June 22, 1943. G. R. CUNNINGTON 2,322,226

METHOD OF MAKING DECORATIVE FABRICS

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FIG. 1

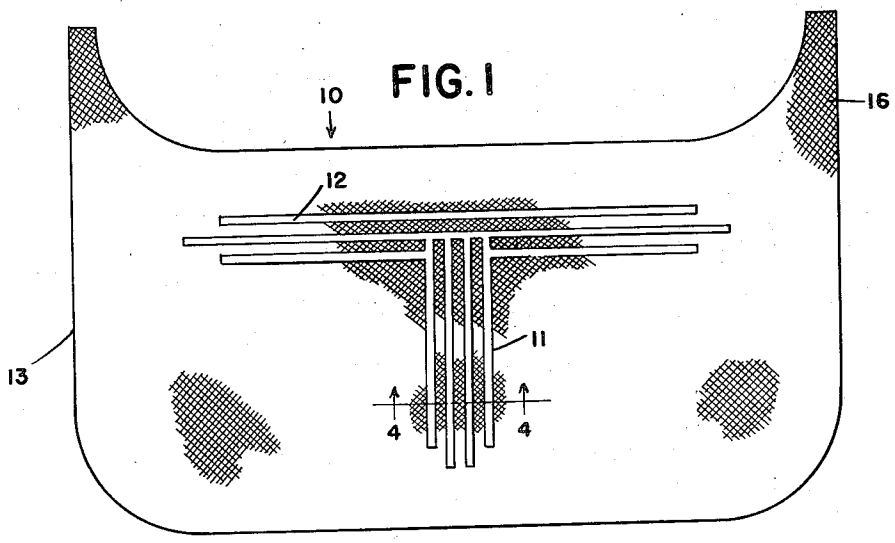


FIG. 2

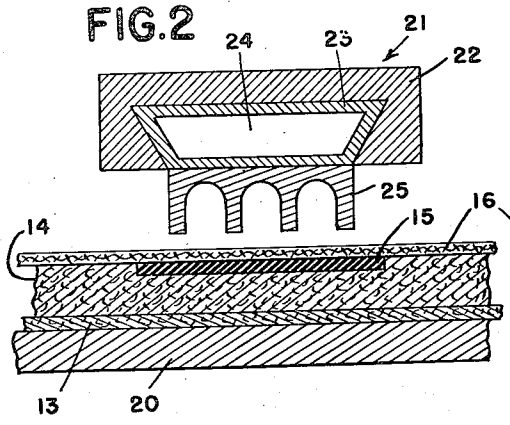


FIG. 3

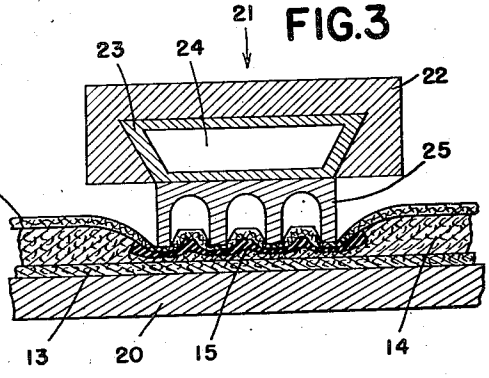
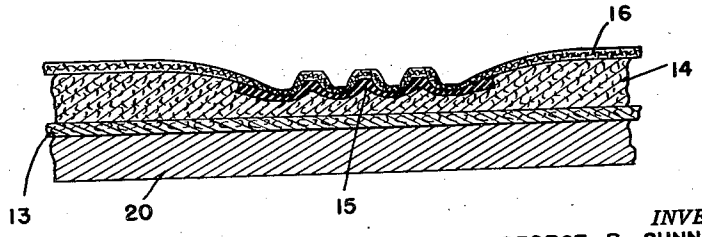


