

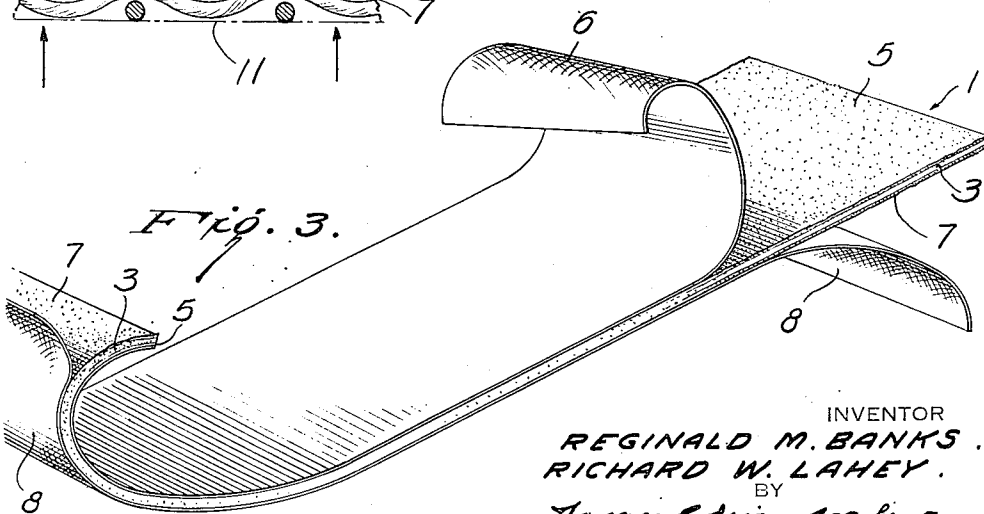
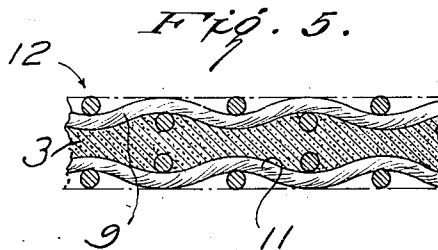
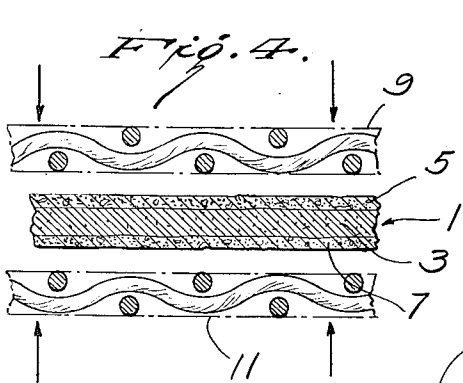
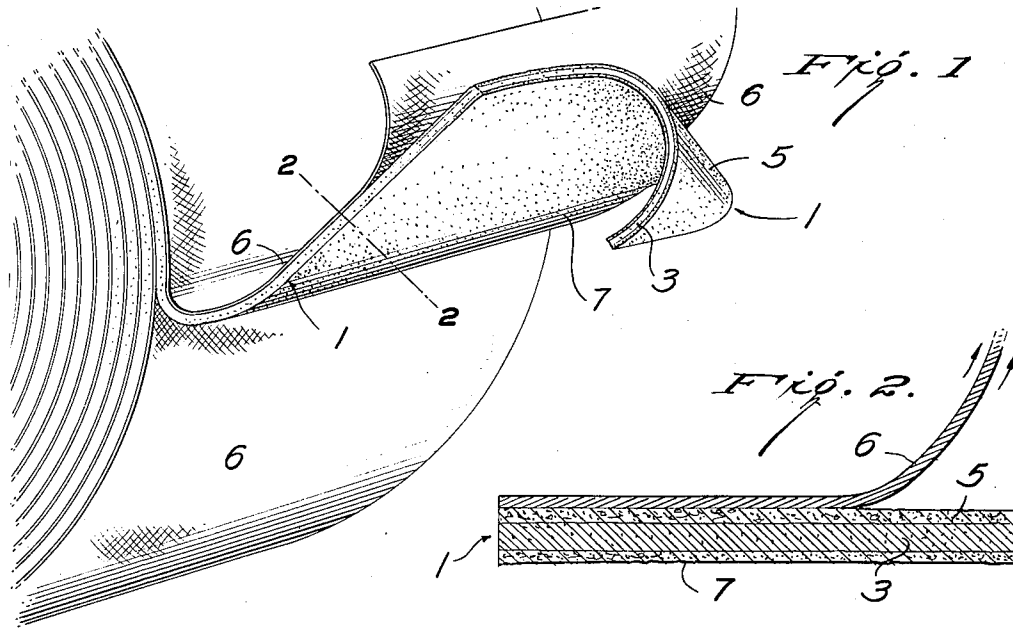
June 3, 1952

