

UNITED STATES PATENT OFFICE

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PRODUCTION OF BRUSHES AND THE LIKE

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This invention relates to a method for inserting bristles and staples into articles made from polymerized vinyl aromatic compounds. More specifically it is directed to a method for inserting bristles and staples into brush backs made from polymerized styrene.

The usual method for inserting bristles and staples into brush backs made of thermoplastic materials has been to drill holes in the back and insert the bristles and staples in the holes under pressure to drive the staples into the thermoplastic and thus fasten them securely with the bristles being held in place by the staple. The operation is carried out at room temperature and no difficulty is experienced either in the stapling operation or in storage or service if cellulose ester thermoplastics are used. When an attempt was made to use the more brilliant vinyl aromatic polymers for brush handles, it was found that cracks developed during the stapling operation. These cracks grew larger during storage and service and new cracks also developed.

It is one object of this invention to provide a process for the stapling and bristling of articles made from polymeric vinyl aromatic resins which will prevent the development of cracks during the stapling operation and during storage and service.

It is another object to insert bristles and staples into vinyl aromatic polymer articles by use of the apparatus customarily employed with cellulose ester plastics.

These and other objects are attained by heating the vinyl aromatic polymer article to be bristled and stapled, to a temperature above its critical temperature after the holes for insertion of the bristles and staples have been drilled or otherwise formed in the article. While the article is at the desired temperature, the bristles and staples are inserted in the holes provided for them and the staples are driven into the article to anchor the bristles firmly and substantially permanently. The article thus bristled and stapled is allowed to cool. No cracks are caused by the stapling operation and no cracks develop on storage or in service.

Example 1

A drilled, cast polystyrene brush back was heated to approximately 130° C. in a suitable oven or the like. It was then removed and, while still at about the same temperature, bristled and stapled in the conventional manner. No fractures appeared when the brush became cool and

none developed after standing for two years at room temperatures.

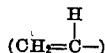
An identical drilled, cast polystyrene brush back was bristled and stapled in exactly the same manner as just described, except without preheating. Within three hours numerous small fractures developed around the staples and these cracks continued to increase in size and number.

It is believed obvious from the above, that the preheating treatment results in a product containing bristles firmly fixed in place in the superior polyvinyl plastic with its outstanding appearance and stability.

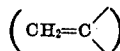
Example 2

A drilled cast styrene-methyl acrylate copolymer in which the styrene was the major component was heated in an oven to approximately 125° C. It was then removed, bristled and stapled while hot. No fractures were observed when the brush became cool and none developed during storage at room temperatures.

The polymeric vinyl aromatic materials contemplated for use in the present invention may be prepared by polymerizing vinyl aromatic compounds, i. e., aromatic compounds having attached thereto a single polymerizable vinyl



or substituted vinyl



group. In particular, polymerized vinyl benzene compounds are contemplated, i. e., vinyl aromatic materials having a single benzene ring. Examples of such vinyl aromatic compounds include styrene, ortho methyl styrene, para methyl styrene, para phenyl styrene, para chloro styrene, para bromo styrene, dichloro styrenes, such as 2,5-dichlorostyrene, 3,4-dichlorostyrene, para isopropyl styrene, vinyl naphthalene and the like. When desired, there may be employed mixtures of two or more of the vinyl aromatic materials such as those mentioned above, or mixtures with other materials copolymerizable therewith wherein the vinyl aromatic materials predominate, for example, mixtures containing more than 50% of styrene and the balance vinyl chloride, methyl acrylate, maleic anhydride, fumaronitrile and the like.

The temperature to which the article must be heated to obtain the benefits of this invention may be varied from the critical temperature of the

vinyl aromatic composition used to 40-50° C. above said temperature. The upper limit is determined by the attainment of a state so soft as to cause flow under atmospheric pressure. The critical temperature is the temperature at which the polymerized material changes from the solid state to a rubbery state. For polymerized styrene, the critical temperature is 85° C. and any temperature from 85° up to 135° C. may be used in the process of this invention. The preferred range is from 30 to 50° C. above the critical temperature of the polymerized vinyl aromatic material.

The process of this invention enables the manufacturer to fabricate brushes in which bristles and staples are permanently fastened using vinyl aromatic resins which are more brilliant and harder than the cellulose ester resins used heretofore in the trade without risking a large number of rejected pieces due to the development of cracks or fractures in the finished articles in storage or in service.

It is to be understood that the above description is given by way of illustration only, and not in limitation, and deviations are possible within the spirit of the invention as defined in the claims.

What is claimed is:

1. A method for bristling and stapling articles made from polymerized vinyl aromatic compounds

and copolymers thereof which comprises heating the article to a temperature of from 0 to 50° C. above the critical temperature of the polymerized vinyl aromatic compound and inserting the bristles and staples in the article while maintaining the said article in the said temperature range.

2. A method for bristling and stapling articles made from polymerized vinyl aromatic compounds and copolymers thereof which comprises heating the article to a temperature of 30 to 50° C. above the critical temperature of the polymerized vinyl compound and inserting the bristles and staples in the article while maintaining said article at 30 to 50° C. above the critical temperature of the polymerized vinyl aromatic compound.

3. A method for bristling and stapling articles made from polymerized styrene which comprises heating the articles to a temperature of 85 to 135° C. and inserting the bristles and staples in the articles while maintaining said articles at a temperature of 85 to 135° C.

4. A method for bristling and stapling articles made from polymerized styrene which comprises heating the articles to a temperature of 115 to 135° C. and inserting the bristles and staples in the articles while maintaining said articles at a temperature of 115 to 135° C.

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