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METHOD OF TREATING ARTICLES OF WOOD
SUCH AS SPOOLS AND BOBBINSLouis M. Catchett, Brookline, Mass., assignor to
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Boston, Mass., a corporation of MassachusettsNo Drawing. Application December 7, 1931,
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3 Claims. (Cl. 99—12)

The present invention relates to a new and improved method of treating bobbins, spools, shuttles and similar or equivalent articles of commerce for the purpose of improving the qualities and characteristics of such articles.

The present application is a continuation in part of my application Serial No. 493,683, filed November 5, 1930.

Bobbins, spools, shuttles and the like, employed for many years in the textile industry, are commonly formed of wood; even though this material presents certain inherent disadvantages which make desirable the employment of expensive hard woods such as dogwood, rock maple and the like. Many suggestions have been made for treating the wood to improve the quality and permit the employment of cheaper soft woods. None of these suggestions, however, has resulted in commercial exploitation, primarily because of the fact that the treatment results merely in a superficial covering which is soon worn off, and in addition is affected adversely by heat, steaming or wetting. On the whole the advantages, if any, due to these treatments do not justify the additional expense involved.

It has been suggested heretofore that certain synthetic resins such as bakelite may be satisfactorily employed for impregnating or indurating certain fibrous or cellular materials such as fibreboard, asbestos board and the like for the purpose of strengthening and exteriorly finishing these materials. This treatment, however, as previously performed is not effective for the proper and commercial treatment of articles of commerce such as bobbins, shuttles and the like, and the purpose of the present invention is the development of a satisfactory and practical treatment for impregnating wooden articles of this character which may or may not be subjected to a final finishing operation after impregnation.

I have developed a new and vastly improved method for the treatment of wooden articles of manufacture such as bobbins and shuttles which must be maintained within definite limits of measurement, which results in a definite and substantial improvement in the physical qualities of the article, and at the same time permits the employment of less expensive materials than have hitherto been used.

With this end in view, I first form the wooden article, whether a bobbin, shuttle or the like, to predetermined dimensions. I may then dry the articles to a known moisture content with a diminution in size to offset any swelling which

the article gains after impregnation. This preliminary treatment, coupled with the subsequent method of impregnation, precludes any substantial departure either in dimension or shape from the properly formed article before treatment. Having thus reduced the moisture content of the formed article to a known value, or in other words, removed therefrom an approximately definite moisture content, I next impregnate the partially dried article with a potentially reactive resin varnish in liquid form, accumulations of resin upon the exterior of the article being removed following impregnation by rinsing in a solvent or a light mixture of solvent and resin. I prefer to employ a formula for impregnation which provides insufficient formaldehyde to completely react with all of the phenolic groups, so that complete polymerization is not obtained and the portion not so polymerized probably serves as a bonding cement between the wood fibres. By so doing I preclude the liability of splitting the wooden article during the process of treatment.

After suitable impregnation of the wooden article, preferably by soaking in the liquid resin varnish, the latter is cured by the application of heat, and in this connection I find it important to progressively increase the curing temperature to which the article is subjected. For example, I have found that by initially subjecting the impregnated article to a temperature of 100° C. or thereabouts, and then advancing this temperature by progressive stages of about 10° each until the final curing temperature of 150° C. is approximated, satisfactory results may be obtained.

During the curing process the articles are subjected to a substantial pressure, which may be on the order of 150 pounds per square inch, which is normally sufficient to maintain the bulk of the solvents within the formed article and preclude liberation. At the completion of curing, I have found it extremely desirable to remove these solvents by lowering the temperature to a point just above 100° C., completely removing the pressure and evacuating for perhaps ten or fifteen minutes. During the liberation of the solvents, and preferably during the entire curing period, the articles are confined in their contact to inert gases such as flue gas, nitrogen, or the like, the presence of air being strictly avoided to prevent explosive combinations between the solvent and the air.

