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Cartwright

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[54] **TOBACCO REPLACEMENT MATERIAL**

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[52] **U.S. Cl.** **131/2,** 131/17

[51] **Int. Cl.** **A24b 15/00**

[58] **Field of Search** ..... 131/2, 15, 17, 140–144; 260/78.5 T, 78.5 R

[56] **References Cited**

UNITED STATES PATENTS

2,866,775	12/1958	Sellers	260/78.5 T
3,145,717	8/1964	Osborne et al.	131/140 C
3,407,157	10/1968	Carstensen et al.	260/78.5 T
3,461,879	8/1969	Kirkland	131/2
3,529,602	9/1970	Hind et al.	131/2
3,545,448	12/1970	Troon et al.	131/2

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[57] **ABSTRACT**

A smoking material is disclosed which consists essentially of a vinyl methyl ether: maleic anhydride copolymer or salts thereof, an inorganic particulate filler and optionally a second combustible material. The second combustible filler may be of tobacco dust, sodium gluconate, pectins, natural gums, or cellulose or its derivatives. The inorganic particulate material serves in the capacity of a combustion modifier and reduces the total effective combustible material in a particular charge.

5 Claims, No Drawings

TOBACCO REPLACEMENT MATERIAL

The present invention relates generally to products which may be smoked in cigarettes, cigars, pipes, etc., either alone or in combination with tobacco, reconstituted tobacco or other smoking materials, and more specifically, relates to new types of tobacco substitutes. As is well known in the art, cigars and cigarettes are smokable articles comprising a combustible or burnable material contained in a wrapper, such as paper or tobacco, usually in a tubular form; Pipes are smoking devices comprising a hollow tube having a bowl or chamber at one end adapted to receive a charge of combustible material and a mouthpiece of other suitable means through which smoke may be withdrawn at the other end of the tube.

It is believed by many practitioners in the relevant art that the smoking of tobacco, while a widespread practice, may tend to have adverse effects on the smoker's health if the practice is continued over a significant time period. These effects are believed to be attributable to the presence in tobacco smoke of various undesirable pyrolysis components. Furthermore, such components tend to irritate the smoker's respiratory passages, particularly in the nose and throat. From a production standpoint, tobacco is also undesirable because of variations in availability and uniformity from season to season.

As a result of the above factors, prior art workers have attempted to develop tobacco substitutes which would deliver reduced amounts of undesirable pyrolysis components and be independent of a growing season while still being aesthetically acceptable to the smoker.

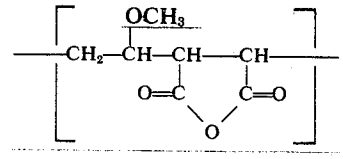
As examples of such attempts, U.S. Pat. No. 3,461,879, issued Aug. 19, 1969, describes tobacco substitutes in which the combustible portion is oxidized cellulose or contains a significant percentage of alpha cellulose; U.S. Pat. No. 3,529,602, issued Sept. 22, 1970, describes tobacco substitutes in which tobacco pectins are employed as a combustible binder; and Canadian Pat. No. 822,969, issued Sept. 16, 1969, describes tobacco substitutes comprised of thermally degraded cellulose. Particularly desirable tobacco substitutes are disclosed in British Pat. No. 1,244,441, published Sept. 2, 1971. The tobacco substitutes described in this latter patent comprise as a combustible binder, various starch or cellulose ethers.

While the foregoing substitutes have been successful to varying degrees in overcoming the disadvantage of tobacco, there still exists a need for an improved tobacco substitute. Accordingly, it is the primary object of the present invention to provide a tobacco substitute overcoming the aforesaid disadvantages of tobacco. Within this primary objective, it is also an object of the present invention to provide a process for preparing these tobacco substitutes.

