Aug. 30, 1938. F. L. FOSTER 2,128,811

METHOD OF FLOCKING

Filed Nov. 11, 1935

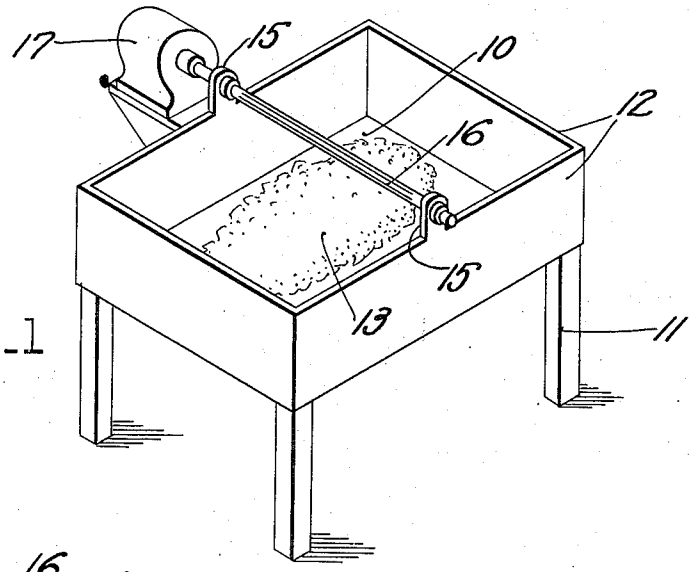


Fig. 1

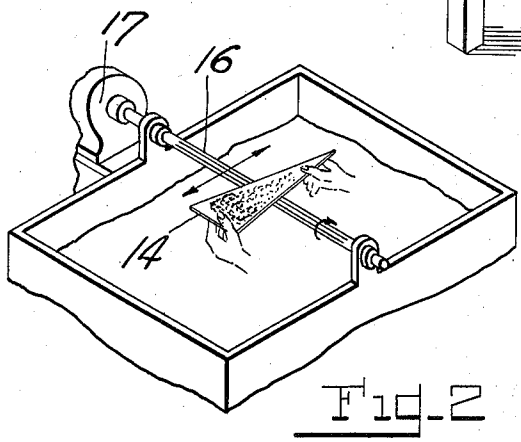


Fig. 2

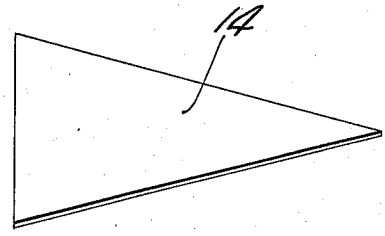


Fig. 3

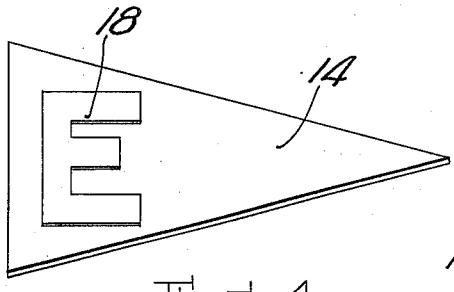


Fig. 4

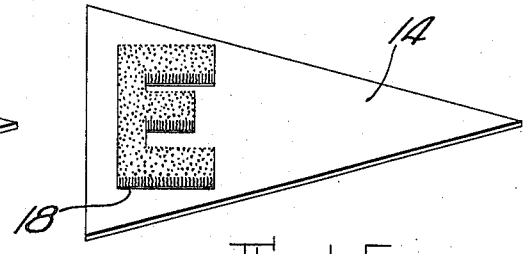


Fig. 5

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Patented Aug. 30, 1938 2,128,811

UNITED STATES PATENT OFFICE

2,128,811

METHOD OF FLOCKING

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Application November 11, 1935, Serial No. 49,266

9 Claims. (Cl. 91—68)

This invention relates to a method of flocking.

