

Nov. 1, 1960

A. D. SYLVESTER ET AL

2,958,148

SURFACE ORNAMENTATION

Filed June 6, 1956

2 Sheets-Sheet 1

Fig. 1.

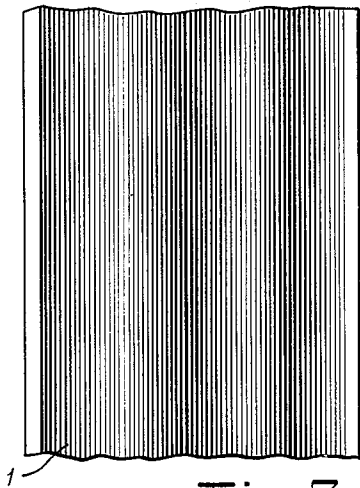


Fig. 2.

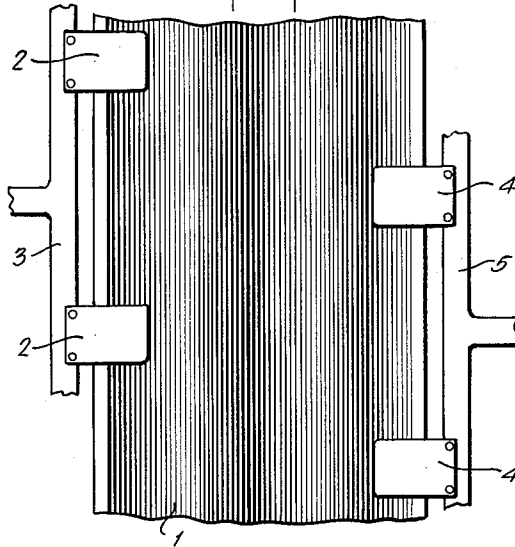


Fig. 3.

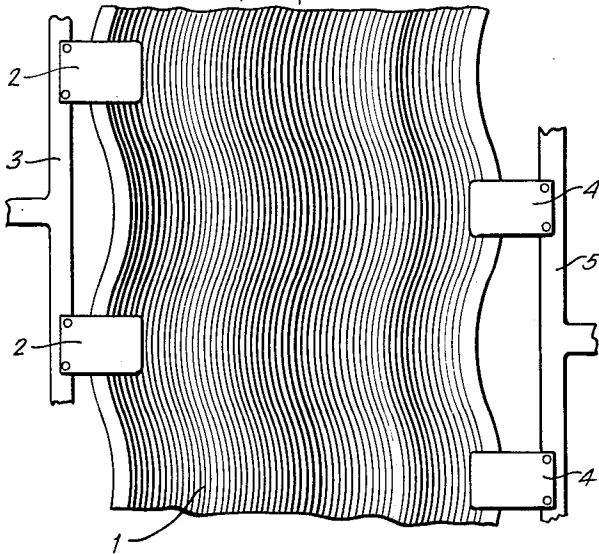


Fig. 5.

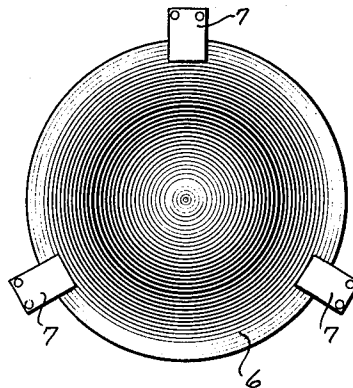
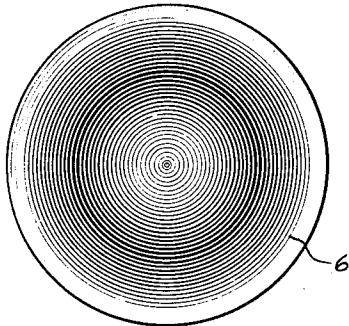


Fig. 4.



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Fig. 6.

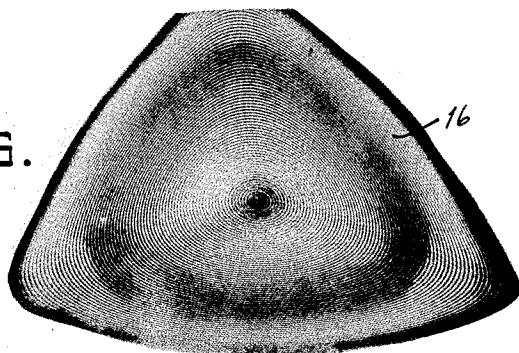
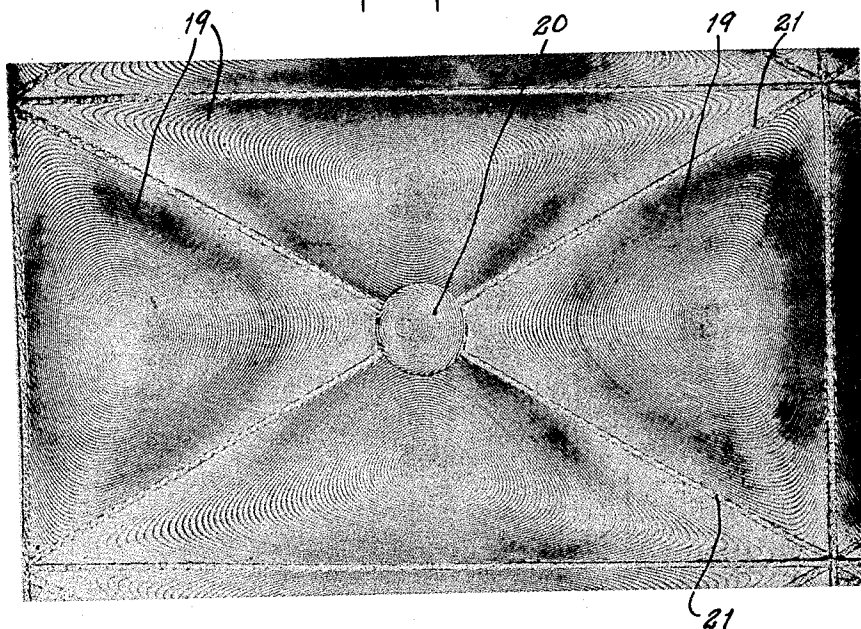