FIG. 4



INVENTOR
GEORGE R. CUNNINGTON

BY
Whittemore, Hulbert & Belknap
ATTORNEYS

June 22, 1943. G. R. CUNNINGTON 2,322,226

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FIG.5

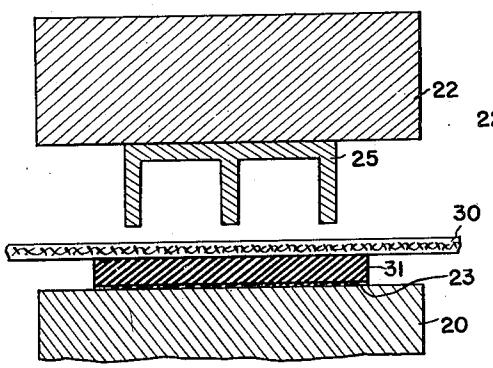


FIG.6

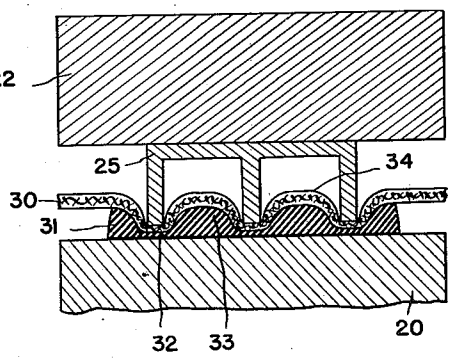


FIG.8

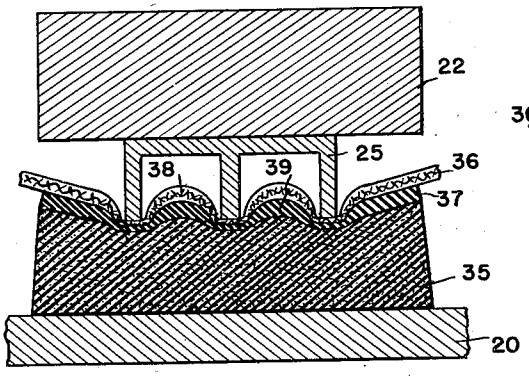


FIG.7

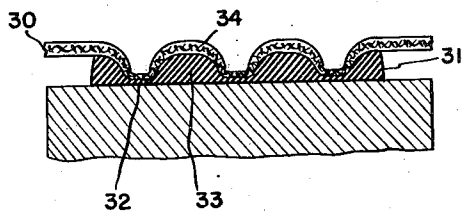
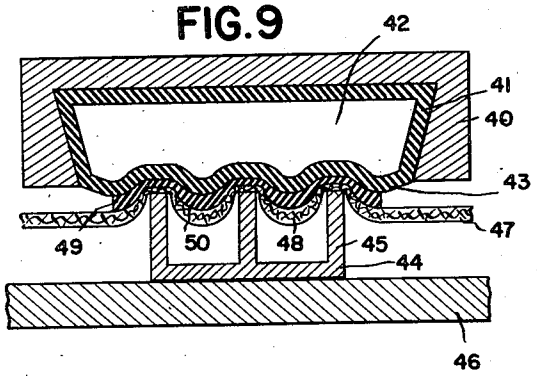


FIG.9



INVENTOR
GEORGE R. CUNNINGTON
BY
Whittemore, Hulbert & Belknap
ATTORNEYS

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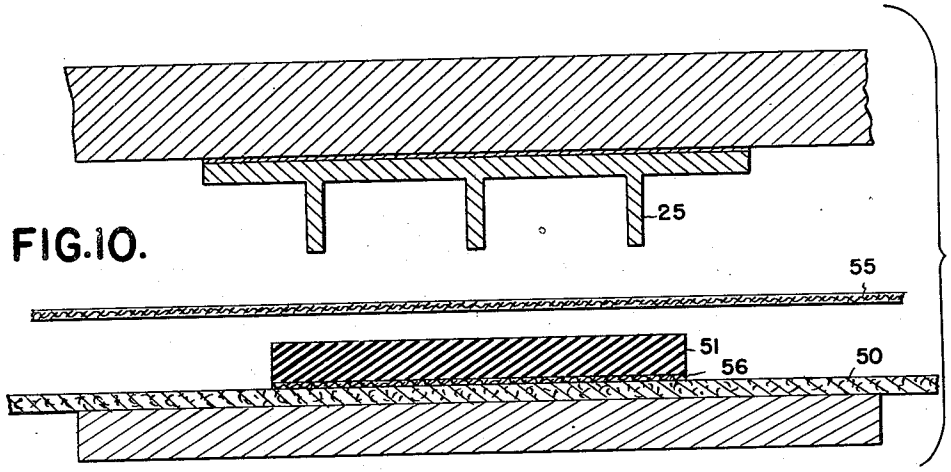


FIG.10.

FIG.11.

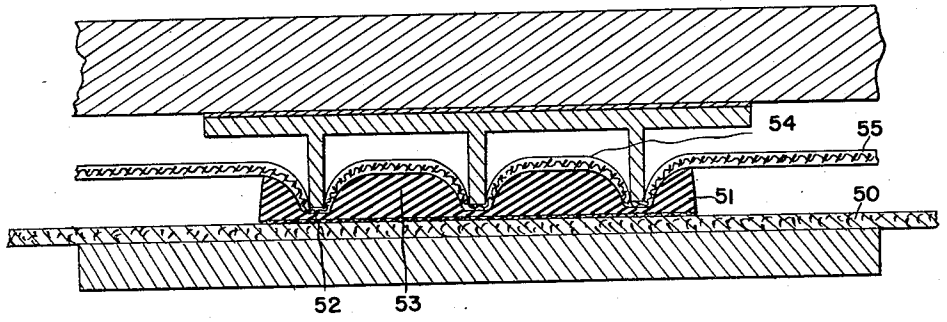


FIG.12.

