

Sept. 14, 1937.

G. S. HIERS

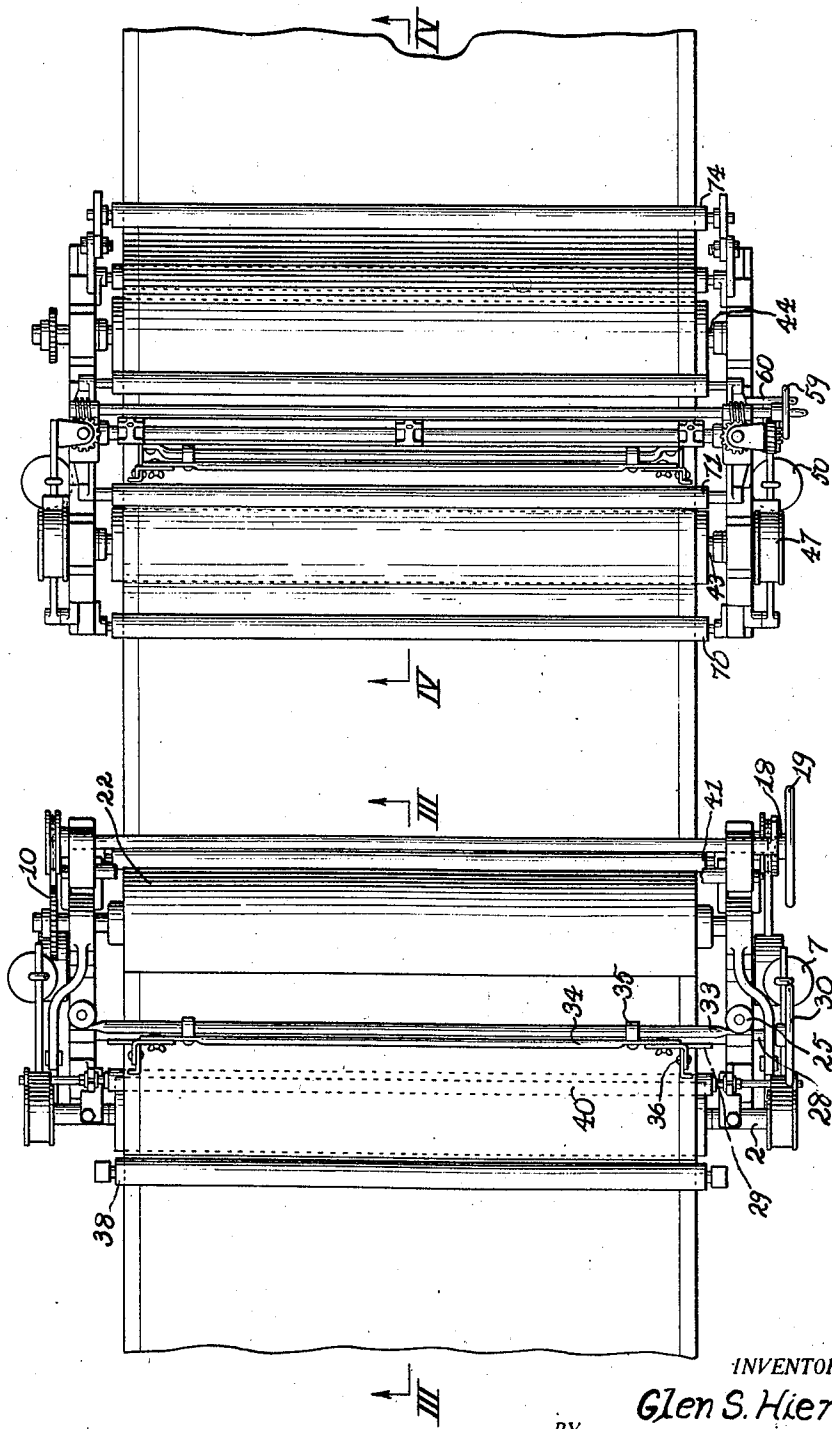
2,092,974

APPARATUS FOR APPLYING ADHERENT SUBSTANCES TO CARPETS

Filed Sept. 29, 1934.

4 Sheets-Sheet 1

FIG. I.