R. M. BANKS ET AL

2,599,359

ADHESIVE MATERIALS AND PROCESSES OF ASSEMBLING SHEET MATERIALS

Filed March 21, 1946



INVENTOR
REGINALD M. BANKS
RICHARD W. LAHEY
BY
James Edwin Archer
ATTORNEY

UNITED STATES PATENT OFFICE

2,599,359

ADHESIVE MATERIALS AND PROCESSES OF ASSEMBLING SHEET MATERIALS

Reginald M. Banks, New York, and Richard W. Lahey, New Rochelle, N. Y., assignors to American Cyanamid Company, New York, N. Y., a corporation of Maine

Application March 21, 1946, Serial No. 656,128

2 Claims. (Cl. 154—139)

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This invention relates to adhesive tapes and to processes of assembling fabrics or other fibrous materials by means of such adhesive tapes.

In the manufacture of many articles from cloth, a large part of the labor cost involved is incurred in the sewing operations which are time-consuming. It would, therefore, be desirable to be able to assemble many articles of cloth and the like without the necessity of sewing pieces of edges together.

In the manufacture of water-proof clothing and other water-proof articles from water-proof cloth, leaks are often encountered along the lines of the stitching employed to sew the pieces of the cloth or the edges of the cloth together. Obviously, this is because of the fact that the stitching perforates the cloth and the water-proof coating generally applied thereto, and water or other liquids can penetrate through the perforations in the cloth.

An object of the present invention is to provide an adhesive tape suitable for permanently affixing the edges of a piece of cloth or different pieces of cloth together.

Another object of the present invention is to provide an adhesive tape which may be used to temporarily bond two pieces of cloth together while adjusting the cloth in the manner desired, prior to permanently affixing the pieces of cloth together.

These and other objects are attained by providing an adhesive tape comprising a sheet of thermoplastic material coated on both sides by means of a pressure adhesive composition.

A further object of the present invention is to provide a means for assembling fabrics or other fibrous materials without the necessity of sewing.

Still another object of the present invention is to provide a means of bonding together sheets of the same or diverse materials by means of an adhesive which may be used to removably attach two sheets of material together until properly adjusted, and thereafter rendering the bond between the sheets of material permanent.

These and other objects are attained by affixing two sheets of material, such as fabric or the edges of a sheet of such material, to a sheet of thermoplastic material having both surfaces covered with pressure adhesive coatings, thereafter making necessary adjustments, and then finally

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subjecting the resulting assembly to heat and pressure to cause the thermoplastic sheet to fuse, and thereby permanently fix together the sheets or edges of material to be joined together.

5 Figure 1 of the drawings is a fragmentary perspective of a roll of our adhesive material or tape.

Figure 2 is a cross section along the line 2—2 of the tape illustrated in Figure 1.

10 Figure 3 is another embodiment of our invention wherein two sheets covering each of the pressure adhesive coatings are employed, and this figure is a perspective showing the cover sheets partly removed from the backing.

15 Figure 4 is a diagrammatic cross section illustrating the method of assembling two pieces of cloth by means of our adhesive tape, while Figure 5 is a fragmentary cross section of two pieces of cloth permanently affixed by means of our adhesive tape after fusing the thermoplastic sheet of that tape.

20 In Figures 1 and 2, our tape 1 comprises a sheet of thermoplastic material 3 having pressure adhesive coatings 5 and 7 on both sides of the thermoplastic sheet 3. An interlayer or cover sheet 6 is applied to the adhesive coating 5 in order to protect it from the adhesive coating 7.

25 In Figure 3, our thermoplastic tape 1 comprises a thermoplastic sheet 3 having pressure adhesive coating 5 and 7 on both sides thereof and having cover sheets 6 and 8 on the exposed sides of coatings 5 and 7, respectively.

30 In Figure 4, two sheets of fabric 9 and 11 are being brought together on to the pressure adhesive coatings 5 and 7. Figure 5 illustrates the finished assembly 12, comprising two sheets of fabric 9 and 11 permanently bonded by means of the thermoplastic material 3, after the assembly formed in accordance with Figure 4 is subjected to heat and pressure.

40 Pressure adhesives heretofore employed have generally had a cellulosic backing, such as cloth, paper or more often, regenerated cellulose films, such as cellophane. These products are suitable for removably attaching materials to one another, but they do not form a permanent bond, and in many cases, the adhesive bond does not have any substantial strength. Our adhesive materials, on the other hand, provide the same advantages as those provided by the ordinary pressure adhesive, namely, that the bond is not permanent,

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and accordingly, adjustments in arranging the sheets of material to be bonded together may be made. After the sheets of material are properly adjusted, the bond can be made permanent by heat and pressure, supplied, for example, by means of the ordinary irons and pressing equipment employed in laundering and cleaning clothes, or optionally, the materials may be subjected to heat and pressure in a platen press or by passing through heated squeeze rolls. The pressure required is not great, merely enough to cause the thermoplastic material to impregnate the fibrous material to form a good bond, or to come into intimate contact with a non-fibrous surface to form a good bond. Similarly the temperature need not be too high, since it is only necessary to use temperatures sufficient to fuse or soften the particular thermoplastic material.

