Dec. 12, 1961 F. A. HOWARD 3,012,915

TOBACCO COMPOSITION INCLUDING COMMINUTED SOLID MATERIAL AFFIXED THERETO

Filed Nov. 21, 1957

FIG. 1

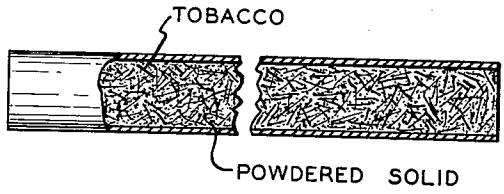


FIG. 2

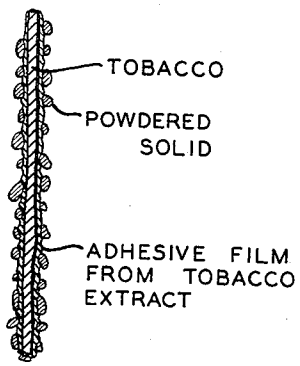
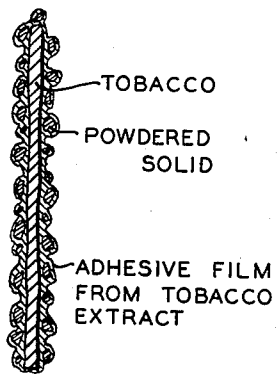


FIG. 3



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TOBACCO COMPOSITION INCLUDING COMMINUTED SOLID MATERIAL AFFIXED THERETO

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This invention relates to tobacco compositions in which a comminuted solid is distributed throughout tobacco and intimately associated therewith for the purpose of altering the characteristics of the smoke effluent from the tobacco.

The correlation of clinical and pathological evidence with the results of statistical studies gives strong indication that the incidence of certain forms of cancer is associated with the habit of cigarette smoking. This evidence has evoked considerable effort directed to the elimination of potential carcinogens from the main stream of tobacco smoke either prior to or simultaneously with the pyrogenesis of the deleterious substances. Many methods for eliminating deleterious substances involve the commingling of finely-divided solids with the tobacco in the smoking unit. Some of these materials are adapted to lower the burning temperature of the cigarette or the like when commingled with the tobacco. It has been established that high temperatures favor the generation of the potential carcinogens which are, in general, high-molecular weight polycyclic aromatics, probably pyrogenetically generated from aliphatic precursors thought to be resident in the wax in the cutin and rays of the tobacco. Other finely-divided materials which have been suggested in the prior art to eliminate the deleterious substances such as certain alkaloids from the main stream of tobacco smoke include certain sorptive material of natural or synthetic origin, such as for example, silica gel, certain naturally-occurring clays (either in their raw state or heat-treated), alumina gel, etc. A copending U.S. patent application of Serial No. 685,093, filed September 20, 1957, by Wright W. Gary et al. relates to smoking mixtures in which smoking tobacco is mixed with certain acid-activated kaloin clays in which the alumina content is from 40 to 50 percent by volatile-free weight, volatile-free weight being the weight of the clay after being heated to substantially constant weight at about 1700° F. The acid-activated clay is preferably incorporated in the tobacco of a cigarette in a very finely-divided form, usually less than about 10 microns and preferably having a substantial portion between about 0.5 and 2 microns. The terms "highly particulated" and "finely divided" as used herein have reference to a particle size of about 100 microns or less and include powdered materials and microspherical or otherwise shaped material. It has been found that the addition of the above-described acid-activated clay in amount of from about 0.5 to 15 percent volatile-free basis (based on the weight of the tobacco) and preferably from about 2 to 10 percent, same basis, produces outstanding benefits.

Prior art methods of applying finely-divided solids, particularly absorbent solids, to tobacco include dusting of the tobacco or treating the tobacco in leaf or particulated form with an aqueous slurry of the finely-divided mineral-type material and dewatering the resultant mixture. Both methods suffer from the disadvantage of leaving the finely-divided material unbonded to the tobacco in the absence of considerable moisture and hence free to dust-off during the subsequent processing to which the tobacco is subjected. Furthermore, these methods fail where uniform distribution of particulated mineral-type material in the tobacco in the consumer's product is required, since during processing or storage the particles form segregated

strata, channels or the like in the smoking unit. It is evident that it is highly advantageous to the efficient performance of these finely-divided solids that they be uniformly distributed on and affixed to the tobacco. Furthermore, dust problems are encountered in the handling and processing of tobacco in the presence of such fine materials in an unbonded mobile condition.

Although numerous synthetic resins are available for bonding particulate solids to a substrate they are not satisfactory for bonding comminuted incombustible solids to tobacco for many reasons. First, they are either inherently toxic or burn with evolution of toxic or noxious volatiles. Furthermore, such synthetic resins have a deleterious effect on the taste of the tobacco both prior to and during smoking. Another disadvantage of commercially available synthetic adhesives is that inorganic solids of the classes above described are not readily wet thereby.