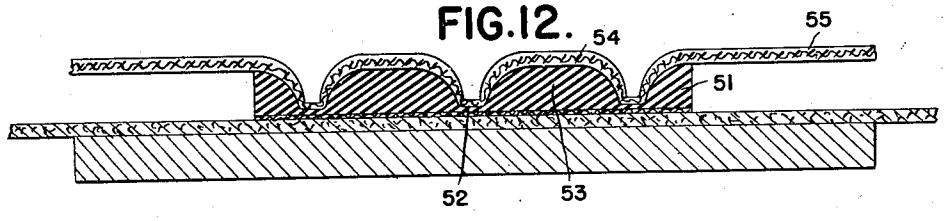
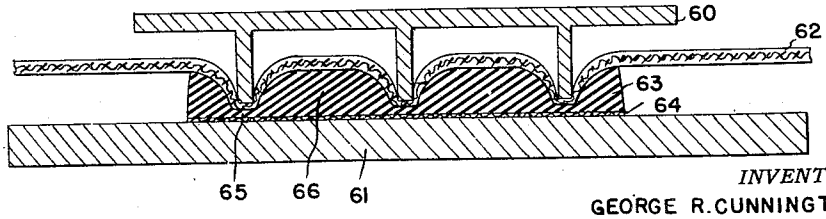


FIG.13.



INVENTOR
GEORGE R. CUNNINGTON
BY
Whittemore, Hulbert & Belknap
ATTORNEYS

Patented June 22, 1943 2,322,226

UNITED STATES PATENT OFFICE

2,322,226

METHOD OF MAKING DECORATIVE FABRIC

George R. Cunnington, Grosse Pointe Park, Mich., assignor to National Automotive Fibres, Inc., Detroit, Mich., a corporation of Delaware

Application May 25, 1938, Serial No. 210,034

10 Claims. (Cl. 154—2)

This invention relates to a decorative fabric of general application and to the method of making the same.

In the manufacture of automobiles and in related arts it has been the practice to trim the interior of the vehicle or corresponding parts with an upholstery fabric. In motor vehicles the upholstery fabric is normally decorated. In the past it has been the practice in many instances to apply the upholstery fabric to a so-called trim panel before insertion in the vehicle and the decoration of the fabric has, in the past, taken such forms as sewing the fabric to the panel, deforming both the panel and the fabric simultaneously, or providing risers intermediate the panel and the fabric and sewing the fabric to the panel adjacent the risers.

The present practice requires that the decorated upholstery fabric be provided with a padding material such as cotton, jute, blue wadding or the like, intermediate the panel and the fabric. This has somewhat complicated the problem of providing a desirable form of decoration to the fabric and at the same time maintaining a reasonably low level of production cost.

I have discovered that it is possible to provide a permanent decoration in an upholstery fabric, either before the fabric is attached to a panel or after it has been attached to the panel. In its broadest aspect my invention comprises the decoration of fabric by applying a thin area of deformable form-retaining material to one surface of the fabric and simultaneously deforming both the fabric and the deformable material and causing a permanent union between the two by the application of pressure, preferably in conjunction with controlled heating. More specifically, fabric is decorated by placing a thin area of uncured rubber adjacent the rear face of the fabric, applying heat and pressure to deform both the fabric and the rubber and to cause the rubber to flow in a controlled manner to form a riser portion and to vulcanize the rubber to the fabric in such a way that a substantially permanent bond is established between the two.

I have found that this particular method of decorating a fabric is especially useful in the manufacture of automobile trim panels, for the reason that the decoration may be imparted to the fabric after the fabric has been assembled to the padded panel plate, without the necessity of removing areas of padding material from the panel plate and without the necessity of providing accurate registry between the forming mechanism and panel plate.

Accordingly it is one of the primary objects of the present invention to provide a decorative fabric by simultaneously deforming the same and uniting the fabric with a deformable form-retaining material.

It is a further object of the present invention to decorate a fabric by deforming the same with a thin area of uncured rubber and vulcanizing the same in desired patterns.

It is a further object of the invention to provide an improved decorative trim panel in which the design is impressed in the fabric after the fabric is assembled on the trim panel.

It is a further object of the invention to provide an improved trim panel in which an upholstery material is spaced from a panel board by a layer of resilient padding material and in which a design is formed in the upholstery material without securing the upholstery material to the panel board at the decorated areas.

It is a further object of the invention to decorate a fabric by means of a heated die which need not register with the area to be decorated with great precision.

Other objects of the invention will be apparent as the description proceeds, and when taken in conjunction with the accompanying drawings, wherein

Fig. 1 is a plan view of an automobile trim panel showing an arbitrary design carried thereby;

Fig. 2 is a sectional view showing the trim panel after assembly and before stamping, with the die member in operative position;

Fig. 3 is an enlarged fragmentary sectional view showing the relationship of the panel elements during compression by the die elements;

Fig. 4 is a fragmentary sectional view taken on the line 4—4, Fig. 1;

Fig. 5 is a fragmentary sectional view showing the arrangement of parts including the fabric and thermal setting material, with the die member in inoperative position;

Fig. 6 is a view corresponding to Fig. 5 with the die member moved into engagement with the fabric;

Fig. 7 is a fragmentary sectional view showing the fabric as decorated;

Fig. 8 is a fragmentary sectional view showing a modified form of mechanism for decorating the fabric;

Fig. 9 is a fragmentary sectional view showing yet another modified form of mechanism for decorating the fabric;

Fig. 10 is a sectional view showing the mecha-

nism for decorating a fabric applied to a panel board;

Fig. 11 is a view similar to Fig. 10, with the die engaging the panel;

Fig. 12 is the completed panel as decorated by the mechanism shown in Figs. 10 and 11;

Fig. 13 is a sectional view showing mechanism for decorating fabric, in which heat is applied from the rear.