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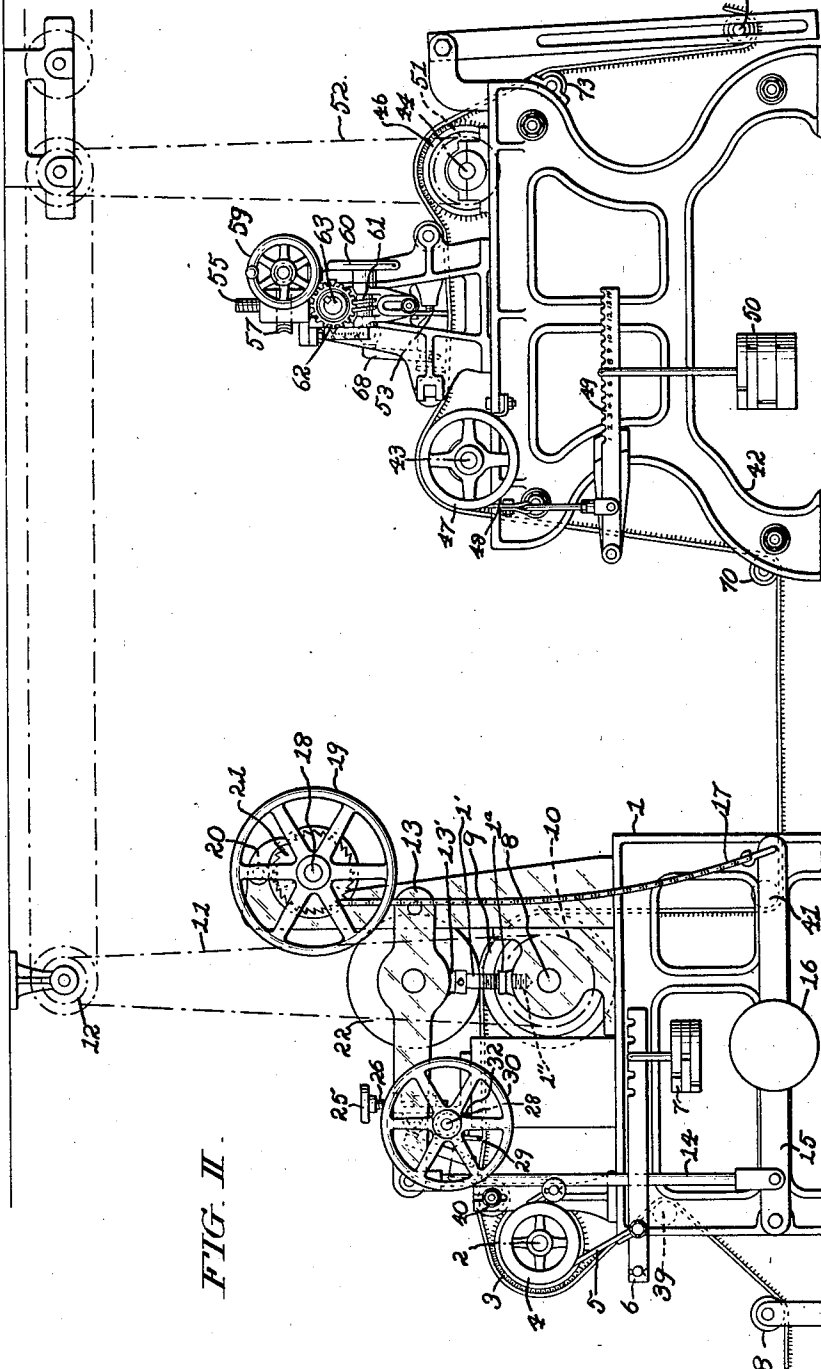


FIG. II.

