

Jan. 4, 1944.

G. R. CUNNINGTON
METHOD OF DECORATING FABRICS

2,338,490

Original Filed Nov. 2, 1939

FIG. 1.

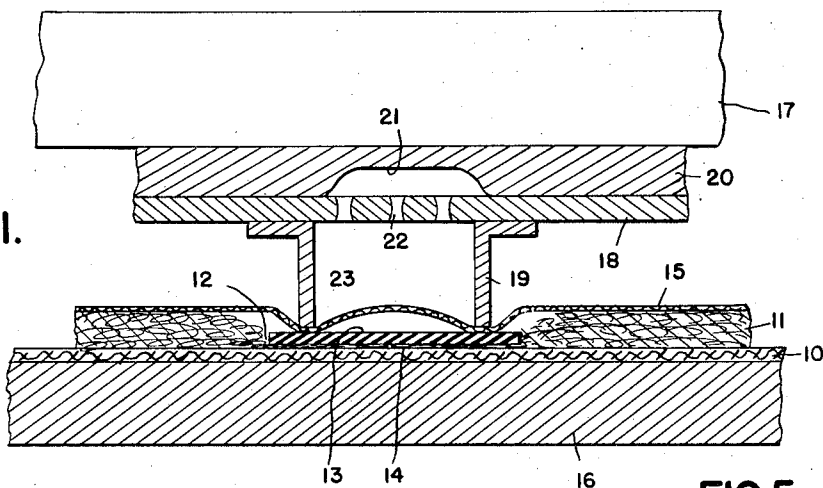


FIG. 2.

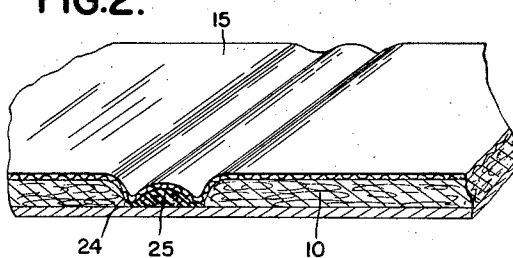


FIG. 5.

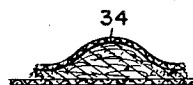


FIG. 4.

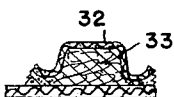
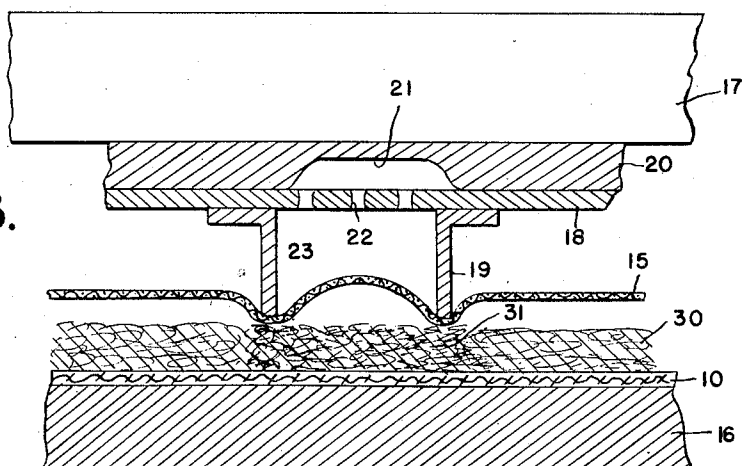


FIG. 3.



INVENTOR.

GEORGE R. CUNNINGTON

BY *Whittemore, Hulbert*
& Belknap ATTORNEYS

UNITED STATES PATENT OFFICE

2,338,490

METHOD OF DECORATING FABRICS

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

Original application November 2, 1939, Serial No.
 302,605. Divided and this application May 26,
 1941, Serial No. 395,297

10 Claims. (Cl. 154—2)

The present invention relates to the decoration of cloth and more particularly to a new method of forming a relief design in the front or dress face of the fabric.

In the past cloth has been decorated by molding a design in a suitable moldable material, such for example as rubber, by the application of pressure through a cloth to be decorated. Heat was at the same time applied with the result that the moldable material was at once molded to the desired contour and was at the same time vulcanized to the fabric in a manner to permanently retain the embossed design therein.

This method of decoration broadly is applicable both to cloth alone and to cloth after assembly as a covering for trim panels.