In Figs. 1 to 4 I have illustrated a process as applied to decorating an upholstery fabric after the same has been applied to a panel.

The panel generally indicated at **10** in Fig. 1 has formed thereon a plurality of horizontal lines **11** and a plurality of vertical lines **12**. It will be appreciated of course that these lines may be straight or curved and arranged according to any desired fanciful design. These lines are formed by depressions in the upholstery fabric as is more apparent from an inspection of Fig. 4.

In Fig. 2 I have illustrated the panel assembly prior to the impressing of the design therein. In this figure the panel is illustrated as resting on a flat plate or table **20**. The substantially rigid panel board **13** is cut to predetermined shape, for example, that illustrated in Fig. 1. This panel board is normally made of card board or the like which may be impregnated with an asphaltic material if desired. The specific character of the panel board is immaterial in the present process, since it is one of the features of the present process that the panel board is not itself deformed. For this reason, the panel board may be of any rigid material and if desired may be formed of metal.

A thin film of padding material **14** is applied to the panel plate. This may be done in any desired manner. For example, the padding material may be in the form of "blue wadding" or the like which has been die cut to predetermined form. However, as a matter of economy, and because the finished product exhibits improved characteristics, I prefer to form this layer of padding material from loose cotton batting. A preferred method of applying this cotton batting to the panel board is to fabricate as by means of a Garnett machine a thin and fragile film of cotton on to a moving conveyor. The thickness of this filler may be varied at will by varying the relative speed of operation of the Garnett machine and the moving conveyor. Precut panel boards are sprayed or otherwise provided with adhesive on one face thereof and are then placed, adhesive face down, upon the cotton on the moving conveyor.

By suitable mechanism, which forms no part of the present invention, cotton is then removed from around the edges of the panel plate and, if desired, a bevel edge is provided for the cotton which remains on the panel plate. It has also been found that it is possible to omit the application of adhesive to the panel plate, particularly if the panel plate is somewhat roughened in character. The loosely matted cotton has a tendency to adhere to the roughened surface and this adherence will be sufficient to retain the cotton in predetermined position until complete assembly of the panel.

The panel plates which have been thus provided with a layer of cotton are then removed from the conveyor and inverted. A thin layer of deformable, form-maintaining material indicated at **15** is placed on the exposed face of the cotton batting. This material, for the sake of economy, will normally be provided in the form of a strip of sufficient width to include within its edges the desired design. I have found that highly satisfactory results are obtained when this strip is in the form of a thin strip of uncured rubber of a thickness from .010 to .020 inch thick. Slight variations in the finished product result from variations in thickness of this strip of material. but in general the results are substantially the same.

Instead of employing a thin strip of rubber, I have found that satisfactory results may be obtained by the use of a thin strip or film of a suitable resin. This resin may be applied as a self-sustaining strip, or it may be applied as a coating for a carrier strip of paper, cloth or the like, or it may be applied directly to the back of the upholstery fabric. Where a resin is used, the thickness of the strip may be reduced. I have also found that satisfactory results are obtained by providing extremely thin coating of lacquer or the like to a strip of paper, cloth or the like, and interposing the same between the exposed surface of the cotton and the back of the upholstery fabric, with the lacquer side against the fabric.

In cases where this deformable strip is provided in the form of a separate member, it is desirable to secure the same to the exposed face of the cotton padding temporarily as by means of the application of adhesive at spaced points. This step is only for the purpose of maintaining the deformable strip in position during assembly of the panel, and may be omitted if desired.

The next step in the manufacture of my improved trim panels is the application of the upholstery fabric **16** to the panel. This fabric is applied over the exposed face of the cotton and the strip or layer of deformable material. Normally, the upholstery fabric conforms in shape to the shape of the trim panel but is of a size sufficiently greater to provide an edge to be folded over and adhesively or otherwise secured to the back of the panel.

The completely assembled panel is then placed on a plate or table **20** and is struck with a heated press **21**. This press comprises an upper plate **22** in which is provided a conduit **23** forming a passage **24** for steam or the like. A die member **25** of predetermined form is secured to the face of the plate in heat exchange relationship thereto. It will be readily appreciated of course that alternate methods of heating the die member are contemplated herein, such for example as hot water, electric resistance elements, or the like. The die members **25** are impressed into the assembled panel as shown in Fig. 3, which also illustrates the comparative thickness of the parts under compression. In the case where the strip **15** is of uncured rubber or rubber material, the temperature employed in the press and the pressure is sufficient to vulcanize the rubber to the upholstery fabric. For example, this rubber may be of the following composition: approximately 50% new rubber; 30% reclaimed rubber; 3% sulfur; 1% accelerator.

This material may be obtained commercially in strips of standard width and standard thickness. As obtained commercially, these strips may be provided with a paper or cloth backing. I have found that substantially equivalent results may be obtained by using this strip without removing the backing. Therefore it is within the scope of the present invention to employ this rubber strip either with or without a backing.