At the completion of this process the articles may be removed, and will be found to have a

progressively increasing resin content as the surface is approached, terminating in a resin content of greatest density at the surface due to the tendency of the resin during curing to flux outwardly toward the surface of the article. The impregnation, however, is substantially more than a superficial coating, and is sufficient to adequately protect the article in usage. Furthermore, the articles so treated may be given a desirable finish, as will be obvious to those skilled in the art.

In actual practice I have found that spools and bobbins may be satisfactorily treated in the following manner: First dried in an oven temperature for approximately four hours to remove the moisture; next removed to a vacuum vessel and evacuated for a further period of perhaps two hours to evacuate and render permeable the cellular pores of the wood; next immerse it in liquid resin without breaking the vacuum, and thereafter allow it to soak at atmospheric pressures for approximately two hours; thereafter momentarily rinse it with the solvent, and then remove to a curing vessel. In the curing vessel or oven the articles are surrounded with inert gas at 150 pounds pressure, and first subjected to a temperature of 110° C. for one hour, 120° C. for one-half hour, 130° C. for one-half hour, 140° C. for one hour, and 150° C. for one hour. After curing the temperature is reduced to approximately 100° C., the pressure released and the vessel or oven evacuated to remove solvents for a period of fifteen minutes. As a final step in the impregnating treatment, and for the complete removal of the last vestige of solvent, I may subject the impregnated article to a bath of steam at 10 to 15 pounds pressure for a period of 15 to 30 minutes. This steam treatment tends to condition and shrink the article to permanent size, removes the last vestiges of solvent, and promotes an annealing effect with an accompanying reduction of internal strains with the article. It will be obvious that these times are approximate, and would be varied in accordance with the need and character of the object treated. However, they serve to indicate a simple and efficient form of the process which has been found satisfactory in use.

Aside from its applicability to the processing of textile articles such as bobbins, spools and shuttles, the present process markedly improves the physical properties of bobbins and like articles which are intended to be revolved in use, and which, in the case of textile bobbins, must remain substantially in balance with revolutions on the order of 7,000 to 12,000 per minute. Dur-

ing the normal usage of such bobbins they are subjected to steaming and wetting during the conditioning of the yarn package wound thereon, and this treatment inevitably warps and distorts the bobbin, regardless of the care with which it is initially formed. Although there has been a general recognition of these defects and widespread endeavors to overcome them, heretofore artificial treatment of this type of product has failed to achieve practical value. Frequently, if not generally, the ingredients heretofore suggested for impregnating purposes have been wholly or partially solvent under the temperatures to which the bobbin was subjected, causing the ingredients to flow from the bobbin and stain or otherwise damage the yarn.

What is claimed is:

1. The method of treating articles of the class described, which consists in initially impregnating with liquid resin varnish while maintaining a vacuum, polymerizing the resin within the wood under curing temperature and pressure, relieving the pressure in the presence of an elevated temperature to liberate the remaining solvent, and finally subjecting the impregnated article to a bath of steam under pressure to condition and shrink the article and remove the last vestige of solvent.

2. The method of treating articles of manufacture of the class described, which consists in impregnating the formed wooden article with a liquid resin varnish, polymerizing the resin within the wood with a temperature progressively increasing to the curing point of the resin and while subjected to substantial pressure in the presence of an inert gas, liberating the remaining solvents by relieving the pressure while maintaining an elevated temperature, and finally subjecting the impregnated article to a bath of steam under pressure to condition and shrink the article and remove the last vestige of solvent.

3. The method of treating articles of manufacture of the class described, which consists in removing moisture from the cellular structure of the wood, impregnating the thus-evacuated cells with a liquid resin varnish, curing the resin within the wood by subjection to temperature and pressure, removing remaining solvents by relieving pressure while maintaining the temperature above the condensation point of the solvents, and finally subjecting the impregnated article to a bath of steam under pressure to condition and shrink the article and remove the last vestige of solvent.

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