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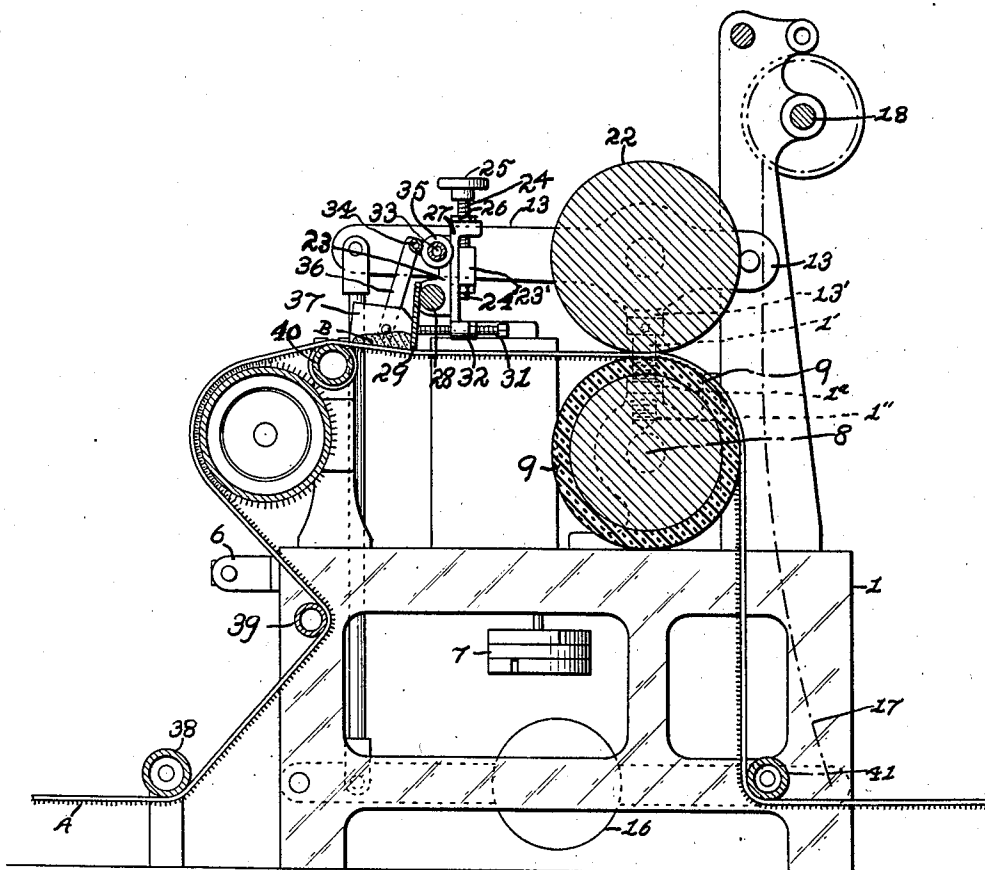
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FIG. III.



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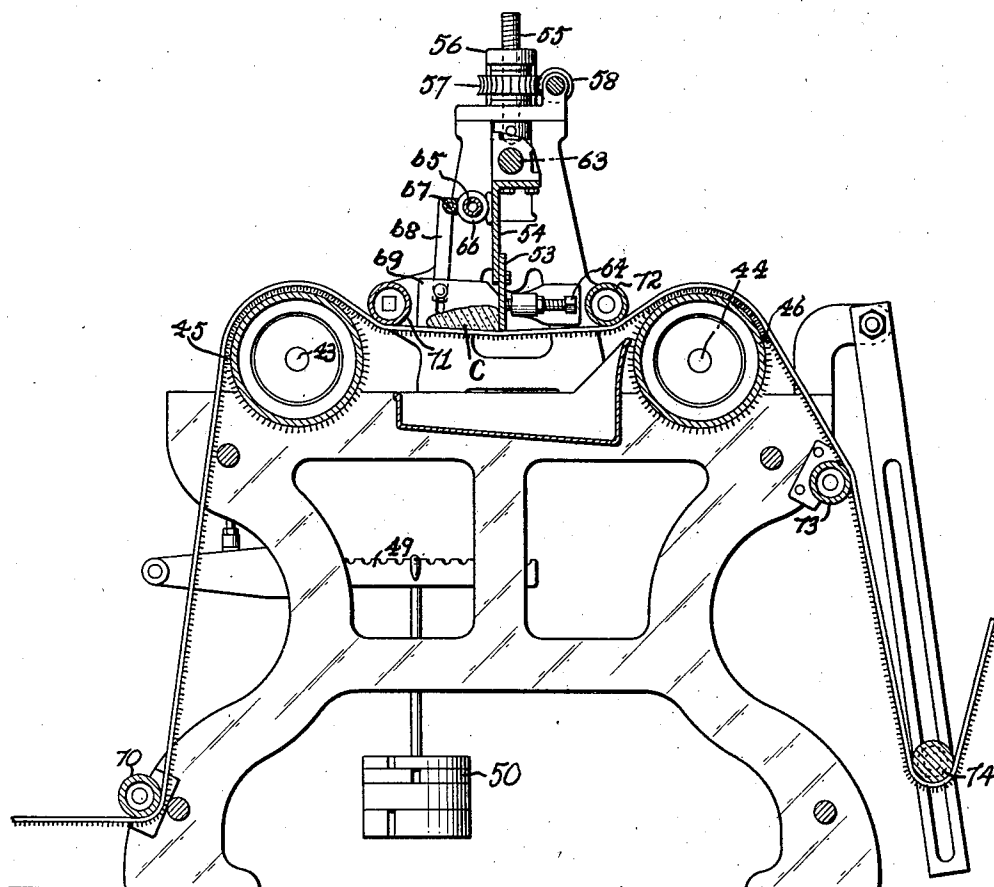
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APPARATUS FOR APPLYING ADHERENT SUBSTANCES TO CARPETS