Material of this character has been used for inner tube patches in automobile tires for many years. Where this type of rubber is employed, I find that by the application of heat and pressure for between three and seven minutes, the rubber is cured and a good vulcanized bond is obtained. The temperature necessary to obtain this result is moderate, being insufficient to scorch or otherwise damage the upholstery fabric. Where a filler or strip of resin is employed, the temperature and pressure will vary, but in all cases the temperature will be such that no damage to the upholstery fabric will result.

I have found that the trim panel resulting from the process described above is substantially equal in appearance and durability to much more expensive trim panels. The process is characterized by its extreme economy. The application of cotton or other fibrous material by the method described is economical in the extreme, there being no waste material since the cotton removed from between consecutive panels is returned for re-use in the Garnett machine. After the initial application of cotton to the panel board, it is unecessary to provide further treatments such as, for example, the removal of cotton or other padding material from predetermined areas of the panel board. The economy of this method of application of padding material is marked, particularly when compared with the process which involves the use of precut form-sustaining padding members.

Another economy in the present process results from the fact that it is unecessary to cause the heated die member to register with extreme precision with a desired portion of the upholstery fabric. In other processes, it is sometimes necessary to register the die member with preformed risers, or the like, which requires extreme accuracy and care in the practice of the process. Where the process is carried on in an assembly line where extreme precision is not to be obtained in general practice, the necessary result is that a substantial number of panels are spoiled by lack of registry between the die member and the preformed risers. In the practice of the present process, as will be readily apparent, it is only necessary that the heated die member register with the layer or strip of deformable material. This material will, for economy's sake, be made as narrow as is commensurate with the degree of accuracy to be obtained in commercial practice.

It is a characteristic of the completed panel, as manufactured by this process, that the design is in effect stamped or impressed only in the cover fabric and the cover fabric at the point bearing the design is in a free condition, that is, not secured to the panel board. Tests have demonstrated that this design is permanently formed and will resist pulling out even to the point of rupture of the fabric. The design is distinctive and is clearly marked and lends itself admirably to use in fanciful designs which involve the use of curved and irregular lines. Instead of narrow lines, areas of predetermined form and extent may be impressed in the same manner, as will be obvious.

In Figs. 5, 6 and 7 I have illustrated the method and mechanism for decorating the fabric independently. It will be appreciated that fabric decorated as taught herein may subsequently be applied to trim panels and may be used in the manufacture of cushions or other upholstered parts. The fabric however, as will be understood, is capable of much wider application. The decoration imparted thereto is permanent and will withstand long wear without losing its distinctive characteristics. Furthermore, the fabric if decorated according to the method herein retains to a large extent its former flexibility, and may be used in any case where decorated fabric is desirable. Merely by way of example, this fabric is adaptable for use in manufacturing hand bags, purses, traveling bags, pillows, and the like.

In Fig. 5 the fabric **30** with a layer of deformable form-retaining material, preferably uncured rubber, is placed on a table **20**. The rubber is preferably of a thickness between .010 and .075 inch thick, but corresponding results are obtained with the use of a thinner strip of rubber, while the use of a thicker strip of rubber permits a greater accentuation of the design. The thickness of the strip will be determined by limitation of cost as balanced against the desired effectiveness of the design. However, even when an extremely thin strip of rubber is employed, the design is distinctive and for all practical purposes, is indestructible.

It is to be understood that the thermal setting material, if rubber, is uncured rubber, so that it may be deformed to desired shape, as by molding, or flowing, and subsequently vulcanized so as to retain its deformed shape. The method illustrated in Fig. 5 may advantageously be carried out by using a rubberous material comprising a high percentage of uncured rubber, in combination with a filler. The filler may be fibrous material, or may be any bulk producing material compatible with the process. Thus the bulk material may be active in aiding vulcanizations, or it may be inactive, as the aforementioned fibrous material. Hence it is to be understood that where the term "rubberous material" is employed, it is to embrace any material including sufficient uncured rubber to permit substantial deformations through a fabric and subsequent vulcanization.

The press for imparting the design to the fabric comprises an upper heating element **22** which may be heated by steam, electricity, or otherwise. A die member **25** of any predetermined design is carried in surface contact with the element **22** and heat is available at the edges of the die member **25**, due to conduction from the heating element.

In Fig. 6 I have shown the die member brought into juxtaposition to the table, compressing the fabric and the area of rubber or other material therebetween. As will be seen in this figure, the rubber is displaced from beneath the edges of the die member as indicated at **32**, and in practice the thickness of the rubber at this point is found to be extremely small. Due to the application of pressure, the rubber in the strip is caused to mold or flow to points between adjacent edges, with the result that upstanding ridges or risers **33** are formed therein. These ridges or risers **33** force the cloth upward into upstanding ridges **34**. The application of heat and pressure is continued for a time sufficient to provide vulcanization of the rubber with the result that the rubber is formed and permanently secured by vulcanization to the fabric **30**. As will be readily understood, the above described method produces upstanding ridges **34** in the laminated structure, and these ridges are distinctly defined and are entirely permanent. It has been found that in a properly formed and vulcanized combination of rubber and fabric, the fabric may be placed under tension just short of that sufficient to rupture the

same and when released, the decorative design is as distinct as ever.

