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## CIGARETTE

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The present invention relates to the provision of improved tobacco smoking preparations of the paper enclosed variety and it particularly relates to those smoking preparations which are commonly known as cigarettes.

The paper material which is customarily employed for encapsulating or encircling the tobacco material in cigarettes is usually very thin, porous, and absorbent. During the smoking process, in which one end of the cigarette is placed in the mouth, the paper at such end of the cigarette becomes soaked with moisture, loses a great deal of its strength and tends to disintegrate. In addition the paper tends to absorb nicotine where moistened by the lips, which nicotine tends to stain the teeth, tongue and lips of the smoker.

To avoid these difficulties it has been frequently proposed to apply independent tips to cigarettes, usually of cork or straw, which will protect the end of the cigarette placed in the mouth and prevent staining, soaking and disintegration of cigarette paper. However, these tips increase the cost of the cigarette and are not favored by a great many smokers. In addition these independent tips are not readily applied by automatic machinery now widely used for making cigarettes. These independent tips tend to crack and separate from the cigarette and moreover are very dry to the taste.

In common with untipped cigarettes, these tipped cigarettes usually must be first moistened by the smoker before they are ignited and otherwise they tend to adhere to and injure the epidermis of the lips. Also in the case of feminine smokers, the surface of both the tipped and untipped cigarettes tend to remove lipstick and to become stained therewith.

Moreover, it is generally objectionable to most smokers to have visible or appreciable tippings on cigarettes as there is a tendency to regard these as something artificial applied to the cigarette to the deterioration of the smoking properties and is something which deteriorates from the flavor and smoking qualities of the cigarette.

An object of the present invention is to provide a cigarette in which the tip portion of the cigarette to be placed in the mouth has been so treated as to be moisture-resistant and so that it will not tend to become soaked by the mouth fluids or disintegrate during the smoking process, all of this without changing the appearance, flavor or smoking qualities of the cigarette and without any modification therein as may be detected by the ordinary smoker.

Another object is to provide a cigarette in which the tip portion of the cigarette to be placed in the mouth has been so treated so as to be provided with a substantially invisible and insoluble protective impregnation or surfacing which will tend to prevent adherence to the lips of the smokers, which will not require moistening before ignition and consumption.

Another object is to provide a cigarette with a substantially invisible and undetectable tipping, which will not tend to become stained and stain the lips, tongue and teeth of the observer with nicotine and which will not tend to adhere to or remove lipstick from the lips of a consumer.

Another object is to provide an invisible tipping for cigarettes which will not tend to become detached, or crack or peel off even though the cigarettes be stored over extended periods and subjected to rigorous moisture application as is encountered during consumption.

Another object is to provide an invisible tipping for cigarettes which may be readily applied by the automatic machinery now widely utilized in cigarette manufacture.

Other objects are in part obvious and in part pointed out hereinafter.

In accomplishing these objects it has been found necessary to apply a tipping to the cigarette in such a manner that the tipping materials are absorbed and taken up by the cellulosic fibers in the interior of the sheet of cigarette paper which has been placed at the tip of the final cigarette. If the tipping materials are applied in the form of chemical solutions, such solutions should be so dilute and applied in such limited quantities that the cigarette paper will absorb them and become saturated with them without being subjected to any substantial loss of strength and without there being any substantial residual amount of the tipping materials after evaporation of the solvent left upon the surface of the cigarette paper. The solution should always be applied in such inappreciable quantities that the drying action will be for the most part accomplished by absorption of the solvent or solution in the fibers of the paper. However, this operation will be subsequently followed by evaporation of the solvent itself from the fibers of the paper.

In the preferred form of the invention, a combination of a greaseproofing and waterproofing material in a suitable solvent is applied to the paper in substantially great dilution and in relatively small quantity so that there will be no residual amount of the material left upon the

surface of the paper after absorption and evaporation. The preferred treating solutions are emulsions preferably containing substantially less than 5% of solid material but if desired, solutions of suitable treating agents in organic solvents may also be employed. The preferred solution should also be of such concentration and dilution that if applied to a glass surface it should leave a substantially inappreciable dull opaque white film in a period of substantially less than one minute.

