

## UNITED STATES PATENT OFFICE

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## CIGARETTE AND CIGARETTE PAPER MANUFACTURE

No Drawing.

Application filed June 16, 1932. Serial No. 617,600.

Our present invention relates generally to paper manufacture, and has particular reference to cigarette paper.

A general object of our invention is to provide a new and improved type of cigarette paper, produced or treated by means of a novel procedure, whereby the paper may be imbued with useful properties and qualities which are lacking in the ordinary cigarette paper now almost universally used in the manufacture of cigarettes.

It is a primary object of our invention to provide a cigarette paper which is water-resistant.

Cigarette paper consists essentially of cellulose. Paper pulp of requisite purity, suspended in water, is formed into thin webs or sheets, usually on the well-known type of Fourdrinier machine; and the webs are then subjected to dehydration, drying, and calendaring. One of the essential characteristics of the finished product lies in its porosity, since it is this porosity which permits the products of combustion to escape when the cigarette is smoked. To improve the burning qualities of the paper, a filler such as calcium carbonate is sometimes employed, serving to increase the porosity of the paper and enhancing not only its opacity but also its continuity of smooth burning.

The inherent porosity of a good cigarette paper is obviously accompanied by great absorbency, which is an undesired quality in so far as it results in almost complete or immediate breakdown or disintegration of the paper whenever a drop of water comes in contact with it. This disadvantageous characteristic of ordinary cigarette paper is well-known to those who have experienced the almost complete ruination of a cigarette when it is subjected to a drop of rain or the like; or, more commonly, when the tip of the cigarette becomes wetted upon insertion into the mouth.

Any attempts to obviate the foregoing disadvantage by any ordinary type of impregnation procedure, with a view to producing a paper which is waterproof, is obviously unfeasible, and has proven so in practice, for the reason that the porosity of the paper

must be maintained in order to insure its burning qualities. Accordingly, the problem has been sought to be solved in a variety of ways involving the formation or addition of special "tips" on the cigarette, such as cork, straw, or the like. In some instances, we are aware of attempts to produce tips by forming the same of cellulose nitrate.

Tipped cigarettes are, however, notoriously disliked by the average smoker. Not only is the addition of a separate element a procedure which raises the cost of manufacture and the selling price, but it produces a cigarette which is distinctively different from the ordinary run of cigarettes, a distinction which for some reason or other does not appeal to the public generally. Furthermore, all tips of conventional character are utterly unburnable without a highly disagreeable and sometimes toxic effect.

Our present invention is predicated upon the discovery that it is possible to treat a cigarette paper by a process which essentially of the nature of impregnation or coating, and which results in imparting a water-resistant characteristic or quality to the paper, and sometimes other desirable characteristics, without in the least impairing the inherent porosity, appearance, taste, or burning qualities of the paper.

It is a feature of our invention to produce or treat cigarette paper for the purposes illustratively specified by a procedure wherein the advantages of the phenomenon known as "blooming" or "efflorescence" are resorted to. This phenomenon manifests itself in a variety of arts and under a variety of conditions and consists essentially in the formation, either on the surface or throughout the body, of a whitish or colorless, mealy or crystalline powder or crust caused by some sort of chemical action or evaporation under certain specified conditions. Ordinarily, the phenomenon of blooming is an undesirable one and is usually strenuously avoided or sought to be avoided, especially in processes involving the waterproofing of paper or similar material.

We have, however, discovered that a water-resistant material may, under certain condi-

tions, be caused to form a desirable type of efflorescence on or in cigarette paper in a manner whereby the inherent porosity and burning qualities of the paper are substantially unimpaired while a new and additional water-resistant characteristic, and other desirable characteristics, are imparted to the paper.

Although our invention is, from many aspects, not restricted to the employment of any particular type of water-resistant material, we have found it preferable and eminently satisfactory to employ a material of the class which may be generically designated as resins. Resins are insoluble in water, and yet they are soluble in organic solvents, which permit our method and mode of treatment to be economically and feasibly carried out in a commercially practical manner. Of primary importance is the fact that resins generally are amenable to the blooming phenomenon, and are readily adapted to form an efflorescence of a porous character.

Briefly, our invention resides in applying to a cigarette paper a resin dissolved in a solvent which may be evaporated under conditions inducing the formation of an efflorescent film of the resin on or in the paper; and thereupon causing the solvent to evaporate under the proper conditions to effect this purpose. We have found that our present objective is most satisfactorily carried out by dissolving the resin in a readily volatile solvent, e. g., of the class which includes carbon-tetrachloride, benzol, acetone, alcohol, and similar materials; and by permitting or causing the solvent to evaporate rapidly in a moist atmosphere. While we do not mean to restrict ourselves to any particular explanation of the nature of causes of the phenomenon which results, it is our present theory, based upon extensive experimentation and study, that the relatively rapid evaporation of the solvent reduces the temperature of the atmosphere in the proximity of the paper, thereby increasing the relative humidity in the vicinity of the resin, and thereby causing the resin to precipitate or "bloom" upon and in the pores of the paper, producing a porous film or efflorescence which imparts remarkable water-resistant qualities to the paper without in the least affecting its porosity, combustibility, or appearance.

