United States Patent Office 2,996,065 Patented Aug. 15, 1961

2,996,065

METHOD FOR FORMING FILTER CIGARETTES

Oliver S. North, 2119 4th St. NW., Washington 7, D.C.

No Drawing. Filed Sept. 9, 1958, Ser. No. 759,851
2 Claims. (Cl. 131—10)

This invention relates to smoking tobacco compositions for cigarettes, and more particularly to tobacco having associated therewith a quantity of a certain additive, which mixture when formed into a cigarette and smoked will produce a filtered smoke. Specifically, it relates to a method of incorporating that additive in the tobacco in such a way that optimum filtration and smoking properties will be realized in cigarettes formed from that composition.

The present application is a continuation-in-part of my earlier application, Serial No. 665,120, filed June 12, 1957, which issued on October 4, 1960 as United States Patent 2,955,060, wherein there are disclosed tobacco mixtures in which randomly oriented particles of the additive are uniformly distributed throughout the tobacco mixture.

A number of compositions for and methods of filtering nicotine, dust, and impurities from tobacco smoke before it is drawn into the smoker's mouth are known. Many of these are comparatively expensive and inconvenient to manufacture and/or use, and it is desirable to produce a product having self-contained and inexpensive, yet relatively effective, means for accomplishing filtration of smoke.

The principal object of this invention is to provide a method for making tobacco compositions and cigarettes which when smoked will have the smoke filtered of a large portion of its content of nicotine and other tars, dust, and impurities.

Another object is to provide cigarette tobacco compositions and cigarettes that can be manufactured at a cost lower than or closely comparable with the cost of like standard articles of commerce.

Another object is to provide a method of manufacturing filter cigarettes of the size, shape, and general appearance of standard commercial products.

The objects of this invention are accomplished by disseminating quantities of unexpanded, or unexfoliated, vermiculite in the tobacco in such manner that in cigarettes manufactured from the composition the vermiculite particles are orientated in a particular direction, as described later.

I have discovered that when a cigarette consisting essentially of an admixture of tobacco and a limited quantity of unexfoliated vermiculite disposed substantially uniformly throughout the portion of the cigarette which is to be smoked (hereinafter designated as the body of the cigarette) is ignited and smoked in the usual way, the contained vermiculite particles nearest the spark will be exfoliated, due to the fact that the burning tobacco particles produce sufficient heat to cause the vermiculite particles to undergo the phenomenon of exfoliating, that is, the laminae of each particle being caused to separate in some degree, although the individual particles retain coherent, unit form.

I have further discovered that if the unexfoliated vermiculite particles are incorporated uniformly in the tobacco throughout the body of the cigarette with their crystallographic axes in correct alignment with respect to the longitudinal axis of the cigarette, said cigarette can be readily smoked and the resulting smoke will be filtered of an appreciable portion of its content of tars, dust, etc., which might otherwise be drawn into the smoker's mouth. When a cigarette so constituted is smoked there is sufficient expansion of vermiculite particles located at the point of spark to provide a plurality of thin platelets through which the smoke will be drawn to accomplish desirable filtration and prevent some of the nicotine and impurities from being drawn into or through the remaining body of the cigarette, yet at the same time there is insufficient volume increase to split the wrapper paper or otherwise to disrupt the cigarette. As burning of the cigarette progresses, successive portions of vermiculite are thus expanded and are discarded along with the tobacco ash. This type of filtration is preferable to that accomplished by filter sections, or "filter tips," because a filter section or tip, of whatever composition or type, tends to become progressively more clogged with accumulating tars, nicotine, etc., as smoking proceeds, thus losing some of its effectiveness. Furthermore, it is generally somewhat more economical to manufacture a cigarette composed wholly of a physical intermixture of materials than one requiring provision of a special section or tip which initially is separate from the main body of the cigarette.

A corollary benefit derived from the exfoliation phenomenon under the conditions just described stems from the fact that the unexpanded vermiculite acts as a thermodynamic "heat sink." As the unexpanded vermiculite is exposed to the heat of the burning tobacco, heat is necessarily used to accomplish the exfoliation, and water of crystallization is released. The presence of water vapor right in the combustion area, which enhances the condensation of the products of combustion, and the lower smoke temperature are important factors contributing to the desirability of having unexpanded vermiculite distributed throughout the tobacco as described.

It may be here pointed out that a ton of unexpanded vermiculite, which can be bought for a few dollars, will make many tens of thousands of cigarettes, and therefore this material is most economical to use for this purpose. The cost per unit of filter cigarettes manufactured in accordance with this invention is less than, or closely comparable with, the cost per unit of cigarettes made without vermiculite.

Vermiculite is a micaceous, hydrated magnesium-aluminum silicate mineral which is well known in industry, particularly in the construction, chemical, and agricultural fields. While vermiculite is of fairly widespread mineralogical occurrence, the bulk of the commercial material now comes from the States of Montana and South Carolina in the United States and from the Transvaal, Union of South Africa. As prepared for the market, ores containing vermiculite are mined and then beneficiated, or purified, by various methods of concentration and sizing, so that the final product consists almost entirely of unexpanded vermiculite crystals of more or less uniform thickness and equal lateral dimensions. Expansion, or exfoliation, of vermiculite can be accomplished at relatively very low temperatures, for example by a match flame, as contrasted with most other expandable inorganic materials which require much higher heats. Expansion of vermiculite is due to separation and warping of the individual laminae. The final particle possesses a very large surface area and consists of a succession of extremely thin platelets loosely attached to adjacent platelets and separated from one another by more or less flat air spaces.

