

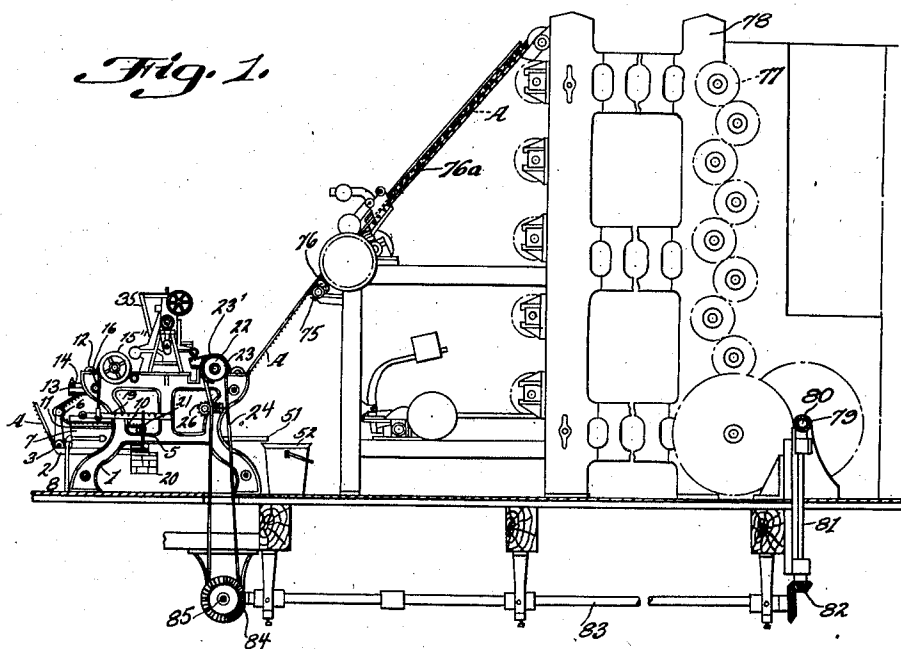
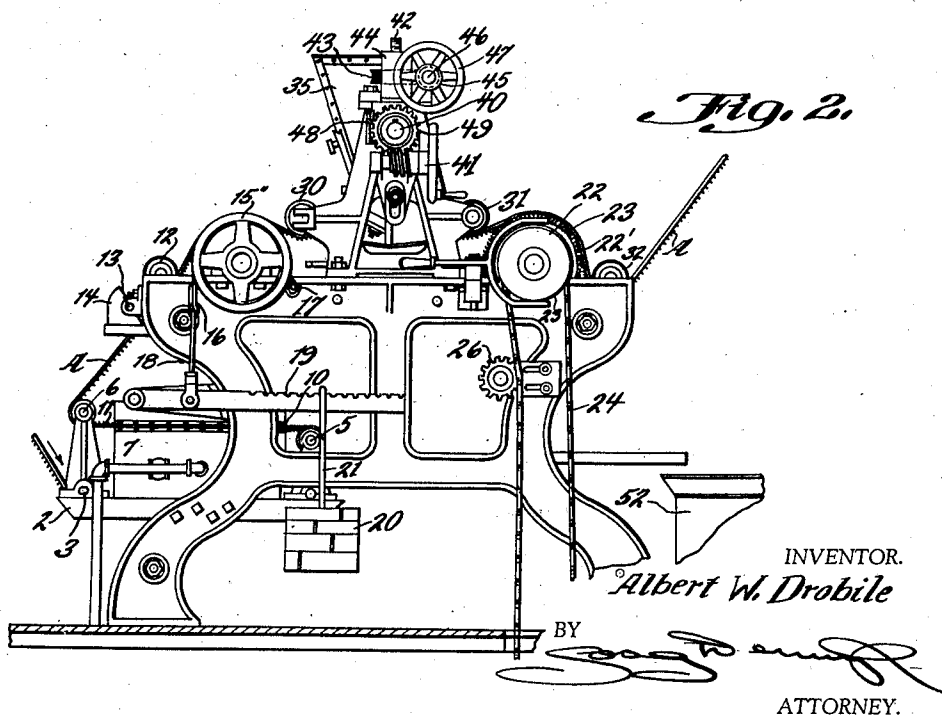
June 14, 1938.