The preferred waterproofing materials include preferably hydrocarbon, oleaginous, waxy, fatty acid and high molecular weight ester materials, which materials are either dispersed in colloidal or molecular form in a solvent or carrying medium before application. The preferred oily or waxy materials are stearic acid, high melting point paraffin combinations, high molecular weight aliphatic alcohols, and high molecular weight fatty esters of substantially greater molecular weight than the stearin of commerce. These materials upon evaporation and deposition from emulsions or solutions should leave a white coherent or incoherent film of substantially inappreciable thickness of less than  $\frac{1}{1000}$  of an inch.

As the greaseproofing materials the preferred materials are either a plastic protein nature such as gelatine preferably in toughened or hardened condition, high grades of glue, casein, and so forth. However, for this greaseproofing purpose cellulosic esters, such as cellulose nitrate and cellulose acetate may also be employed, as may also odorless soluble transparent resinous materials of either synthetic or natural origin. These greaseproofing materials are also preferably dispersed in molecular or colloidal form in liquid medium and they may be utilized in equal proportion to the moistureproofing material, although in preferred instances the proportion of the greaseproofing material to the waterproofing material may vary from 1 to 10 to 10 to 1, depending upon the particular cigarette and the particular character of the cigarette paper to which it is applied.

The preferred liquid medium or carrying agent is water either in pure form or in the form of a solution containing certain desired electrolytes, preferably those of bivalent, trivalent and polyvalent metals which will not lend any particular color to the final treated paper. If desired, electrolytes including the salts of alkali metal and alkali earth metal may also be employed. With water, emulsions or colloidal solutions are most preferably employed, but with organic solvents, such as acetone, benzene, ether, carbon tetrachloride, ethyl acetate, and so forth, frequently true solutions may be obtained. However, it is generally preferred to utilize the colloidal suspension or emulsion rather than the true solution with provision that the solution in all cases is of such dilution and is utilized in such small quantity that it will be all substantially absorbed by the paper of the cigarette tip without substantially wetting such paper and without leaving a visible or perceptible coating on the cigarette paper.

In preparing the solutions in organic solvents the materials in the amount of preferably less than 5% are incorporated in the solvent, but preferably emulsions are prepared in water by adding the greaseproofing and waterproofing material combined or separately in solution or in finely

divided form to a suitable amount of water with vigorous agitation.

If desired the oily water insoluble or waxy material may also be dispersed in the water in the form of a colloidal suspension or emulsion by means of a homogenizing apparatus or by means of a colloid mill. If desired, both the step of first dissolving the oily or waxy material in an organic solvent, then dispersing it in water, and then passing it through a homogenizing apparatus or a colloid mill may be employed. Various emulsion stabilizers or protective colloids may be employed, such as alkali metal salts of high molecular weight acids, esters of high molecular weight fatty alcohols, soluble proteins, such as gelatine, and so forth. These protective colloids may also be added for the purpose of improving the qualities of the tipped cigarette and particularly in the case of gelatine to make the impregnated paper substantially greaseproof.

Particularly satisfactory emulsions have been prepared by using complex alkali metal salts of sulphonic acids as emulsifying agents and as ingredients of the emulsion.

The emulsions as usually prepared have finely divided colloidal particles for carrying a negative electrical charge. It is often desirable, because of an opposite charge of the cigarette paper, to prepare the emulsions with particles of positive electrical charge. To do this to the emulsions in dilute or concentrated condition may be added suitable materials having charge reversing properties.

