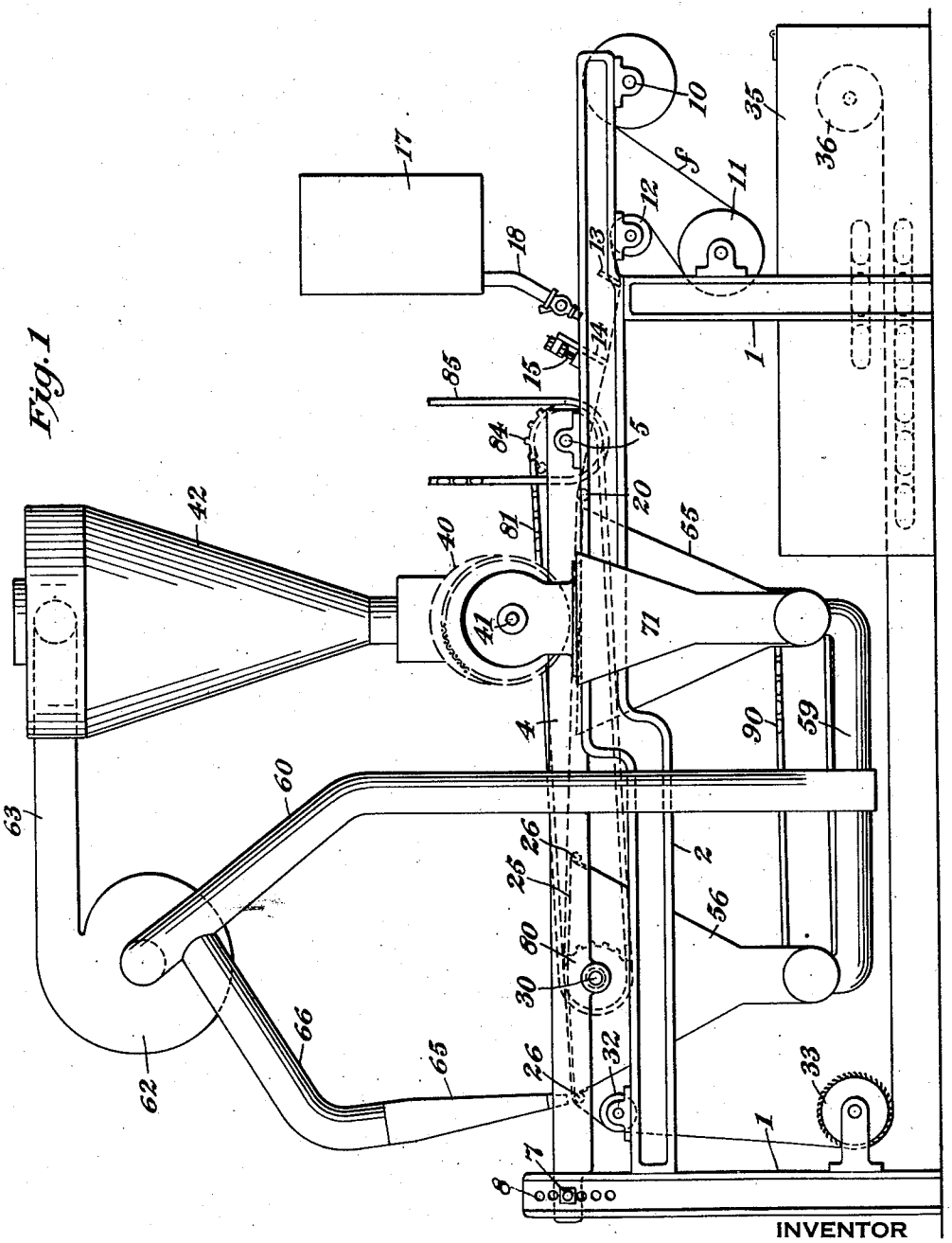
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METHOD AND APPARATUS FOR SUEDE SURFACING FABRICS

