# United States Patent [19]

**Michelson**

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[54] **METHOD OF MAKING A CIGARETTE OF REDUCED BIOLOGICAL DAMAGE CAPABILITY**


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[58] **Field of Search** ..... 131/2, 9, 15, 17, 131/140



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[57] **ABSTRACT**

This invention relates to a method for making a cigarette which has the same smoking properties as an ordinary cigarette but reduces components contained in the smoke of such a cigarette which cause cancer on the skin of mice. The method includes adding to the cigarette paper calcium sulfamate in an amount of from 0.1% to 1.0%, by weight, based on the combined weight of the tobacco and cigarette paper. Ammonia is added to the tobacco in an amount of from 0.015% to 0.15%, by weight, based on the combined weight of the cigarette paper and tobacco and the tobacco containing ammonia is wrapped with the cigarette paper containing the sulfamate salt. The preferred amount of calcium sulfamate in the paper, by weight, is from 0.2% to 0.8% and the preferred amount of ammonia in the tobacco is from 0.03% to 0.12%, by weight.


**7 Claims, No Drawings**

# METHOD OF MAKING A CIGARETTE OF REDUCED BIOLOGICAL DAMAGE CAPABILITY

## BACKGROUND OF THE INVENTION

In recent years, the concern for the health of tobacco smokers, particularly cigarette smokers, has increased. The reason for this concern is because of the evidence gathered by scientists around the world that smoking definitely endangers the health of the smoker to a greater or lesser extent, depending upon the amount of the smoke, the extent to which it is inhaled, and the person's susceptibility to being injured by tobacco smoke. For example, it is definitely established that cigarette smokers are more apt to develop lung cancer, bronchitis, emphysema, and suffer other biological damage than non-smokers. Figures from Smoking and Health, report of the Advisory Committee to the Surgeon General, indicate that heavy smokers are 15 to 25 times more susceptible to the risk of lung cancer than that of non-smokers and that light smokers' changes of developing lung cancer is five to 10 times that of non-smokers. In addition, the mortality of smokers because of bronchitis and emphysema is five to eight times that of non-smokers.

Because of the foregoing and other evidence that smoking is detrimental to the health and well-being of people of all ages, the Federal government of the United States has required all cigarette manufacturers to place on cigarette packages the warning that "The Surgeon General Has Determined That Cigarette Smoking Is Dangerous To Your Health." In spite of this warning, the consumption of cigarettes and other tobacco has actually decreased very little from the prior years. It is thus very apparent that people who are addicted to cigarette smoking are very unlikely to quit merely because they run the risk of having their health seriously impaired.

It is thus a desideratum in the art to produce a tobacco composition, the smoke of which has a reduced amount of components which are apt to cause biological damage to the smoker. It is therefore not surprising that in the past decade the prior art has endeavored to produce a safe tobacco, particularly safe cigarettes. For the most part, the prior art attempts have centered around the idea of filtering out or screening the tars produced during the smoking of the tobacco. However, this has not been entirely satisfactory because inter alia it appears that the materials produced in the smoking of the cigarette which cause biological damage can not be filtered out selectively and therefore the filtered smoke still contains substantially the same proportions of deleterious material as the unfiltered smoke.

## SUMMARY OF THE INVENTION

The present invention provides cigarette meeting the above desideratum in that the cigarettes produced by the method of the present invention produce a smoke which contains fewer components which cause cancer on the skin of mice than a corresponding untreated cigarette. This surprising result is obtained by the present invention by adding a critical amount of calcium sulfamate to cigarette paper and adding a critical amount of ammonia to the tobacco.

Thus, it can be seen, that the principal object of the present invention is to disclose and provide a method for making a cigarette composed of cured tobacco wrapped in paper, the smoke of said cigarette having a significantly reduced amount of components which cause tumors on the skin of mice.



Another object of the present invention is to disclose and provide a method for treating cigarette paper with calcium sulfamate and treating the tobacco thereof with ammonia.

Still another object of the present invention is to provide a novel method for producing novel cigarettes by applying an aqueous solution of calcium sulfamate to the paper of such cigarette by contacting the paper with a solution containing calcium sulfamate and spraying ammonium hydroxide on the tobacco and wrapping the tobacco containing ammonia with the calcium sulfamate treated cigarette paper.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

The foregoing objects, and others, are accomplished by the present invention by the addition of from 0.1% to 1.0% of calcium sulfamate, calculated as $Ca(SO_3NH_2)_2$, to the cigarette paper and the addition of ammonia to the tobacco in an amount of from 0.015% to 0.15%, by weight. The preferred range of calcium sulfamate added to the paper is from 0.2% to 0.8% and the preferred range of ammonia added to the tobacco is from 0.03% to 0.12%, all percentages being by weight, based on the combined weight of the tobacco and cigarette paper.

The ammonia can be added to the tobacco in any convenient manner; however, it is preferred to add the ammonia to the tobacco (preferably cut or shredded tobacco) by spraying a solution of ammonium hydroxide on the tobacco while the tobacco is being rolled and tumbled in order to insure that the ammonia is distributed substantially uniformly throughout the tobacco. Thereafter, if necessary, the tobacco can be dried to remove the solvent (e.g. water) for the ammonia. However, inasmuch as tobacco utilized for cigarettes contains a certain amount of moisture it may not be necessary to dry the tobacco after the addition of ammonia thereto.

