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METHOD OF PRODUCING CIGARETTE PAPER

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2 Claims. (Cl. 92—21)

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Our invention relates to cigarette paper and more particularly to improving the ashing properties of cigarette paper when burned as the wrapper on a cigarette.

A desirable paper ash is one that has a minimum of carbonized or incompletely burned residue, has a grayish-white color, adheres to the tobacco ash and thereby avoids dropping of ashes on the smoker's clothing, but is nevertheless easily flickable at the will of the smoker. In the past, it has not been uncommon for a cigarette to produce black, curling ashes that fall from the cigarette onto the smoker's clothing.

In the application of Robinson E. Matthews and Ward D. Harrison, Serial No. 162,402, filed May 16, 1950, now Patent No. 2,580,568, there is disclosed a cigarette paper having the above-mentioned desirable ashing properties, which are obtained by incorporating in the paper approximately 0.1% to 1% of ammonium phosphate. We have found that it is important to maintain the ammonium phosphate as such, that is, to prevent its decomposition or reaction with the calcium carbonate filler or free lime in the paper. If it is allowed to react with the filler or with the free lime its original property of effecting the above desired type of ash is greatly reduced or entirely lost, depending upon the extent of the reaction. The ammonium phosphate reacts very slowly with the calcium carbonate form of filler because of the low solubility of the latter in water, but will react readily with the free lime, calcium hydroxide, content of the filler which may be present originally or is produced by hydrolysis of the calcium carbonate.

This hydrolysis and the succeeding reaction of the ammonium phosphate with the calcium hydroxide content is likely to take place during the manufacture of the cigarette paper, particularly during passage of the wet sheet over the hot drier rolls on the paper machine. The moisture and elevated temperature greatly accelerate the reaction between the ammonium phosphate and any free lime that is present or is forming during this operation. It also accelerates the rate of hydrolysis of the calcium carbonate to form free lime.

In our application Serial No. 228,982, filed May 29, 1951, now Patent No. 2,580,610, we have disclosed a procedure for minimizing the above mentioned reaction between the ammonium phosphate and the calcium hydroxide, namely, incorporating in the cigarette paper sheet, by means of a size press or applicator roll, a small amount of phosphoric acid in the form of a dilute solution in

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water, which neutralizes the free lime or calcium hydroxide and thereby prevents it from reacting with the ammonium phosphate. As a result, the ammonium phosphate is maintained as such and produces the desired ashing properties in the paper. Practical disadvantages to the use of the phosphoric acid, as above described are the corrosive effect of the dilute solution on the equipment, e. g., pipe, tanks and pump parts, and the formation of calcium phosphate scale on the drier rolls following the point of application of the ammonium phosphate and phosphoric acid solutions. This is especially true when these chemicals are added by means of an applicator roll at the press section of the paper machine because of the relatively higher concentration of ammonium phosphate required and the larger amount of water in the cigarette paper sheet after the applicator roll, as compared with conventional size press application.

In accordance with the present invention, we obtain the desirable effect on the ashing properties of the paper with ammonium phosphate and at the same time avoid the above described operational disadvantages attendant to the use of phosphoric acid. We accomplish this result by incorporating in the filler or in the paper furnish, a small amount of magnesium carbonate which neutralizes the calcium carbonate content of the filler and prevents its reaction with the ammonium phosphate. Apparently the magnesium carbonate reacts with the small amount of free calcium hydroxide present in the calcium carbonate, to form magnesium hydroxide and calcium carbonate, thus:

$$MgCO_3 + Ca(OH)_2 \rightarrow Mg(OH)_2 + CaCO_3$$

The insoluble calcium carbonate thus formed simply adds to the supply of calcium carbonate filler and the very insoluble magnesium hydroxide is likewise retained as a small adjunct to the original supply of filler with the net result of almost complete reduction of the alkalinity of the system.