Preferably, though not necessarily, the uncured rubberous material **31** is provided with a paper or textile backing sheet shown at **23** in Fig. 5. This material provides for greatly increased lateral strength of the finished product at the decorated area, and strongly tends to preserve the effectiveness of the design even though the decorated fabric is tensioned in use.

In Fig. 7 I have illustrated the appearance of the decorated fabric after the heated die member has been removed.

A slightly different embodiment of my invention is illustrated in Fig. 8 in which a block **35** of resilient material such for example as sponge rubber, is interposed between the table **20** and the die **25**. A heating element **22** may be the same as illustrated in Fig. 5. In this modification when pressure is applied between the table **20** and the die **25**, the fabric **36** and the thermal setting material **37** are pressed down into the block **35**. This results in a somewhat different condition than is encountered when the fabric and thermal setting material are placed on a rigid block **20**. The resilient block **35** tends to force the thermal setting material and the fabric upwardly between adjacent dies to a substantial extent. The thermal setting material directly beneath the edges of the die **25** is somewhat compressed as illustrated in Fig. 8. This results in the formation of integral ridges or risers **39** in the thermal setting material and corresponding well-defined upstanding ridges **38** in the exposed face of the decorative fabric. When the decorated material is removed from the piece, the thermal setting material is vulcanized to the shape shown in Fig. 8 and a vulcanized bond is established between the material **37** and the fabric **36**. Any resilient material may be substituted for the block **35**. It will be recognized that the method illustrated in Fig. 8 is substantially the same as that employed in decorating the fabric after application to the trim panel as illustrated in Figs. 2 to 4 where resilient padding is intermediate the fabric and panel board.

In the foregoing embodiment of my invention, heat is applied to the rubber through the upholstery fabric. It is therefore necessary to apply heat and pressure to the fabric for a considerable period of time. As is well known, the length of time required to cure rubber is a function of the temperature and in the embodiment previously illustrated, the temperature available at the rubber was strictly limited due to the fact that excessive temperatures cannot be applied to the cloth, and due also to the fact that there is a considerable heat drop through the upholstery or other fabric.

In Fig. 9 I have illustrated an embodiment of my invention which overcomes the necessity of limiting the temperature to a degree which will not injure the fabric. In this embodiment of my invention a die member **44** having a plurality of die blades or edges **45** is placed on a table **46**. A block **40** is placed in juxtaposition to the die **45** and the two parts are movable towards and away from each other either by providing means for elevating the table **46** or lowering the block **40**. The block **40** has a channel formed therein and received within the channel is a conduit **41** of resilient material providing a passage **42**. The material **41** may be of cured rubber or an impervious fabric. The passage **42** is connected to a steam supply and steam may be under any desired pressure. For example, at 35 pounds pressure the temperature is 280° F. This pressure and temperature condition is found particularly well adapted for the process illustrated. A fabric **47** and a backing strip of thermal setting material, preferably rubber, is interposed between the die **44** and the conduit **41**. As will be apparent the conduit **41** has at its exposed face what amounts to a flexible diaphragm **43**, through which heat is transmitted to the material **49**. As illustrated in Fig. 9, the material **49** is somewhat reduced in thickness at the point directly above the blades **45**, and the rubber is caused to flow and is deformed to points intermediate adjacent blades, which results in the formation of ridges or risers **50**. These ridges **50** force the fabric **47** into upstanding decorative ridges **48** which, as will be apparent, corresponds to the predetermined design. The flexible diaphragm **43** tends to force both the thermal setting material **49** and the fabric **47** into the space between adjacent blades **45** further than would otherwise be the case.

It will be apparent in this modification that the heat is applied directly to the rubberous backing strip so that a higher temperature may be provided than in the embodiments previously described, selecting a temperature which provides the most rapid curing or a vulcanization of the rubber. The process may be substantially accelerated, and also any danger of damaging the textile fabric through excessive temperatures is avoided.

In Figs. 10–12 I have illustrated a slightly different embodiment of my invention in which a thin strip of thermal setting material **51**, which is preferably a rubberous composition, is applied directly to a panel board **50** and adhesively secured thereto as at **56**. The rubberous material **51** may be attached to the panel board areas from which the fibrous padding material has been removed or, if desired, in this type of panel the padding material may be entirely omitted. Upholstery material generally indicated at **55** is placed over the thermal setting material **51** and heated dies corresponding to the dies **25** in Figs. 1, 5 and 8 are applied to the upholstery material. This has the effect of deforming the thermal setting material under the edges of the die as indicated at **52**, with a resultant flow or deformation of material into upstanding ridges or areas **53**. These areas **53** perform the function of risers and provide corresponding upstanding lines or areas **54** in the upholstery fabric.

A somewhat different method and apparatus is shown in Fig. 13. Here a die **60** and heated flat plate **61** are movable toward and away from each other. The plate **61** may be heated by any convenient means, such as steam, electricity, or other means. Fabric **62** and an area of uncured rubberous material **63**, which may include a filler of fibrous or other material are placed between members **60** and **61** as shown. Preferably the rubberous material **63** has a backing of textile or other sheeting **64** which will increase the lateral strength of the design as before described.