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METHOD OF TREATING FLE FABRICS

Original Filed March 7, 1930 2 Sheets-Sheet 1



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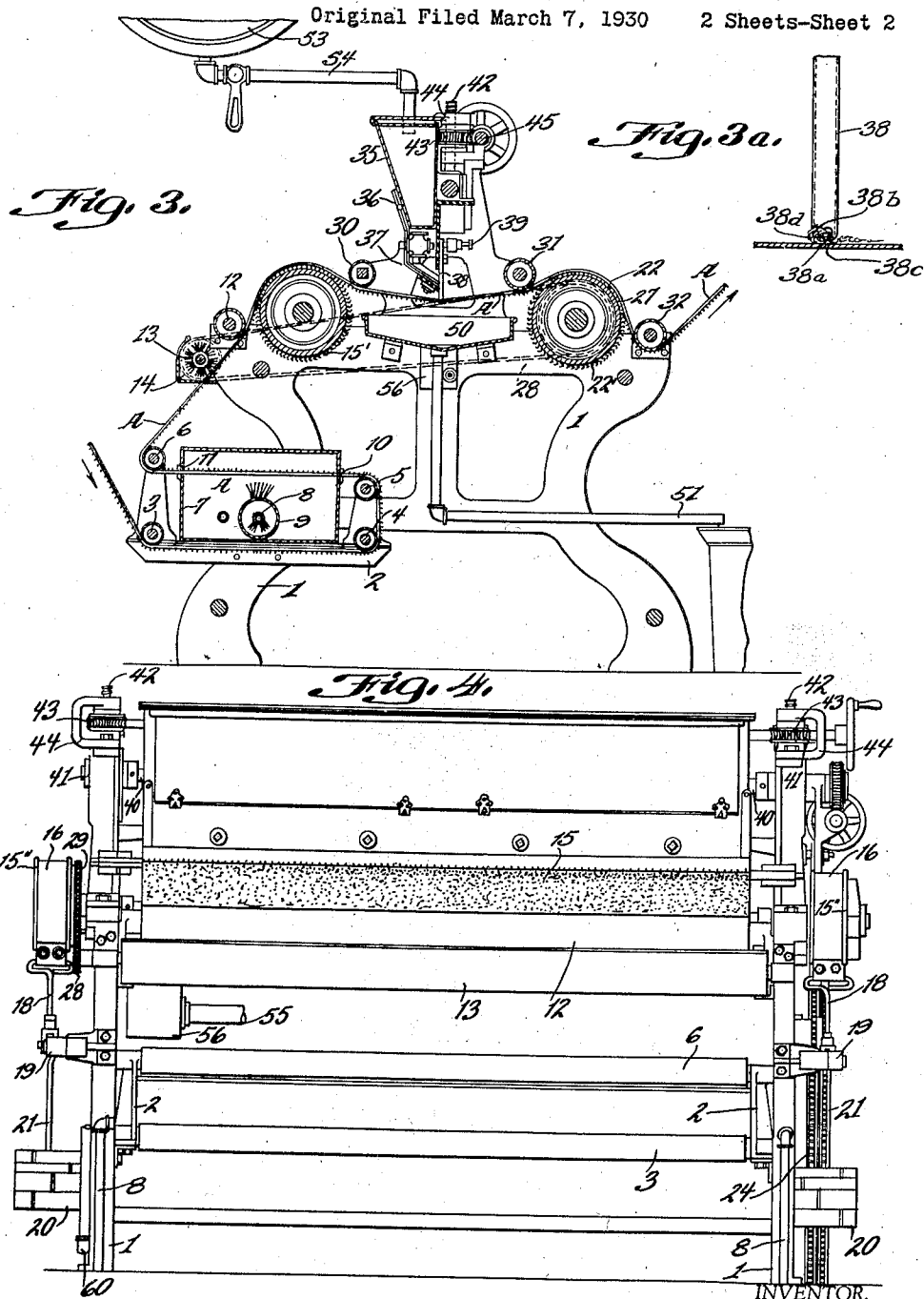
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METHOD OF TREATING PILE FABRICS