It is even more preferred if the ammonia is added during the time when other additives such as humectants, sweetners and flavoring agents are being added to the tobacco. These additives are added to the tobacco by so-called casing solutions. For example, in general, there are at least two casing solutions which are added separately to the tobacco. Humectants such as glycerine are added to the tobacco by dissolving the humectant in water and then spraying the resulting solution on the tobacco. Sweeteners are also added in the same manner in that the sweetener is dissolved in an aqueous medium and the resulting solution sprayed on the tobacco. These two types of additives are usually applied as one solution. Inasmuch as ammonium hydroxide is water soluble it is preferred if the ammonium hydroxide is added to the above-identified aqueous casing solution. However, it is also possible that ammonia can be added when the flavoring agents are added to the tobacco. Generally speaking, the flavoring agents such as peppermint oil are applied in an alcohol medium.

The calcium sulfamate is conveniently added to the paper via an aqueous solution inasmuch as calcium sulfamate is soluble in water. Thus, it becomes convenient, to add the calcium sulfamate in an aqueous solution which will contain other normal cigaratte paper

additives by passing a roll of commercial cigarette paper through the aqueous solution of calcium sulfamate and squeezing the excess solution out by pressure rollers. Normally, utilizing this method, 70 percent of the calcium sulfamate solution will be retained on the paper. Therefore in order to prepare a cigarette paper containing 0.2 percent, by weight, of calcium sulfamate (calculated on the weight of the paper and tobacco) the cigarette paper is passed through an aqueous solution containing 6.34 pounds of calcium sulfamate made up to 12 gallons by the addition of water. In order to prepare a cigarette containing 0.8 percent calcium sulfamate it is merely necessary to pass the cigarette paper through an aqueous solution containing 25.35 pounds made up to 12 gallons by the addition of water.

In order to demonstrate the effectiveness of the present invention two different groups of cigarettes were made containing varying amounts of calcium sulfamate and ammonia. The first group contained 0.06 percent ammonia in the tobacco and 0.38 percent calcium sulfamate on the paper. The second group contained about 0.09 percent of ammonia in the tobacco and 0.58 percent of calcium sulfamate on the paper. Another group of cigarettes was designated as the control group and contained the same standard blend of cigarette tobacco and the same batch of cigarette paper as was utilized on the test cigarettes. The untreated cigarettes provide a control against which to compare the treated cigarettes, in order to evaluate the effectiveness of the treatment.

The cigarettes from all three groups are smoked in a manifold-type smoking machine, one 2-second puff per minute, with the suction pressure equal to that which delivered 17.5 ml./sec. of smoke in sample cigarettes of the respective groups. The smoke is condensed in two liter collection flasks immersed in dry ice-methanol mixture. The condensate is removed from the flasks with acetone. The acetone suspension is concentrated in a flash evaporator until all of the acetone is driven off. The remaining "crude tar" is treated with an equal volume of acetone and then eight volumes of heptane are added slowly with vigorous shaking to provide a two-phase system. The upper phase is concentrated in a flash evaporator until all of the heptane is apparently driven off. It has been shown that this fraction of the tar contains all of the carcinogenic activity that is found in crude cigarette tar.

The various tars collected as exemplified above were diluted such that equivalent weights of crude tar were present in the appropriate test solution for each group of cigarettes used. Female ICR Swiss mice at 60–70 days of age were used in the test for tumor activity. The mice were divided into two groups, 100 in each group. The mice in each group were shaved and then painted two times daily, 5 days a week, for 44 weeks with the solution of tar obtained as indicate supra. About once a month the tar was replaced by a fresh batch which was obtained in exactly the same manner as the original tar. After a period of 44 weeks it was determined tha the smoke of the Group I treated cigarettes produced 50 percent fewer tumors on the skin of mice than the control group had and the Group II cigarettes produced 40 percent fewer tumors than the control group. At the end of the sixtieth week the Group I cigarettes produced 30 percent fewer tumors than the smoke of the untreated cigarettes and the Group II cigarettes produced 27 percent fewer tumors than the smoke of the untreated cigarettes.

In the foregoing embodiment the ammonia was applied to the tobacco by spraying a 58 percent ammonium hydroxide solution onto the tobacco; however, the ammonium can be added to the tobacco in any convenient manner and the invention is not limited to spraying an aqueous solution of ammonium hydroxide thereon. Similarly, the calcium sulfamate can be added to the cigarette paper in any convenient manner and not necessarily by an aqueous solution thereof.

I claim:

**1.** A method for producing a cigarette which, when smoldered produces a smoke which has a lesser amount of components which cause tumors on the skin of mice which comprises uniformly distributing throughout the paper from about 0.1% to 1.0%, by weight, of calcium sulfamate and uniformly distributing throughout the tobacco of the cigarette from about 0.015% to 0.15%, by weight, of ammonia and wrapping the thus obtained paper around the tobacco to produce a cigarette.

**2.** A method according to claim **1** wherein the amount of calcium sulfamate in the paper, by weight, is from 0.2% to 0.8% and the amount of ammonia in tobacco is from 0.03% to 0.12%, by weight.

**3.** A method according to claim **1** wherein the ammonia is uniformly distributed throughout the tobacco by contacting said tobacco with a solution of ammonium hydroxide.

**4.** A method according to claim **3** where the solution containing ammonium hydroxide is an aqueous solution.

**5.** A method according to claim **3** wherein the ammonium hydroxide is in an alcoholic medium.

**6.** A method according to claim **1** wherein the calcium sulfamate is added to the paper by contacting said paper with a solution containing calcium sulfamate.

**7.** A method according to claim **6** wherein the solution containing calcium sulfamate is an aqueous solution.

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