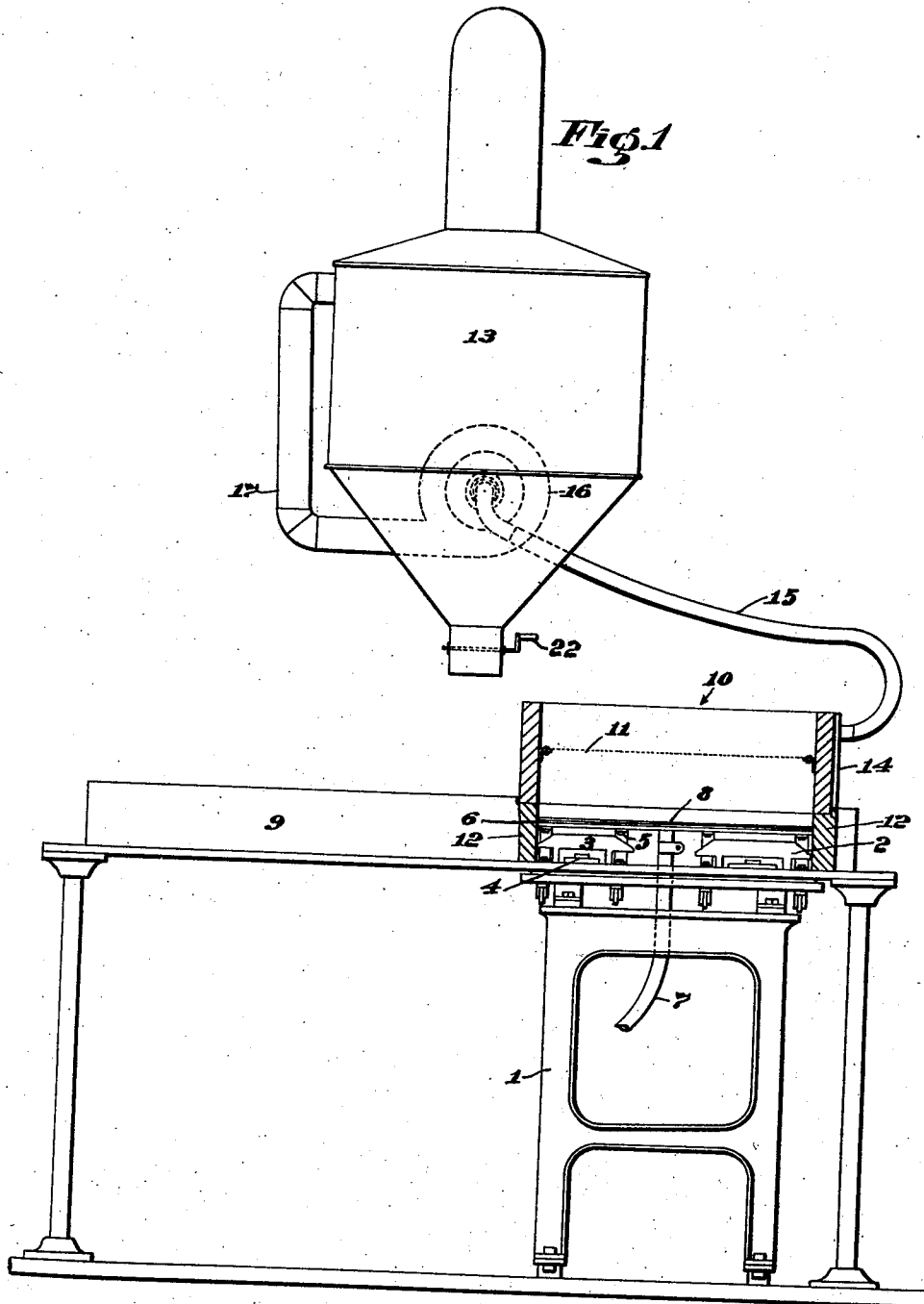


Oct. 7, 1941.

