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PROCESS FOR UNITING MATERIALS OF
POLYMERIZED VINYLCHLORIDE WITH
WOOD, LEATHER, OR THE LIKEKurt Thinius and Fritz Loblein, Ellenburg, Ger-
many, assignors, by mesne assignments, to
Walther H. Duisberg, New York, N. Y.No Drawing. Application April 13, 1939, Serial
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Our instant invention relates to the uniting of materials of polymerized vinylchloride with wood, leather or the like.

Moulded articles made from polymerized vinylchloride, for instance tubes, sheets, rods or the like, have many uses owing to their high mechanical and chemical resistance, particularly in the construction of apparatus for chemical industry. To a great extent such apparatus are constructed of cheap materials, for instance common metals or wood, and only those parts which come into direct contact with the aggressive agent are coated with the polymerized vinylchloride plastic material. For this purpose there have been used not only adhesives which are obtained by dissolving vinyl polymers, cellulose derivatives or other polymers in organic solvents but also, experimentally at all events, the sticky aqueous emulsions of vinyl polymers for uniting the polymerized vinylchloride material with the aforesaid constructional materials. Since in this mode of union even after sufficient drying the polymerized vinylchloride foil is apt to separate from the surface of the other material, attempts have been made to obtain a more firmly adhering coating by uniformly melting the sheet of coating on the support. High temperatures (100-200° C.) are, however, necessary for this purpose or else there must be used pressure as well as heat. Even so, the goal has not been attained in all cases, quite apart from the fact that it is frequently impossible, particularly in apparatus already mounted or when wood is the constructional material, to apply either heat or heat and pressure. In view of the tendency to introduce wood as a constructional material in many branches of industry, it is of great importance that a premature destruction of the wood should be combatted by a protective sheet of resistant material.

Our instant invention has for an object to provide a process of producing the necessary intimate union between a wood surface to be protected and a polymerized vinylchloride foil without using a high temperature with or without a simultaneous application of pressure by first making on the surface of the polymerized vinylchloride foil which is to be stuck an extremely thin layer of polymerized vinylchloride containing a softening agent and then ensuring the adhesion of the foil by means of an aqueous emulsion of a mixed polymerizate from monomers of the vinyl group.

Further objects of the invention will appear from the following description.

The thin layer containing a softening agent and measuring only a fraction of a millimeter is most advantageously produced on the surface to be stuck, for example on a sheet of polymerized vinylchloride, by painting the surface with an organic solution of a softening agent. While on the one hand this layer containing the softening agent constitutes a part of the sheet itself, it acts on the other hand as an anchoring for the residual sticky film of the aqueous emulsion, so that a firm union between the wood and the sheet is secured. Without this extremely thin layer containing the softening agent it is not possible to cause adhesion of the residual film of the emulsion used to a polymerized vinylchloride foil, whereas the union with the wood occurs without difficulty. On removing the sheet the sticky film always remains on the wood. A further very essential advantage of this extremely thin layer containing a softening agent on the surface of a sheet of polymerized vinylchloride to be stuck is that the properties of the side opposite to the surface to be stuck are in no way affected. The importance of this is the greater since it is known that a polymerized vinylchloride material which contains a softener in uniform distribution differs fundamentally from a like material free from softening agent and on this account is often inapplicable where a sheet free from softener may be safely used.

For producing the layer containing softener on the surface to be stuck there may be used a solution of a softener for polymerized vinylchloride, for example dibutyl phthalate, tricresyl phosphate, containing advantageously besides the freely volatile solvents a small proportion of a solvent of high boiling point having a stronger solvent capacity than that of the freely volatile portion. For example, a solution may be used of the following composition:

	Parts
Toluene+acetone+methylene chloride	
1:1:1	75-80
Cyclohexanone	5-10
Dibutyl phthalate or tricresyl phosphate	10-20

The surface of the foil which is to be stuck may be painted once or several times with this solution. After a period, for instance five minutes, allowed for action in which the very thin layer containing softener is formed, the gluing to the wood may be effected by painting the latter with a film-forming aqueous emulsion of a mixed polymerizate of the vinyl group, for instance an emulsion of 25 per cent strength of the mixed polymerizate from vinylisobutyl ether and acrylic

acid ethyl ester, and then the sticky surface of the foil may be applied with pressure.