As to the amount of the magnesium carbonate to be used in accordance with this invention, it may vary upward from a relatively minute minimum, such as 0.5% based on the weight of filler or 0.1% based on weight of paper. In usual commercial practice the amount of magnesium carbonate used would fall within the range of approximately 0.5% to 2% based on the weight of filler, and a typical percentage used would be 1% for the normal type of precipitated calcium

carbonate that is conventionally used as a cigarette paper filler.

The magnesium carbonate may be incorporated, as above indicated, according to different procedures and with satisfactory results. For example, it may be added directly to the calcium carbonate filler, or to the paper furnish before the filler is added, or added to the furnish at the same time or after the filler is added. Two typical procedures followed in the paper mill are as follows:

Example I

To a paper machine chest containing refined cigarette paper pulp at a consistency of about 2.5% there is added 11 pounds of magnesium carbonate to 80 cubic meters of stock volume in the chest. The stock is then pumped to the Jordan, following which there is added the regular calcium carbonate in the form of a slurry. The pulp-filler furnish is run over the paper machine in the conventional manner, and the ammonium phosphate is applied to the sheet either by an applicator roll or a size press.

Example II

Magnesium carbonate is added to the furnish just prior to the paper machine as a 0.5 lb./gal. slurry in water at the rate of 250/ml./min. when the paper machine is running at a speed to give 10 lb. cigarette paper per minute. The paper sheet is formed and the ammonium phosphate applied as in Example I above.

When the ammonium phosphate solution is applied to the wet paper web containing cellulose fiber and calcium carbonate filler, and no magnesium carbonate is present, the ammonium phosphate appears to decompose by reacting, in the presence of moisture, with the free calcium hydroxide to form calcium phosphate and liberate ammonia. The calcium phosphate does not have the property of producing the desirable type of cigarette paper ash above described. Thus, it is important to prevent the decomposition of the ammonium phosphate—which results in formation of calcium phosphate—and to preserve the ammonium phosphate for controlling the cigarette paper ash. This we have accomplished by use of the minute amounts of magnesium carbonate which apparently functions as above described to neutralize the free calcium hydroxide content of the calcium carbonate and prevent it from reacting with the ammonium phosphate.

The filler commonly used in cigarette paper to regulate the porosity, and hence the rate at which it burns on the cigarette, is calcium carbonate. It is ordinarily added to the flax or other cellulosic pulp furnish in an amount sufficient to give a filler content of about 20%–25% in the finished paper, and it constitutes the principal ash-forming constituent in the cigarette paper.

Cigarettes rolled in the paper, prepared as above-described, burned so as to leave fine, discontinuous flakes of paper ash, which closely adhered to the tobacco ash, and these cigarettes upon storage retained their fine ashing properties, when burned, to a much better extent than when the magnesium carbonate was not used.

This is a division of our copending application Serial No. 255,733, filed November 9, 1951.

Various modifications and changes may be made in the foregoing process, materials and products, without departing from the spirit and scope of our invention as defined in the appended claims.

We claim:

1. A process of producing desired ashing properties in cigarette paper containing cellulosic fibers and calcium carbonate filler, comprising incorporating in the pulp-filler furnish sufficient magnesium carbonate to provide in the cigarette paper produced therefrom, approximately 0.5% to 2% magnesium carbonate, based on the weight of filler, sheeting the paper furnish and incorporating in the paper sheet sufficient ammonium phosphate to provide in the cigarette paper approximately 0.1% to 1% ammonium phosphate, said magnesium carbonate functioning to neutralize any free calcium hydroxide content of the calcium carbonate filler and prevent reaction between said calcium hydroxide and said ammonium phosphate, whereby the ammonium phosphate can function effectively to provide the desired ashing properties in the cigarette paper.

2. A process of producing cigarette paper containing cellulosic fibers and calcium carbonate filler, comprising incorporating in refined cigarette paper pulp a controlled amount of magnesium carbonate in the proportion of about 11 pounds of magnesium carbonate to 80 cubic meters of the cigarette paper pulp stock of about 2.5% consistency, sheeting this cigarette paper pulp on a paper machine and incorporating in the wet paper sheet sufficient ammonium phosphate to provide in the finished cigarette paper approximately 0.1% to 1% ammonium phosphate.

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