Accordingly, the subject invention has for a principal object to provide tobacco compositions in which a comminuted solid capable of desirably altering the nature of the effluent tobacco smoke is adhesively secured to said tobacco.

Another important object of the invention is the provision of tobacco compositions in which such a solid is affixed to the tobacco by a pleasant-tasting innoxious adhesive which burns without evolution of offensive volatiles.

Another object of the invention is to provide smoking mixtures and smoking units containing the same in which a comminuted solid is affixed to tobacco by a novel adhesive of such a character that smaller quantities of conventional tobacco additives may be employed in tobacco compositions including the novel adhesive.

Another object of the invention is to provide smoking compositions and smoking units containing the same in which a comminuted solid is affixed to tobacco by an adhesive which also functions as a humectant for the smoking composition.

Still another object is the provision of tobacco compositions in which a solid capable of altering the character of the effluent tobacco smoke is attached to tobacco by an adhesive of such a character that the solid is readily wet thereby, thus permitting a variety of methods to effect the adhesion of the solid to the tobacco.

Another object of the invention is the provision of tobacco compositions in which a finely-divided solid is bonded to tobacco by an adhesive having a chemical composition akin to that of tobacco leaf constituents.

In accordance with the subject invention, an aqueous material produced by cold aqueous leaching of tobacco, followed by evaporating the leachate, is applied to tobacco in the presence of a finely-divided solid capable of altering the burning characteristics of the tobacco. This extract serves as a humectant and sweetening agent in addition to its primary function as an adhesive to interbond the solid to the tobacco. The invention in its broadest aspect encompasses: those compositions in which the tobacco extract envelops the solid particle; compositions in which the tobacco extract is the matrix for the particulated solid; compositions in which the tobacco extract is interposed between the solid and the tobacco surface to which it is affixed. Hence, tobacco treated with the extract simultaneously with the addition of solid or in which the solid is applied to tobacco subsequent or prior to the addition of the extract to the tobacco are within the purview of the invention. Furthermore, the method is equally applicable to the treatment of whole leaf tobacco, subdivided whole leaf tobacco (such as filaments or shreds) or to reconstituted tobacco (comminuted tobacco reformed into a coherent mass by additive bonding agents).

The accompanying drawings illustrate several embodiments of tobacco compositions of this invention.

FIGURE 1 is a longitudinal section through my cigarette, showing the finely divided solid additive uniformly distributed throughout the tobacco shreds.

FIGURE 2 is an enlarged side view, partly in section, of a tobacco shred of FIGURE 1 in which the finely divided tobacco treating solid is secured to the shred by an adhesive, obtained by leaching tobacco, which partially envelops the solid tobacco additive particles.

FIGURE 3 is an enlarged side view, partially in section, of a tobacco shred of FIGURE 1 in which the adhesive envelops the tobacco treating solids and secures them to the tobacco shreds.

In accordance with this invention the viscid concentrate of the crude aqueous extract of tobacco (tobacco leaf or leaf and stems) I employ to bind particulated solids to tobacco is readily prepared by aqueous leaching of comminuted tobacco, preferably a tobacco having a high content of pectic substances. Waste tobacco is suitable as is a poor grade of tobacco or a poor-grade fraction thereof. Well-known methods for extracting pectic substances from apple or citrus materials are readily adapted to tobacco although the pectic substance useful as an adhesive need not undergo the extensive purification used in processing certain plants to obtain pure pectinic acid for use in making edible jellies. Extraction may be practiced prior or subsequent to curing and aging of the tobacco. When the extract is not intended for immediate use it may be necessary to exclude polyvalent ions and certain enzymes therefrom to prevent precipitation of the pectic substances. For this reason it will frequently be found desirable to use demineralized water in extraction. Likewise where the sugar content of the particular tobacco plant is high it may be advantageous to remove the sugar by practices described in detail for extraction of pectin from fruits such as apples.

The sugar and pectic substance content of tobacco varies considerably with the origin of the plant and the nature of the constituents of the pectic substance will vary within a tobacco specie on factors such as ripeness, extent of curing, aging, etc. Furthermore, the presence of ash in the extract will affect the ultimate adhesive capacity of the extract. The following is taken from a table of representative analysis of cigarette tobacco appearing in Encyclopedia of Chemical Technology, published by Interscience Encyclopedia, Incorporated 14: 246 in which tobacco leaf web after aging was analyzed on a moisture-free basis. The pectic substances are analyzed therein as calcium pectate.