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4 Sheets-Sheet 4

FIG. IV.



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UNITED STATES PATENT OFFICE

2,092,974

APPARATUS FOR APPLYING ADHERENT
SUBSTANCES TO CARPETS

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Application September 29, 1934, Serial No. 746,120

6 Claims. (Cl. 91—33)

My invention is an apparatus for applying to a pile carpet or similar material a layer of an adherent substance so as to firmly anchor the pile tufts and give a desired body and stiffness to the fabric.

My invention is primarily designed to secure a desired degree of penetration and a firm bond between the layer of adherent substance and the fabric backing which is unobtainable by mere spreading, and without the deterioration of the adherent substance and the displacement and flattening or laying of the pile tufts incident to usual calendering operations and the heat incident thereto and generated therein.

My invention is particularly applicable to the bonding together of animal fibre V-pile tufts with the vegetable fibre of ground yarns of carpet fabrics having loosely woven backings, but into which adherent substances such as aqueous dispersions of rubber, do not readily penetrate due to the presence of oils and greases naturally occurring in the fibres or incorporated therein in processing, as well as to the density of the fabric.

In the preferred practice of my invention the bonding material consists of a fluid or semi-plastic rubber, preferably in the form of an aqueous dispersion, which is sheeted on the back of a fabric by means of a spreader blade and subsequently squeezed into the fabric by nip rolls applying pressure to both sides of the fabric, the nip rolls being so adjusted as to effect a desired degree of penetration without unduly flattening the pile or causing leakage through to the face of the fabric.

Preferably the adherent material is applied in two coats, the second of which is spread upon the impressed coat by a spreader blade and is coalescible with the impressed coat and unites therewith to form a homogeneous layer giving body and stiffness to the fabric. Instead of using an aqueous dispersion of rubber I may employ a coagulated rubber liquefied or rendered semi-plastic by an organic solvent with or without milling, or I may in some cases utilize cellulose compounds such as pyroxylin.

The rollers used to impress the adherent substance into the fabric backing have preferably resilient surfaces of rubber or the like of such firmness or density as to effectively impress the adherent substances into the backing yet yield to the irregularities due to the texture of the fabric or seams connecting sections thereof.

The characteristic features and advantages of my improvements will further appear from the

following description and the accompanying drawings in illustration thereof.

In the drawings, Fig. 1 is a top plan view of an apparatus embodying my improvements and suitable for the practice of my method; Fig. 2 is a side elevation of the apparatus shown in Fig. 1; Fig. 3 is a transverse sectional view on the line 3—3 of Fig. 1; and Fig. 4 is a transverse sectional view on the line 4—4 of Fig. 1.

As illustrated in the drawings, a frame 1 has journaled therein a shaft 2 to which is fixed the card clothing roller 3 and the brake drums 4 which are frictionally engaged by the brake bands 5 which are held under tension against the brake drums by the levers 6 and adjustable weights 7.

