The conventional factory rolled cigarette generally embodies a blend of foreign and domestic tobaccos mechanically rolled into cylindrical form within a paper tub or envelope having open ends. During the rolling operation, the tobacco is compacted sufficiently to hold it within the tube ends and at the same time provide for the draft necessary for smoking.

Cigarettes of this character remain open to certain objections. For example, it is not uncommon for such cigarettes to stick to the lips of the smoker so tightly, particularly when first brought into contact therewith, that if attempt is made to remove the cigarette, the skin of the lip will be removed with it. Moreover, persons who smoke cigarettes with wet lips find that the paper envelope softens to such extent as to free appreciable parts of the tobacco which fall into the mouth and the wetting of the envelope at the tip causes saliva to work by capillary action along the cigarette an appreciable distance. These difficulties have been somewhat remedied by the employment of cork or straw tips, but even when such tips are employed, and whether the cigarette is smoked with dry or wet lips, it is found that shreds of tobacco fall into the mouth and constitute an annoyance and discomfort to the smoker. The result is that although upwardly of one hundred billion cigarettes are annually consumed in the United States alone, and although the disadvantages to which we have referred have long been recognized by cigarette smokers, no adequate solution of the problem has been thus far advanced.

With the foregoing considerations in mind, the object of the present invention is primarily to provide a cigarette wherein the tip, adapted to be held between the lips, is water-proofed in such manner as to preclude wetting of the paper envelope, while the tobacco shreds in the region of the corresponding end of the cigarette are made relatively rigid, adhesively secured to one another, so that the said tip end of the cigarette has a definite stiffness or body, is water-proofed and the tobacco shreds or grains precluded from inadvertent release from the remainder of the cigarette during ordinary smoking, the latter. These results were achieved in a simple, expeditious and economical manner without the application of cork, straw or metal tips and without modifying the taste of a conventional cigarette or imparting thereto undesirable properties or characteristics.

We have found that it is highly practical to solve the problems which thus have long vexed this industry by treating the tip portion of the cigarette with an appropriate liquid composition, one specific form of which is hereinafter more fully described, and in such a way that that portion of the length of the paper tube which is exposed to the lips is rendered water-proof or saliva-proof, while the tobacco shreds of the corresponding end of the cigarette are caused to adhere to one another. The composition employed embodies appropriate solids with sufficient volatile solvent to permit of the efficient application of the composition and to provide for rapid volatilization of the solvent, leaving the solids to perform the functions stated.

During our research in connection with the composition, it became apparent that such composition, in order to be satisfactory, must necessarily conform with certain rigid requirements. The composition in its finished form must be odorless, tasteless and moisture resistant. It must be such that it will not chemically react with saliva, nor can it be affected by the products of burning incident to the smoking of tobacco. It must be absolutely harmless and it must be non-toxic. Furthermore, while obviously the mouth end would be properly designated, it must be such that, in the event the wrong end of the cigarette is lighted by mistake, or in the event the cigarette is permitted to burn down too close to the lips, no harmful effects or undesirable taste will result.

Because of the factors to which we have referred, the requirements of a proper composition for this purpose are manifestly highly exciting for, among other important considerations, the questions of taste and odor are important. Manufacturers of cigarettes have gone to great expense in developing and standardizing and rigidly maintaining the smoking characteristics of any given brand. This of course involves not only the tobacco blend, but the particular paper used in conjunction therewith. Consequently it is important that the taste, odor and aroma of the smoke remain absolutely unchanged. To this end no change should be made in the burnable portion of the cigarette and any treatment which is to be applied thereto should be confined strictly to the mouth end thereof. The composition hereinafter more fully described conforms to all of these requirements and is also such that it may be applied to the paper wrapper prior to, during or after fabrication of the cigarette, and that it may be applied to the tobacco filler after the formation of the cigarette, without causing cigarettes which may be adjacent one
another during the treatment to adhere to one another. This composition also forms a part of this invention.

The invention also consists in a novel method whereby the cigarette of this invention may be economically and economically manufactured.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description, when read in conjunction with the accompanying claim.