In the manufacture of trim panels in the past, efforts were made to provide a simpler embossed decoration in the trim fabric by covering the panel board with a loose fibrous material impregnated or treated with a suitable adhesive binder. This loose fibrous material was therefore in a sense moldable. In order to provide a decorated panel the fibrous material was first molded into a desired outline, after which the trim fabric was secured over the molded material and caused to conform to its surface curvature. Efforts to mold a moldable material of this type through the fabric was unsuccessful due to the fact that the tension of the fabric largely flattened out the whole of the moldable material.

According to the present invention I propose to decorate fabric, either alone or in combination with trim panels by a new method which provides several important advantages over methods known previously. Briefly described, the present method involves the step of initially forming the fabric to approximately the desired design, after which the fabric is moved into pressure engagement with the moldable material. In the event that the moldable material is an unvulcanized blowing rubber stock, as is contemplated herein, this initial forming of the fabric provides ample fullness for substantially complete expansion of the rubberous material when it is vulcanized. In the event that the moldable material is a loosely aggregated fibrous material impregnated or treated with an adhesive binder, the initial formation of the cloth permits a sharply delineated design to be imprinted therein by avoiding substantial pressure at the points of the design which are to be elevated points in the completed product.

In its broader aspects the invention may be practiced with numerous different apparatuses,

but for purposes of illustration I have illustrated herein a preferred embodiment of an apparatus for carrying out the present method. This apparatus comprises a die having relatively deep die elements corresponding to the desired design to be formed. It will be appreciated that the die elements correspond to depressed portions of the design and that the spaces between and adjacent the die elements correspond to elevated portions of the desired design. The die is provided with means for applying suction between the die elements. Preferably the die is brought into contact with the cloth to be decorated and then suction is applied in a manner to form the cloth inwardly into the spaces between the die members. Where the cloth to be decorated has not previously been assembled with the panel board, suitable means may be provided to prevent drawing too much cloth into the spaces. Where the cloth has previously been assembled to the trim panel it will, of course, be impossible to draw too much cloth into the spaces between the die elements for the reason that the edges are secured to the edges of the trim panel.

Preferably the die elements employed are heated, and if the moldable material is in the form of an unvulcanized blowing rubber stock the heat will be transferred from the die through the fabric to the rubber in a manner to cause the rubber to first blow and vulcanize. In the event that the moldable material is a fibrous material, as above specified, the heat from the die elements will cause the adhesive material therein to set in a manner to adhere the cloth to the moldable material at least at the points contacted by the heated die elements. The heated die elements, as will be understood, are moved inwardly against the cloth in a manner to cause a predetermined molding of the moldable material at the other side of the cloth.

It is accordingly an object of the present invention to provide a method of decorating cloth characterized by the initial formation of the cloth into predetermined form, followed by a molding of an adherent moldable material through the fabric.

It is a further object of the present invention to manufacture trim panels by a method which comprises the steps of initially adhering a trim fabric over a panel board, preforming the cloth into a desired relief design, and then molding a moldable material between the cloth and the panel board while causing the cloth to adhere to the moldable material.

It is a further object of the present invention

to provide a method of decorating fabric characterized by applying a die against the fabric to be decorated, applying suction above the cloth to form the cloth into openings in the die, and molding a moldable material through the fabric while simultaneously adhering the moldable material to the fabric.

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

Figure 1 is a fragmentary sectional elevation illustrating the method of decorating fabric where the moldable material is an uncured blowing rubber stock;

Figure 2 is a fragmentary perspective partly in section showing a panel board formed by the present method;

Figure 3 is a fragmentary sectional elevation illustrating the method of manufacture where the moldable material is a treated fibrous material; and

Figures 4 and 5 are fragmentary sectional views illustrating different types of pad formation.

Referring first to Figure 1 I have illustrated the method of manufacturing a trim panel, although it will be appreciated that the same method may be employed for decorating a fabric apart from a trim panel. In this figure I have illustrated a panel board 10 as having applied thereto certain areas of padding material 11, such for example as loosely aggregated cotton. This padding material may be applied in any desired manner, as for example by covering the entire surface of the panel board 10 with cotton, after which certain areas indicated in this figure as 12 may have the padding material removed therefrom. If preferred, padding material 11 may be pre-cut and applied only to such areas of the panel board as desired. Preferably the padding material 11 is lightly adhered to the panel board in a manner to prevent its becoming displaced in use.