The resins which may be employed are of the general class which includes both artificial and natural resins, gum resins, oleoresins, and the like, such as mastic, ester gum, amber, copal, dammar, guaiacum, lac, rosin, sandarac, copaiba, elemi, balsams, coumarin, indene, etc.

By way of illustration, we will state that one method of producing or treating a cigarette paper in accordance with our present invention lies in first forming the paper in the usual manner; then subjecting it, as by im-

mersion, to a solution of mastic in carbon-tetrachloride, about 5-15 parts, by weight, of the resin being dissolved in about 100 parts of the solvent; then subjecting the paper to a squeezing action to expel any excess; and finally causing the paper to be rapidly dried, as, for example, by subjecting it to air at approximately 100° F.

The procedure involving the application of the resin solution and the subsequent drying takes less than a minute, and is carried out in an atmosphere which is purposefully prevented from being overheated or dry. The resultant paper looks and feels exactly like the untreated ordinary paper; its burning characteristics are substantially unimpaired; and yet the paper has the remarkable quality of resisting the penetration or absorption of water, an advantage whose importance can hardly be over-estimated and which ear-marks the product as a new, different, and hitherto unattained thing.

We have found it equally satisfactory to treat the paper with the resin solution by coating the paper on one or both sides with the material, as well as by immersing it into a bath of the material. Accordingly, although the immersion procedure is preferable, it will be understood that our invention may be carried out with equal facility by applying the resin solution by a coating procedure.

Our invention also contemplates the employment of resins, such as the oleoresins, which carry with them certain essential oils or similar ingredients of aromatic qualities. It is possible, for example, by employing a balsam resin to produce a cigarette paper, and a finished cigarette, of new and improved aromatic qualities, the term "aromatic" referring not only to odor but also to taste. The water-resistant characteristics are achieved in conjunction with a property causing the cigarette to embody a pleasing and novel aroma and/or taste when it is smoked, this result probably being due to the fact that the essential oil or similar ingredient is released under burning conditions.

Under certain circumstances, we have found it advantageous to employ a small percentage of a waxy substance, such as paraffine, carnauba wax, cerowax, or the like, in conjunction with the resinous substance. For example, in the formula hereinafter illustratively specified, about two parts, by weight, of paraffine may advantageously be added, the wax in some way seeming to enhance the practice of the process and the water-resistant qualities of the resultant paper.

It will also be understood that we deem a finished cigarette consisting of a rolled body of tobacco ensheathed in a cigarette paper produced or treated in accordance with our

present invention to fall within the purview of our invention.

The term "efflorescence", as the same is used herein and in the appended claims, is intended to signify the phenomenon hereinbefore referred to whereby the resin apparently forms a film or layer of porous character on the paper, although it will be understood that the resin is quite possibly in efflorescent condition within the pores of the paper as well. Stated otherwise, it is our contention and belief that the resinous material is impregnated in the paper in a mild manner, the amount of resin being insufficient to affect the porosity and burning qualities of the paper, yet enough to impart a water-resistant characteristic to the paper. It will be understood, however, that the impregnation referred to is not of the ordinary character wherein the pores of the paper are filled and whereby the porosity is seriously impaired, if not completely destroyed, but that the deposit of the resin either on or in the paper is of the character which is the result of a blooming or efflorescence whereby a broken and porous or powdery deposit results.

In general, it will be obvious that changes in the details herein described for the purpose of explaining the nature of our invention may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is therefore intended that these details be interpreted as illustrative, and not in a limiting sense.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is—

1. A cigarette paper having a porous efflorescence of water-insoluble material thereon.

2. A cigarette paper having a resinous efflorescence thereon.

3. The herein-described method of treating cigarette paper to make it water-resistant, which consists in forming thereon a porous efflorescence of resin and a waxy substance.

4. The herein-described method of treating cigarette paper to make it water-resistant, which consists in applying to it a water-insoluble material dissolved in a solvent and adapted to effloresce on the paper when the solvent evaporates.

5. The herein-described method of treating cigarette paper to make it water-resistant, which consists in applying to it a resin dissolved in a solvent, and causing the solvent to evaporate so as to deposit an efflorescence of said resin on the paper.

6. The herein-described method of treating cigarette paper which consists in applying to it a resin dissolved in a readily vola-

tile solvent, and causing the solvent to evaporate in a moist atmosphere.

7. The herein-described method of treating cigarette paper which consists in applying to it a resin of the class which includes mastic and ester gum, said resin being dissolved in a readily volatile solvent of the class which includes carbon-tetrachloride, acetone, and benzol, and causing the solvent to evaporate under conditions inducing the formation of an efflorescence of said resin on the paper.

8. The herein-described method of treating cigarette paper which consists in applying to it a resin of the class which includes mastic and ester gum, coumarin and indene, together with a waxy substance of the class which includes paraffine, carnauba wax, and cerowax, said resin and waxy substance being dissolved in a readily volatile solvent of the class which includes carbon-tetrachloride, acetone, and benzol, and causing the solvent to evaporate under conditions inducing the formation of a porous efflorescence of said resin and waxy substance on the paper.

In witness whereof we have signed this specification this 13th day of June 1932.

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