This invention relates to tobacco pipes and coatings or finishes therefor. 

Hereinafter, and over a period of many years, it has been almost the universal practice, in the manufacture of tobacco pipes, to construct these pipes of brisar wood by suitably working the material to appropriate shape. Thereafter the pipe is sanded to give it a smooth surface and an appropriate solution of an anilin dye is thereupon applied to give the desired color. Any small defects or holes, such as are frequently found in wood of this kind, are plugged or filled with colored putty or paste filler and, when sufficiently dried, the excess stain is wiped off and permitted to fully dry. Thereafter shellac is applied to form a shell like coating which is buffed to the desired finish on a buffing wheel.

Although this finish is the one which has been generally accepted throughout the trade, it is open to numerous disadvantages. For example, it is found that while a fine, high luster may be initially obtained in the manner stated, such luster is soon lost when the pipe is used due, in all probability, to the fact that shellac is thermoplast. Thus, when the pipe becomes heated, during smoking, the shellac resin becomes fused and soaks into the pores of the wood leaving a dull, unpleasing appearance.

The foregoing facts have been long recognized and attempts have been made, over a number of years, to improve the finish on pipes with a view primarily to imparting to them initially a luster which would wear well and last indefinitely. Various synthetic resins, as well as varnishes made with oil reactive resins, have been thoroughly tried and tested and a wide variety of lacquers have been experimented with for this purpose, but to apparently the same end, namely, they will not give the permanent high finish desired.

With the foregoing considerations in mind, we have spent very considerable time in experimentation and research to produce the results desired and we have discovered that the problem involves numerous considerations which must be fully worked out in order to obtain a satisfactory solution. It is found, for example, that where synthetic resins or spar varnishes, as well as varnishes made from oil reactive resins are used, that it is impossible to have them air dried in a manner to yield polymerized film of a character to be unaffected by service smoking. In order to get any appreciable results from these types of products, it has been found necessary to bake them gradually for periods ranging from one to two hours and sometimes for much longer periods at elevated temperatures. In the absence of the baking, the film is found to blister badly upon smoking the pipe. On the other hand, if an attempt is made to bake such finishes at temperatures appropriate to give a permanent coating, these temperatures are such as to detrimentally affect the wood of the pipe. Furthermore, it is the common practice, in the art of making tobacco pipes, to fit the bit of the pipe prior to applying the finish, so that during the fitting operation the finish will not be marred or scratched. Thus, when the baking operation is carried out, it must be commercially practiced with the bit in place and, since a great many of the materials used in bit construction are not able to stand the temperature required, any proposed use of the baked finish is, for the reasons stated, out of the question. Moreover, if an attempt is made to bake a finish after fitting of the bit, and in the absence thereof, the resulting heat is very apt to produce such changes in the shank of the pipe, that the bit will not thereafter fit. It is then necessary to refit the same with added expense, a tendency to scratch the finish and an appreciable number of rejected parts due to inability to obtain a proper fit.

Attempts to use cellulose acetate lacquers or cellulose nitrate lacquers have led to no more practical results. With cellulose acetate lacquers in unmodified form, the adhesion or bond with the wood is so poor that the finish may be considered as no more than a poor fitting envelope and resulting slight pressure or attrition on the film will cause this envelope to readily loosen from the wood and peel. In modified form, cellulose acetate lacquers blister on strong and continued smoking and produce a most undesirable appearance. When using cellulose nitrate lacquers, a relatively high nitrocellulose content is necessary to give the desired appearance, but when a sufficient quantity of nitrocellulose is present, the high temperature of smoking causes the nitrocellulose to decompose, turn brown, lose its luster and in many cases to blister. If it is attempted to modify such lacquers with plasticizers and resins, the finish is soft and thermoplastic and will not withstand abrasion or perspiration on the hand of the user. For these reasons, the methods of finishing to which we have referred have not been satisfactory and although others have attempted to solve the problem in question through the use of such materials, they have been uniformly unsuccessful for the reasons, among others, to which we have referred.
Our experimentation has convinced us that a satisfactory pipe finish must conform to the following requirements. It must not be thermoplastic, and must be able to withstand not only the heat of bufeting and smoking without fusing or softening; it must be sufficiently heat resistant as not to discolor unduly or darken the grain and color of the wood of the pipe; it must be resistant to perspiration in a high degree as it is continually handled during service smoking and the heat of the pipe in contact with the human hand always develops an appreciable amount of perspiration; it must be resistant to tarry matter and acids which are developed during the destructive distillation of tobacco while smoking and which acids and tarry matter permeate the pipe and tend to attack the finish; it should have a fair degree of porosity to water vapor for there is always considerable quantities of moisture given off by burning of moist tobacco and from saliva in the bowl of every pipe and this is apt to permeate the wood of the pipe and be driven out through the pores thereof during service smoking; and it must be of such character that it will have no inherent odor or produce any odor during smoking as the slightest trace of a foreign material will detrimentally affect the taste of the pipe.