Tobacco substitutes are comprised generally of a combustible substance in combination with one or more materials which alter the burning rate of the combustible substance to simulate that of tobacco. The combustible substances employed in tobacco substitutes have been either naturally occurring polymers, e.g., cellulose, starch or vegetable gums; or derivatives of such materials, e.g., thermally degraded cellulose, oxidized cellulose, or starch and cellulose ethers. To

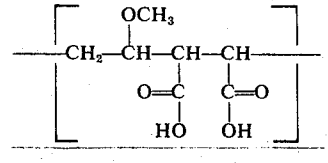
the contrary, the combustible substances used in the present invention are totally synthetic polymers.

More specifically, the present invention contemplates tobacco substitutes in which the combustible substance is a copolymer of vinyl methyl ether and maleic anhydride. These copolymers are comprised of the repeating unit



and have a specific viscosity of from about 0.1 to about 3.5, preferably 1.0 to 2.0, when determined on a solution of 1 gm. of the copolymer in 100 ml of methyl ethyl ketone at 25°C. Copolymers falling within this group are commercially available from GAF Corporation under the trademark "Gantrez." Preferably, the vinyl methyl ether: maleic anhydride ratio is 50:50, although ratios of from 40:60 to 60:40 may be used.

The partially or completely hydrolyzed forms comprised of the repeating unit



may also be used in the present inventions. Preferred are the polymers which in their anhydrous state would have a specific viscosity corresponding to that noted above.

Salts, particularly the alkali and alkaline earth metal salts, of the foregoing copolymers in both the anhydrous and hydrolyzed forms may also be used, as may mixtures of the foregoing polymers.

For the sake of brevity the foregoing polymers, including the hydrolyzed polymers and salts will be referred to by the designation "PVM/MA." Unless otherwise specified, any reference to percent or percentage is intended to mean percent by weight of the tobacco substitute.

In preparing the present tobacco substitutes, from about 15 to about 85, and preferably from about 20 to about 50 percent PVM/MA is intimately mixed in either a dry state or dissolved in water with from about 15 to about 85, and preferably about 50 to about 80 percent of a conventional combustion modifier. This mixture, normally in a 65 to 95 aqueous solution is then cast into a film, preferably having a dried thickness of from about 3 to about 15 mils.

The combustion modifiers employed in the present compositions, which may also serve to varying degrees as fillers which reduce the total amount of combustible substance present, and thus the total amount of combustion products, are non-toxic particulate materials, preferably having an average minimum dimension of from about 0.2 microns to about 1.0 millimeter. Even more preferably, the particles will have an average minimum dimension of from about 0.05 millimeter. It is also preferred that the particulate materials have a maximum dimension of about 0.25 mm, and more preferably, about 0.10 mm. Suitable materials can be se-

lected from organic compounds, inorganic compounds and the elements, so long as the material selected is non-toxic, i.e. pharmacologically inactive in the sense of significant adverse effects in a causative relationship upon oral ingestion of the substance itself or its combustion products. However, a reduced delivery of undesirable components is more readily observed when the particulate material comprises an inorganic compound, an element or a mixture thereof.

Inorganic compounds which may be used as fillers may be comprised of a cation selected from Column (A) and an anion selected from Column (B).

(A)			(B)
Lithium	Manganese	Silicon	Oxides
Sodium	Aluminum	Palladium	Hydrated Oxides
Potassium	Cerium	Tin	Hydroxides
Cesium	Cobalt	Zinc	Carbonates
Magnesium	Iron	Titanium	Phosphates
Calcium	Molybdenum	Zirconium	Aluminates
Strontium	Nickel	Copper	Stannates
Barium	Rubidium		Zincates
			Silicates
			Carbides

Preferably, the cations employed will be selected from the group consisting of zinc, titanium, magnesium, calcium, aluminum, and iron. Desirably, these cations are in the form of the carbonates, oxides, hydroxides, sulfates, phosphates, aluminates, silicates and alumino silicates. The oxides, carbonates and hydroxides are particularly desirable since these anions decompose to carbon, hydrogen and oxygen upon combustion. Inorganic compounds in their natural occurring states, such as limestone, diatomaceous earth, perlite, magnesite, vermiculite, etc., are also suitable.

