This invention relates to the manufacture of coated fibrous compositions, and it has particular application to the manufacture of cardboard plates, cups, spoons, etc., for use in the culinary arts, which are greaseproof and relatively impervious to water.

Heretofore it has been customary to manufacture paper plates, either by pouring a pulp suspension upon a screen having the contour of the finished product and drying the product so formed, or by compressing a sheet of cardboard to impart the desired contour to the finished product by means of a die or press mechanism. Thereafter the resulting product is treated to render it impervious. The product formed by the latter process will be found better suited to a spraying treatment since it is more rigid and dense than the product obtained by the deposition of a pulp upon a screen.

While the product obtained by these processes is satisfactory, it lacks uniformity, is costly in that its necessitates considerable manual labor and it is wasteful of the coating composition.

According to this invention, a fibrous sheet of the desired specification for the finished product, is coated on one side with an impregnating or coating composition such, for example, as a nitrocellulose or synthetic resin solution, etc., after which the solvent is allowed to evaporate. Subsequently, the fibers on the untreated surface are softened with water or by any other suitable agent after which the sheet is cut, pressed into the desired shape and finally dried. The resulting product will be found to be uniform, relatively impervious and otherwise of superior quality and durability.

While the present invention is particularly applicable to the manufacture of culinary utensils, it is not so limited, but extends to a large variety of fibrous or cardboard utensils which one may desire to render impervious to water or decorative by the application of a coating composition. In some instances, particularly when the article must be of a rigid construction necessitating a coarse fibrous base, one may, advantageously, apply a thin sheet of paper to the coarse fibrous base before application of the coating composition. In this way one is enabled to render the material impervious as well as decorative with substantially less coating composition than would otherwise be required.

In general, we have obtained satisfactory results with nitrocellulose lacquer compositions and prefer to employ such compositions for this purpose. The lacquer may be applied with the aid of a doctor blade, a roll type coating machine, or, if desired, it may be sprayed on the fibrous base with the aid of a spray device such as is commonly employed in the arts. For many purposes, a single sprayed coating will be found sufficient.

A nitrocellulose lacquer suitable for use in coating the fibrous sheet before the plates are stamped out may be made as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low viscosity dope</td>
<td>10 ozs</td>
</tr>
<tr>
<td>R. S. ½ sec. gum</td>
<td>5 ozs</td>
</tr>
<tr>
<td>Ester gum</td>
<td>10 ozs</td>
</tr>
<tr>
<td>Diphenyl phthalate</td>
<td>5 ozs</td>
</tr>
<tr>
<td>Pigment</td>
<td>8 ozs</td>
</tr>
<tr>
<td>Lacquer solvent</td>
<td>1 gal</td>
</tr>
</tbody>
</table>

The ingredients of the solvent may be proportioned substantially as follows:

- 25% active solvent such as ethyl acetate, butyl acetate, etc.
- 20% alcohol such as denatured alcohol, butyl alcohol, etc.
- 55% hydrocarbon such as benzol, toluol, etc.

It is to be understood that various gums or synthetic resins may be substituted for all or part of the ester gum. Tricresyl phosphate or other plasticizers commonly used in nitrocellulose solutions may be substituted for the diphenyl phthalate. The viscosity may be varied as needed by using a different viscosity cotton. The ratio of cotton to plasticizer to gum may be varied to meet the demands of flexibility. Increased amounts of plasticizer give increased flexibility but tend to cause sticking during the "stamping out" process.

In lieu of the nitrocellulose lacquer coating, one may substitute a solution of a natural or synthetic resin such as is made by condensing phthalic anhydride with polyhydric alcohol together with modifying agents such as oils, fatty acids, resin, etc. This class of compositions has heretofore found use in the lacquer and quick drying varnish arts as well as in the molded resin arts. The material in a dissolved form is applied in a manner analogous to that in the case of nitrocellulose lacquers. For certain purposes, a decorative effect is desired in which case a pigment or dye is incorporated in the impregnating composition. Uniformity of shade is readily obtained by the present invention since the coating is applied with uniform thickness. Mottled or variegated effects are readily obtained where desired. Similarly, various designs or patterns may be applied to the product.
In practising the invention the sheet of fibrous material is conducted, preferably continuously, through a machine equipped with doctor blade, rolls or sprays for applying the coating material, after which the solvent is evaporated. Thereafter, it is conducted over a wire roll to contact the unimpregnated surface and which supplies sufficient moisture to the fiber to soften the same. The wetting solution may contain either a pigment or dye with a suitable binder such as casein for the purpose of tinting the untreated side. For this purpose a water soluble dye may be employed advantageously. In the softened condition, the sheet is conducted into a stamping or shearing mechanism wherein blanks of fibrous material are cut, after which the blanks are formed into the finished product between mating die elements. If desired, the fibers may be softened by means of steam after the cutting or stamping operation and before or simultaneously with the molding or shaping operation. In the event nitrocellulose lacquers are employed, the temperatures of the dies should not exceed substantially 180° F. In the case of the die engaging the lacquered surface, though the temperature of the die element which is in contact with the moistened surface may be substantially higher, higher temperatures may be employed in case of synthetic resins. After the shaping operation, the product is allowed to dry. If desired, the untreated surface of the molded article may be sprayed with a lacquer or solution of a resin having the same or another tint. However, for many purposes, such as plates, only one surface needs to be rendered waterproof or greaseproof. Although one specific embodiment of our invention is set forth in detail and various modifications have been indicated, the invention is not so limited, but contemplates other embodiments, and we desire, therefore, that it be restricted only as indicated in the appended claims.

What we claim is:
1. The method of manufacturing paper culinary utensils and the like which consists in rendering the paper relatively impervious to water by applying a coating composition dissolved in a volatile solvent to one surface of a fibrous paper base permitting the solvent to volatilize, softening the uncoated fibers of the base by means of water, subsequently cutting blank forms from such coated base, and finally shaping the forms.
2. The method of manufacturing paper culinary utensils and the like which consists in rendering the paper relatively impervious to water by applying a coating composition containing a volatile solvent and nitrocellulose dissolved there-in, to one surface of a fibrous paper base permitting the solvent to volatilize, softening the uncoated fibers of the base by means of water, subsequently cutting blank forms from such coated base, and finally shaping the forms.
3. The method of manufacturing paper culinary utensils and the like which consists in rendering the paper relatively impervious to water by applying a coating composition containing a volatile solvent to one surface of a fibrous paper base permitting the solvent to volatilize, softening the uncoated fibers of the base by means of an aqueous medium, subsequently cutting blank forms from such coated base, shaping the forms and thereafter applying a coating composition to the exposed uncoated paper surface.
4. The method as defined in claim 1 and further characterized in that the coated fibers are softened by means of an aqueous solution of casein containing a coloring composition whereby said fibers are colored and softened and there-after cutting the blank forms and shaping the same into the final product.
5. The method of manufacturing paper culinary utensils and the like which consists in rendering the paper relatively impervious to water by spraying a coating composition embodying a volatile solvent on one surface of a fibrous paper base permitting the solvent to volatilize, subsequently cutting blank forms from such coated base and finally shaping the forms.
6. A method as defined in claim 5 and further characterized in that a coating composition is applied to the uncoated surface of the shaped forms.

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