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Fig. 1




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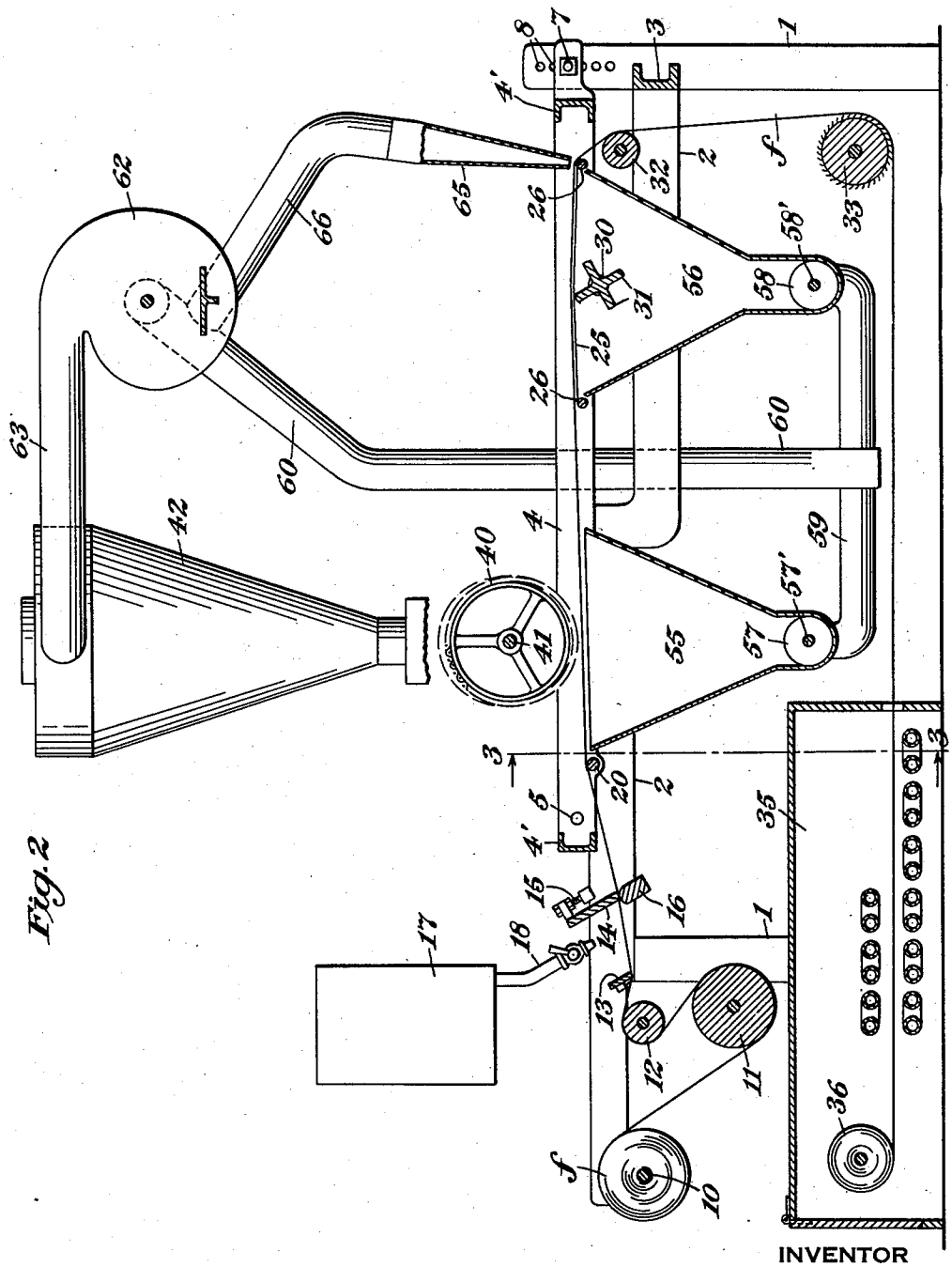



