking strength in kg./inch of width of a 10 centimeter test strip which is 1 inch wide (average of 10 strips).
[6] Instron elongation is the percent elongation, at breakage, on the Instron Test Machine.
[7] Calculated work="breaking work," Instron tested (the area under the Instron stress-strain curve in gms. centimeter per square inch).

The reconstituted tobacco sheet containing lithium chloride was made into cigarettes and submitted to a smoking panel for subjective testing. The tests revealed that the product burned satisfactorily and was at least as satisfactory in flavor as standard reconstituted tobacco, including the control. Analytical data on the cigarettes so prepared are shown in Table II:

Table II

	Control Cigarettes		Test Cigarettes	
TPM, mg./cigt.[1]	15.79	16.1	14.09	15.1
Nicotine, mg./cigt		0.42		0.47

[1] TPM is defined as the total particulate material in milligrams in the smoke from a cigarette as collected on a Cambridge filter.

EXAMPLE 2

Thirty-five pounds (1.5 parts) of tobacco stem pulp which had been prepared as set forth in Example 1, 23.3 pounds (1 part) of medium viscosity sodium carboxymethyl cellulose, and 3.96 pounds (0.17 part) of lithium chloride were combined, acidified, and used as a binder for a reconstituted tobacco sheet as described in Example 1. A sheet plasticized with propylene glycol was used as a control. The sheet containing lithium chloride was superior to the control in tensile strength, filling power, burning rate, and in the percentage of material burned. It was significantly improved over the control in elongation, tear strength, and in breakage. Specification data are shown in Table III.

Table III

	Test Sheet	Control Sheet
Plasticizer, part	0.17 (LiCl)	0.50 (PG)
Binder weight, gm./ft.[2]	1.6	1.6
Basis weight, gm./ft.[2]	9.8	9.6
Moisture, percent	12.7	12.4

The test sheet and the control sheet were shredded and cigarettes prepared from them. The subjective testing by smoke panels showed that the tobacco containing lithium chloride was at least as satisfactory in taste as standard reconstituted tobacco. Chemical test data and specification data on the cigarettes are shown in Table IV.

Table IV

	Test Cigarette	Control Cigarette
Plasticizer, part	0.17 (LiCl)	0.50 (PG)
Binder Weight, gm./ft.[2]	1.6	1.6
TPM, mg./cigt	14.4	14.2
Nicotine, mg./cigt	0.34	0.34

EXAMPLE 3

A binder formulation prepared in the same manner as Examples 1 and 2 except for a variation in the amount of lithium chloride (0.4 part or 9.34 pounds of lithium chloride to 1 part of sodium carboxymethyl cellulose and 1.5 parts of pulp) was used in making a reconstituted tobacco sheet. Specification data for the test sheet and control are given in Table V below. The sheet containing lithium chloride is significantly improved over the control in qualities that facilitate handling of the sheet.

Table V

	Test Sheet	Control Sheet
Plasticizer, part	0.4 (LiCl)	0.5 (PG)
Binder weight, gm./ft.[2]	1.6	1.6
Basis weight, gm./ft.[2]	9.3	9.6
Moisture, percent	12.8	12.4

Cigarettes prepared from the reconstituted tobacco sheet containing the lithium chloride were smoked and tested subjectively and analytically. Subjective smoking panel tests showed that the smoke produced was quite satisfactory as to taste or flavor and was free of bitter or acrid components. Chemical test data and specification data are presented in Table VI.

Table VI

	Test Cigarette	Control Cigarette
Plasticizer, parts	0.4 (LiCl)	0.5 (PG)
Binder weight, gm./ft.[2]	1.6	1.6
TPM, mg./cigt	14.6	14.2
Nicotine, mg./cigt	0.39	0.34

The additive lithium chloride or lithium bromide when used with other types of well known adhesive materials such as the alginates, galactomannan gums and various polysaccharides heretofore mentioned functions similarly and produces similarly satisfactory results when employed in substantially the same percentage as in the case of the carboxymethyl cellulose employed in the above specific examples. An example in which the adhesive is methyl cellulose is given below.

EXAMPLE 4

A formulation was prepared with 10% methyl cellu-

lose, 5% lithium bromide, 7% tobacco pulp, 78% tobacco fines, and cast into a sheet. The dried sheet had satisfactory physical properties for use as a reconstituted tobacco. The plasticizing action of the lithium bromide facilitated the handling of the sheet.

Since certain changes may be made in the above composition of matter and different embodiments of the invention could be employed without departing from its scope, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A composition of matter suitable for smoking comprising finely divided tobacco in a major amount and a binder in minor amount serving to cohere the tobacco, said binder comprising an adhesive material and from 0.07 to 1.5 parts by weight, per part of adhesive material, of a plasticizer selected from the group consisting of lithium chloride, lithium bromide, and mixtures of lithium chloride and lithium bromide.

2. A composition of matter suitable for smoking comprising finely divided tobacco in a major amount and a binder in minor amount serving to cohere the tobacco, said binder comprising an adhesive material and from 0.07 to 1.5 parts by weight, per part of adhesive material, of lithium chloride.

3. A composition of matter suitable for smoking comprising finely divided tobacco in a major amount and a binder in minor amount serving to cohere the tobacco, said binder comprising an adhesive material and from 0.07 to 1.5 parts by weight, per part of adhesive material, of lithium bromide.

4. A composition of matter suitable for smoking comprising finely divided tobacco in a major amount and a binder in minor amount serving to cohere the tobacco, said binder comprising an adhesive material, in an amount corresponding to from about 1 to 90 percent by weight of the total composition, and from 0.07 to 1.5 parts by weight, per part of adhesive material, of a plasticizer selected from the group consisting of lithium chloride, lithium bromide and mixtures of lithium chloride and lithium bromide.

5. A composition of matter suitable for smoking comprising finely divided tobacco in a major amount and a binder in minor amount serving to cohere the tobacco, said binder comprising an adhesive material, in an amount corresponding to from about 1 to 90 percent by weight of the total composition, and from 0.07 to 1.5 parts by weight, per part of adhesive material, of lithium chloride.

6. A composition of matter suitable for smoking comprising finely divided tobacco in a major amount and a binder in minor amount serving to cohere the tobacco, said binder comprising an adhesive material, in an amount corresponding to from about 1 to 90 percent by weight of the total composition, and from 0.07 to 1.5 parts by weight, per part of adhesive material, of lithium bromide.

7. As an article of manufacture, a tobacco sheet made from the composition of claim 1.

References Cited in the file of this patent

UNITED STATES PATENTS

2,708,175	Samfield et al.	May 10, 1955
2,734,509	Jurgensen	Feb. 14, 1956