Fig. 7.



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2,958,148

SURFACE ORNAMENTATION

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Filed June 6, 1956, Ser. No. 589,741

3 Claims. (Cl. 41—19)

This invention relates to the surface ornamentation of plastic materials, and particularly to a method of forming on a plastic surface a pattern of novel type, thereby producing a novel ornamental effect, and to articles and materials bearing such patterns.

The invention is described herein as it has been used in connection with the surface ornamentation methods and ornamented articles shown and described in our copending application Serial No. 578,762, filed April 17, 1956, entitled "Surface Ornamentation" now abandoned in favor of continuation application Serial No. 682,566, filed September 4, 1957, and issued on March 3, 1959, as Patent No. 2,875,543.

The present invention has particular utility when used in connection with the invention of our pending application, in that especially novel and ornamental effects may be thereby produced. However, in its broader aspects, the present invention is not limited to use in connection with the methods and patterns described in the said copending application, but may be used in connection with patterns produced by other methods.

An object of the invention is to provide a new method of ornamenting the surface.

Another object is to provide a method of ornamenting the surface with a pattern which is a distorted modification of another pattern.

Another object is to provide a method of ornamenting a surface with a pattern which produces a novel optical illusion as to the contour of the surface.

Another object of the invention is to provide articles bearing novel ornamental effects produced by the methods described.

The foregoing and other objects are attained in the methods and products described in detail below. Briefly, the essential features of the novel method consist of first forming a pattern in the surface of a sheet of stretchable material. The sheet is then clamped at spaced localities and the clamps are moved apart so as to stretch selectively different areas of the material, thereby distorting the pattern. The distorted pattern is then fixed by taking a mold of the sheet while it is held stretched. The distorted pattern in the mold may then be reproduced on the surface to be ornamented by any suitable conventional method.

Typically, the first pattern may be an array of ridges and grooves formed by engraving. Especially remarkable results are obtained if the first pattern is one of the contour illusion type shown and described in our copending application, identified above.

Other objects and advantages of the invention will become apparent from a consideration of the following description and claims, taken together with the accompanying drawings.

In the drawings:

Fig. 1 is a plan view of a fragment of sheet material having a pattern formed thereon;

Fig. 2 is a somewhat diagrammatic view illustrating

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the fragment of Fig. 1 with a set of clamps engaging spaced localities of the material;

Fig. 3 is an illustration of a further step in our process, in which the clamps are stretched apart to distort the pattern in the material;

Fig. 4 is a plan view similar to Fig. 1 showing a fragment of the material bearing a different type of pattern;

Fig. 5 is a plan view similar to Fig. 4 showing spaced clamps arranged on the material fragment of Fig. 4;

Fig. 6 is a view showing the fragment of material in Fig. 5 after it has been distorted by separating the clamps in that figure; and

Fig. 7 is a plan view of a fragment of material bearing a mosaic design formed by bringing together pieces bearing designs similar to those of Figs. 4 and 6.

Figs. 1 to 3

These figures illustrate the invention as applied to an initial pattern formed of straight, parallel ridges and grooves in accordance with the teachings of our copending application Serial No. 578,762, mentioned above. As described in that application, the grooves between the successive ridges are made of varying depths and the sides of the successive grooves make varying angles with the general plane of the material. The effect of this arrangement of the grooves and ridges is to produce an optical illusion as to the actual contour of the material, that illusion giving an appearance of concavity or convexity. A fragment of material having ridges and grooves embossed in its surface in that manner is illustrated by the reference numeral 1.

In Fig. 2, the fragment 1 has applied to its left-hand side a series of clamps 3 connected by a bar 3. The right-hand margin of the fragment 2 has applied to it a series of clamps 4 connected by a bar 5.