Fig. 2

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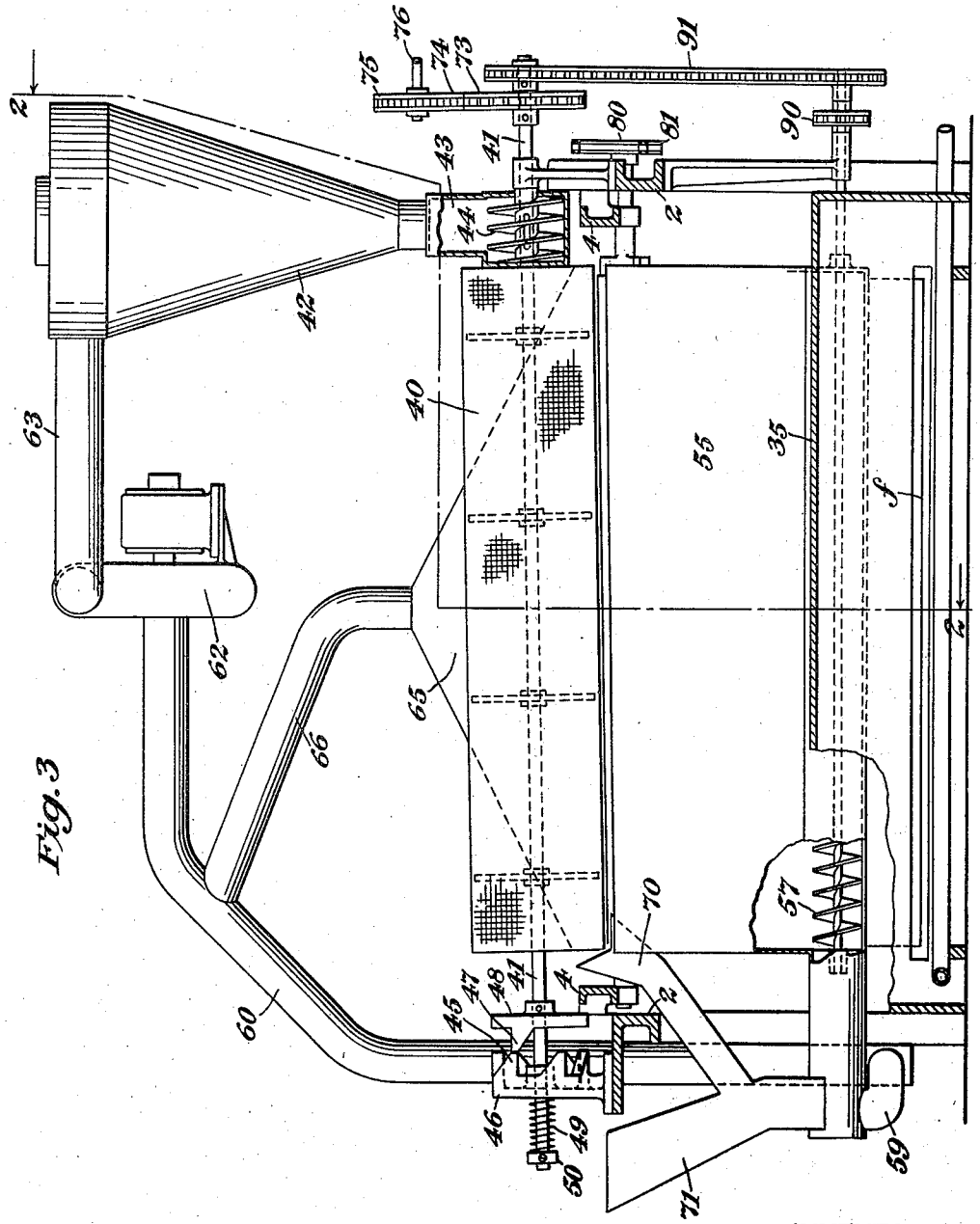



Fig. 3

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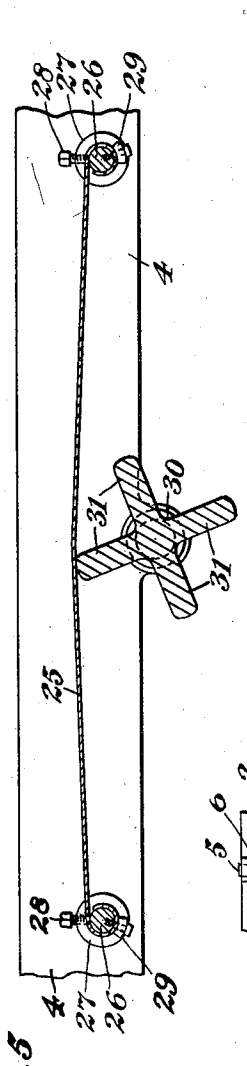



