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METHOD AND MATERIAL FOR PREVENTING THE TARNISHING OF SILVERWARE

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This is an improvement on the method and material patented by Grinnell Jones of Cambridge, Mass., Patent No. 1,766,646, June 24, 1930, for preventing the tarnishing of silverware.

The Jones patent described a fabric for protecting silverware from tarnish comprising a material, suitable for wrapping, impregnated with finely divided silver, or a compound thereof, which would combine with the tarnishing gases in the atmosphere and thereby protect the silver wrapped in the protecting material.

The Jones patent describes a fabric impregnated with silver or a silver compound to protect silver from tarnish. The specific example is dark brown, very powerful in color and will overpower other dyes and moreover is somewhat dusty and uses a large amount of silver. Much of it has been used commercially.

Barnard and Kane Patent No. 2,003,333, June 4, 1935, describes a fabric impregnated with silver ferrocyanide which is an improvement in various ways on the dark brown fabric described by Jones. The Barnard and Kane fabric has been successful in commercial use, also.

While the cloth impregnated according to Patent No. 2,003,333 is successful in protecting silver and has advantages over Jones' dark brown fabric it has the serious disadvantage that a part of the impregnating material is readily driven off as a dust and thus silver is wasted and furthermore, much silver is necessarily wasted in the process of manufacture.

Our invention is also an improvement in other ways over the Grinnell Jones invention and the invention of Patent No. 2,003,333.

Our invention, in brief, consists in impregnating the cloth to be protected with a clear silver-containing solution soluble in a volatile liquid, as ammonia, which thus permeates the entire cloth. When the volatile solvent evaporates it precipitates the silver salt in the material. In consequence little or none of the silver salt is lost in the process of manufacture and little or none of the silver salt is lost as a dust when the fabric is handled.

This principle may be carried out in many ways, of which the following is an example:

First take five pounds of silver nitrate crystals dissolved in three gallons of water and three and one-half pounds of trisodium phosphate dissolved in three gallons of water; mix the two solutions (which may be done in tubs). This will precipitate a yellowish white silver phosphate; add enough ammonia to just dissolve this precipitate. This will require about one gallon of aqua-ammonia of 26° Baumé. Add water to make the solution up to ten gallons, or more or less according to the silver concentration desired. Then pad the cloth, which may be double-napped flannel previously dyed, with this solution. The squeeze rolls of the padder will remove the excess of liquid and the cloth may then be dried, preferably on a tenter frame in a current of warm air. The ammonia evaporates, whereupon the silver phosphate, being insoluble in water, is precipitated in the cloth in a finely divided state.

We then wash out the sodium nitrate, the other product of the reaction of silver nitrate and trisodium phosphate, in cold water and the cloth is thus left impregnated throughout with finely divided silver phosphate in amount corresponding to the strength of the solution used, somewhat yellowish in color, as the protective material. If desired the sodium nitrate may be washed out of the precipitate before the precipitate is dissolved in ammonia.

If the color of the protective cloth is to be brown, the usual color, the foregoing process is very satisfactory. The protective cloth, if beaten, will not give out any substantial amount of dust and the silver gives the protection desired, as stated in the Jones patent.

In some cases, however, the yellow silver triphosphate may be undesirable as, for instance, if a white or light-colored protective cloth is desired. In such cases we use the same amount of sodium tetraphosphate ($Na_6P_4O_{13}$) and proceed as above stated. The silver tetraphosphate is white and will operate substantially as the triphosphate does.

The cloth used and particularly described in the Jones patent, namely that precipitated from silver nitrate by sodium carbonate, gives out a dust which is wasteful and dirties the hands of the operatives. Ferro-cyanide gives forth even more dust.

Various devices may be used to decrease the amount of dust given or rubbed off from the silver oxide cloth and the silver ferro-cyanide cloth but the cloth impregnated according to the present invention is very much better than any way now known to us for diminishing the dust in the silver oxide and the silver ferro-cyanide impregnated cloths. Furthermore, the advantages of having the silver salt precipitated within the fibres of the cloth in the manner shown makes a saving in the amount of silver required as all the silver not taken up by the fabric may be used again as a part of the liquid used for impregnating a further batch of cloth.

As stated, in the previous patents the amount of silver to be used per yard of cloth may be varied within wide limits so that the above concentration of silver need not be followed closely. The amount of silver required depends to a considerable extent upon the conditions to which the cloth is to be subjected in use, especially as to the amount of sulphurous gases in the air to which the cloth is subjected, and the length of time protection is desired.

We have described the use of ammonia as the volatile solvent because that is, by far, the simplest solvent which will dissolve the silver phosphate or silver tetraphosphate, but any suitable volatile solvent which will dissolve the silver-containing salt and evaporate quickly to precipitate it can be used.

Furthermore, our invention is used if the method of impregnating the cloth by soaking it with a silver-containing material insoluble in water, dissolved in a volatile chemical which will precipitate the silver-containing salt in the fabric on evaporation is employed.

The word "fabric" is broadly used to include any kind of cloth, paper or fibrous or cellulosic material.

We claim:

1. A fabric for protecting silverware from tarnish comprising a material suitable for wrapping, impregnated with a phosphate of silver so associated with the fabric as not to give forth a dust in material quantities by ordinary handling.

2. A fabric for protecting silverware from tarnish comprising a fibrous material impregnated with silver triphosphate so associated with the fibres as not to give forth a dust in material quantities by ordinary handling.

3. The method of impregnating a fabric with a silver phosphate which consists of precipitating a silver phosphate insoluble in water by a suitable phosphate, dissolving the precipitate in aqua ammonia, impregnating the fabric with the dissolved precipitate, allowing the aqua ammonia to evaporate, thus precipitating the silver phosphate in the fabric and washing out the water soluble chemicals from the fabric.

4. The method of impregnating a fabric with a silver salt which consists of precipitating a silver salt insoluble in water by a suitable chemical, dissolving the precipitate in aqua ammonia, impregnating the fabric with the dissolved precipitate, allowing the aqua ammonia to evaporate, thus precipitating the silver salt in the fabric and washing out the water soluble chemicals from the fabric.

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