Particular attention is called to that property of the finish heretofore referred to and which relates especially to its porosity to aseptic vapor. This phase of the situation is an important one, although not heretofore recognized in this art. If the coating material or film used on the exterior surface of the pipe is not of such nature that it permeate the aseptic vapor, which finds its way through the pores of the wood, be discharged therethrough, it is found that this aseptic vapor under pressure of heat generated during smoking will cause the finish to be lifted from the bowl of the pipe at various points with resulting blistering of the film.

The object of the present invention is to provide a finish coating which will be free from the disadvantages of prior practice and which will conform to the requirements above enumerated. Exhaustive tests have shown that a lacquer containing the following combination fulfills the requirements stated:

<table>
<thead>
<tr>
<th>Parts by weight</th>
<th>Nitrocellulose</th>
<th>Ethyl cellulose</th>
<th>Butyl acetate</th>
<th>Butyl alcohol</th>
<th>Ethyl alcohol</th>
<th>Xyloil</th>
<th>Mineral spirits 80/100</th>
<th>Toluol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.05</td>
<td>2.75</td>
<td>5.30</td>
<td>1.30</td>
<td>11.95</td>
<td>8.30</td>
<td>12.80</td>
<td>20.85</td>
</tr>
</tbody>
</table>

In the above composition, the nitrocellulose constitutes a tough material which may be buffed and will wear well and at the same time is relatively economical. It does not, however, adhere very well to the pipe body. It is, moreover, relatively unstable in light and heat and if incorporated merely with a suitable solvent, it will not produce a satisfactory finish. We therefore include the ethyl cellulose, or an alternative, benzyl cellulose, either or both of which act as stabilizers for the nitrocellulose both as to light and heat. When incorporated with nitrocellulose, ethyl cellulose or benzyl cellulose correct this situation, act as stabilizers and have the further property of serving as bonding elements. Wherein the nitrocellulose has a relatively poor bond which might cause it to peel, ethyl cellulose or benzyl cellulose have good adherence and when incorporated with the nitrocellulose produce a hard tough composition thoroughly stable and well adapted to withstand the wear. From a practical standpoint, the nitrocellulose is relatively cheap while the ethyl cellulose or benzyl cellulose are quite expensive.

It will be noted that the above composition contains approximately 8.5 per cent solids of which 68.6 per cent is nitrocellulose and 31.4 per cent ethyl cellulose. These percentages, however, are merely illustrative, as we have found that of the said solids a very satisfactory finish was produced embodying 85 per cent nitrocellulose to 15 per cent ethyl cellulose. It is possible that other percentages might be employed in this connection, but we do not feel it desirable to increase the nitrocellulose much above 85 per cent, as there is a tendency beyond this point for the finish to become too hard and brittle and the bond insufficient.

It is further interesting to note in connection with this composition of nitrocellulose and ethyl cellulose or benzyl cellulose that ethyl or benzyl cellulose imparts to the film a more moisture resistant characteristic than nitrocellulose, while the nitrocellulose imparts porosity to the film. Consequently, when nitrocellulose and ethyl cellulose are incorporated, the resulting film is moisture resistant, well able to withstand wear and the same time relatively porous, so that moisture which penetrates the wall of the pipe bowl may be exuded through the pores and is not retained between the wood and the coating in such manner as to form steam which would otherwise result in blistering of the film.

The solids referred to, i. e., nitrocellulose and ethyl cellulose, or the alternative benzol cellulose, constitute, as stated, the solids of the composition. The remaining elements constitute in effect an appropriate solvent combination. Their respective functions in the composition will now be briefly enumerated.