In Fig. 3, the material has been stretched by moving the bars 3 and 5 apart, so that the various ridges and grooves in the fragment 1 are distorted into a sinusoidal contour instead of the straight contour of the same lines in Figs. 1 and 2. The sheet material from which the fragment 1 is formed must be more or less stretchable. For example, it may be a plastic sheet material formed from a vinyl chloride dispersion, according to a technique well known in the art. Such dispersions, if unsupported, i.e., when not bonded to a relatively rigid backing material such as cotton duck, are readily stretchable by considerable amounts.

After the material has been stretched to form the ridges and grooves into the sinusoidal contours of Fig. 3, a mold is made of the stretched pattern, while the ridges and grooves are held in their sinusoidal contours by maintaining the bars 3 and 5 in fixed positions. This mold may then be used in a conventional process to produce an embossing roll, by which the distorted patterns of ridges and grooves appearing in Fig. 3 may be reproduced in sheet material. This reproduction may be in the same stretchable material as in Fig. 1, or it may be in a rigid material. Alternatively, the mold so prepared might be used to prepare a three-dimensional die or form, by which the pattern could be reproduced in solid blocks or other contours of plastic material.

If the pattern appearing in Fig. 3 is reproduced in stretchable material, then it may be further distorted by a second clamping and stretching operation, and the second distorted pattern so produced may be fixed by taking another mold from it.

In this manner, a great variety of novel patterns for surface ornamentation may be constructed. Where the original pattern is of the contour illusion type, the effect of contour illusion will be retained in the modified forms.

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Figs. 4, 5 and 6

These figures illustrate a modification of the invention in which the initial pattern consists of concentric circles rather than straight lines as in Fig. 1. Fig. 4 shows a circular fragment 6 of material having a circular pattern of ridges and grooves formed therein. This circular pattern may be of the contour illusion type, as described in our copending application, Serial No. 578,762, mentioned above. In Fig. 5, three equally spaced clamps 7, have been applied to the periphery of the material. The three clamps 7 may then be moved apart, stretching the material into substantially the form shown in Fig. 6. While it is stretched in that form, a mold of the stretched material is made to fix the pattern. From the mold, embossing rolls may be produced by known techniques to reproduce the distorted pattern in sheet material. If desired, three dimensional molds of other types may be formed with this pattern to reproduce it in objects having three substantial dimensions.

While the pattern of Fig. 5 shows ridges and grooves which are equally spaced, the distortion of the pattern produced in Fig. 6 makes the spacing between ridges vary along the length of the ridges.

Fig. 7

This figure illustrates a composite pattern produced by means of a mosaic technique from simple pattern units, some of which were produced by the distortion method described above.

The pattern of Fig. 7 includes four generally triangular pieces 19, all produced in accordance with the distortion technique of Figs. 4 to 6. These four triangular pieces are assembled with their apices adjoining, and together form a rectangle. At the center of the rectangle is a circular piece 20 which may be a section of an undistorted pattern, such as that of Fig. 4. The pieces 19 are individually enclosed within frames 21, which are long strips of the simple chain pattern.

While we have shown and described certain preferred embodiments of our invention, other modifications will occur to those skilled in the art, and we therefore intend our invention to be limited only by the appended claims.

We claim:

1. An ornamented article of plastic material having on at least a portion of one surface thereof a pattern comprising alternating ridges and grooves varying progressively along a section taken substantially at right angles to the ridges and grooves as to the depth of the successive grooves and as to the angle between corresponding sides of the successive grooves and the tangent to said one surface along said section, said ridges and grooves being spaced apart by distances which vary longitudinally of the grooves, said pattern producing an optical illusion as to the contour of said surface.

2. An ornamental article comprising at least a surface

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layer of plastic material, said layer having embossed in one surface a multiplicity of design areas arranged in contiguous relation, at least some of said design areas consisting of a plurality of alternating ridges and grooves whose profiles, taken along a section at right angles to the ridges and grooves, are formed of substantially straight lines, each said ridge having one steep side and one more gently sloping side, the profiles of the gently sloping sides varying progressively as to slope along said section, the spacing of said ridges varying progressively longitudinally of the grooves and ridges, the depths of said grooves and the angles at the peaks of the successive ridges varying concomitantly and progressively along said sections, said ridges and grooves being effective to produce an optical illusion to an observer as to contour of the surface, said illusion having an appearance to an observer looking at the ridged and grooved surface, of a decreasing slope of the material contour in the direction in which said peak angles increase in magnitude and said grooves decrease in depth.

3. An ornamental article, comprising at least a surface layer of plastic material, said layer having embossed in one surface a multiplicity of design areas arranged in contiguous relation, at least some of said design areas consisting of a plurality of alternating ridges and grooves whose profiles, taken along a section at right angles to the ridges and grooves, are formed of substantially straight lines, each said ridge having one steep side and one more gently sloping side, the profiles of the gently sloping sides varying progressively as to slope along said section, the spacing of said ridges varying progressively along said section and also varying longitudinally of the grooves and ridges, the depths of said grooves and the angles at the peaks of the successive ridges varying concomitantly and progressively along said sections, said ridges and grooves being effective to produce an optical illusion to an observer as to contour of the surface, said illusion having an appearance to an observer looking at the ridged and grooved surface, of a decreasing slope of the material contour in the direction in which said peak angles increase in magnitude and said grooves decrease in depth.

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