Fig. 5

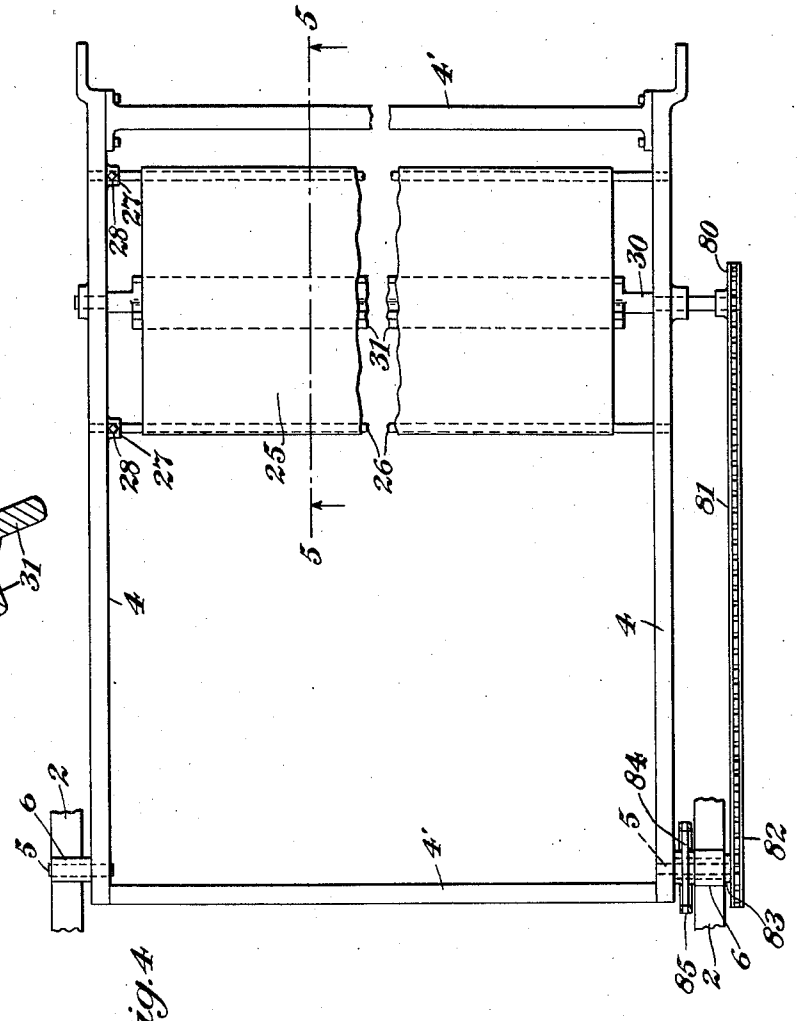



Fig. 4

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Patented Nov. 12, 1935

2,020,319

# UNITED STATES PATENT OFFICE

2,020,319

## METHOD AND APPARATUS FOR SUEDE SURFACING FABRICS

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Application December 31, 1931, Serial No. 584,081

16 Claims. (Cl. 91—8)

The invention relates to a novel method and apparatus for coating sheet fabric with comminuted fiber or flock, primarily for imparting to said coated surface a suede effect, the method involving supplying an adhesive to the fabric surface, sifting flock onto the adhesive coating and drawing the coated fabric over a surface rapidly vibrated in a direction normal to the movement of the fabric thereover; and the machine including instrumentalities for applying a uniform coating of adhesive to the fabric, means for drawing the coated fabric through the machine under tension, a sifting device for applying the flock substantially uniformly to the adhesive coating of the fabric, a flexible plain surface support over which the coated fabric is drawn, and means for rapidly vibrating said flexible support in a direction normal to the movement of the fabric thereover.

Apparatus for carrying out the invention is illustrated in the accompanying drawings, in which:—

Fig. 1 is a side elevation of the machine.

Fig. 2 is a sectional elevation of the machine viewed from the opposite side, the section being taken generally on the line 2—2 of Fig. 3.

Fig. 3 is an end elevation, partly broken away and partly in section, the section being taken generally on the line 3—3 of Fig. 2.

Fig. 4 is a plan view of the auxiliary frame carrying the vibratory surface.

Fig. 5 is a section on line 5—5 of Fig. 4.