A shaft 8, journaled in the frame 1, has fixed thereto a rubber covered nip roll 9 and a sprocket 10 driven by the chain-belt 11 connected with drive shafting or other source of power 12.

Lever arms 13 are journaled in the frame 1 and are connected by links 14 with lever arms 15 journaled in the frame and having thereon adjustable weights 16. Chains 17 connected with the ends of the links 14 are secured to the shaft 18 rotatable in one direction by the hand-wheel 19 and held against reverse movement by the pawl 20 engaging the ratchet 21 fixed to the shaft 18.

The arms 13 have journaled therein the turned steel nip roller 22 to which liquid rubber does not adhere and which coats with the roller 9 to apply line pressure to the liquid rubber and fabric. The yielding rubber covering of the roller 9 prevents cutting of the fabric by the steel roll. The roller 22 may be accurately positioned relative to the roller 9 so as to leave a desired space and exert a desired pressure between the rollers by means of jack screws 1' having threaded shanks screwed into threaded sockets 1'' in the frame 1 above the shaft 8. The heads of the jack screws are provided with wrench or rod sockets and bear against bosses 13' on the arms 13 below the journals of the roller 22. When the rollers are adjusted to the desired position by rotating the jack screws 1', the screws may be locked in place by the lock nuts 1a.

Brackets 27 project upwardly from the frame 1 at opposite sides thereof and contain threaded sockets for the reception of screws 24 which are rotatable by heads 25 and may be fixed in position by lock nuts 26. The lower portion of the screws are sleeved in bosses 23' of brackets 23 and have fixed thereto collars 24' so that the bosses 23' are supported and adjustable by the rotation of the screws 24. The brackets 23 pass through

vertical slots in the brackets 27 and have journaled therein a shaft 28 to which is fixed a spreader blade 29 and handwheels 30 by which the angular adjustment of the spreader blade 29 may be effected. When the spreader blade has been adjusted to desired angular position, it may be secured in such position by means of the screws 31 threaded in bearings 32 and secured in adjusted position by suitable lock nuts.

A tubular cross-bar 33 fixed to the brackets 27 has a cross-bar 34 secured thereto by collars 35. The cross-bar 34 has connected therewith the brackets 36 which position the wings 37 at the ends of the blade 29.

Auxiliary rollers and guides 38, 39, 40 and 41 may be provided for feeding a pile fabric A to and from the spreader blade 29 and nip rollers 9 and 22 to apply to the back of the fabric an adherent substance B which is conveniently placed as a liquid or semi-plastic mass in front of the spreader blade 29 on the back of the fabric A.

Since the fabric is suspended under tension in passing beneath the blade 29, seams in the fabric, having their lips turned toward the face of the fabric, may pass beneath the blade 29 without affecting the uniformity of the thickness of the material spread thereon by the blade. When such seams pass between the rollers 9 and 22, the roller 22 yields sufficiently to permit the same but without affecting the position of the blade 29.

When a second or finishing coat is to be applied to the fabric on top of the impregnated adherent material, the fabric is passed to a second machine having a frame 42 in which are journaled the shafts 43 and 44 having thereon respectively the card clothing rollers 45 and 46. The shaft 43 has fixed thereto the brake drums 47 which are frictionally engaged by bands 48 connected with levers 49 supported by adjustable weights 50 to permit the desired retardation of the rotation of the card clothing roller 45, thereby indirectly resisting the rotation of the roller 46. The shaft 44 has fixed thereto a driving sprocket 51 which is rotated by a chain 52 driven in synchronism with the roller 9 by the driving mechanism 12. A spreader blade 53 is fixed to a bracket 54 which is dependent from the threaded shafts 55 which are vertically adjustable by means of the nuts 56, worm wheel 57, worm 58 and hand-wheel 59. The bracket 54 and the blade 53 may be angularly adjusted relative to the vertical by means of the hand-wheel 60, worm 61, worm wheel 62 and shaft 63. The desired angular adjustment may be maintained by means of the stop screws 64.

The bracket 54 has fixed thereto a shaft 65 on which are engaged collars 66 supporting the shaft 67 to which are attached the brackets 68 for supporting the wings 69 at the ends of the blades 53.