These emulsions may be conveniently prepared of the same strength and character as the ordinary printing inks utilized in connection with automatic cigarette making machinery. As previously pointed out, however, the application of the present invention relates essentially to the production of an invisible impregnation of the cigarette paper and it is necessary therefore to control the addition and strength of the emulsion so that the emulsion will be absorbed almost completely by the interior fibers of the cigarette paper without leaving any substantial sheen or gloss or any other perceptible effect upon the surface of the cigarette. In connection with a cigarette making machine the tipping solution or emulsion is applied to the continuous strip or cigarette paper which is being fed to the tobacco filling part of the mechanism adjacent to the position where the cigarette paper is usually printed. Preferably the cigarette paper is passed over one or a series of rolls and when passing over one of these rolls, there is applied to it an emulsion or solution carrying roll, which application may be followed by the application of heat to evaporate the emulsion and/or by the application of brushing rolls which will roughen the surface of the paper so that it will be in the same condition as before the application of the tipping solution. Although the ordinary embossed printing rolls may be employed for applying the tipping solution, preferably the tipping solution is applied by means of an intaglio roll or by means of an offset printing belt, under which conditions very small amounts of emulsion may be more accurately and more satisfactorily employed. In the case of an intaglio printing roll, the depth of the indentations in the surface of the roll may be conveniently controlled to give the desired quantity of the solution, whereas with an offset printing operation only that amount of solution is applied to the cigarette paper as has been previously applied to the belt. Although the

tipping solution may be applied to the whole width of the paper it is desired to only apply it to the paper in such width that there will be a marginal space left on either side for the application of adhesive to form the final round cigarette. This has the additional advantage that the strength of the cigarette paper is substantially unimpaired when the solution is applied while the cigarette paper is being passed over the face of a large roll and the solvent is substantially all removed before the paper leaves these carrying rolls. Any tendency of the tipping solution to weaken the paper does not at all affect the operation of the machine.

The following are examples of satisfactory emulsions which may be employed. (1) An aqueous emulsion containing between 1 to 5% gelatine, between 1 to 3% of alum and between 1 to 5% of paraffin. (2) An aqueous emulsion containing about 2% of lauryl alcohol, 2% of gelatine and a small percentage of aluminum sulphate. The aluminum sulphate acts to toughen the gelatine. (3) An aqueous emulsion containing between 1 to 5% of myricyl alcohol, oleic alcohol, stearic acid, and colorless glue. (4) An aqueous suspension containing finely dispersed high viscosity colloidal cellulose nitrate particles, gelatine, and aluminum sulphate.

Although solutions of nitrocellulose, cellulose acetate, ether cellulose, styrol resins, urea formaldehyde resins and glycerine-phthalic acid resins may be employed, these materials may also be utilized in the form of their colloidal suspension in water.

Some suggestions have already been made for applying lacquer solutions to cigarettes to tip them, as for example in the British Patent No. 28,490 of 1913 to Lewis John Riley and British Patent No. 264,045 to William Richard Walkey. None of these patents, however, achieve invisible tippings and the tipped end of the cigarette, even if not colored, has a distinct appearance which is very objectionable to the average cigarette smoker. Even if a slight shade, sheen, gloss or coloration appears upon the end of the cigarette, or if the paper structure has been affected so as to change its light reflecting power, the cigarette is psychologically objectionable. Even though it may not affect the taste or flavor of the cigarette by actual taste, it will seem to have such effect to the average smoker.

The important feature of the present invention, even when cellulose acetate or cellulose nitrate solutions are employed, is that they are employed in such a manner as to give an invisible altogether imperceptible impregnation of the paper at the tip of the cigarette. Moreover, the process of invisible tipping of the present invention particularly lends itself to automatic machinery which is operative at a high speed, and the ordinary tipping solutions such as those disclosed in these British patents not only would give a distinctive appearance to the tip of the cigarette but in addition would smear in the automatic cigarette making machine.

According to the present invention no matter how you hold the cigarette in the light no shine, gloss or sheen appears so that the smoker will think that it is a better cigarette paper rather than that the cigarettes have at all been treated with any chemical solutions whatsoever.