Component	Flue-cured	Burley Type	Maryland Type	Turkish Blend
Reducing sugars as dextrose, percent	22.09	0.21	0.21	12.39
Pectin as calcium pectate, percent	6.19	9.91	12.14	6.77

Pectic substances may be extracted from tobacco by a simple cold-water extraction. This may be followed (if it is desired to extract protopectins) by a leaching at a pH preferably from about 1.2 to 3.0 with dilute lactic, citric, phosphoric or tartaric acids and at a temperature from about 125 to 200° F. for sufficient time, usually about ½ to 3 hours to solubilize protopectin and to precipitate alkaloid bases such as nicotine. From about 10 to 25 parts of water per part of tobacco may be used in extraction although the quantity may vary considerably depending on the analysis of pectic substances in the tobacco, percentage of protopectin in the pectic substance and the degree to which extraction is commercially feasible. A preliminary soaking in water may be applied prior to extraction for the purposes of allowing the tobacco to hydrate and swell and remove water-soluble constituents such as sugar and coloring matter. The extract may be clarified by enzymes to decompose starch and some proteins and is preferably heat treated and subjected to pH control to destroy enzymes, particularly pectolytic enzymes, which would otherwise degrade pectic substances in solution. The extract, preferably filtered, is evaporated, suitably in multiple effect evaporators or in vacuum pans to a concentrate having the desired viscosity. In general crude extracts in which the concentration of pectic substances is from about 1 to 10 percent and usually about 2 to 6 percent will have the requisite viscid character to provide an adhesive suitable for use in practice of the subject invention. However, satisfactory adhesives may have higher concentrations of pectic substances. The pectic substances may be applied in dilute solution and the adhesive formed in situ therefrom by partial evaporation of the water or the viscid concentrate may be directly applied to the tobacco. The amount of pectic substance in the viscid concentrate depends to a large extent on the origin and state of ripeness of the tobacco, the severity of leaching and the specific leaching conditions.

The following examples are given only for the sake of further illustrating the invention and are not to be construed as limiting the scope thereof.

Example I

A novel smoking mixture of the present invention is prepared by affixing a finely-divided acid-activated kaolin clay ground to an average particle size of about 2.5 microns to cured and aged tobacco leaf by a viscid concentrate of tobacco leaf extract. The extract is prepared by cold aqueous leaching of an aged comminuted Burley-Maryland blend followed by concentration by evaporation at room temperature. The uncut tobacco leaf is coated with a thin film of the pectic concentrate and acid-activated kaolin clay is dusted on the binder to the extent of 4 percent (based on the moisture-free weight of the tobacco).

Example II

A cigarette may be prepared by packing a 1.0 gram portion of the mixture of Example I in the normal manner into a suitable paper cylinder and providing a fibrous filter tip at an extremity of the cylinder.

While one method of applying my adhesive has been described in the example given above, another method involves spraying the tobacco with a slurry of the solid additive in a dilute solution of the tobacco extract.

The solid is preferably incorporated in the cigarette tobacco in a very finely-divided form, usually less than about 10 microns and preferably having a substantial portion between about 0.5 and 2 microns. In general, the more finely-divided the solid the greater the active surface available to combat deleterious substances and the greater the adhesion of the solid to the tobacco particles. It has been found that coarser particles, for example particles approximately 325-mesh, tend to be drawn into the mouth of the smoker upon inhalation whereas finer particles are more resistant to inspiration. Of course the particle size of the solid used in a composition will depend on such factors as moisture content, mode of application to the tobacco, size of tobacco particles, presence of and nature of filter-device adapted to be placed in smoker's mouth, quantity of solid used and locus of solid placement.

The comminuted solid may be distributed substantially uniformly throughout the body of the cigarette or, as in an embodiment of the invention, the material may be placed selectively within the cigarette to effect maximum benefits. Accordingly, the material may be advantageously gradated throughout the cigarette, with maximum content proximate the inhaling end where, during the smoking of the cigarette maximum tar deposition is encountered. When an unsmoked cigarette is first ignited the effluent smoke contains a smaller amount of tars than when the smoke issues from the more completely smoked cigarette. Any tars produced by the burning of the

tobacco are conveyed towards the mouth of the smoker. The elevation of the burning temperature due to the presence of tars promotes the generation of deleterious compounds. Hence, the greatest load on a solid tobacco-treating material is near that portion of the smoking unit, in the case of a cigarette in particular, adapted to be placed in the smoker's mouth.

A filter, either of the well-known type which is integral with the smoking unit or of the holder type including a filter, is preferably employed in a smoking unit when tobacco is treated by the process herein taught. The filter may be fibrous and/or include absorbents such as silica, clays or the like. The purpose of the filter is to prevent any inspiration of any finely-divided solid particles which may occur if the smoking unit is subjected to dry, warm weather for prolonged periods. The filter interposes a bed of porous material, or the like, between the tobacco-solid mixture and the smoker's mouth and imprisons any solid particle which might otherwise be drawn into the smoker's mouth.

It will be understood that the invention as hereinabove described is susceptible to numerous embodiments without departing from the spirit or scope thereof.

I claim:

1. A smoking mixture comprising tobacco shreds and uniformly dispersed thereon a comminuted solid capable of altering the characteristic of the smoke from said tobacco when smoked, the particles of said solid being

at least partially enveloped by and bonded to the surfaces of said tobacco shreds by an adhesive produced by cold aqueous leaching of aged tobacco followed by concentration of the leachate by evaporation at room temperature.

2. The smoking mixture of claim 1 in which said aged tobacco comprises a blend of Maryland and Burley tobaccos.

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