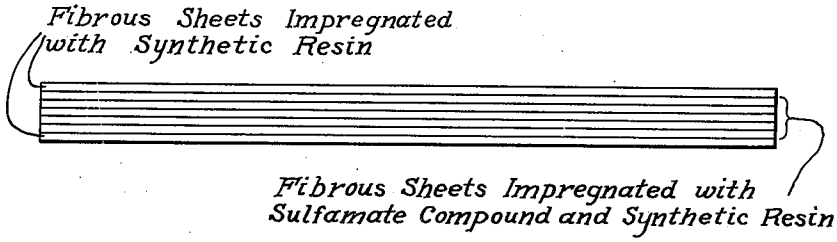
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PROCESS FOR PRODUCING MOLDED PRODUCTS

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WITNESSES:
Edward Michaels
James N. Ely

INVENTOR
Frederick P. Hunsicker.
BY Ezra D. Savage
ATTORNEY

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PROCESS FOR PRODUCING MOLDED PRODUCTS

Frederick P. Hunsicker, Wilkinsburg, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

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1 Claim. (Cl. 154—2)

This invention relates to molded products and particularly to the process for making such products.

Molded products of fibrous material impregnated with synthetic resins have been widely used in the different industries. Recently, such products have been employed in the airplane industry and in other industries where it is desired to employ materials which are resistant to fire. In service, it has been found that the known molded products utilizing the synthetic resins are not sufficiently flame-proof to be altogether satisfactory, but instead they are definitely damaged when subjected to flame, some of the molded products even carrying flame. It is, therefore, desired to provide a molded product having flameproof characteristics and which can be employed with safety in such applications.

An object of this invention is to provide a process for making a molded product of fibrous material impregnated with a resinous binder and having flameproof characteristics.

Other objects of this invention will become apparent from the following description when taken in conjunction with the accompanying drawing, the single figure of which illustrates in elevation and greatly enlarged a laminated article produced in accordance with the process of this invention.

In practicing this invention fibrous materials, such as paper, cotton cloth, duck, or the like, in sheets of any predetermined shape and size depending on the product to be molded are immersed in a solution of a material which is capable under predetermined conditions of evolving gases suitable for extinguishing flame. After the sheet of fibrous material is completely impregnated, it is subjected to a heat treatment at a temperature sufficient to dry the sheet, thereby freeing it from moisture, and giving a sheet impregnated with the material which is capable of evolving the desired non-inflammable gases.

Since it is desired that the material employed for impregnating the sheet of fibrous material evolve non-inflammable gases under predetermined conditions, a material comprising sodium sulfamate ($NaSO_3NH_2$) is employed as the impregnant, it being found that when subjected to a temperature in the neighborhood of 205° C., the sodium sulfamate melts, giving off ammonia, sulfur dioxide and water vapor as fire retarding gases together with the formation of some sodium hydroxide which may or may not be in the gaseous state. Where it is desired that the non-inflammable gases should be evolved at a lower temperature, ammonium sulfamate ($NH_4SO_3NH_2$) which decomposes at a temperature as low as 150° C., liberating the desired non-inflammable gases of ammonia, sulfur dioxide and water vapor is employed.

In order to impregnate the sheets of fibrous material with sufficient ammonium or sodium sulfamate to impart the highly desired fire retarding characteristics thereto, a solution of ammonium or sodium sulfamate and water containing from 10 to 50% of ammonium or sodium sulfamate and preferably from 10 to 40% of ammonium or sodium sulfamate is employed. With these concentrations, it is found that when the impregnated fibrous material is dried it carries sufficient ammonium or sodium sulfamate for the purposes of this invention.

After the sheets of fibrous material are impregnated with the material which is capable of evolving non-inflammable gases under predetermined conditions, they are impregnated with a synthetic resin, such as the phenolic, urea or thiourea types, in a manner well known in the art, after which they are dried to permit handling of the impregnated sheets. The sheets are then stacked in laminated relation until a stack having the requisite size is secured, after which the stacked sheets are subjected to sufficient heat and pressure to mold them into an integral unit, the synthetic resin of the unit being cured to the infusible state.

Where only sheets of fibrous material containing ammonium sulfamate and impregnated with a synthetic resin are employed in forming the molded product, it is found that sometimes sticking of the stack to the molding plates is encountered during the molding operation. Such sticking during the molding operation is caused by the presence of the ammonium sulfamate which has a low melting point, the molding temperature usually employed being somewhat higher and preferably at about 175° C. Where sodium sulfamate is employed, it is found that the sticking of the molded product to the molding plates is not encountered.

In order to prevent the molded product containing the ammonium sulfamate from sticking to the molding plates, a sheet of fibrous material impregnated with only the synthetic resin is positioned over the outer sheets of the stack of fibrous material containing the ammonium sulfamate and impregnated with the synthetic resin. In molding such a composite article having surface sheets free from the fire retardant material as illustrated in the single figure of the draw-

ing, it is found that a product having the desired flameproof characteristics is produced which has an exceedingly smooth surface.

Although the molding temperature employed in forming the integral unit is higher than the melting temperature of the ammonium sulfamate, and the fire retardant evolves some non-inflammable gases during the molding operation, in practice it is found that a sufficient amount of the gases is trapped within the molded product, together with a portion of the ammonium sulfamate which does not decompose under the molding temperatures, to impart flameproof characteristics to the finished molded product. The presence of the material which is capable of evolving the non-inflammable gases can be readily detected in the molded product.

When the molded product is subjected to fire, it is found that when the temperature of the fire is greater than the melting point of the fire retardant employed in the material the non-inflammable gases are evolved and will prevent the molded product from carrying flame. Further, the evolution of such non-inflammable gases has a definite limiting action on the charring of the molded product at the point where it is subjected to a direct flame. The material produced in accordance with this invention is particularly useful as the lining for airplane cabins or for other applications where it is desired to employ a material which will not carry flame.

Although this invention has been described with reference to a particular embodiment thereof, it is intended that all matters contained in the description given hereinbefore shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

A process for producing a flameproof product, comprising, passing sheets of fibrous material through a 10% to 50% solution of material selected from the group consisting of ammonium sulfamate and sodium sulfamate, drying the sheets to remove moisture therefrom, impregnating the sheets carrying the sulfamate compound with synthetic resin, stacking the impregnated sheets in laminated relation, applying facing sheets of fibrous material impregnated with a synthetic resin and free of the sulfamate compound to the stacked sheets, and molding the composite stack under heat and pressure into an integral unit having flameproof characteristics.

FREDERICK P. HUNSICKER.