R. E. FOGG
METHOD FOR FLOCKING
Filed Nov. 15, 1937

2,258,092

3 Sheets-Sheet 1



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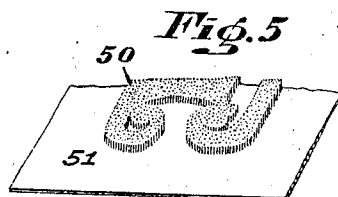
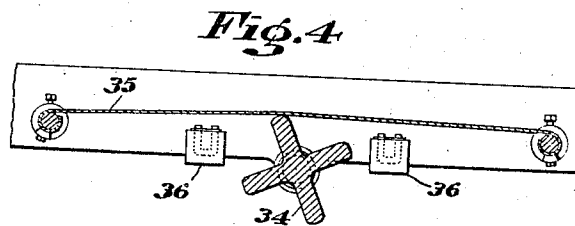
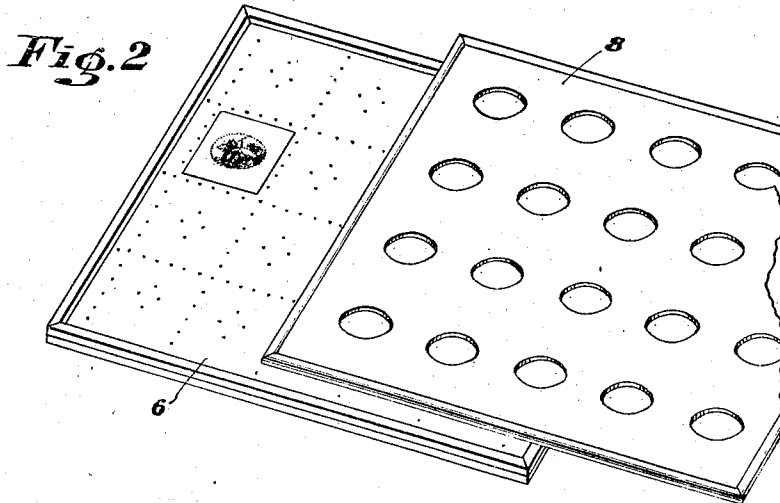
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3 Sheets-Sheet 2



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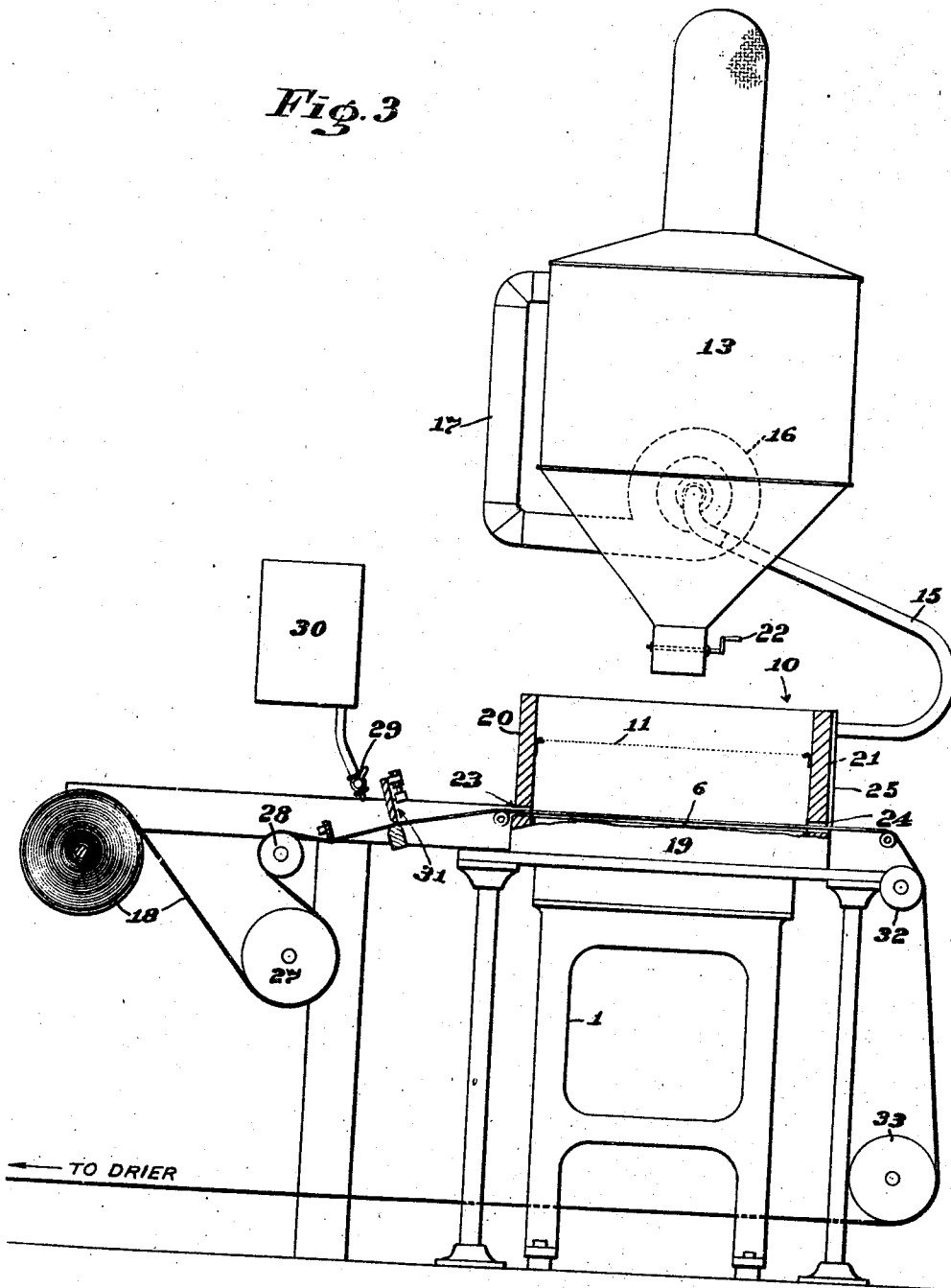
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Fig. 3