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2 Sheets-Sheet 2



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METHOD OF TREATING PILE FABRICS

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6 Claims. (Cl. 91—68)

My invention is designed to provide a method of applying an adherent coating to the backing of a pile fabric so as to form a thin water insoluble film which penetrates the interstices and pores of the backing and pile fibres to strengthen and prevent raveling of the backing and firmly anchor the pile.

My improvements are particularly applicable to the coating of pile fabrics woven with a backing containing a subnormal number of weft threads and having pile, looped over each weft thread, so loosely enmeshed in the backing as to be unsuitable for dyeing, finishing or use in the condition in which woven, and the application to such fabrics of an aqueous dispersion of rubber solidifiable on the fabric by heat.

In the preferred practice of my improvements, the loosely woven pile fabric is coated while suspended from card clothing rollers which support the pile face without displacing the pile from the backing and the coating is confined and swirled adjacent to the point of application of the backing, and thereby caused to better penetrate the fabric, which may, if desired, be humidified or moistened to render it more absorbent and increase the capillary action of the fibres. Any loose pile fibres resulting from cutting, passage through the humidifier or from other causes, may be evacuated from the backing, and the loops of the pile are preferably pressed firmly into position against the weft threads immediately before application of the coating and while the fabric is suspended between the card clothing rollers.

My improvements further provide for nicely regulating the thickness of the applied coat and for facilitating solidification and vulcanization of the coating on the fabric during the passage thereof through a drier to which it is delivered from the coating mechanism.

The characteristic features and advantages of my improvements will further appear from the following description and the accompanying drawings of apparatus shown in my copending application Serial No. 433,907 suitable for the practice of my method of which application the present application is a division.

In the drawings, Fig. 1 is a side elevation, partly in section, of apparatus suitable for the practice of my method; Fig. 2 is an enlarged side view of the coating apparatus shown in Fig. 1; Fig. 3 is a longitudinal sectional view on an enlarged scale of the coating apparatus; Fig. 3a is an enlarged side elevation of a blade by which the coating may be applied to the fabric backing and caused

to permeate the same; and Fig. 4 is an enlarged end elevation of the coating apparatus.

In accordance with my invention, the fabric to be treated, preferably consisting of a loosely woven pile fabric, is translated in a continuous operation through steps which first prepare the fabric for coating, then coat the fabric, and then solidify the coating, the several steps being taken in synchronous relation.

In the practice commercially of my method there may be conveniently utilized the machine illustrated in the drawings and comprising a frame 1 having fixed thereto a bracket 2 in which there are journaled rollers 3, 4, 5 and 6. A steam box or humidifier 7 is also mounted upon the bracket 2 and supplied with steam through a perforated tube 8 surrounded by a perforated cylinder 9.

In the practice of my method, a loosely woven pile fabric A may be passed over the rollers 3, 4 and 5, and into the humidifier through the slot 10 where it is moistened by steam emitted from the pipe 8 and cylinder 9 and passes from the humidifier through the slot 11. The engagement of the back of the fabric with rollers 3, 4 and 5 prevents dislodgement of the pile and tends to properly position it in the backing, and the moistening of the fabric in the humidifier increases the capillarity and absorption of the fibres.

Fabric passing from the humidifier passes over the rotatable roller 6 and under the rotatable roller 12, which hold the fabric taut during brushing of the backing and pile loops thereof by a rotary brush 13. Any loose pile projecting from the backing of the fabric A is swept by the brush 13 into a receptacle 14.

