Patented Sept. 14, 1937

2,092,817

UNITED STATES PATENT OFFICE

2,092,817

IMPREGNATED CIGARETTE

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No Drawing. Application May 18, 1935, Serial No. 22,167

7 Claims. (Cl. 131—36)

This invention relates to the manufacture of cigarettes and more particularly to a method of treating the paper of the cigarette to render the same waterproof and at the same time not to impair the smoking qualities of the finished cigarette.

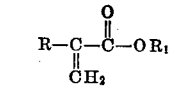
It is well known that paper which is commonly used in the manufacture of cigarettes has the disadvantage that it readily disintegrates when it becomes wet or damp for any reason. The paper also has a definite tendency to stick to the lips, sometimes quite tenaciously. It is a common experience of smokers to have a cigarette become soggy due to the absorption of moisture by the paper and tobacco and to have the individual pieces of tobacco become loosened and remain in the mouth. Heretofore, these disadvantages have been partly overcome by coating one tip of the cigarette with straw, cork, bark, ivory, and materials of a similar nature. The main disadvantages of this practice are that the cost of cigarettes so prepared is high because of the special tipping operation required; the cigarette can be lighted at only one end; and only the tip is protected and rain or wet fingers readily cause the remaining part of the cigarette to disintegrate rapidly. Other expedients such as coating the cigarette or cigarette paper with cellulose derivatives, oils, waxes, etc. have been proposed, but in each case the appearance, burning rate, odor, or taste has been adversely influenced by the agent used.

The use of various resins for coating cigarette paper has also been proposed. It has been my experience, however, that the resins suggested in the prior art exert a more or less definite and undesirable transparentizing action on the paper, thereby altering its appearance. Apparently it is possible to obviate this transparentizing effect by applying the resin in such a way as to produce an "efflorescent coating" on the paper, but this method is commercially undesirable because it involves the costly process of drying the paper, after it has been treated with a solution of the resin in organic solvent, in special and abnormally warm, humid atmospheres, in order to produce this "blooming" or "blushing" effect which masks the transparentizing action of the resin.

This invention has as an object the preparation of a cigarette which is resistant to moisture, at least over that part which is placed in the mouth and preferably over its entire length. A further object is the preparation of cigarette paper or the impregnation of the paper of a finished cigarette, without the necessity of resorting to special methods of treatment, in such a way that the paper will not readily disintegrate and at the same time will not have adversely affected its appearance, odor, taste, or combustibility.

These objects are accomplished by treating the cigarette paper before or after the cigarette is made with dilute solutions or emulsions of certain synthetic resins not heretofore to my knowledge proposed for the purpose. The resins used in my invention are of the type which do not transparentize the paper; that is, they do not give the paper impregnated therewith the appearance of parchment but leave it in exactly the same condition, as far as may be observed, as the original paper. Furthermore, these effects are secured without resorting to special solvents or special methods of drying.

It has been found that only limited and restricted classes of synthetic resins have the properties described above. Those with which the present invention is concerned are the polymeric esters of α-methylene carboxylic acids. This expression comprehends the mono or polyhydric alcohol or phenol esters of mono or polycarboxylic acids having a methylene group ($=CH_2$) attached to a carbon atom adjacent to a carboxyl group. Within this field, the most generally useful agents are resinous polymers of compounds of the general formula



where R is hydrogen or a monovalent hydrocarbon radical and R_1 is a monovalent organic radical derived from a monohydric alcohol by removal of the hydroxyl therefrom. R_1 may be the radical of a saturated or unsaturated, straight or branched chain, aliphatic, alicyclic or aromatic alcohol, which alcohol may or may not contain other groups such as ketone, ether, amino, etc. The following specific resins, derived from compounds of the above general formula, may be used in the practice of this invention: methyl alpha-methacrylate (the outstanding resin), cyclohexyl alpha-methacrylate, isobutyl alpha-methacrylate, ethyl alpha-methacrylate, methyl acrylate, isopropyl acrylate, diethylaminoethyl alpha-methacrylate, ethoxyethyl alpha-methacrylate, benzyl alpha-methacrylate ethyl alpha-ethacrylate, methyl alpha-phenacrylate, methyl alpha-cyclohexyl arcrylate, etc. Other esters of α-methylene carboxylic acids whose polymers may be used in this invention are diethyl itaconate and other esters of itaconic acid. I may also

use in my invention interpolymers or mixtures of polymers of different esters of α-methylene carboxylic acids.

The following examples in which parts given are by weight, illustrate how the invention may be carried out. However, the practice of the invention is not limited to the examples since modifications thereof will be readily apparent to those skilled in the art.

Example I

	Parts
Methyl methacrylate polymer	2.5
Toluene	97.5
	100.0

This solution was brushed on approximately ½ inch of the tip of a cigarette with a small camel's hair brush. The solution penetrated the paper and within one minute at approximately 25° C. the treated paper tip was perfectly dry and no different in appearance from the remainder of the cigarette. The treated tip was waterproofed to the extent that it could be rubbed between moist lips without any effect on the paper and a definite line of demarcation existed between the treated and untreated portions of the cigarette when moistened by the tongue or lips.

The cigarette may be rendered waterproof over its entire length by brushing the above resin solution over the remainder of the cigarette.