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UNITED STATES PATENT OFFICE

2,258,092

METHOD FOR FLOCKING

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Application November 15, 1937, Serial No. 174,560

2 Claims. (Cl. 91-68)

The invention relates to methods of coating or flocking adhesive treated paper, fabric or other material with short fibres or flock, the present application constituting a continuation in part of my application, Serial No. 103,321 filed September 30, 1936, now Patent No. 2,187,617, issued January 16, 1940 which relates particularly to machines for flocking, adapted for use in accordance with the present invention.

More specifically, the present invention has for its objects the provision of new and improved methods for coating material with flock and of a flock coated material in which the flock particles are firmly bonded to the material surface in upstanding relation thereto.

I accomplish these objects in the manner hereinafter described and illustrated in the accompanying drawings in which:

Fig. 1 is a side elevation, partly in section, showing apparatus which I preferably employ in practicing the methods of this invention for batch flocking, such as the flocking of groups of greeting cards;

Fig. 2 is a plan view of a vibrator plate and top plate for the apparatus shown in Fig. 1;

Fig. 3 is a side elevation, partly in section, of a modification of the apparatus shown in Fig. 1 adapted for use according to the present invention for continuous flocking of long strips or sheets of materials;

Fig. 4 is a section view of a modified form of vibration apparatus and magnets for use in connection with the invention;

Fig. 5 is an enlarged view of a flat surface coated with flock in accordance with the present invention, showing arrangement of the fibres.

Heretofore, the customary method of flocking has been to sift or dump quantities of flock on the adhesive treated surface of the material and subsequently to subject the material to vibration in a direction normal to the treated surface to assure bonding of the flock with the adhesive. When flock is applied to the material in this fashion it collects on the adhesive surface as a tangled mat with most of the fibres lying flat on the adhesive and is bonded with the adhesive in this form by the subsequent vibration. The flock coat produced by this method has, therefore, very much the appearance of a felt.

I have found that a much superior appearance is imparted by the flock if the individual fibres are uniformly driven endwise into the adhesive, thus producing a smooth, deep coat of flock which has much the appearance of a nap.

I have discovered that a coat of flock in which

the great majority of the fibres are secured in upstanding relation to the material surface may be obtained, if, instead of dumping or sifting the flock onto the adhesive treated surface prior to vibration, the flock is supplied to such surface only while it is being vibrated and in the form of a continuous shower from above the vibrating surface. The fibres, even though very light, tend to fall in endwise relation onto the surface, particularly if they are more or less vertically arranged with respect to the surface at the start of the fall, as may be assured by sifting the flock onto the material through a screen of finer mesh than the length of the fibres. The fibres reaching the vibrating surface in endwise relation are driven into the adhesive in that position by the force of the vibration, without which the fibres would fall over and lie lengthwise on the adhesive, the force of the fall alone, due to the lightness of the fibres, being insufficient to cause vertical penetration into the adhesive. The vibration of the material being flocked is preferably uniform throughout the area under treatment to assure uniformity of the coat.

Flocking by this method attains a much superior coat of flock to that attained by prior methods in that a majority of the fibres are secured in upstanding endwise relation to the surface. I have discovered, however, that in cases where rayon or silk fibre flock is used, this desirable effect can be further enhanced to the point of uniformity in vertical arrangement of the flock by subjecting the falling fibres to the influence of a magnetic field, the lines of force of which extend from below the vibrating material through and approximately vertically thereto. I have found that under the influence of such a magnetic field these flock fibres uniformly assume and maintain a vertical position as respects the material surface while they contact it and are being driven by the vibration into the adhesive and I therefore believe that such flock fibres must carry a charge and become polarized under the influence of the magnetic field, the fibre end having a charge corresponding to that of the magnet being attracted and the opposite end repulsed by the magnet.