As is well known in the art, flocking is the application of flock to a backing material which has been coated with a moist adhesive to which the flock permanently adheres when the adhesive dries. Flock is both cut and ground fiber. Cut flock is ordinarily composed of short lengths (usually ¼ to 3 millimeters) of cotton, silk, or rayon fiber but other suitable fibers and materials may be used. Ground flock is fiber ground into powder form. By the use of flock attractive ornamental effects or designs may be produced on textile fabrics, leather, paper, cardboard, metal, wood or other suitable materials. When flocking in a design or pattern, the adhesive is ordinarily applied to the backing material in the desired pattern by means of a stencil. This invention relates primarily to cut flock, but is likewise applicable to ground flock.

Hitherto, so far as I am aware, flock has been applied to the backing material by dusting it on or by blowing it on through tubes or with a dry spray gun. In this way, with cut flock, the flock is applied in random and haphazard fashion, the fibers lying in every direction, held by the adhesive in the position in which they fall. Only rarely and by accident do any of the fibers stand on end. In obtaining a suede effect, as with cotton flock, or with ground flock the random lay of the flock is immaterial, but to obtain a plush or velvet effect (as with silk or rayon cut flock) the fibers must, of course, be made to stand on end, substantially upright and parallel to each other. Hitherto it has been impossible to obtain a satisfactory plush effect on flocked material due to the impossibility of making a sufficient proportion of the fibers stand upright. I have discovered, however, that if the backing material being flocked is held taut and is rapidly beaten and rubbed, as by a rapidly rotating polygonal steel bar, and flock repeatedly applied to the backing material, that the flock fibers are caused to stand on end and become firmly embedded and anchored in the adhesive in that condition, thereby producing a beautiful plush effect. This phenomenon is apparently due to two causes. One is the static electricity induced by the rapid rotation and rubbing of the rotating bar upon the backing material, imparting like electrical charges to the flock fibers, and causing them to mutually repel each other and thereby assume an upright position. The other is the beating and vibration given to the backing strip which hammers the ends of the fibers down into the adhesive, whereby they become firmly embedded and anchored when the adhesive dries.

Before explaining in detail the present invention, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

In the drawing:

Fig. 1 is a perspective view of my machine;

Fig. 2 is a perspective view showing the machine in operation in carrying out my process;

Fig. 3 is a perspective view of a sample of backing material to be flocked;

Fig. 4 shows the backing material with adhesive applied, and

Fig. 5 is a perspective view of a sample of flocked material as produced on the machine and by my process.

In the drawing, 10 represents a flat table having legs 11, and upright sides 12 forming an open box-like container for the flock. If desired, a separate open box may be used for containing the loose flock. Loose flock 13 is shown on top of table 10. Suitable standards 15 are mounted on two sides of the table opposite each other and form journals for a rotatable bar 16, caused to rotate by a suitable source of power such as the electric motor 17. Bar 16 may be of any suitable shape and of any suitable material such as steel, but for best results I prefer a non-circular bar having sharp angles such as a hexagonal bar. The bar is preferably about $1\frac{1}{16}$ inches in thickness between its shortest side and is preferably rotated at about 1725 R. P. M.

In practicing my process of flocking, a strip of backing material 14 which is to be flocked is cut in desired shape, (as in Fig. 3) and a stencil (not shown) is properly located and placed on over it, which has an opening or openings therein outlining the shape of the design to be reproduced in flock on the backing material. An adhesive 18 is then applied to the backing material through the stencil leaving the desired pattern showing in adhesive on the backing material.

Any suitable adhesive may be used, such as a rubber, or a nitrocellulose cement. The stencil is then withdrawn and a coating of flock is sifted onto the backing material covering the adhesive.

The operator grasps the backing strip 14 at two ends and holds it taut or under tension against the rapidly rotating bar 16, the underside of the backing strip touching the bar and the adhesive side up. A light pressure is preferably placed on the strip at first, the operator pressing down lightly with his hands at the ends and increasing the pressure as the operation proceeds. The operator then moves the backing strip slowly back and forth across the rotating bar 16 a number of times sifting on additional flock from time to time until sufficient flock has adhered to the backing strip and the adhesive portion is filled in with upright fibers as thickly as desired. The backing strip is then set aside to dry, and when thoroughly dried the loose flock is brushed or vacuumed off leaving the flock in the adhesive firmly attached to the backing strip, as shown in Fig. 5.