In practically carrying out the invention, we first compound an appropriate composition in liquid form, the same preferably being an ethyl cellulose solution. It is found in this connection that a solution of ethyl cellulose in anhydrous ethyl alcohol will give the best results and if the solution is to be applied by spraying, as may conveniently be the case, a concentration of 5% to 7% of ethyl cellulose in the solvent will give about the right consistency. The anhydrous alcohol used may be pure or modified with small amounts of other non-toxic solvents. Either a high or low viscosity ethyl cellulose may be used depending upon the method of application and the character of the finished product desired. If it should be desired to improve the end of the cigarettes by applying a drop or two of the composition directly to the tobacco, it is more desirable to use a high viscosity ethyl cellulose, so as not to extend the penetration of the composition too rapidly into the paper as this would cause wrinkling or discoloration. On the other hand, if it is desired to apply the composition by spraying, a relatively low viscosity cellulose composition may be employed, as the application of the composition may, by the method, be more accurately controlled. The paper wrapper may be treated prior to its association with the tobacco in which case it may be dipped in the solution or the solution may be applied by a sprayer or by suitable application rolls.

If the composition is to be applied to the paper after the cigarette is formed, we preferably employ a cellulose of relatively high viscosity, so that the composition will form a film on the surface without appreciable penetration of the paper for a low viscosity cellulose is employed, the cellulose might penetrate the paper and dissolve some of the coloring matter from the tobacco with the resulting discoloration of the paper.

For the reasons given, the use of the high or low viscosity cellulose in solution will be chosen in accordance with the particular method of manufacture carried out and the invention is not therefore to be understood as limited in this respect.

We have referred specifically to a composition embodying a solution of ethyl cellulose in absolute or anhydrous ethyl alcohol. This solution has been found to give highly satisfactory results and to possess all of the exacting requirements incident to use in this connection. It causes the deposit of a moisture-resistant, flexible, solid cellulose which is odorless, tasteless and watervisible in color. It is non-toxic, moisture resistant and unaffected by the products of burning incident to the smoking of tobacco. It will not chemically react on saliva and if the wrong end of the cigarette is lighted by mistake or the cigarette is permitted to burn too close to the lips, no harmful effects or undesirable taste will result. Furthermore, in the event that for any reason the slightest trace of the solvent remains, through incomplete evaporation, combustion thereof will leave no toxic compounds and the presence of the alcohol will accentuate rather than detrimentally affect the aroma of the cigarette.

If a relatively high viscosity ethyl cellulose is employed for the treatment of the lip end of the cigarette, a thin film on the surface of the paper results which tends to give a luster and a smoothness which is pleasing to the lips. By the use of a lower viscosity, however, there is an appreciable penetration or absorption by the paper so that the presence of the composition in a finished cigarette is not visually apparent. Waterwhite treatment will, we feel, ordinarily be found most desirable, although, if desired, the solution may be appropriately colored or tinted if this is preferred.

It is of course possible to apply solutions of benzy! or methyl cellulose in suitable solvents, but the benzyl or methyl group is apt to give off some traces of odor, may be considered slightly toxic and is therefore not so desirable as the ethyl group.

We have also tried stable chlorinated products. Some of these chlorinated materials possess most of the properties of the product described in an article of this kind, but they give off chlorinated compounds when burned and therefore cannot be considered as non-toxic.

Shellac in regular and refined forms in dissolved solution in alcohol have been tried, but they impart color to the paper and odor in burning.

Paraffine and other natural synthetics may also be employed in some cases, but are not recommended.

In the accompanying drawing:

Figure 1 shows one way of practising the present invention.

Figure 2 shows, in a more or less diagrammatic manner and on an enlarged scale, a cigarette made according to the method of this invention.

As hereinafter stated, the cigarette of this invention may be made in various ways. By preference, however, we apply the composition to the paper prior to rolling the cigarette and before the paper comes in contact with the tobacco. In other words, we prefer to apply to the paper a band of the composition so locating the same with respect to the strip of paper that when the cigarette is completed the band will be located at the tip end of the cigarette. The paper with the band of composition thereon is thereupon fed into position to receive tobacco which is caused to be deposited on the paper. The paper is thereupon rolled to form the same into a tubular shape with its edges adhesively secured together and with the tobacco enclosed within the tube. The conventional cigarette making machine may be employed in this connection, the same being provided with composition applying devices to apply the composition in the form of a band at appropriate intervals in the length of the paper as the latter is fed to the tobacco feeding station. A longitudinally fluted roll extending transversely of the paper strip and positioned in advance of the tobacco feeding station and cooperating with an appropriate doctor roll may be used to advantage in this connection to apply the composition. The method of this invention is not, however, limited to mechanical construction.