At the areas 12 of the panel board from which the padding material has been removed I adhere a strip or area of rubberous material 13. This material is an uncured blowing rubber stock adapted upon heating to expand considerably and form a porous, soft resilient rubber. Preferably the rubberous material 13 has a backing of paper or sheeting interposed between the rubber and the panel board, and this is indicated at 14.

A trim fabric 15 is placed over the panel board 10 in a manner to overlie both the padding material 11 and the rubber 13. The fabric 15 may be any conventional trim fabric, such for example as mohair, broadcloth or the like. Preferably the edges of the fabric are bent over the edges of the panel board and are adhered or otherwise secured to the back thereof.

The panel assembly as thus far described is placed on a rigid support 16 with the fabric side uppermost. Over the support 16 is a movable die plate 17 mounted for vertical movement relative to the support 16. A die indicated generally at 18 is carried by the underside of the die plate 17 and is provided with depending die elements 19 which are provided in a desired design. Suitable means (not shown) are provided for heating the die elements 19 and may conveniently take the form of heating elements carried within the supporting plate 17 in a manner to cause heat to be conducted to the depending die elements 19.

An intermediate plate 20 is provided between the supporting plate 17 and the die, and the intermediate plate is provided with a conduit 21, which in this figure is illustrated as being closed at one side by the die. Suitable ports 22 are provided in the die providing communication between the conduit 21 and the space 23 intermediate the die elements. In this figure I have illustrated only two die elements, but it will be appreciated, of course, that any number may be provided in accordance with the desired design.

The conduit 21 communicates with a source of reduced pressure of any convenient sort, and which is accordingly not illustrated herein. Preferably valves are provided for controlling communication between the conduit 21 and the source of reduced pressure.

As will be apparent, the panel assembly as thus far described is placed on the support 16 and the die plate 17 is moved downwardly until the die elements 19 contact the upper surface of the trim fabric 15. The die is preferably arranged so as to be open only at its bottom, being closed at the sides and both ends. The recess thus formed in the die need not of course be elongated but may have any desired configuration. In any event the recess in the die may be described as being laterally closed and open at its bottom. The source of reduced pressure connected to the conduit 21 now withdraws air from the space 23 between the die elements 19 with the result that the fabric 15 is drawn upwardly thereinto. In the present instance the amount of fabric which is drawn up within the die elements 19 depends upon the differential pressure applied, and also upon the amount of fullness in the fabric 15 as well as the elasticity thereof. Preferably, however, the fabric is brought up between the die elements 19 an amount sufficient to permit unrestricted expansion of the rubber stock 13. After the fabric 15 has been drawn upwardly into the space 23 the die plate 17 is moved further downwardly in a manner to displace most of the rubber stock from beneath the die elements 19 into a thickened portion adjacent the die elements and intermediate the same. The support 16 and the die plate 17 are retained in this position for a substantial interval of time, sufficient to cause the rubber stock 13 to first blow into a porous rubber and then to undergo substantial vulcanization. The vulcanization adheres the fabric permanently to the rubber, particularly at the points directly beneath the die elements 19, with the result that the decoration thus imparted to the fabric is substantially permanent. Due to the fact that the fabric has initially been formed into substantially the desired contour, the rubberous material 13 expands freely and forms a much higher and softer riser than in methods previously known. In the event that only a shallow riser is desired, it will be appreciated that the method is equally useful, for the reason that such riser may be obtained with substantially less rubber stock.

In Figure 2 I have illustrated a fragment of the completed panel, and in this figure the panel board 10 and fabric 15 are shown united, as indicated at 24, by a relatively thin film of rubber. It should be noted particularly that the fabric 15 and the panel 10 are united by a relatively thin film of substantially unblown rubber, for the reason that the pressure of the die elements 19 prevents substantial blowing or sponging of the rubber. On the other hand, the rubber as

indicated at 25 is fully expanded with the result that a relatively high riser is formed.

The method has thus far been described in connection with the use of an uncured blowing rubber stock. It is equally useful, however, where the moldable material employed is of an entirely different nature.