The ethyl acetate is a highly volatile solvent for nitrocellulose, while the butyl acetate is a less volatile solvent thereof. The two, these two when combined is that when the finish is sprayed on, it will not dry too quickly or bluish. The butyl and ethyl alcohols are solvents for nitrocellulose and ethyl cellulose and facilitate proper flow of the composition during application, so as to give a uniform coating without marks. The highly volatile toluol and slower evaporating xylool enter into the solvent composition to produce the desired solvent balance in order that the composition may properly spread or flow and properly dry with a uniform surface free of marks and without blushing. The mineral spirits assist in giving the composition proper liquid body for spraying and also help to reduce cost, while the ethylene glycol monoethyl ether further assists in obtaining the proper solvent balance. Xylool and toluol are examples of hydrocarbons used in the solvent mixture. The said various solvents to which we have referred have been found in practice to produce a very satisfactory solvent balance and to give highly efficient results in the production of the proper finish coating. We do not, however, wish to limit the present invention to this particular composition of solvents or to the particular por
percentages of the several solvents in the composition as these may be varied within the skill of the art provided a proper solvent balance is obtained as will be well understood. Nevertheless, the foregoing example is given for the purpose of concrete illustration of a highly satisfactory solvent mixture.

In finishing a pipe according to this invention, the pipe, having been properly shaped and sanded, may be left in its natural color or may be stained with an appropriate dye, such as anilin dye. Any holes or pockets in the grain may be filled with colored putty or any other appropriate filler. Thereafter, a solution embodying the present invention is applied to the pipe, by dipping or spraying, preferably by spraying the same thereon and the pipe is laid aside for the finish to harden in the air. If desired, two or more thin coats are sufficient and are in fact preferred because the coating is more porous and allows of proper exit of the moisture which may penetrate the bowl from within, in order to eliminate the formation of blisters. The composition has good covering power and one or two coats will produce a tough porous finish which is non-thermo plastic and will stand buffing without softening and also withstand the temperatures of service smoking without fusing or softening. It is highly heat resistant and will not unduly discolor or obliterate or darken the grain of the wood of the pipe. It is moisture resistant and is not affected by perspiration on the hands of the smoker nor is it affected by the moisture which penetrates the bowl of the pipe from within. It is not affected by tarry matter and acids which result from the destructive distillation of tobacco during smoking and it positively will not blister under heat or aqueous vapor resulting from service smoking. Furthermore it is absolutely free from odor or taste and thus will not detrimentally effect the aroma of the tobacco or the taste.

An important advantage of the composition to which we have referred is that it requires no baking, dries and hardens quickly and thus eliminates the loss due to rejection of damaged pipe bowls, so common in the baked finished practice. The bits may be properly fitted to the shanks of the bowls and the bowls thereupon finished as stated without in any wise causing distortion or modification in the shape thereof. When the finish is dry and hard, it may be buffed in the usual manner to obtain the desired polish.

The foregoing detailed description sets forth the invention in its preferred practical form, and the invention is to be understood as fully commensurate with the appended claims.

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

1. As a new article of manufacture, a moisture permeable tobacco pipe bowl having, on its exterior surface, a heat resisting, non-thermoplastic cellulose coating permeable to water vapor.

2. As a new article of manufacture, a moisture permeable tobacco pipe bowl having, on its exterior surface, a heat resisting, non-thermoplastic cellulose coating permeable to water vapor, and wherein the coating includes a cellulose ester and a cellulose ether.

3. As a new article of manufacture, a moisture permeable tobacco pipe bowl having, on its exterior surface, a heat resisting, non-thermoplastic cellulose coating permeable to water vapor, and wherein the coating includes nitro-cellulose and ethyl cellulose.

4. As a new article of manufacture, a moisture permeable tobacco pipe bowl having, on its exterior surface, a heat resisting, non-thermoplastic cellulose coating permeable to water vapor, and wherein the coating includes nitro-cellulose and benzyl cellulose.

5. As a new article of manufacture, a moisture permeable tobacco pipe bowl having, on its exterior surface, a heat resisting, non-thermoplastic cellulose coating permeable to water vapor, and wherein the coating includes nitro-cellulose.

6. As a new article of manufacture, a moisture permeable tobacco pipe bowl having, on its exterior surface, a heat resisting, non-thermoplastic cellulose coating permeable to water vapor, and wherein the coating includes the solid constituents of a solution of a cellulose ester and a cellulose ether in a combination of organic solvents including esters, alcohols and hydrocarbons.

MICHAEL A. DORIAN.
LEO ROON.