As previously noted, elements may also be used as filler materials. Preferred elements include carbon, zinc, magnesium, titanium, aluminum, and iron.

While the filler materials are generally granular in nature, they may also be in fibrous form. Materials readily useable in fibrous form are fiberglass, mica, asbestos, metal, metal oxide, and metal carbide whiskers. For the purposes of the present invention, thin metal strips such as aluminum shaving are considered to be fibrous. Preferably the fibrous materials will have an average length of from about 0.1 mm to about 5 mm., and an average minimum dimension of the magnitude previously noted.

It is also within the scope of the present invention to employ combinations of particulate fillers in order to obtain the ultimate smouldering rate desired. Fillers found to be particularly suitable in controlling smouldering rates include titanium dioxide, carbon, magnesium oxide, zeolite, silica gel, magnesium silicate, and diatomaceous earth.

If desired, the present tobacco substitutes may include a minor amount of a secondary combustible substance uniformly incorporated therein. Such materials include tobacco dust; sodium gluconate; pectins; natural gums, e.g., guar gum; cellulose, cellulose ethers and esters, and oxidized cellulose. To preserve film integrity and maintain filling power of the film, this optional second combustible material may be used in an amount of from zero to 40 percent of the total product with up to 30 percent being preferred.

Combinations of the present materials within the specified percentages will generally produce a smoking material yielding an ash comparable to that of tobacco. If desired, however, the type of ash formation and appearance thereof can be readily modified by the addition of various substances as fiberglass, potassium salts, organic fibers, or phosphates, and non-toxic hydrated metal salts generally.

The materials of the preceding nature produce a smoke which in itself is relatively odorless and tasteless. This property permits a wide range of modification of taste and odor by incorporating into the material a variety of flavorants. Exemplary materials which have been found to be desirable in modifying the taste and odor properties of the present smoking material include tobacco extracts, fruit extracts, synthetic flavorants, natural gums, resins, and sugars. Nicotine and other alkaloids, while not essential ingredients in the present compositions, may also be added in controlled amounts.

In the preparation of cigarettes, the foregoing films are normally shredded to a width of about 16–60 cuts per inch and wrapped in paper. The amount of combustion modifier used should be the amount necessary to produce a puff count of 5–12 when a cigarette of conventional dimensions, i.e., 8 mm in diameter and 85 mm in length is smoked to a 30 mm butt length on an apparatus taking 35 ml. puffs over a 2-second interval on a 60-second cycle.

As previously indicated, smoking products may be prepared using the present tobacco substitutes alone or in combination with tobacco, reconstituted tobacco or other tobacco substitutes. Desirably, however, the present tobacco substitutes should constitute at least 5 percent and preferably at least 10 percent of the blend.

The following examples are presented as illustrative of the present invention and should not be construed as in limitation thereof.

EXAMPLE I

Ingredient	Amt. (Grams)
Gantrez AN-169	9.0
Pectin	3.0
Dolomite	12.0
Diatomaceous Earth	10.0
Carbon	0.4
Glycerine	3.0
Coloring Agents	0.18

Pectin was dissolved in 120 ml. of water. The remaining ingredients were added and the mixture stirred for 10 minutes. A film cast from the mixture, while somewhat brittle, burned with limited smoke and very little odor.

EXAMPLE II

Ingredient	Amt. (Grams)
Gantrez HY-H	12.0
Hydrated Alumina	12.0
Diatomaceous Earth	12.0
Carbon	0.4
Glycerine	6.0
Coloring Agents	0.18

The Gantrez was added to 85 ml of rapidly stirring water and the stirring was continued for 10 minutes. The remaining ingredients were then added and stirring was continued until a smooth dough was obtained. A film cast from this dough was heated in an oven at 125°C for 25 minutes. The resultant sheet, while rather brittle, exhibited good water resistance and burned with a rather sweetish side-stream odor.