In Figure 3 I have illustrated a method of manufacture in which the trim panel 10 and the fabric 15 have interposed therebetween a continuous covering of padding material 30. This padding material may be in the form of loosely aggregated cotton substantially like the padding material 11 illustrated in Figure 1, or it may be other fibrous material, such for example as suitable wadding, Cellufome, or the like. Cellufome is a trade name applied to a fibrous sheet material having substantial body, so that while it may be broken down by pressure, it compresses only substantially at the zone of pressure application. The padding material 30 in the zone 31 underlying the die elements 19 preferably is treated or impregnated with a suitable adhesive. Numerous adhesives are available for this purpose, although I prefer to employ a thermo-setting adhesive. This is for the reason that in many applications the trim fabric 15 is under substantial tension while the die 19 is molding the moldable material at 31. If thermoplastics are employed, these thermoplastic materials will soften by heat and no substantial bond is obtained until cooled. It is, of course, impractical to retain the die elements 19 in forming contact with the material until the material is cool. It is possible, of course, to employ thermoplastic materials having certain desirable characteristics, and in some instances, as will be recognized, materials may be employed which do not depend upon change in temperature. Thus, if the padding material in the zone 31 is rendered very tacky, the fabric 15 may be firmly adhered to the panel board 10 without the application of heat, and will be retained in molded form until the adhesive thoroughly sets. I mention the above points so that those skilled in the art may practice the present invention without difficulty, but I desire to emphasize the fact that the invention is considered to be broadly novel, irrespective of the method employed to secure the depressed portion of the design in the fabric to the panel board.

The apparatus employed in practicing the method with the adherent moldable fibrous material at 31 in Figure 3 is in all respects similar to the apparatus employed in Figure 1.

The character of the design imparted to the cloth will of course in large measure depend upon the character of the moldable material. It may be pointed out that the rubber 13 in Figure 1 and the adherent fibrous material 31 in Figure 3 have in common the two essential properties, namely that they are moldable and that they are adherent to the fabric. The material at 31 in Figure 3 is of course essentially compressible, whereas the rubber stock in Figure 1 is essentially incompressible. Thus the initial molding of the rubber stock in Figure 1 is accompanied by a definite flow of the material from beneath the die elements 19 into the space between the die elements, whereas the material at 31 in Figure 3 is essentially compressed without any plastic flow of the material.

I have mentioned a few fibrous materials which may be employed in the method as illustrated in Figure 3, and it will further be appreciated that

the result obtained will depend upon the specific characteristics of the fibrous material employed. Thus if the material exhibits substantial stiffness, the riser formed will be characterized by substantially square corners, whereas if the material is readily compressible, it will tend to round off at the corners. I have illustrated these two different conditions in Figures 4 and 5. Thus in Figure 4 I have indicated a riser 32 having substantially squared corners 33. This is the type of riser that will result from the employment of a relatively stiff fibrous material.

In Figure 5 I have illustrated a riser which is rounded and which is the type which will result from the employment of a relatively softer and more compressible fibrous material, such for example as cotton.

This application is a division of my copending application Serial No. 302,605, entitled "Decoration," filed November 2, 1939.

While I have illustrated and described several specific embodiments of my invention, it will be apparent to those skilled in the art that various additions, modifications, omissions, combinations and substitutions may be made which will be within the spirit and scope of my invention as defined by the appended claims.

What I claim as my invention is:

1. The method of making a trim panel which comprises securing a generally flat piece of uncured, blowing rubber stock to a panel board, securing a trim fabric to said panel board in position to overlap said rubber stock, bringing a die member against the outer surface of said fabric over said rubber stock, said die having a deep recess to provide a space for free movement of said fabric thereinto, applying suction to the outer surface of said fabric to draw said fabric into a raised bead in said space, moving said panel and die member together to mold said rubber into a riser incompletely filling the bead in said fabric, and heating said rubber while holding said die in molding position to cause said rubber to blow so as to completely fill said bead, and to become vulcanized.

2. The method of making a trim panel which comprises the steps of placing a generally flat layer of uncured blowing rubber stock in surface to surface relation upon a panel board, placing a trim fabric over the rubber stock, moving downwardly against the outer surface of the trim fabric above said rubber stock a die member having a relatively deep laterally closed open bottomed recess for the reception of a portion of said fabric, applying suction to the outer surface of the trim fabric beneath the recess to draw a portion of said fabric upwardly into a raised bead within said recess, moving the die member further downwardly against the fabric to displace most of the rubber stock beneath the recess upwardly within the bead in said recess, and heating said rubber stock while holding the die member down against the fabric to cause the displaced rubber stock within said bead to blow into a porous body within and substantially fill the bead, and to become vulcanized.