Example II

	Parts
Methyl methacrylate polymer	0.5
Toluene	99.5
	100.0

Example III

	Parts
Methyl methacrylate polymer	1.5
Butyl acetate	20.0
Acetone	77.5
Dibutyl phthalate	1.0
	100.0

Example IV

	Parts
Cyclohexyl methacrylate polymer	2
Xylene	3
Petroleum ether	20
Ethyl acetate	75
	100

Example V

	Parts
25% methyl acrylate—75% methyl methacrylate interpolymer	2
Butyl acetate	10
Acetone	88
	100

Example VI

	Parts
Diethyl itaconate polymer	2.5
Butyl acetate	14.0
Acetone	83.5
	100.0

Cigarettes treated with a solution prepared according to any one of the above examples are rendered definitely waterproof and at the same time no difference between these and untreated cigarettes may be detected in respect to odor, taste, appearance, and rate of burning. In connection with this latter test, two cigarettes, one which had been treated and the other which had not been treated, were lighted and smoked for about ¼ inch and then laid side by side at the edge of a table. The cigarettes burned at the same rate and there was no evidence to indicate that the coatings had any effect whatever on the combustibility or burning qualities of the cigarettes. In Example III given above, it will be noted that dibutyl phthalate has been added to the resin solution. A plasticizing agent of this type may be added where increased pliability of the treated paper is desired or where the resin is friable. It will be readily apparent that the amount of plasticizing agent may be increased or decreased to obtain the results desired; and, further, no limitation is placed on the particular plasticizer which may be used other than the fact that it must not be poisonous or have an offensive odor.

While I have given examples where the resin is dissolved, I may resort to aqueous emulsions particularly where the coating is applied to the paper before it is made into a cigarette. The expense and fire and health hazards of handling organic solvents are thus avoided. Unlike solutions, emulsions do not vary greatly in viscosity with different resins and different concentrations and as a result lend themselves more readily to application in one operation of the same amount of different resins or different amounts of the same resin.

In the practice of this invention it is preferable to use dilute solutions or emulsions, for example in the range from 0.5 to 2.5% resin by weight. This concentration may, however, be varied beyond these limits. For example, if a resin of very low viscosity is used or if the solvent selected is particularly active, the percentage of resin may be increased. On the other hand, the solution may be made as thin as desired but if carried too far in this direction, a plurality of impregnations or coatings will probably be necessary. Pigmented compositions may in some instances be used to advantage. It has also been found that in addition to solvent, resin, and plasticizer, small amounts of cellulose derivatives such as cellulose nitrate, cellulose acetate, ethyl cellulose and other esters and ethers may be incorporated into the impregnating compositions. These compounds should be added, however, in amounts small enough so that they will not seriously influence the rate of burning or taste of the cigarette.

While I have indicated that the resin solution may be brushed on the paper of the cigarette, it is obvious that other conventional methods may be used such as spraying or dipping. It is also within the scope of this invention to treat the cigarette paper with the resin before the cigarette is rolled by dipping the paper in the resin solution or emulsion, or by applying the resin to one side or both sides of the paper. The untreated cigarette may also be passed over rolls one side of which is immersed in the resin solution or emulsion.

I believe that the unaltered appearance of my coated cigarettes is due to the fact that the resins which I use have refractive indices substantially lower than that of the paper. The resins proposed in the prior art (which require special methods of application if the appearance of the cigarette is to remain unchanged) have refractive

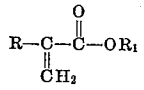
indices such as 1.515, 1.54 and 1.64. The refractive index of cigarette papers ranges from 1.53 upwards. The resins which I use, however, have values of around 1.47 and 1.48. The objects of this invention can therefore be accomplished by the employment of any synthetic resin which has a refractive index substantially lower than that of the cigarette paper.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof; and, therefore, it is not intended to be limited except as indicated in the appended claims.

I claim:

1. A cigarette having the paper thereof treated with a composition comprising essentially a resinous polymeric ester of an alpha-methylene carboxylic acid.

2. A cigarette having the paper thereof treated with a composition comprising essentially a resinous polymer of a compound having the formula



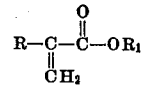
where R is a member of the group composed of hydrogen and a monovalent hydrocarbon radical and R_1 is a monovalent organic radical derived from a monohydric alcohol by removal of the hydroxyl therefrom.

3. A cigarette having the paper thereof treated with a composition comprising essentially a resinous polymer of methyl alpha-methacrylate.

4. In the manufacture of cigarettes the step which comprises treating the cigarette paper with a composition comprising essentially a resinous polymeric ester of an alpha-methylene carboxylic acid.

5. In the manufacture of cigarettes, the step which comprises treating the cigarette paper with a composition containing 0.5–2.5% of a resinous polymeric ester of an alpha-methylene carboxylic acid.

6. In the manufacture of cigarettes the step which comprises treating the cigarette paper with a composition containing 0.5–2.5% of a resinous polymer of a compound of the general formula



where R is a member of the group composed of hydrogen and a monovalent hydrocarbon radical and R_1 is a monovalent organic radical derived from a monohydric alcohol by removal of the hydroxyl therefrom.

7. In the manufacture of cigarettes the step which comprises treating the cigarette paper with a composition containing 0.5–2.5% of methyl alpha-methacrylate resin.

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