Vermiculite is inorganic, and during the expansion process contemplated in this invention is free of violent effects, disagreeable odors or tastes, or any other form of objectionable manifestation.

In the manufacture of cigarettes in accordance with this method, I first form an intermixture of quantities of tobacco and unexfoliated vermiculite particles, the latter being aligned as hereinafter described. I prefer to use

smoking tobacco of any of various suitable types commonly used in the manufacture of cigarettes. The tobacco used may contain additives, such as for binding or flavoring or otherwise improving the qualities of the finished product, or such additives may be added during or after the mixing of the tobacco and unexfoliated vermiculite. The vermiculite used may be of a particle size grade available on the market; alternatively, a grade which is commercially available may be sized to produce a fraction meeting special specifications.

A large proportion, for example 95 to 99 percent, by weight, of the desired cigarette tobacco is intermixed with a small amount, for example 1 to 5 percent, by weight, of the proper grade of unexfoliated vermiculite. Generally, it will be preferable to use one of the intermediate particle size grades of vermiculite, for example a grade of which about 95 percent will pass a 28-mesh Tyler screen and the bulk of which will be retained on a 50-mesh Tyler screen, or it may be desired to use a more closely sized material, for instance one in which most of the particles will pass a 28-mesh Tyler screen but will be retained on a 35-mesh Tyler screen. It will be understood that these proportions are cited merely as examples, and that I do not limit the scope of this invention as regards the proportions of the materials and the particle size grades of the vermiculite used.

A critical factor in the manufacture of cigarettes in accordance with this invention is the alignment of the vermiculite particles in the tobacco, and subsequent formation of cigarettes with due regard for said alignment. Vermiculite flakes are impervious to air and smoke in the direction of the thin dimension, that is, in the direction at right angles to the crystallographic basal cleavage plane of vermiculite. If the vermiculite particles are situated in random positions through the tobacco, many of the particles will be caused to expand at such attitudes as to tend to block the flow of air and smoke through the body of the cigarette to the mouth of the smoker, thereby rendering it difficult or impossible to "draw" on the cigarette satisfactorily. Therefore, controlled dissemination of the vermiculite in the tobacco is desirable and necessary, not only with regard to uniform distribution of vermiculite particles through the tobacco, but also to make certain that substantially all of the vermiculite flakes are so aligned that the crystallographic basal cleavage plane of every vermiculite crystal is orientated in the approximately same direction, so that it may be assured that these basal cleavage planes will lie substantially parallel with the longitudinal axis of cigarettes thereafter formed from the subject composition. Such aignment may be produced, for example and depending on the structural details of the cigarette machine used, by feeding a thin stream of vermiculite over a metal

strip positioned immediately above and longitudinally of the "tobacco belt" in the cigarette machine, in such manner as to drop vermiculite flakes onto the belt simultaneously with the feeding of tobacco thereto.

The composition of tobacco and aligned unexpanded vermiculite particles is fed onto the cigarette paper in such a way, for example over the end of the "tobacco belt" mentioned above, that the basal cleavage planes of the bulk of the particles are aligned more or less parallel with the longitudinal axes of the cigarettes. The composition may be formed into cigarettes by any appropriate procedure and using any suitable machine or apparatus. Cigarettes so formed may be of any desired length, cross-section shape, etc., but it will generally be preferable that such products be of standard lengths and shapes.

The composition may be used in the manufacture of cigarettes containing no other provision for smoke filtration; or, combustible body sections consisting of quantities of this composition properly wrapped and sealed in paper may be attached to filter tips, for example of cellulose acetate, to produce cigarettes possessing maximum filtration characteristics. In the latter instance it may be found advantageous to use comparatively small-sized vermiculite particles and/or a relatively limited proportion of vermiculite in the composition, so as to accomplish only a part of the desired filtration near the point of spark.

I claim:

1. In a smoking mixture formed by intimately admixing flakes of unexpanded vermiculite with tobacco to obtain a mixture of from 1–5% vermiculite in from 95 to 99% of tobacco, the improvement which comprises: depositing the flakes of unexpanded vermiculite and tobacco onto a support with substantially all of the flakes of unexpanded vermiculite aligned in a common orientation and thereafter forming the mixture into a smoking tobacco product wherein the basal cleavage planes in the unexpanded vermiculite and the direction of draw of the smoking product are parallel to one another.

2. A smoking product formed with from 1–5% of flakes of unexpanded vermiculite and 95–99% of tobacco, intimately mixed and combined within an outer wrapper and wherein the basal cleavage planes in the flakes of unexpanded vermiculite are parallel to the direction of draw of the smoking product.

References Cited in the file of this patent

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2,786,471 Graybeal ---------- Mar. 21, 1957

OTHER REFERENCES

Application Serial No. 665,120, filed June 12, 1957, by O. S. North.