Referring to the drawings, it will be seen that the machine involves a main supporting frame including legs or standards 1, longitudinal channel members 2 and transverse channel member 3, upon which main supporting frame is mounted an adjustable auxiliary frame comprising side members 4 and end members 4', said auxiliary frame being pivoted at the feed end of the machine by studs or stub shafts 5 engaging bearings 6 mounted on the members 2 of the main frame, the rear end of the auxiliary frame being adjustably attached to the rear standards or legs 1 by means of bolts 7 selectively applied to holes 8 of a vertical series formed in the uprights, whereby the auxiliary frame may be given any desired inclination to the horizontal within the range of adjustment fixed by the series of holes 8.

The fabric *f* to be coated is mounted on a spindle 10 located at the front of the machine, from which it is passed under a roll 11, then upwardly and over a second roll 12, then under a knife 13 secured transversely of the frame, and from thence between a knife 14 secured to the frame by adjusting screws 15, and a transverse bar 16, the cooperation of the knife 14 and the bar 16 determining the thickness of an adhesive applied to the fabric between the knives 13 and 14 by a reservoir 17 and valved supply pipe 18, the knife 14 serving to spread the adhesive in a uniform layer of predetermined thickness over the surface of the fabric. After leaving the knife 14, the coated fabric passes over a tensioning bar 20 mounted transversely of the auxiliary frame, and then passes under the device for sifting the flock onto the adhesive coating, which sifting device will be hereinafter explained.

After receiving the flock, the fabric passes over a special form of vibrating surface which effects the anchoring or fixing of the flock in the adhesive, said vibrating surface comprising a sheet of fabric 25, which is stretched between transverse bars 26 mounted in bearings 27 in the side members of the auxiliary frame, said bars being locked in adjusted position in the bearings 27 by means of set screws 28. As particularly illustrated in Figs. 4 and 5, the fabric 25, constituting the vibratory surface, has its front and rear edges secured to the transverse bars 26 by suitable clamps 29. By turning either or both of the bars 26 in their bearings, any desired degree of tension may be imparted to the fabric 25.

Mounted in bearings on the side members 4 of the auxiliary frame is a shaft 30 carrying radial arms or blades 31, which successively engage the under surface of the stretched supporting fabric 25 and cause a rapid vibration of the entire surface of the fabric in a direction normal to the travel of the fabric under treatment. After leaving the vibratory surface formed by the stretched fabric support 25, the coated fabric passes down and over a guide roll 32, thence over a lower guide roll 33, the surface of which may be provided with spines or projections engaging the rear surface of the coated fabric to insure the said fabric being maintained under tension as it is fed through the machine. From the roll 33, the coated fabric passes into a drying compartment, conventionally illustrated at 35, and is wound up on a batching roll 36.

The preferred means for sifting the flock onto the adhesive coating applied to the fabric comprises a perforated drum 40 mounted on a shaft 41 journaled in bearings on the upper rails 2 of the machine frame. As shown, the sieve or drum 40 comprises a skeleton framework covered with wire netting, the size of the mesh of which will depend upon the character of the flock employed. The flock is supplied to the interior of the sifting drum from a hopper 42 mounted on the machine

frame, which is provided with a lower discharge chamber 43 in which is located a feed screw 44 mounted on the shaft 41 of the drum and connected to said shaft by a spline which admits of an axial movement of the shaft relatively to the feed screw. A longitudinal oscillatory or vibratory movement, imparted to the drum for the purpose of causing the flock to maintain a constant progressive movement through the drum, is effected by means of a special camming device, comprising a series of teeth 45 formed on the inner face of the bearing 46, which are successively engaged by a tooth 47 on a disk 48 secured to the shaft 41. The teeth 45 and 47 have complementary inclined faces and straight faces as shown, so that, when the inclined face of the tooth 47 engages a similar inclined face of a tooth on the bearing 46, the shaft and the drum will be moved axially or longitudinally toward the hopper against the tension of a helical spring 49 mounted on the end of the shaft 41 and confined between a collar 50 thereon and the bearing 46. This advancing movement of the drum is relatively slow, but, when the tooth 47 passes out of engagement with any tooth on the bearing 46, the spring 49 moves the drum in the opposite direction quite rapidly, the general effect of the successive engagement and disengagement of the teeth being to impart a shaking movement to the drum to have the effect of advancing the flock through the drum by a series of jerks in a feeding direction, which will materially facilitate the sifting of the flock through the interstices of the drum onto the fabric passing below the latter. Preferably the shaft of the drum is slightly inclined from the feed to the discharge end of the drum to assist in the passage of the flock through the drum toward the open discharge end of the latter.