My preferred method, therefore, consists in supplying flock in a continuous shower to a vibrating adhesive treated surface and, particularly where rayon or silk flock is used, maintaining magnetic lines of force through and vertically of said surface. It will be understood, however, that use of the method of supplying flock to the material as a continuous shower during

vibration, without the use of the magnetic field, produces a flock coat superior in point of vertical arrangement of the flock to that obtainable by previously known methods, although, in the case of rayon or silk flock at least, without the uniformity of such arrangement attainable with the aid of the magnetic field.

In order to assure uniformity in bonding of the flock with the adhesive on the material, I prefer that all flock coated areas of said material be subjected to a uniform amount of vibration and that the material area exposed to the showering flock be uniformly vibrated throughout while so exposed. To this end, I prefer to secure the material area exposed to the flock shower, while so exposed, to a rigid support, which is raised and lowered at rapid regular intervals to a uniform extent. I have found that such desirable motion may be imparted to the support through the medium of an electro-magnetic vibrator, of which the vibratable element is attached to the support. Conveniently, the support may be a flat plate which is at least co-extensive in area with the material area exposed to the flock shower at any time.

In carrying out the methods of my invention, I prefer to employ apparatus of the type illustrated in Figs. 1 and 3, in which electro-magnetic vibrators are employed to vibrate a rigid material supporting plate, both because the uniform vibration of material thereby attainable is particularly advantageous to obtaining a uniform coat of flock uniformly bonded and because I have found that the coils of such vibrators produce a magnetic field through the material sufficient for purposes of positioning flock, as previously described.

The apparatus shown in Fig. 1, which is fully described in my co-pending application previously referred to, is arranged for batch flocking of small area materials. It consists of table 1, which has secured to its top portion two electro-magnetic vibrators 2 comprising an armature 3 and a coil 4, the latter connected to an electric current source. Secured to the tops of the armatures, preferably through an elastic connecting medium, such as rubber supports 5, to increase the throw, is a lightweight, rigid vibrator plate 6 to which the adhesive treated material is clamped. To provide a suitable clamp for thin, light materials, the plate 6 may be made hollow with small perforations in its upper surface, as in Fig. 2, the cavity therein communicating with a suitable suction pump (not shown) through a tube 7. The materials to be flocked may be placed on the apertured top of the plate 6 and secured thereto by the suction alone, or in addition, by a top plate 8 having apertures of such size and arrangement as to expose all adhesive treated areas of the material.

The vibrator plate 6 extends upwardly into a trough 9 in which is slidably mounted a flock sifting box 10 across which extends a flat screen 11, having a mesh somewhat smaller than the length of the flock used, such as a 60 mesh screen. The trough 9 has cross pieces 12 on which the ends of the box 10 rest when it is in position over the vibrator as shown in Fig. 1, the box 10, together with the cross and side pieces of the trough 9 thus forming a vertical closure around the plate 6. The plate 6 is preferably connected at its edges by flexible strips to these cross and side pieces of the trough. Flock may be supplied through the open top of the box 10 to the top of the screen 11 from a supply hopper 13 as

the box is slid beneath it. If desired, the outside end of the box may be provided with a suction chamber 14, opening downwardly, through which excess flock may be drawn up from the plate 6, as the box 10 is moved across it, through the tube 15 to a blower 16 which returns the flock to the hopper through tube 17.

In use, the adhesive treated material is arranged and clamped on the plate 6 with the adhesive treated portions exposed, the box 10, provided with a layer of flock over the screen 11, is moved to the position shown in Fig. 1 and the vibrators connected to current. The resultant vibration of the plate creates currents of air up and down through the screen sufficient to produce the desired continuous shower of flock through the screen, thus obviating need for apparatus to shake the screen. As previously explained, the majority of the fibres are maintained in vertical position with respect to the plate 6 by the influence of the fall through the screen 11 and are thus firmly driven endwise into the adhesive by the force of the vibration to form a flock coat in which most of the flock particles are vertically disposed with respect to the surface. In the case of rayon or silk flock, the further influence of the magnetic force exerted through the plate 6 by the coils 4 of the vibrators produces a coat of flock such as shown in Fig. 5 in which the flock fibres 50 are uniformly bonded in endwise relation to the surface 51.