The beating and rubbing effect produced by the rapidly rotating bar vibrates the backing strip rapidly, and causes the flock particles both to jump about and to assume an upright position so that they become firmly embedded and anchored in the adhesive at their bottom ends. As previously stated, I believe this effect is due to the combination of two causes, first, to static electricity induced by the rubbing of the rotating bar, whereby the flock particles are caused to stand on end, due to their mutual repulsion, and second, to the rapid beating and vibration given to the backing strip by the edges of the rotating bar, which causes the particles to become hammered into and firmly embedded in the adhesive. The static effect is evidenced by the manner in which the loose flock will follow the bar, even uphill to the crest of the strip as the backing strip is moved back and forth across the bar thereby showing an attraction exerted against the flock particles. And I prefer an irregularly shaped bar, which gives a beating effect rather than a circular bar which merely rotates, because of the better results obtained. I find also that superior results are obtained when the backing strip is held directly against the rotating bar without the interposition of a layer of any other material, as in this way the static electricity is not dissipated, nor is the vibration absorbed or lessened, and the full effect is available to control the behavior of the flock particles.

Other materials such as leather, paper, cardboard, metal or wood can be satisfactorily flocked in this way but a full plush effect is best obtained on flexible material such as textile fabric and leather presumably because of the greater static electricity generated. By the use of this machine and process I am able to obtain a plush effect on flock material that has hitherto been impossible, because never before has it been possible to cause a large proportion of the flock fiber to stand upright and on end, as in plush or velvet fabric.

I claim:

1. The process of flocking which includes applying adhesive to the material to be flocked, applying loose flock to the same material, and generating static electricity among the flock particles to make them mutually repel each other and so stand on end on the material to be flocked, by providing relative frictional and rubbing contact between the material to be flocked and another surface.

2. The process of flocking which includes applying adhesive to the material to be flocked, applying loose flock to the same material, and moving a frictional surface rapidly enough to generate static electricity among the flock particles to make them mutually repel each other and so stand on end on the material to be flocked when said material is held under tension against said moving surface.

3. The process of producing a pile fabric by flocking which includes applying adhesive to a face of the material to be flocked, supporting said material with the face to which the adhesive is applied uppermost, applying flock fibers to said face and subjecting the flock fibers to a charge of static electricity caused by rubbing said material against another surface.

4. The process of flocking which includes applying flock to the adhesive-coated face of the material to be flocked, rotating a bar rapidly and holding the opposite face of the material to be flocked under tension against said bar so as to generate static electricity among the flock particles to make them stand on end on said material.

5. The process of flocking which includes generating static electricity among the flock particles to make them mutually repel each other and so stand on end on the material to be flocked by providing relative frictional and rubbing contact between the material to be flocked and another surface and rapidly beating and vibrating said material.

6. The process of flocking material to which adhesive has been applied which comprises rapidly rotating a non-circular bar, holding the material to be flocked under tension against said bar so as to generate static electricity among the flock particles to make them mutually repel each other and so stand on end on said material, and rapidly beating and vibrating said material to embed said flock particles firmly in said adhesive in substantially upright position.

7. The process of producing a pile fabric by flocking, which includes applying flock to the adhesive coated face of the material to be flocked, rotating a bar, and holding the opposite face of the material to be flocked under tension directly against said bar without the interposition of other material between said flocked material and the bar, said bar being rotated sufficiently rapidly to cause the flock particles to stand substantially on end on said material.

8. The process of producing a pile fabric by flocking material to which adhesive has been applied, which comprises rotating a non-circular bar, holding the material to be flocked under tension directly against said bar without the interposition of other material between said flocked material and the bar, said bar being rotated sufficiently rapidly to cause the flock particles to stand substantially on end on said material and to embed said flock particles firmly in said adhesive in substantially upright position.

9. The process of producing a pile fabric by flocking material to which adhesive has been applied, which comprises rotating a polygonal bar, holding the material to be flocked under tension directly against said bar without the interposition of other material between said flocked material and the bar, said bar being rotated sufficiently rapidly as to beat and vibrate said material to cause the flock particles to stand substantially on end on said material and to embed said flock particles firmly in said adhesive in substantially upright position.

FRED L. FOSTER.