Inasmuch as the machine is designed to treat fabrics of different widths, means are provided for collecting the flock which does not fall upon the coated fabric or which is shaken off of the same, said means comprising hopper-like troughs 55 and 56, which are mounted on the machine frame below the sifting drum 40 and below the vibratory support 25, both of the troughs being provided at their bottom with feed screws 57 and 58, respectively, which deliver the flock from the troughs into a common conveyer pipe 59, which, in turn, is connected with a pipe 60 leading to a blower 62, the discharge of which is connected by a pipe 63 with the top of the hopper 42. The feed screws 57 and 58, which may be operated from any suitable source, are here shown as mounted on suitably journaled shafts 57' and 58' respectively, operatively connected at one end by a chain and sprocket gearing, indicated generally at 90, and one of the shafts having a chain and sprocket connection 91 with the shaft 41, as shown in Fig. 3, to be driven thereby.

In order to remove excess or surplus flock from the adhesive coated fabric, after the latter passes over the vibratory surface or table 25, there is provided a suction nozzle 65 extending transversely of the rear end of said table and elevated a short distance above the fabric traveling thereover, said suction nozzle being connected by a pipe 66 to the pipe 60.

To receive the flock which is not sifted through the drum onto the coated fabric, but is discharged from the open end of the drum, there is provided an open mouthed chute 70, which is connected to a hopper 71, which, in turn, is connected to the pipe 59 of the pneumatic conveyer system which delivers the flock to the feed hopper 42.

The sifting drum 40 is rotated at a relatively slow rate of speed by means of chain and sprocket gearing 73, 74 and 75 operated from the drive shaft 76 and, as the shaft 41 has a reciprocatory as well as a rotary motion, as hereinbefore explained, the chain 74 should be sufficiently long and flexible to permit such reciprocatory motion of the shaft without disengaging the chain from the sprocket.

The beater shaft 30 is rotated at a relatively high rate of speed, that is to say, from 500 to 800 revolutions per minute, by means of a drive consisting of a sprocket wheel 80, sprocket chain 81 and sprocket wheel 82, which latter is preferably mounted on a hollow axle 83 concentric with one of the pivoting studs 5 of the auxiliary frame 4, the axle 83 being driven by a sprocket 84, which, as understood, will be operatively connected with the main shaft of the machine, as through the chain 85.

As will be observed from Figure 2, the flexible apron 25 and the rods 26 are positioned so that the portion of the fabric *f* passing thereover is in a plane above the adjacent portions of the fabric. By reason of this arrangement of the parts, the portion of the fabric passing over the support will be uniformly tensioned when subjected to the vibratory action of the beater 31 and thus insure the flock being firmly embedded in the adhesive and evenly distributed on the fabric.

In the operation of the machine, the fabric to be coated, which may be of any suitable or preferred form, such as paper, webbing or other textile fabric, is drawn off the batch roll mounted on the spindle 10 at the front part of the machine and passes under roll 11, over roll 12, and under knife 13 and thence between the adjustable knife or spreader 14 and the bar 16. Between the two knives, the adhesive or anchoring medium for the flock is supplied to the upper surface of the moving fabric by the distributing nozzle on the end of pipe 18 connected with the tank containing the adhesive. This adhesive may be of any suitable character, such as rubber cement, rubber latex, rubber dispersion, glue, casein or the like and, when deposited on the moving fabric between the knives 13 and 14, the former prevents the adhesive flowing backward over the moving fabric, while the knife 14 and the cooperating bar 16 distributes the adhesive laterally in a uniform layer over the surface of the fabric. The fabric then passes over the tensioning rod 20 carried by the auxiliary frame 4 and under the sifting drum 40, which latter is supplied with flock from the hopper 42, which flock may consist of cotton dust, cotton fiber, leather fiber, leather dust, silk fiber, rayon flock, or the like, which may be dyed or which may retain its natural color. The rotating and shaking movement applied to the drum serves to distribute the flock substantially uniformly over the adhesive coating of the fabric and subsequent operations of the machine serve to firmly fix or anchor the flock in the adhesive and to remove the surplus flock from the fabric and return such surplus ultimately to the feed hopper 42. When the adhesive coated fabric, bearing the flock deposited by the sifting drum, reaches the vibrating support or table 25, the rapid vibrations imparted to the taut supporting surface 25, by the beater 31, are likewise imparted to the coated fabric, the rapidly recurring hammer-like blows serving to embed or anchor the flock in the adhesive coating, thereby