The die **60** molds the uncured rubberous material forming lines **65** of reduced thickness, and upstanding ridges or risers **66** therebetween. The fabric **62** conforms to the deformed rubberous material. Heat is applied from plate **61**, so that higher temperatures may be employed than could be used through the fabric **62**. The time necessary to vulcanize the rubber is thus reduced.

Here as in the other forms, the fabric is permanently bonded to the rubber by vulcanizations.

It will be appreciated that the thin film of rubber remaining underneath the die elements will be vulcanized to the rear surface of the fabric, and where a backing element such as the sheeting **64** in Figure 13, or **23** in Figure 5, is provided, vulcanization of this thin film of rubber directly beneath the die element provides a strong permanently vulcanized bond between the fabric and the backing sheet at low portions of the relief design. While the rubber which forms the riser portions of the design such as **66** in Figure 13, is also vulcanized, there will, of course, be no such strong vulcanized bond between the fabric overlying the riser portion as there is between the fabric and the thin film of rubber underneath the die element. This is due to the fact that for a good vulcanized bond between the rubber and fabric, it is necessary to provide both pressure and heat, and the pressure between the fabric and the rubber making up the riser portion **66** (Figure 13) is much less than the pressure between the rubber and fabric directly beneath the die elements. As a result of this a primary function of the rubber film between the trim fabric and the backing sheet is to secure the trim fabric substantially directly to the backing sheet in a manner to retain the fabric tensioned over the riser portion of the rubber.

Throughout the foregoing description I have referred to upholstering material, upholstery fabric, and in some cases fabric. It is to be understood that the method and products described include fabrics of all suitable materials, such for example as textile fabrics such as broadcloth and mohair, leather, artificial leather, or any other material or composition which may be decorated by the process above described. It is also to be understood that where the terms "fabric" or "upholstery material" are employed in the claims, these terms are to be regarded as covering any material as outlined above.

The foregoing detailed description has been given for clearness and understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

What I claim as my invention is:

1. The method of imparting a relief design to a flexible, woven fabric which comprises: providing a thin sheet of soft, uncured rubber at the rear of the fabric; placing said rubber and fabric against a smooth support with the rubber toward said support; applying sufficient pressure to the fabric at a plurality of separated, closely spaced areas which are to be low areas in said relief design to displace all but a thin film of rubber into raised riser portions intermediate said areas of pressure application; leaving the fabric intermediate and adjacent said areas of pressure application free for unrestricted outward displacement by the formation of said riser portions whereby said fabric shapes said riser portions and is smoothly tensioned thereover; and heating said rubber while maintaining the application of pressure to vulcanize said riser portions and to provide a vulcanized bond between said films of rubber and said fabric at the areas of pressure application.

2. The method of imparting a relief design to a flexible, woven fabric which comprises: providing a thin sheet of soft, uncured rubber between the rear of the fabric to be decorated and a flexible, reinforcing sheeting; placing the fabric, rubber and sheeting assembly against a smooth support with the fabric outermost; applying sufficient pressure to the fabric at a plurality of separated, closely spaced areas which are to be low areas in said relief design to displace all but a thin film of rubber into raised riser portions intermediate said areas of pressure application; leaving the fabric intermediate and adjacent said areas of pressure application free for unrestricted outward displacement by the formation of said riser portions whereby said fabric shapes said riser portions and is smoothly tensioned thereover; and heating said rubber while maintaining the application of pressure to vulcanize said rubber, whereby said riser portions retain their shape and the rubber provides a vulcanized bond between the fabric and sheeting at the low areas of said relief design, thereby retaining said fabric smoothly tensioned over said riser portions of said rubber.

3. The method of imparting a relief design to a fabric which comprises: assembling a thin sheet of uncured, soft rubber between the rear of a fabric to be decorated and a flexible, reinforcing sheeting; positioning the assembly on a smooth support with the fabric outermost; moving a die having a plurality of closely spaced, flat-bottomed die elements into pressure contact with said fabric and displacing all but a thin film of rubber from beneath said die elements into risers of increased height intermediate said die elements; said die having deep recesses intermediate said die elements for free outward displacement of said fabric by the formation of said risers, whereby said fabric shapes said risers and is smoothly tensioned thereover; heating said rubber while maintaining pressure on said die to vulcanize said rubber in its molded shape and to vulcanize the thin film of rubber beneath said flat-bottomed die elements to provide a vulcanized bond between said fabric and said sheeting to retain said fabric tensioned over said riser portions.

4. The method of imparting a relief design to a fabric which comprises: assembling a thin sheet of uncured, soft rubber between the rear of a fabric to be decorated and a flexible, reinforcing sheeting; positioning the assembly on a smooth, hot support with the fabric outermost; moving a die having a plurality of closely spaced, flat-bottom die elements into pressure contact with said fabric and displacing all but a thin film of rubber from beneath said die elements into risers of increased height intermediate said die elements; said die having deep recesses intermediate said die elements for free outward displacement of said fabric by the formation of said risers, whereby said fabric shapes said risers and is smoothly tensioned thereover; heating said rubber from said support while maintaining pressure on said die to vulcanize said rubber in its molded shape and to vulcanize the thin film of rubber beneath said flat-bottom die elements to provide a vulcanized bond between said fabric and said sheeting to retain said fabric tensioned over said riser portions.