EXAMPLE III

Ingredient	Amt. (Grams)
Gantrez HY-L	10.0
Hydroxyethyl Cellulose	2.0
Carbon	0.4
Glycerine	4.0
Coloring Agents	0.18
Dolomite	12.0
Diatomaceous Earth	10.0
$KCLO_3$	2.0

A film was prepared by mixing of the above ingredients in water, followed by casting of a film and drying at 125°C for about 6 minutes. A piece of this film burned with a good ash, a good smouldering appearance and a rather mild sidestream. The sheet also exhibited excellent water resistance.

EXAMPLE IV

Ingredient	Amt. (Grams)
Gantrez HY-H	12.0
Limestone	12.0
Diatomaceous Earth	10.0
Carbon	0.4
Coloring Agents	0.18
$KCLO_3$	2.0

The above ingredients were mixed into 100 ml. of water and a film was cast from the mixture. The film, while initially relatively brittle, acquired flexibility upon steaming. It burned well with a bland odor, and good ash and smouldering properties.

EXAMPLE V

Ingredient	Amt. (Grams)
Gantrez HY-H	6.0
Gantrez HY-L	4.0
Hydroxyethyl Cellulose	2.0
Limestone	12.0
Diatomaceous Earth	10.0
Glycerine	4.0
Carbon	0.4
Coloring Agents	0.18

A film cast from the foregoing ingredients was also observed to have good smouldering rate and a bland odor.

EXAMPLE VI

Ingredient	Amt. (Grams)
Gantrez HY-L	9.0
Hydroxyethyl Cellulose	3.0
Limestone	10.0
Diatomaceous Earth	15.0
Reten A-1*	4.0
Carbon	0.4
Coloring Agents	0.18

* Reten A-1 is a trademark of Hercules, Inc. for a proprietary cross-linking agent.

A film cast from the above ingredients was also observed to have good ashing properties and smouldering rate. Smoking in cigarette form yielded a bland sidestream odor and a mild mainstream taste.

While the present invention has been described with specific illustrations, it is to be understood that many modifications may be made thereto without departing from the spirit and scope thereof.

What is claimed is:

1. A smokable article comprising a combustible material contained in a wrapper, said combustible material consisting principally of:
   1. 15 to 85 per cent by weight of vinyl methyl ether: maleic anhydride copolymers of the hydrolyzed or salt forms thereof;
   2. 15 to 85 per cent by weight of a particulate inorganic material selected from the group consisting of limestone; dolomite; diatomaceous earth; perlite, magnesite; vermiculite; and salts having a cation selected from the group consisting of zinc, titanium, magnesium, calcium, aluminum and iron and an anion selected from the group consisting of the carbonates, oxides, hydroxides, sulfates, phosphates, aluminates, silicates and aluminosilicates; and
   3. 0 to 40 per cent by weight of a secondary combustible material selected from the group consisting of tobacco dust, sodium gluconate, pectins, natural gums, cellulose, cellulose ethers and esters, and oxidized cellulose.

2. A smokable article according to claim 1 containing at least 5 per cent by weight of said combustible material.

3. The smokable article defined in claim 1 in the form of a cigarette.

4. The smokable article of claim 1 in the form of a cigar.

5. A smoking device comprising a hollow tube having a chamber at one end of said tube, said chamber adapted to receive a charge of a combustible material, means through which smoke may be withdrawn at the opposite end of said tube, said combustible material consisting principally of:
   1. 15 to 85 per cent by weight of vinyl methyl ether : maleic anhydride copolymers of the hydrolyzed or salt forms thereof;
   2. 15 to 85 per cent by weight of a particulate inorganic material selected from the group consisting of limestone; dolomite; diatomaceous earth; perlite; magnesite; vermiculite; and salts having a cation selected from the group consisting of zinc, titanium, magnesium, calcium, aluminum and iron and an anion selected from the group consisting of the carbonates, oxides, hydroxides, sulfates, phosphates, aluminates, silicates, and aluminosilicates; and
   3. 0 to 40 per cent by weight of a secondary combustible material selected from the group consisting of tobacco dust, sodium gluconate, pectins, natural gums, cellulose, cellulose ethers and esters, and oxidized cellulose.

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