producing a uniform distribution of the flock over the traveling fabric and, as stated, securely embedding or fixing the flock in the adhesive. This result could not be so well attained if the beater 31 engaged the under surface of the traveling fabric for the following reasons: It is not practical to put the fabric to be coated under heavy tension, so that, if the fabric were directly engaged by the beater when it was struck by one blade of the latter, the fabric would be thrown upward and, by the time it returns, it would have missed engagement with several blades of the beater and this relatively slow return movement of the fabric would result in the latter receiving very light shocks or impacts from the beater, so that transverse wrinkles or wave-like accumulations will be formed in the fabric, the crests of which would receive no beating action whatever and the coated surface would lack uniformity and homogeneity. The application of the vibrating surface or table 25 obviates the difficulties referred to as follows: After the beater blade strikes the support or table 25, the latter moves upwardly, but, because of the tension applied to the flexible surface or table, the latter returns immediately into position to be engaged by the next blade of the beater. The fabric to be coated moving over this flexible surface or table necessarily moves upward under the impulses of the taut surface 25 and, when the latter returns, the fabric tends to leave the surface of the table, but is prevented from doing so by the vacuum created between the fabric and the table. The fabric is, therefore, drawn downwardly by the vacuum substantially as rapidly as it is driven upward by the impulses imparted to the table, and the resultant vibrations imparted to the fabric are, therefore, much more rapid, vigorous and uniform than could be effected if the vibratory flexible support or table were not employed. As the traveling fabric is subjected to tension between the rod 20 mounted in advance of the sifting drum and the rod 26 at the discharge end of the vibrating support or table 25, the portion of the traveling fabric over the vibratory support or table 25 is subjected to heavy vibrations, which, however, are reduced in amplitude in the portions of the fabric between the tension rod 26, and the forward edge of the vibrating support or table 25, so that the section of the fabric passing under the sifting drum 40 is subjected to a relatively light vibratory motion, which is sufficient to scatter the flock uniformly over the surface of the relatively wet adhesive on such surface. By the time the flock coated fabric reaches the advance edge of the table 25, it has been substantially uniformly distributed over the surface of the adhesive and the latter has dried sufficiently to attain the proper degree of viscosity to hold the flock when the fabric is subjected to the intense and rapidly recurring vibrations imparted by the beater, but said adhesive is nevertheless still sufficiently plastic to permit the flock to be securely hammered or embedded therein by the action of the beater. By the time the coated material has reached the discharge edge of the supporting table, all of the flock that can possibly find an anchorage in the adhesive has done so and the surface is completely covered with the flock and any excess is removed by the suction nozzle 65 and ultimately returned to the feed hopper 42, as hereinbefore described. The coated fabric then passes over the guide rolls 32 and 33 through the drying chamber 35 and is taken up, in roll form, on the spindle 36.

The spaced rods 26 are so positioned as to further tension the coated fabric which lies between the binders of these rods. The effect of this further tensioning is to select or localize a definite area or section of the fabric so that the vibrations imparted by the beater 31 in a direction normal to the travel of the fabric will be at their maximum at this particular point. This insures the uniform distribution of the flock and its firm fixing in the adhesive over this localized area.

As indicated, any of the flock delivered by the sifting drum 40, which does not fall upon the traveling fabric, is collected by the trough 55, and any of the flock which is shaken off of the travelling fabric, as the latter passes over the table 25, is similarly collected by the trough 56 and all of the surplus flock is returned to the feed hopper 42 by means of the pneumatic conveyer system hereinbefore explained. If desired, the flock may be initially supplied to the machine by way of hopper 71, whence it is carried by the pneumatic conveyer system into the feed hopper 42.

What I claim is:

1. A machine for coating fabrics with flock, comprising means for drawing the fabric through the machine under tension, means for applying an adhesive to the surface of the fabric, means for sifting flock onto the adhesive coating, a flexible plain surfaced support over which the coated fabric is drawn, and means for rapidly vibrating said support in a direction normal to the movement of the fabric thereover.