The brushed fabric is held by the roller 12 against a card clothing roller 15 having wires or teeth 15' projecting therefrom in counterclockwise direction. The wires or teeth 15' support the backing away from the face of the roller 15, the wires or teeth being of suitable length to receive the pile threads among them so as to avoid any pressure on the tips of the pile tending to displace the pile loops from the backing. The rotation of the roller 15 is retarded by a brake band 16 secured to anchorages 17 and passing around drums 15'' fixed to the shaft of the roller 15. The opposite ends of the brake band are connected by links 18 to fulcrumed notched levers 19 from which weights 20 are suspended on hangers 21. The drag on the roller 15 may be varied by changing the number or weights of the

disks 20 or the position of the hangers 21 on the levers 19.

A card clothing roller 22, complementary to the roller 15, is journaled in the frame 1 and has its teeth or wires 22' projected therefrom in a clockwise direction, the length of such teeth or wires being properly proportioned to house between them the free ends of the pile and support the backing on the fabric A. The roller 22 is revolved in a clockwise direction through a sprocket 23 which is made loose or fast to the shaft of the roller 22 by a clutch 23'. A sprocket chain 24 operatively connects the sprocket 23 with a sprocket 25, and the tension of the sprocket chain may be regulated by means of an idler 26. A sprocket 27 is fixed to the opposite end of the shaft of the roller 22 and is connected by a sprocket chain 28 with a sprocket wheel 29 on the shaft of the brush 13 to rotate the latter. A polished cylinder presser 30 is fixed to the frame adjacent to the card clothing roller 15 and both holds the fabric in contact with such roller and presses into close contact with the backing any pile loops disturbed by the passage of the card clothing roller 15. The fabric is held in engagement with the card clothing roller 22 by the revoluble rollers 31 and 32.

A supply reservoir 35 is mounted between the card clothing rollers 15 and 22 and is provided with a series of valved outlets 36 through which the coating is discharged and flows down an inclined hinged plate 37 to the blade 38 adjustably fixed to the tank frame by the bolts 39. The bottom of the blade contains an arcuate groove 38a forming a lip 38b and a narrow edge 38c lies between the arcuate groove 38a and the bevel 38d.

The blade edge 38c bears against the fabric backing and applies additional tension thereto to place the fabric in suitable condition for the application of the coating fluid which flows from the hinged plate 37 down the face of the blade 38. The excess coating is scraped or wiped by the edge 38c and forms a species of wave which is confined in the groove 38a by the downward projection of the lip 38b, and the swirling action resulting from such confinement and the movement of the fabric forces the coating fluid into the interstices and pores of the fabric.

The tension applied to the fabric and the permeation of the coating thereinto may be regulated by the vertical and angular adjustment of the reservoir and blade unit which is journaled by trunnions 40 in vertically movable bearings 41 which are vertically adjustable by means of the screws 42 fixed thereto and threaded in wormwheels or nuts 43 journaled in the bearings 44. The peripheral teeth of the wormwheels 43 mesh with worms 45 on a shaft 46 rotatable by the handwheel 47.

A scale and pointer 48 indicate the vertical movement of the reservoir and blade and a scale and pointer 49 indicate the angular movement thereof.

The excess coating deposited on the fabric and deflected therefrom by the blade 38 is discharged into a drip pan 50 from which it may be discharged through a pipe 51 into a pail for return to the storage tank 53 which discharges through the valved pipe 54 to the supply reservoir 35.

The coated fabric passes from the roll 32 over the card clothing roller 75 having wires or teeth 76 projecting from the periphery thereof in a clockwise direction. The teeth 76 are of sufficient

length to house the pile threads between them and support the fabric.

The fabric passes from the roller 75 to pin chains 76a, which engage the selvages of the fabric and carry it in a circuitous route over the rollers 77 of the enclosed dryer 78. The driving shaft 79 of the dryer is connected through the beveled gears 80, shaft 81, beveled gears 82, shaft 83, beveled gears 84, and shaft 85 with the sprocket 25, so that the dryer conveyor and coating mechanism are operated in synchronism.