By the use of this strongly dissolving and high-boiling solvents for the softener one prevents the too rapid penetration of the softener into the inner layers of the sheet, whereby some of the properties of the sheet would be undesirably affected. When for special uses of the wood coated with polymerized vinylchloride foil it is necessary to refrain from introducing a strongly smelling solvent of high boiling point, it is recommended, in order to cause the softener to be effective at the surface of the foil, to enhance the viscosity of the solution of the softener in the easily volatile solvent. This may be done most simply by addition of a small proportion of easily soluble low polymer of vinylchloride or even of after-chlorinated polymerized vinylchloride. In this case the content of a solution in softener may be lowered to about 0.5 per cent. This method has the advantage, moreover, that the very thin layer containing softener may be produced directly after the manufacture of the sheets and thereby the actual user may be saved an operation, since he has then only to paint the surface to be stuck with the emulsion.

As especially suitable adhesives may be named, for instance, the mixed polymerizates from acrylic acid nitrile and acrylic acid methyl ester, from vinyl-isobutyl ether and acrylic acid ester, the mixtures of the both mixed polymerizates, the fourfold mixed polymerizates from vinyl ethers, acrylic acid, acrylic acid esters and styrene, and the threefold mixed polymerizates from vinyl chloride, vinyl acetate and acrylic acid butyl ester.

A modification of the instant process consists in first uniting separately a very thin sheet containing a softener with a sheet of polymerized vinylchloride free from softener in any known manner and then fixing these united sheets to the wood by treating the sheet containing the softener as the surface to be stuck with an aqueous emulsion as the adhesive. In this way also the wood is protected by a polymerized vinylchloride foil which exhibits most of the properties of a foil free from added substance. The following is an example of this modification of the process:

A foil produced by rolling together 60 parts of polymerized vinylchloride and 40 parts of tricresyl phosphate and having a thickness of 0.03 millimeter is pressed by hand on a polymerized vinylchloride foil free from a softener and having a thickness of 0.12 millimeter, after a surface of this foil has been thinly painted with a solution of after-chlorinated polymerized vinylchloride in a mixture of acetone and toluene (1:1). The foils are then dried at about 40° C. for about 30 minutes. The surface, containing the softening agent, of the foil thus produced and now having a thickness of about 0.15

millimeter is subsequently pressed by hand on the surface to be stuck of the wood which has been painted with an aqueous emulsion of 40 per cent strength of the threefold mixed polymerizate from vinylchloride, vinylacetate, and acrylic acid butyl ester.

It has further been found that it is possible to use the process for sticking a polymerized vinylchloride material to bend leather, sole leather and other materials having similar kinds of surface. However, it is not possible to unite the polymerized vinylchloride material with wood or leather by the known method of incorporating the softener first with the emulsion.

We claim:

1. A process for fastening a protective polymerized vinylchloride sheet onto a surface of material of the group consisting of wood, leather and other materials having a similar kind of surface, which comprises applying a very thin layer of polyvinylchloride together with a softener to the surface of the protective sheet, coating the surface to be protected with an aqueous emulsion containing interpolymers of different vinyl compounds and uniting both surfaces thus treated to one another by applying pressure.

2. A process for fastening a protective polymerized vinylchloride sheet onto a surface of material of the group consisting of wood, leather and other materials having a similar kind of surface, which comprises applying a very thin layer of polyvinylchloride together with dibutyl phthalate as a softener to the surface of said protective sheet, coating the surface to be protected with an aqueous emulsion containing the interpolymers of vinylisobutyl ether and acrylic acid ethyl ester and uniting both surfaces thus treated to one another by applying pressure.

3. A process for fastening a protective polymerized vinylchloride sheet onto a surface of material of the group consisting of wood, leather and other materials having a similar kind of surface, which comprises coating the surface of the polyvinyl chloride sheet material with a solution of polyvinylchloride containing a small amount of a softener, applying to the surface to be protected an aqueous emulsion of the interpolymers of vinylchloride, vinylacetate and acrylic acid butyl ester and uniting both surfaces thus treated to one another by applying pressure.

4. As a new article of manufacture a sheet having a surface consisting of a material selected from the group consisting of wood, leather and other materials having a similar kind of surface, a coating consisting of an interpolymers of different vinyl compounds on said surface, further an intermediate layer of polyvinylchloride containing a softener and a protective top sheet of polyvinylchloride.

KURT THINIUS.
FRITZ LÖBLEIN.