2. A machine for coating fabrics with flock, comprising means for drawing the fabric through the machine under tension, means for applying an adhesive to the surface of the fabric, means for sifting flock onto the adhesive coating, a flexible table stretched between transverse supports over which the coated fabric is drawn, and means for imparting rapidly recurring vibrations to said table.

3. A machine as described in claim 1, in which the sifting means is a rotating foraminated cylinder extending transversely of the machine, and means for oscillating the cylinder in the direction of its axis.

4. A machine as described in claim 1, in which the vibrating means is a rotating beater extending transversely below the flexible support and having longitudinal blades successively impacting said support.

5. A machine as described in claim 1, provided with means adjacent the rear edge of said support for removing excess flock from the fabric.

6. A machine as described in claim 1, provided with a suction nozzle adjacent the rear edge of said support for removing excess flock from the fabric.

7. A machine for coating fabric with flock, comprising a frame having transverse guide rolls and tensioning bars over which the fabric is drawn, means for applying a uniform coating of adhesive to the upper surface of the fabric, a feed hopper, a foraminous rotating drum extending transversely of the machine above the fabric for sifting the flock from the hopper onto the adhesive coating, a flexible support stretched between transverse bars on said frame over which the coated fabric is drawn, and a rotating beater mounted below the support to impart rapid vibrations to the latter.

8. A machine as described in claim 7, including transverse troughs below the drum and the flexible support and at the end of the drum to

receive the unapplied flock, and a pneumatic conveyer system connecting the troughs to the feed hopper to return the collected flock to the latter.

9. A machine as described in claim 7, having a suction nozzle disposed over the rear edge of the flexible support for removing excess flock from the fabric, and a pneumatic conveyer system connecting the nozzle to the feed hopper.

10. In a machine as described in claim 7, in which the tensioning bars, the flexible support and the beater are mounted in an auxiliary frame adjustably mounted on the main frame, whereby the inclination of said auxiliary frame may be varied.

11. In a machine as described in claim 7, in which the tensioning bars, the flexible support and the beater are mounted in an auxiliary frame pivoted at the forward end to the main frame and adjustably connected at its rear end to the main frame, whereby the inclination of said auxiliary frame may be varied.

12. A machine for coating fabrics with flock comprising means for drawing the fabric through the machine under tension, means for applying an adhesive to the surface of the fabric, means for sifting flock on the adhesive coating, means for imparting rapidly recurring vibrations to the coated fabric in a direction normal to its direction of travel to uniformly distribute and anchor the flock thereon, and supporting means in the immediate vicinity of said last mentioned means over which the coated fabric is drawn for movement by the vibrating means, said supporting means being positioned to guide the fabric thereover in a plane above the adjacent portions of the fabric.

13. A machine for coating fabrics with flock comprising means for drawing the fabric through the machine under tension, means for applying an adhesive to the surface of the fabric, means for sifting flock on the adhesive coating, means for imparting rapidly recurring vibrations to the coated fabric in a direction normal to its direction of travel to uniformly distribute and anchor the flock thereon, and a flexible support in the immediate vicinity of said last mentioned means over which the coated fabric is drawn for movement by the vibrating means, said flexible support being positioned to guide the fabric thereover in a plane above the adjacent portions of the fabric.

14. The method of making a flock coated fabric, which comprises feeding the fabric under tension, applying an adhesive to the fabric surface, sifting the flock onto the adhesive coating, and vibrating a localized section of said flock coated fabric in a direction normal to its direction of travel whereby the flock will be uniformly distributed over and firmly fixed in the adhesive.

15. The method of making a flock coated fabric, which comprises feeding the fabric under tension, applying an adhesive to the fabric surface, sifting the flock onto the adhesive coating, further tensioning a portion of the flock coated fabric and vibrating the further tensioned section in a direction normal to its direction of travel whereby the flock will be uniformly distributed over and firmly fixed in the adhesive.

16. The method of making a flock coated fabric, which comprises feeding the fabric under tension, applying an adhesive to the fabric surface, sifting the flock onto the adhesive coating, passing the flock coated fabric in a plane above the adjacent portions of the fabric to further tension that portion of the fabric, and vibrating the raised coated fabric in a direction normal to its direction of travel whereby the flock will be uniformly distributed over and firmly fixed in the adhesive.

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