The paper strip having been wrapped about the tobacco and sealed in the convenient way as...
by a sealing roll 5, is cut to length by cut off wheel 6 and discharges the cigarettes in the conventional hopper 7, the tips of which are externally treated with the composition as described. Before or after the cigarettes have been deposited in the hopper, the tobacco shreds at the tip ends of the cigarettes are subjected to the treatment of this invention. This is preferable although not necessarily accomplished by means of a spray application of the composition. If the sprayer 8 is used, the ends of the cigarettes are sprayed with the composition in sufficient quantities to cause the composition to penetrate the ends of the cigarette to such extent that the shreds of tobacco in this vicinity are subjected to contact with the composition. As the solution evaporates, a fine film or residue of the solids of the composition remain causing the shreds of tobacco to be individually strengthened or stiffened while said grains are collectively bonded to one another and may be bonded to the paper wrapper to form, in effect, a relatively rigid plug of tobacco at the tip end of the cigarette. The composition is, however, of such character that it will not fill up or clog the voids between the shreds of tobacco and will not therefore interfere with proper draft necessary in the smoking of a cigarette.

It is of course practical to roll a cigarette into finished form and thereafter apply the composition to the tip end without departing from this invention, but we believe it to be more efficient and desirable to treat the paper prior to the rolling operation and to treat the tip end of the tobacco subsequent to the formation of the cigarette. In this way, the treatments can be carried out separately and to meet individual requirements of the paper and tobacco in order to give the best results. In practice, we preferably treat the paper for a distance of one inch or less at the tip end as this will allow for ample lip room, while the tobacco shreds or grains at the corresponding end of the cigarette are preferably treated for a distance of approximately one-quarter inch although a lesser distance will suffice.

The finished cigarette of this invention possesses all the desirable characteristics of the conventional cigarette, so far as taste, aroma and smoking is concerned, without possessing the disadvantage to which we have hereinbefore referred. It has the further advantage that the lips will not stick to the paper or wet the same and the tobacco at the tip end will not be released into the smoker's mouth. Furthermore, the tip end of the cigarette will have appreciable body in that it will be materially more rigid than the conventional cigarette and will not be so readily crushed between the lips.

It will be apparent from the foregoing detailed description of this invention that it embodies numerous novel features. It deals with a cigarette which, in its preferred form, has a treated moisture-proof paper at the smoking tip with treated tobacco at the corresponding portion of the cigarette and at the same time a cigarette having an appreciable body at the tip and without added wrappers, such as cork, straw or metal foil. We consider a cigarette embodying all of these characteristics to be most desirable, particularly when the standardized character of the tobacco and the paper are left unchanged in that portion of the cigarette which is to be burned. It is however, possible that some manufacturers may prefer to manufacture cigarettes embodying certain features of this invention without, however, utilizing all. We have in mind in this connection, the use of the water-proofed tip leaving the rest or remainder of the paper untreated as hereinbefore described, but without treating the tobacco at the corresponding end of the cigarette. Furthermore, it is entirely possible that others may desire to treat the tobacco at the tip end of the cigarette to produce the stiffened body without treating the paper. For these reasons, the present invention is to be understood as fully commensurate with the appended claim.

Furthermore, while we have referred to the application of the composition by spraying or through the use of an applying roll, we are aware that it may be applied by dipping, brushing, flowing or that physical contact may be obtained in other ways either with or without accompanying capillary flow of the composition.

We have noted that a cigarette treated in accordance with the manner hereinbefore described appears to afford a slightly cooler smoke than the conventional cigarette and therefore one having a better taste. We are unable to give a satisfactory explanation for this cooling effect, but it is notable and in all probability accounts for the slightly better taste of the cigarette thus produced; for the sensitivity of the smoker's tongue to the flavor of tobacco is materially increased when subjected to less heat.

Having thus fully described the invention, what we claim as new and desire to secure by Letters Patent is:

Method of forming a partially waterproofed cigarette which comprises feeding a strip of paper, applying thereon a band of a solution of ethyl cellulose and ethyl alcohol, permitting the ethyl alcohol of the solution to volatilize and deposit on the paper a band of solid ethyl cellulose, folding said paper while positioning therein loose tobacco, compressing the tobacco and sealing the paper therearound, cutting the paper and tobacco to form a cigarette, and treating one end thereof with a solution of ethyl cellulose and ethyl alcohol to bond the tobacco particles together, whereby said particles at the treated end are maintained in a stiffened and assembled relation and the cigarette prevented from sticking to the lips.

EDWARD HOXIE MCArdLe.
LEo ROoN.