The apparatus shown in Fig. 3 represents a modification of that shown in Fig. 1 for practice of the methods of the present invention in connection with continuous flocking of large area flexible materials, such as the fabric 18. In this case the vibrator apparatus is similar to that shown in Fig. 1 except that the suction clamping system has been dispensed with, the fabric being maintained against the vibrator plate 6 by tension. The vibrator plate 6 extends into a vertical closure formed by side strips 19 and cross strips 20 and 21 which may, in this case, be sufficiently high to form the sides of the flock box 10. The screen 11 in this case is preferably of somewhat coarser mesh, such as a 30 mesh, for reasons subsequently disclosed. The flock supply hopper 13 is mounted over the open top of box 10 and is shown as provided with a hand feed lever 22, although automatic feed mechanism such as a worm feed may be employed if desired.

The cross strips 20 and 21 have transverse slots 23 and 24 extending substantially the length of the strips, the bottoms of said slots slightly below the top of the plate 6 in its lowermost position, and the slots having a depth somewhat greater than the length of the vibrating stroke of the plate 6, so that the adhesive or flock coated fabric will not touch the top of the slots as it approaches the vibrating plate 6 through the slot 23 and leaves it through the slot 24. A suction chamber 25 may be provided on the outside of the strip 21 having its mouth flush with the top of the slot 24, for removing excess flock from the fabric.

The fabric 18 is drawn under a roll 27, over a roll 28, under adhesive distributing nozzle 29 of adhesive tank 30, through a spreading knife 31, through the slot 23 over the plate 6, through the slot 24, over rolls 32 and 33, and into a suitable drying compartment (not shown).

The fabric 18 is vibrated as it passes over the plate 6, being held against the plate 6 by the tension. The movement of air created in the box 10 by the vibrating fabric and plate sifts the flock

down through the screen 11. The vertical movement of air, however, is not so great as in the apparatus shown in Fig. 1 due to the lateral openings 23 and 24, and, therefore, I have found that use of a somewhat coarser screen is advisable to assure a sufficient shower of flock. The fabric is flocked by the vibration of the plate 6 as it passes thereover, the flock fibres or particles being maintained in vertical position under the combined influence of the sifting, fall, magnetic field and vibration as in the case of the apparatus shown in Fig. 1.

While I prefer to make use of the air currents created by vibration to sift the flock as previously described, mechanical sifting means, such as a rotary screen, may be substituted for the flat screen 11 if desired.

The vibrator apparatus shown in Figs. 1 and 3 is a preferred construction for the practice of methods of this invention, but other types of vibrators may also be used in connection therewith. In Fig. 4 I have shown a vibrator of the beater type which may, if desired, be substituted for the vibrators previously described, although with less efficient results. The vibrator of Fig. 4 comprises a rotatable beater or paddle wheel 34 and a flexible top piece 35, such as a tightly stretched piece of canvas. The blades contacting the under surface of the top piece 35 in the manner shown cause vibration of the top piece 35 and material secured thereto for flocking. Electromagnets 36 may be placed at either side of the beater 34 to provide a magnetic field such as is present in the case of the electro-magnetic vibrators.

Due to the flexibility of the top piece 35 and the fact that its motion is not controlled with respect to that of the beater, the vibration produced by this device varies in extent over the area of the piece 35 and is apt to occur at irregular intervals. Hence, use of methods of the pres-

ent invention in conjunction with this type of vibrator does not produce the uniformity in arrangement and bonding of the flock attainable when vibrators of the type previously described are employed.

Having thus described the product and methods of my invention and apparatus for use in practicing the methods and producing the product, what I claim is:

1. A continuous method of coating a flexible sheet material with flock particles which comprises applying adhesive to a surface of flexible material, passing said material continuously through a flocking zone, tensioning said material in said zone upon the upper surface of a rigid horizontally disposed plate, continuously showering flock downwardly upon the adhesive treated surface of the material on the plate and simultaneously continuously vibrating the plate rapidly vertically at a speed and to an extent sufficient to embed the flock substantially uniformly in the adhesive on said material.

2. A continuous method of coating a flexible sheet material with flock which comprises applying adhesive to a surface of flexible material, passing said material continuously through a flocking zone, tensioning said material in said zone upon the upper surface of a rigid horizontally disposed plate, continuously showering flock downwardly upon the adhesive treated surface of the material on the plate and simultaneously continuously vibrating the plate rapidly vertically at a speed and to an extent sufficient to embed the flock substantially uniformly in the adhesive on said material and creating beneath the vibrating material a magnetic field which polarizes the flock particles falling onto said surface of the material and positions them endwise relative to said surface.

ROBERT E. FOGG.