In applying solutions in volatile solvents, such as ether, acetone, benzine, ethyl acetate, ether alcohol, and so forth, separately or in combination, the solution is preferably contained in some

sort of a feed device and this feed device applies the solution to a group of rotating brushes or felts, which periodically apply the solution to the strip of cigarette paper as it is passed through the automatic machinery. In applying solutions whether in organic solvents or in the form of emulsions in water, it is desirable to apply them along the grain of the cigarette paper, and if any rubbing or frictional contact is obtained, during the impregnation or during subsequent operations following the impregnation, this action is preferably also caused to take place along the grain of the cigarette paper. In applying these solutions and emulsions the machinery is so synchronized that the solution is applied over a space which will correspond to the tips of the cigarette so that when the cigarette is subsequently cut into lengths, each end thereof will be tipped to a satisfactory depth, usually about  $\frac{1}{10}$  or  $\frac{1}{8}$  of the length of the cigarette.

The following are examples of organic solvent solutions which may be employed.

(1) Cellulose acetate 1 gram, acetone 50 grams, carbon tetrachloride 10 grams. (2) A 5% nitrocellulose solution and a half and half mixture of ethyl acetate and acetone. (3) Ether-alcohol containing 1% of gelatine and 2% of stearic acid, and if desired, also small quantities of diphtalate. (4) Small quantities of lanolin, ceresin and Carnauba wax dissolved in carbon tetrachloride. (5) Small quantity of Carnauba wax, cerosene wax, paraffin dissolved in a mixture of benzine and acetone. (6) Small quantities of glyptal and vinyl resins dissolved in acetone.

Gums, such as gum arabic, gum sandarac and gum manila may also be employed, and under certain conditions natural hydrocarbon plastic materials, such as balata and rubber may also be employed, either in the form of a colloidal suspension, such as latex or in the form of a solution in an organic solvent. Here again these materials whether in the form of a solution or an emulsion should be employed in such limited quantity and in the form of such thin films that the material will all be absorbed into the body of the paper without leaving any perceptible marking upon the surface thereof.

It is true that it has been often suggested to tip the end of cigarettes with plastic materials. For example, in Patent No. 709,369 to Lewis H. Sondheim, a tipping solution is utilized consisting of a solution of shellac and alcohol which is very visible as is clear from the drawings of this patent. A later Patent No. 1,013,825 was also granted to Sondheim and according to this patent the end of a cigarette, tobacco and all, was coated with a composition containing shellac, stearic acid and also powdered chalk, talcum, or other similar filling material. Tippings of this character also clearly differ quite greatly from the invisible, imperceptible, inappreciable tipping impregnation of the present invention.

Attention may also be called to Patent No. 1,153,574 to Joaquin Rovira and Hermann Ahrie, in which patent a varnish consisting of Celluloid dissolved in amyl-acetate and acetone was used as an adhesive to attach cork flour to the tip of a cigarette. This tipping had all the disadvantages of being visible and readily noticeable to the smoker and therefore was not particularly of the character desired.

Tipping solutions have also been applied to cigars as in the Meyer Patent No. 931,629, the tipping solution according to this patent being a

solution of acetyl cellulose. However, it is clear from the drawings and disclosure of this patent that here again we are dealing with an objectionable visible tipping upon the end of a cigar. The present invention on the contrary is essentially directed to invisible tipplings formed by impregnating cigarette paper.

As a special application of the present invention it is contemplated to enclose the entire cigarette including the ends in a water and moistureproof paper which may be treated according to the impregnating process of the present invention, so that each cigarette would be substantially provided with its own humidior and the tendency to dry out and become stale would be greatly decreased.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be devised without departing from the scope thereof, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping being formed by applying an emulsion to the cigarette paper before said paper has been formed into the cigarette containing less than 10 per cent of grease and water-proofing materials.

2. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette, making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping being formed by impregnation of the cigarette paper with greaseproofing and water-proofing materials, said materials being carried in a liquid medium containing less than 10 per cent thereof, said liquid carrying grease-and-water-proofing materials in insufficient quantities to prevent such liquid medium from being readily absorbed in the cigarette paper and in such sufficient quantities to assure satisfactory grease-and-water-proofing of the paper where applied and said liquid medium being applied in such small quantities that it will substantially all be absorbed by the interior of the paper and dry therein without drying over the surface thereof.

3. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping being formed by impregnating the paper with waxy and protein materials, said materials

being carried in a liquid medium containing less than 10 per cent thereof.

4. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping being formed by adding such small quantities of waterproofing and greaseproofing materials in a liquid carrying medium in amounts less than 5 per cent that the solution will be substantially completely absorbed by the interior fibers of the paper, said liquid carrying grease-and-water-proofing materials in insufficient quantities to prevent such liquid medium from being readily absorbed in the cigarette paper and in such sufficient quantities to assure satisfactory grease-and-water-proofing of the paper where applied and said liquid medium being applied in such small quantities that it will substantially all be absorbed by the interior of the paper and dry therein without drying over the surface thereof.

5. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping consisting of a mixture of stearic acid and gelatine applied in the form of a liquid mixture of less than 5 per cent concentration.

6. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping consisting of a mixture of stearic acid, gelatine and aluminum sulphate applied in the form of a liquid mixture of less than 5 per cent concentration.

7. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping consisting of a mixture of one part of stearic acid, one part of gelatine and one-half part of aluminum sulphate applied in the form of a liquid mixture of less than 5 per cent concentration.

8. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking

ing properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, said tipping including a high molecular weight fatty alcohol, and gelatine applied in the form of a liquid mixture of less than 5 per cent concentration.

9. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and staining with nicotine and other materials, the paper at the tipped end of the cigarette being impregnated with very small quantities of stearic acid and gelatine applied in the form of a liquid mixture of less than 5 per cent concentration.

10. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, the paper at the tipped end of the cigarette being impregnated with very small quantities of moisture and grease proofing materials applied thereto in the form of a relatively dilute dispersion of less than 5 per cent concentration, in a liquid medium, said dispersion being of such a character so as to leave a substantially inappreciable dull opaque white film in a very short period of about  $\frac{1}{1000}$  of an inch in thickness when applied in the form of a thin film to a smooth glass surface, said dispersion including 1 to 5 per cent of gelatine, 1 to 3 per cent of alum and 1 to 5 per cent of paraffin and the remainder water.

11. A cigarette provided with an invisible, imperceptible, and inappreciable tipping which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture

or staining with nicotine and other materials, the paper at the tipped end of the cigarette being impregnated with very small quantities of moisture and grease proofing materials applied thereto in the form of a relatively dilute dispersion of less than 5 per cent concentration, in a liquid medium, said dispersion being of such a character so as to leave a substantially inappreciable dull opaque white film in a very short period of about  $\frac{1}{1000}$  of an inch in thickness when applied in the form of a thin film to a smooth glass surface, said dispersion including 2 per cent lauryl alcohol, 2 per cent of gelatine, relatively small amounts of aluminum sulphate and the remainder water.

12. A cigarette paper having its tip end forming portion treated with an emulsion containing waxy and protein material, said emulsion having the property of rendering said tip end portion non-absorbent to and non-stainable by nicotine and indistinguishable from the remaining portion of the cigarette.

13. A cigarette, the paper covering of which is provided with an invisible, imperceptible, and inappreciable impregnation which does not cause any sheen, gloss, or change in light reflecting power upon the exterior surface of the cigarette and which greatly improves the smoking properties and qualities of the cigarette making the tip of the cigarette non-sticking in regard to the lips of the smoker and preventing soaking and disintegration of the paper with moisture or staining with nicotine and other materials, the paper being impregnated with very small quantities of moisture proofing and grease proofing materials applied thereto in the form of a relatively dilute dispersion in a liquid medium, said dispersion being of such a character so as to leave a substantially inappreciable dull opaque white film in a very short period of about  $\frac{1}{1000}$  of an inch in thickness when applied in the form of a thin film to a smooth glass surface, said dispersion being substantially completely absorbed and deposited within the pores of the paper without apparently affecting the surface of the paper.

14. The cigarette of claim 13 in which the dispersion is of less than 10% concentration and consists of an organic solvent solution of waxy and resinous materials.

15. The cigarette of claim 13 in which the dispersion is an emulsion of waxy and resinous materials and has a concentration of substantially less than about 10%.

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