The auxiliary rollers and guides 70, 71, 72, 73 and 74 facilitate the passage of the fabric under tension beneath the spreader blade 53 to effect the spreading on the back of the fabric of the adherent material C in a layer of uniform depth.

When pile carpet or similar material is treated in accordance with my invention, it is fed face downward under the roller 38, around the guide 39, around the card clothing roller 3, over the roller 40, beneath the spreader blade 29, between the nip rollers 9 and 22, under the rollers 41 and 70, over the card clothing roller 45, under the curved non-rotating guide 71, under the spreader blade 53, under the rotatable roller 72, over the card clothing roller 46, over the roller 73, under

the roller 74, and passed into a drying and vulcanizing chamber (not shown). In the passage of the fabric through the apparatus, the adherent substances B and C are fed to the back of the fabric so as to form lakes of liquid material in front of the spreader blades 29 and 53 and between the wings or side guards 37 and 69. The adherent substance B preferably consists of an aqueous dispersion of rubber of relatively high viscosity which is spread on the fabric A by its passage under the blade 29 to form an unfractionated and uncalendered layer of uniform depth which is squeezed into the interstices of the fabric by the passage thereof between the nip rollers 9 and 22 which apply a rolling pressure along substantially a line of contact to thereby cause the permeation or penetration of the rubber material without any disrupted action thereon or tendency to pull loop pile tufts out of the backing. The pressure forces the liquid rubber into the backing to such an extent that it is sometimes desirable to apply a supplemental coating and this is effected by spreading the adherent substance C on the fabric backing by means of the spreader blade 53 while the fabric is held under tension. The substance C is preferably miscible and coalescible with the substance B, which is still in liquid or soft condition. The adherent material C may, however, have a stiffening agent, such for instance as sodium silicate, added to the body thereof, which is preferably an aqueous dispersion of rubber. The spreading of this auxiliary coat results in the formation of a homogeneous layer which is firmly imbedded in the back of a fabric and provides a desired body and stiffness to the fabric.

Having described my invention, I claim:

1. In apparatus of the character described, the combination with means for supporting a fabric, a spreader blade positioned above said fabric for spreading an adherent substance thereon, and means, including a pair of complementary nip rollers, for applying pressure to a substance spread on said fabric by said blade.

2. In apparatus of the character described, the combination with means for suspending a fabric under tension, a spreader blade positioned above the fabric tensioned by said means for spreading an adherent substance on a fabric supported by said means, and nip rolls between which passes fabric passing under said spreader blade.

3. In apparatus of the character described, a fabric support, a spreader blade positioned above a fabric supported by said support for spreading thereon an adherent substance to form a layer of uniform depth, nip rollers between which is squeezed fabric which has passed beneath said spreader blade, a second spreader blade beneath which passes fabric squeezed by said nip rollers, and means for supplying to the top of the fabric ahead of said subsequent spreader an adherent substance adapted to coalesce with the adherent substance which has been squeezed into the fabric by said rollers.

4. In apparatus of the character described, the combination of means including a roller for supporting a fabric under tension, a fulcrumed member, a spreader blade in engagement with fabric supported by said means, a roller journaled in said fulcrumed member and engaging fabric supported by said means, a second roller coacting with said first named roller and held at a fixed distance therefrom to squeeze a fabric passing between them, and driving means for rotating said second named roller.

5 5. In apparatus of the character described, the
combination of a spreader blade, means including
a roller for supporting a fabric in front of said
spreader blade, means for supplying an adherent
substance to the top of said fabric intermediate
said spreader blade and roller, nip rollers behind
said spreader blade and drawing fabric beneath
said spreader blade, a second spreader blade be-
hind said nip rollers, means for supplying an
10 additional amount of adherent substance to the
top of said fabric at a point between said second
spreader blade and said nip rollers, and means
including a roller for drawing fabric beneath said
second spreader blade.

6. In apparatus of the character described, the
combination of means for supporting a fabric
under tension, a spreader blade for engagement
with the fabric supported by said means, a roller
having an unyielding surface in the path of such
fabric after its passage under the spreader blade,
and a second roller held at a fixed distance from
said first roller and having a yielding surface co-
acting with the unyielding surface of said first
named roller to squeeze a section of fabric pass-
ing between such rollers. 10

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