3. The method of making a trim panel which comprises the steps of placing a layer of uncured blowing rubber stock in surface to surface relation upon a panel board, placing a trim fabric over the rubber stock, moving downwardly against the outer surface of the trim fabric above said rubber stock laterally spaced die elements providing therebetween a relatively deep laterally closed open bottomed recess for the reception of

a portion of said fabric, applying suction to the recess to draw upwardly thereinto in the form of a raised bead a portion of the fabric sufficient to permit unrestricted expansion of the rubber stock, moving the die elements further downward against the fabric to displace most of the rubber stock beneath the recess upwardly within the bead in said recess and to compress portions of the rubber stock beneath the die elements, and heating said rubber stock while holding the die elements down against the fabric to cause the displaced rubber stock within said bead to blow into a porous body within and substantially fill the bead, and to cause the compressed portions of the rubber stock beneath the die elements to be adhered to said fabric.

4. The method of making a trim panel comprising the steps of placing a trim fabric over a layer of uncured blowing rubber stock, moving against the outer surface of the trim fabric above said rubber stock a die member having a recess providing a space for the reception of a portion of said fabric, applying suction to the outer surface of the fabric beneath the recess to draw a portion of said fabric upwardly into a raised bead within said space, moving the die member further downward against the fabric to displace most of the rubber stock beneath the recess upwardly within said raised bead, and heating said rubber stock while holding said die member against said trim fabric to cause said displaced rubber stock to blow within and thereby substantially fill said raised bead and to become vulcanized.

5. The method of making a trim panel comprising the steps of placing a trim fabric over a layer of uncured blowing rubber stock, moving against the outer surface of the trim fabric above said rubber stock downwardly projecting laterally spaced die elements defining a laterally closed open bottomed recess providing a space for the reception of a portion of said fabric, withdrawing air from said recess to draw a portion of said fabric upwardly into a raised bead within said space, moving the die elements further downward against the fabric to displace most of the rubber stock beneath the recess upwardly within said bead, and heating the die elements to cause the displaced rubber stock to blow within and thereby substantially fill said raised bead and to become vulcanized.

6. The method of making a trim panel comprising the steps of placing a trim fabric over a layer of expansible material, moving against the outer surface of the trim fabric above said expansible material a die member having a recess providing a space for the reception of a portion of said fabric, applying suction to the outer surface of the fabric to draw a portion of the fabric upwardly into a raised bead within said space, moving the die member further downward against the fabric to displace most of the expansible material beneath the recess upwardly within said raised bead, and heating said ex-

pansible material while holding said die member against said trim fabric to cause said displaced expansible material to expand within and thereby substantially fill said raised bead.

7. The method of making a trim panel comprising the steps of placing a layer of heat-setting expansible material in surface to surface relation upon a relatively stiff flat backing member, placing a trim fabric over the expansible material and backing member, moving against the outer surface of the trim fabric above said expansible material downwardly projecting laterally spaced die elements defining a laterally closed open bottomed recess providing a space for the reception of a portion of said fabric, withdrawing air from said recess to draw a portion of said fabric upwardly into a raised bead within said recess, moving the die elements further downward against the fabric to displace most of the expansible material beneath the recess upwardly within said bead, and heating the die elements to cause the displaced expansible material to expand within and thereby substantially fill said raised bead.

8. The method of making a trim panel comprising the steps of placing a layer of uncured blowing rubber stock between a backing sheet and a cover fabric, applying to the outer surface of the cover fabric above said rubber stock laterally spaced die elements defining a laterally closed open bottomed recess, withdrawing air from said recess to draw a portion of said cover fabric upwardly into a raised bead within said recess, moving the die elements against the fabric to displace most of the rubber stock beneath the recess upwardly within said bead, and heating the rubber stock while the die elements are applied as aforesaid to blow the displaced stock within said raised bead.

9. The method of making a trim panel comprising the steps of placing a layer of heat-setting expansible material between a backing sheet and a cover fabric, applying to the outer surface of the cover fabric above said expansible material laterally spaced die elements defining a laterally closed open bottomed recess, withdrawing air from said recess to draw a portion of said cover fabric upwardly into a raised bead within said recess, moving the die elements against the fabric to displace most of the expansible material beneath the recess upwardly within said bead, and heating said die elements while they are applied as aforesaid to expand said expansible material within said raised bead.

10. The method of making a trim panel comprising the steps of placing a layer of uncured blowing rubber stock between a panel board and a cover fabric, drawing a portion of said cover fabric upwardly above said rubber stock into a raised bead, displacing most of the rubber stock upwardly within said bead, and subjecting the rubber stock to heat and pressure to blow the displaced portion thereof within said raised bead.

GEORGE R. CUNNINGTON.