It will be understood that, in the practice of my invention, the loosely woven pile fabric formed by splitting the pile of a double plush fabric may be conditioned for coating by passage through the humidifier 7 wherein the backing is dampened without substantially moistening the cut pile face of the fabric, so that the capillarity of the backing fibres and pile loops is increased disproportionately to the capillarity of the pile tips. The moistening of the fibres is of particular advantage where the backing is composed of cotton yarns. Projecting pile loops may be removed by the brush 13. The fabric is translated by the rollers 15 and 22 beneath the presser bar 30 and blade 38. The action of the presser bar 30 tends to firmly seat the pile loops against the backing wefts, and as the fabric passes beneath the blade 38 it is supplied with an even coating which is caused to uniformly permeate it by the pressure and swirling action resulting from the contour of the arcuate channel 38a. By adjusting the vertical and angular position of the blade by the means described, the tension of the cloth and the degree of penetration of the coating may be regulated. The coated fabric passes under the roller 31, over the card clothing roller 22, under the roller 32, and over the card clothing roller 75 to the pin chain of the dryer by which the coating is coagulated and vulcanized to solidify it into a thin film which firmly anchors the pile threads, and reinforces and prevents raveling of the fabric.

My method is particularly adapted for coating with an aqueous dispersion of rubber, either in the form of natural latex or in the form of an artificial dispersion of rubber. Such aqueous rubber dispersions may have mixed therewith suitable vulcanizers, accelerators and fillers. Such compounds are frequently of a somewhat unstable character, but my improvements permit the use thereof without deleterious effects thereon or upon the loosely woven fabric, which is being treated.

From the foregoing description, it will be seen that in accordance with my improved method a pile fabric having a loosely woven ground may have pile tufts which are looped therein securely attached thereto by forcing into and solidifying in the ground while the tips of the pile tufts are free from counter-pressure tending to displace them, an aqueous material containing a solidifiable substance, such material being preferably first spread as a layer of low viscosity liquid prior to the application thereof to the back of the ground and such applied layer being forced into the ground by pressure so that the free excess on the surface of the ground may be removed or scraped off and the impregnating material being solidified while the fabric is suspended from its selvages.

While my improvements are particularly applicable to the coating of cut pile fabrics, it will be evident that they may be used in connection with the coating of uncut pile fabrics.

Having described my invention, I claim—

1. In the manufacture of pile fabric having pile tufts looped over the wefts of a backing, the steps which include forming a layer of substantially uniform thickness of a low viscosity aqueous binder material prior to the application of such material to the fabric, applying such pre-formed layer of aqueous binder material to a concavely bent surface section of a freely suspended taut section of said fabric, forcing a portion of said binder material into said back, scraping off the free excess on the surface of the ground, and solidifying the binder material in the back.

2. In the manufacture of pile fabrics, the steps which include humidifying the back of the pile fabric, removing dislodged pile from the back of the fabric, supporting said fabrics in two places on its face side without exerting pressure on the pile, applying a coating material between the two supports and applying pressure to the back of the fabric at a point between a support and the point of application of the binder to reposition any partly dislodged pile tufts.

3. In the manufacture of pile fabrics, the steps which include translating a fabric face downward below a supply of impregnating material, supplying said impregnating material uniformly to the back of the fabric, then swirling the impregnating material within a confined area so

that penetration of the impregnating material is affected by the downward driving force built up as a result of the swirling.

4. In the manufacture of loosely woven pile fabric, the steps which include supporting and translating a fabric downward below a supply of impregnating material to be applied to said fabric, applying the impregnating material uniformly to the back across the width of the fabric, swirling said impregnating material within a confined area so that said impregnating material has a substantially vertical and downward direction and pressure, removing excess binding material from the back of the fabric and wiping the tips of the pile bights to make them substantially devoid of impregnating material.

5. The method of impregnating the backing of a woven cut pile fabric having pile tufts looped over wefts and loosely enmeshed in the backing which comprises supporting the pile fabric on its pile face side without exerting a compressive force on the ends of the cut pile and depositing an impregnating material on the backing between the supporting positions.

6. The method of impregnating the backing of a pile fabric which comprises humidifying the backing of the fabric disproportionately to the pile face of the fabric and applying a liquid impregnating material to said backing.

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