The thermoplastic sheet material is preferably water-insoluble, since in most applications the finished product will be subjected to water or washing, or to both. Furthermore, it is preferable that the thermoplastic material soften at temperatures between about 105° C. and about 160° C. Suitable materials are: methyl methacrylate, hydrophobic ethyl cellulose, cellulose acetate, polyvinyl formal, synthetic rubbers produced by copolymerization of butadiene and acrylonitrile, etc. Non-cellulosic, water-insoluble, resinous materials are preferred, since the cellulose derivatives are more or less water-sensitive. Water-soluble thermoplastic materials which may in some instances be used include sheets of polyvinyl alcohol, methyl cellulose, etc. Any or all of these materials may be plasticized and softened by means of various materials well known in the art.

The pressure adhesive compositions which are applied to the thermoplastic sheet include rubber, isobutylene polymers, isobutyl vinyl ether, butyl acrylate, methyl acrylate, synthetic rubbers produced by copolymerizing butadiene with styrene, and mixtures of any number of these substances alone or with other materials. These are all plastic materials or elastomers.

The thermoplastic backing may be coated with a primer prior to the application of the thermoplastic adhesive coating if desired, in order to obtain better adhesion. This can be done generally in accordance with known principles.

The thermoplastic adhesive coatings may be applied to the thermoplastic backing from a solvent solution, or they may be calendered or frictioned on to the backing. Generally, it is desirable that softeners and plasticizers, such as methyl adipate, hydrogenated methyl adipate, ester gum, dibutyl phthalate, stearic acid, dimethyl phthalate, and other plasticizers, be incorporated into the pressure adhesive coating compositions. If no solvent is used, these may be milled together with the adhesive composition and the resulting material calendered or frictioned on to the thermoplastic sheet.

In order to avoid injury to the thermoplastic sheet backing, it is necessary that the pressure adhesive composition contain only those solvents which do not greatly affect the thermoplastic backing, and which in any event are not really good solvents for the thermoplastic backing. Suitable solvents for the pressure adhesive coatings include aliphatic gasolines and aliphatic hydrocarbons, such as heptane. In other words, the thermoplastic sheet material must not dissolve in the solvent used for the pressure adhesive coatings in anything more than very small amounts. The solubility may be as much as the

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sheet material may tolerate without disintegration before the solvent evaporates after the application of the solution of the pressure adhesive coating composition. Generally, the solubility should not exceed about 10% by weight, but it should be as low as possible.

The cover sheets 6 and 8 are preferably cellophane or other similar material which will strip readily from the pressure adhesive, such as wax paper, Holland cloth, etc.

Our adhesive materials generally are made in the form of relatively narrow tapes, but they may also be made in the form of sheets, so that the materials bonded together have a sheet of the thermoplastic material extending between their entire adjacent surfaces.

As previously pointed out, our invention is particularly adapted to the fabrication of articles made from cloth where it is desirable that sewing be avoided. Among such articles, bags or sacks made of cloth or paper, either water-proof or untreated, are important examples. Our materials also find application in the manufacture of water-proof clothing, such as raincoats.

Our products may also be used to join together same or diverse substances, including sheets of glass, metal, wood, paper, cloth, leather, plastics, etc.

Obviously many modifications and variations in our processes and compositions may be made without departing from the spirit and scope of the appended claims.

We claim:

1. A process of joining two sheets of material which comprises affixing the two sheets of material together by interposing between them an adhesive material consisting essentially of a sheet of water-insoluble thermoplastic synthetic resinous material which softens between 105° C. and 160° C. having both surfaces covered with pressure adhesive coatings of an elastomer, affixing the two sheets of material to be joined together in the desired position by means of said pressure adhesive coatings to form a temporary bond between said two sheets of material, and then subjecting the resulting assembly to heat and pressure to cause the thermoplastic sheet to fuse and thereby permanently fix together the two sheets of material to be joined together, said thermoplastic material being a synthetic rubber-like material obtained by the copolymerization of butadiene and acrylonitrile and said elastomer being natural rubber.

2. A process which comprises applying a solution of natural rubber in a hydrocarbon solvent to both sides of a sheet of a water-insoluble thermoplastic synthetic rubber-like material obtained by the copolymerization of butadiene and acrylonitrile, characterized in that the solvents in said solution dissolve the thermoplastic sheet in such small amounts that said sheet does not disintegrate before the solvent evaporates.

REGINALD M. BANKS.
RICHARD W. LAHEY.

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