UNITED STATES PATENT OFFICE.

LEO H. BAEKELAND, OF YONKERS, NEW YORK, ASSIGNOR TO GENERAL BAKELITE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

COMPOSITE CARDBOARD.

1,019,406. Specification of Letters Patent. Patented Mar. 5, 1912.

No Drawing. Application filed November 30, 1910. Serial No. 594,979.

To all whom it may concern:

Be it known that I, LEO H. BAEKELAND, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Composite Cardboard, of which the following is a specification.

This invention relates to the manufacture of composite cardboard, or articles thereof, the cardboard possessing great strength and being highly resistant to physical and chemical agents.

The binding mixtures or agents heretofore used for gluing or fastening together several layers of paper for the manufacture of cardboard are of such character that the cardboard becomes soft or disintegrates under certain conditions of use, the binding agents being soluble in hot or cold water, solutions of sodium carbonate, oils, certain neutral solvents, or in phenol or cresol. For some purposes, however, it is desirable to provide a cardboard capable of withstanding all the above solvents or chemical agents, possessing also high dielectric properties, and capable of resisting temperatures above the boiling point of water.

In order to prepare a cardboard having the foregoing characteristics, I may proceed as follows: I apply to the surface of any of the ordinary grades of paper, or to asbestos paper or the like, a coating of a liquid condensation product of phenols and formaldehyde of such character that it is capable of transformation under the action of heat into an insoluble and infusible body. For this purpose I may use either a liquid condensation product of the character described, or a solution of the same in alcohol or other appropriate solvent. This layer is permitted to dry somewhat, when a second sheet of paper is superposed upon the first and similarly treated; or the several layers may be coated and preferably dried before being superposed. The condensation product may be applied to one or both sides of the sheets. The desired number of sheets having been assembled, the composite article is compacted by pressure, with or without the aid of heat. Heat is now applied in order to effect the transformation of the condensation product into an insoluble and infusible body. The heat may be applied during the operation of pressing or compacting the composite body, or at a subsequent stage of the process; or it may be applied partly during the pressing operation, and continued during subsequent stages. The pressed articles may be heated gradually in an oven, starting at relatively low temperatures, say 40° C. to 80° C., and gradually increasing to higher temperatures, for instance 100° C. to 140° C., the increase in temperature being so gradual as to avoid the formation of blisters or other irregularities. Instead of superposing a number of separate sheets, the liquid condensation product may be applied to a continuous sheet or web, which is then rolled upon itself into the form of a tube, suitable mechanical devices being used. The tubes thus formed may be used as such after being subjected to the hardening operation, or they may be cut and straightened into composite sheets before hardening, according to the use for which they are intended.

The condensation products for use as above may be mixed with pigments, or dyes, or they may be used in conjunction with a certain proportion of resinous material.

I claim:

A composite cardboard consisting of superposed layers of paper or the like combined with intermediate layers of an insoluble, infusible condensation product of phenols and formaldehyde.

In testimony whereof, I affix my signature in presence of two witnesses.

LEO H. BAEKELAND.

Witnesses:

HERBERT S. MAY,

WM. A. GORDON, JR.