5. The method of making a relief design of the class described, comprising the steps of assembling in surface to surface relation a layer of uncured rubber between a fabric sheet and a backing sheet, applying pressure to one side of said assembly at spaced points thereof to form alternate depressed and elevated portions in the fabric sheet and simultaneously to compress portions of

the uncured rubber beneath the depressed portions of said fabric sheet and to displace other portions of said uncured rubber into the elevated portions of said fabric sheet, and heating the depressed portions of said fabric sheet and the compressed portions of said uncured rubber while subjected to pressure as aforesaid to vulcanize the compressed portions of the rubber to the depressed portions of the fabric sheet and to adjacent portions of the backing sheet, to thereby maintain the relationship aforesaid between the displaced rubber and the elevated portions of the fabric sheet.

6. The method of making a relief design of the class described, comprising the steps of assembling in surface to surface relation a layer of thermal setting material between a fabric sheet and a backing sheet, applying pressure to the fabric sheet at spaced points thereof to form alternate depressed and elevated portions in said fabric sheet and simultaneously to compress portions of the thermal setting material beneath the depressed portions of said fabric sheet and to displace other portions of said thermal setting material into the elevated portions of said fabric sheet, and heating the depressed portions of said fabric sheet and the compressed portions of said thermal setting material while subjected to pressure as aforesaid to adhere the compressed portions of the thermal setting material to the depressed portions of the fabric sheet and to adjacent portions of the backing sheet to thereby maintain the relationship aforesaid between the displaced thermal setting material and the elevated portions of the fabric sheet.

7. The method of making a relief design of the class described, comprising the steps of placing a sheet of uncured rubber at the rear of a fabric sheet, placing said rubber with the fabric thereon upon a support, applying sufficient pressure to the fabric at a plurality of spaced areas which are to be low areas in said relief design to displace all but a thin film of rubber into raised riser portions intermediate said areas of pressure application, leaving the fabric intermediate and adjacent said areas of pressure application free for unrestricted outward displacement by the formation of said riser portions whereby said fabric shapes said riser portions and is smoothly tensioned thereover, and heating said rubber while maintaining the application of pressure to vulcanize said riser portions and to provide a vulcanized bond between said films of rubber and said fabric at the areas of pressure application.

8. The method of making a relief design of the class described, comprising the steps of assembling a sheet of uncured rubber between a fabric sheet to be decorated and a reinforcing sheet, placing the assembly against a support, applying sufficient pressure to the fabric at a plurality of spaced areas which are to be low areas in said relief design to displace all but a thin film of rubber into raised riser portions intermediate said areas of pressure application, leaving the fabric intermediate and adjacent said areas of pressure application free for unrestricted outward displacement by the formation of said riser portions whereby said fabric shapes said riser portions and is smoothly tensioned thereover, and heating said rubber while maintaining the application of pressure to vulcanize said rubber, whereby said riser portions retain their shape and the rubber provides a vulcanized bond between the fabric and reinforcing sheet at the low areas of said relief design, thereby retaining said fabric smoothly tensioned over said riser portions of said rubber.

9. The method of making a relief design of the class described, comprising the steps of assembling a sheet of uncured rubber between a fabric sheet to be decorated and a reinforcing sheet, positioning the assembly on a support with the fabric outermost, moving a die having a plurality of closely spaced, flat-bottomed die elements into pressure contact with said fabric and displacing all but a thin film of rubber from beneath said die elements into risers of increased height intermediate said die elements, said die having deep recesses intermediate said die elements for free outward displacement of said fabric by the formation of said risers, whereby said fabric shapes said risers and is smoothly tensioned thereover, heating said rubber while maintaining pressure on said die to vulcanize said rubber in its molded shape and to vulcanize the thin film of rubber beneath said flat-bottomed die elements to provide a vulcanized bond between said fabric and said reinforcing sheet to retain said fabric tensioned over said riser portions.

10. The method of making a relief design of the class described, comprising the steps of assembling a sheet of uncured rubber between a fabric sheet to be decorated and a reinforcing sheet, positioning the assembly on a hot support with the fabric outermost, moving a die having a plurality of closely spaced, flat-bottomed die elements into pressure contact with said fabric and displacing all but a thin film of rubber from beneath said die elements into risers of increased height intermediate said die elements, said die having deep recesses intermediate said die elements for free outward displacement of said fabric by the formation of said risers, whereby said fabric shapes said risers and is smoothly tensioned thereover, heating said rubber from said support while maintaining pressure on said die to vulcanize said rubber in its molded shape and to vulcanize the thin film of rubber beneath said flat-bottomed die elements to provide a vulcanized bond between said fabric and said reinforcing sheet to retain said fabric tensioned over said riser portions.

GEORGE R. CUNNINGTON.