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PAPER AND PAPER MAKING

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This invention relates to paper and paper making, especially to cigarette paper and cigarettes, so as to provide an alkaline smoke upon combustion of the paper instead of the usual acid smoke.

5 The smoke produced by combustion of the ordinary cigarette paper is acid in reaction, although the smoke of tobacco is usually alkaline. When a cigarette is smoked an alkaline smoke is produced from the tobacco due to the presence
10 of natural nitrogenous products in the tobacco which combine with the pyroligneous or other acid produced, while the smoke produced upon combustion of the cigarette paper is acid in reaction because the paper contains almost no
15 nitrogenous substances to break up and neutralize the acids produced. Thus a cigarette held in the mouth during smoking produces both alkaline and acid smoke. In smoking a cigarette even if enough nitrogenous substances are
20 present to theoretically neutralize the acid, these vapors or smokes are not mixed sufficiently to neutralize the acid part of the smoke especially while the cigarette is held in the mouth during intervals of puffing. During those intervals between inhalation of smoke, the acid vapor from
25 the burning paper reaches the eyes and causes lachrymiosis with a burning sensation familiar to those who get cigarette smoke in their eyes. These acid vapors, depending upon the variable
30 conditions of combustion encountered in ordinary smoking, also irritate the mucous membranes of the throat and nose. Acid vapors are equally irritating when produced by smoking cigarettes containing a tobacco substitute, such
35 as cubebs.

Various attempts have been made to add aromatic substances to cigarette paper in order to ameliorate the irritating effects of cigarette smoke, but such substances have not had the
40 desired effect because they failed to neutralize the acid vapors produced in combustion of the paper and were otherwise objectionable because of their interference with the tobacco smoke flavor, or their undesirable effects upon the burning qualities, color, or physical properties of the paper.

45 It has been found that papers, such as commercial cigarette paper, may be conveniently treated with substances of nitrogenous nature to produce a paper which yields an alkaline
50 smoke upon combustion. It is possible to accomplish this treatment by running the formed paper web through a solution of the substance or substances just before a final calendering. It is usually necessary that such nitrogenous substances should not yield an odoriferous smoke

which affects the flavor of tobacco smoke; and they should not adversely affect the burning qualities or physical properties of the paper. Such additions must be non-poisonous and they must not adversely affect the taste, color, texture, or keeping quality of the paper. 5

In addition, the substances employed must usually be of such nature that they may be incorporated with cigarette papers now in use, without requiring changes in composition of
10 paper stock or processes which require substantial changes in the customary methods of manufacture. Moreover, the treatment must not add prohibitive costs to production.

Other features and advantages will herein-
15 after appear.

In accordance with the present invention, cigarette paper is treated with a solution of substances capable of yielding an alkaline smoke when such paper is burned as in the ordinary
20 combustion of a cigarette. The substances are preferably dissolved in water and the cigarette paper impregnated with the solution in the final stage of manufacture of the paper or just before making it into the cigarettes. 25

The impregnating materials preferably include organic nitrogenous substances of high nitrogen content which are completely combustible. It has been found that many amino acids, preferably aminoacetic acid, $\text{CH}_2\text{NH}_2\text{COOH}$, are suitable
30 substances. These acids, and some other substances, are preferable to natural nitrogenous substances like gelatin or proteins, because those natural substances tend to inhibit combustion and alter the texture of the paper. Aminoacetic
35 acid is readily soluble in water, while gelatin and proteins are limited in solubility and yield viscous solutions which stiffen or size the paper though it is possible to use them with nitrates. Similar good results are obtainable with urea,
40 CON_2H_4 , which is easily soluble in water. Another satisfactory substance is hexamethylenetetramine, $\text{C}_6\text{H}_{12}\text{N}_4$, also readily soluble in water. Completely combustible inorganic salts of high
45 nitrogen content, like ammonium nitrate, which is readily soluble in water, may also be employed.

It has been found that, depending upon the paper stock used, one of the above substances, or a combination thereof, may be employed to produce the effects described. It has also been
50 found that the desirable effects as regards production of an alkaline smoke, combustibility, and other advantages may be enhanced by adding an alkaline earth nitrate, preferably calcium nitrate. It is found that calcium nitrate, and to some ex- 55

tent barium and strontium nitrate, cause the paper to burn more evenly than other nitrates. They may be used for this purpose either alone or in combination with the organic nitrogenous substances mentioned. They do not alter the feel or texture of the paper.

Ordinary cigarette paper impregnated with the following solutions (A, or B, or C, etc.) and dried provides a paper which upon combustion yields an alkaline smoke.

Substance	Impregnating solution, showing percent of substance dissolved in water										
	A	B	C	D	E	F	G	H	I	J	K
Aminoacetic acid.....	2	2								2	2
Urea.....			2	2							
Hexamethylenetetramine.....						2	2				
Ammonium nitrate.....								4	2	2	
Calcium nitrate.....		2		2			2		2		
Potassium nitrate.....											2
Urea nitrate.....					2						

The chemicals used and their proportions may be varied considerably depending upon the result desired and upon the nature of the paper stock and its weight and texture. The smoke may be neutral if the nitrogenous substances are present in proper proportion.

It has been found that an impregnating solution containing 5% calcium nitrate or 5% potassium nitrate will produce a paper yielding mild alkaline smoke though the ash and burning qualities are undesirably affected, while weak solutions of those chemicals do not produce a paper yielding alkaline smoke. Thus control through the inorganic ash alone cannot yield a satisfactory cigarette for all purposes.

Variations may be made in the kind of nitro-

genous chemicals used, whether organic or inorganic. We may use salts of amino acids or other nitrogenous organic compounds. Those compounds which contain a low percentage of nitrogen and which leave a high percentage of ash are not usually best for the purpose in hand. Preferable compounds are those which contain a high percentage of nitrogen and are completely combustible, or those which contain nitrogen and yield an alkaline, earth metal ash upon incineration.

A paper containing both a highly nitrogenous organic compound and an inorganic alkaline earth nitrate provides very satisfactory combination because the inorganic nitrate regulates and controls the burning of the organic nitrogen compound.

Having thus described certain embodiments of the invention what is claimed is:

1. A cigarette paper carrying a nitrogen-bearing compound selected from the group consisting of water-soluble amino-acids, urea, ammonium nitrate, urea nitrate and hexamethylenetetramine, in such proportion that the burning paper yields an alkaline smoke.

2. A cigarette paper carrying a nitrogen-bearing compound selected from the group consisting of water-soluble amino-acids, urea, ammonium nitrate, urea nitrate and hexamethylenetetramine, and also carrying a nitrate selected from the group consisting of alkali metal nitrates and alkaline earth metal nitrates, in such proportion that the burning paper yields an alkaline smoke.

3. A cigarette paper carrying ammonium nitrate and a water soluble amino acid in such proportions that the burning paper yields an alkaline smoke.

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