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MACHINE FOR COATING FABRICS.

APPLICATION FILED FEB. 18, 1918.

1,316,784.

Patented Sept. 23, 1919.

2 SHEETS—SHEET 1.

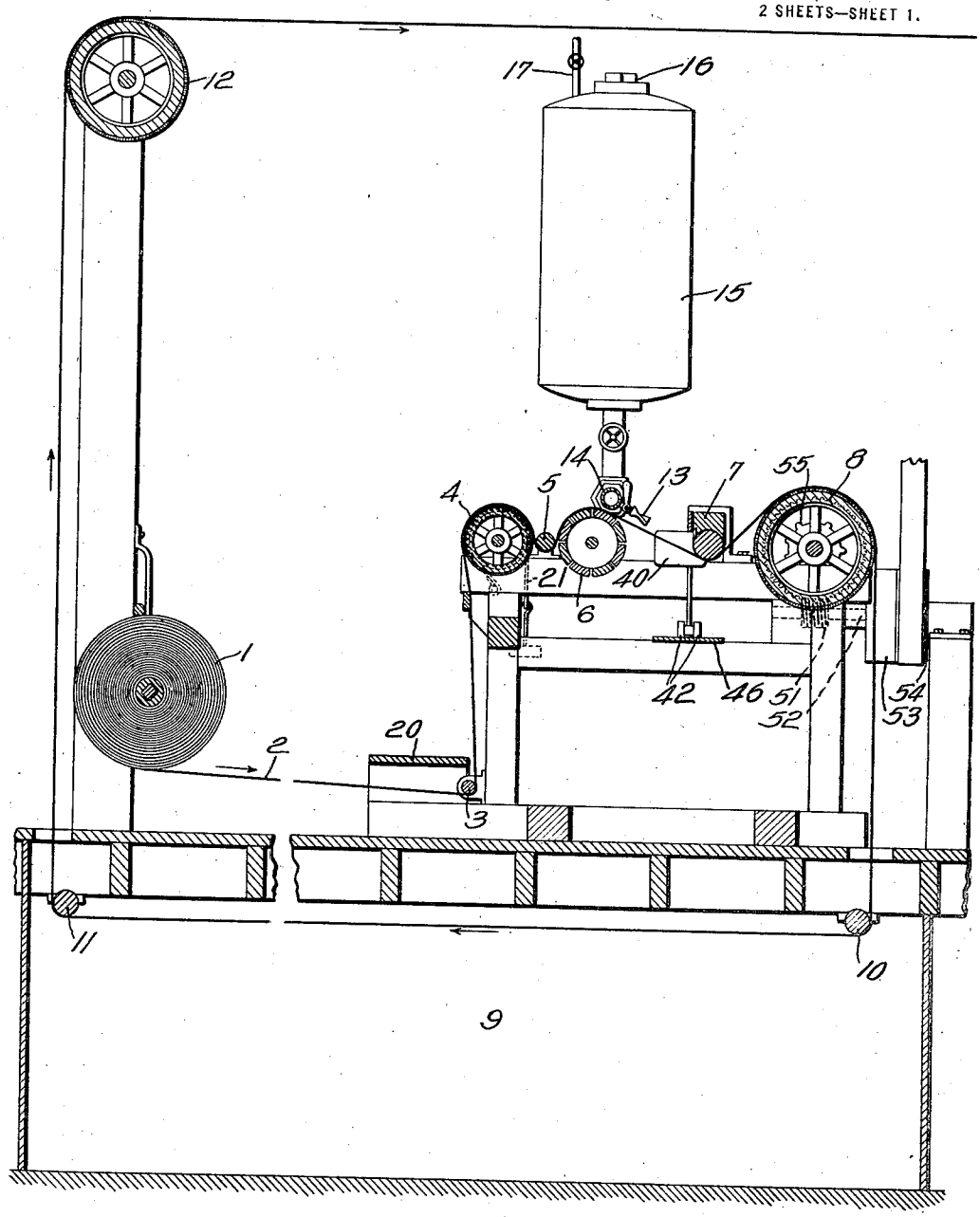


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

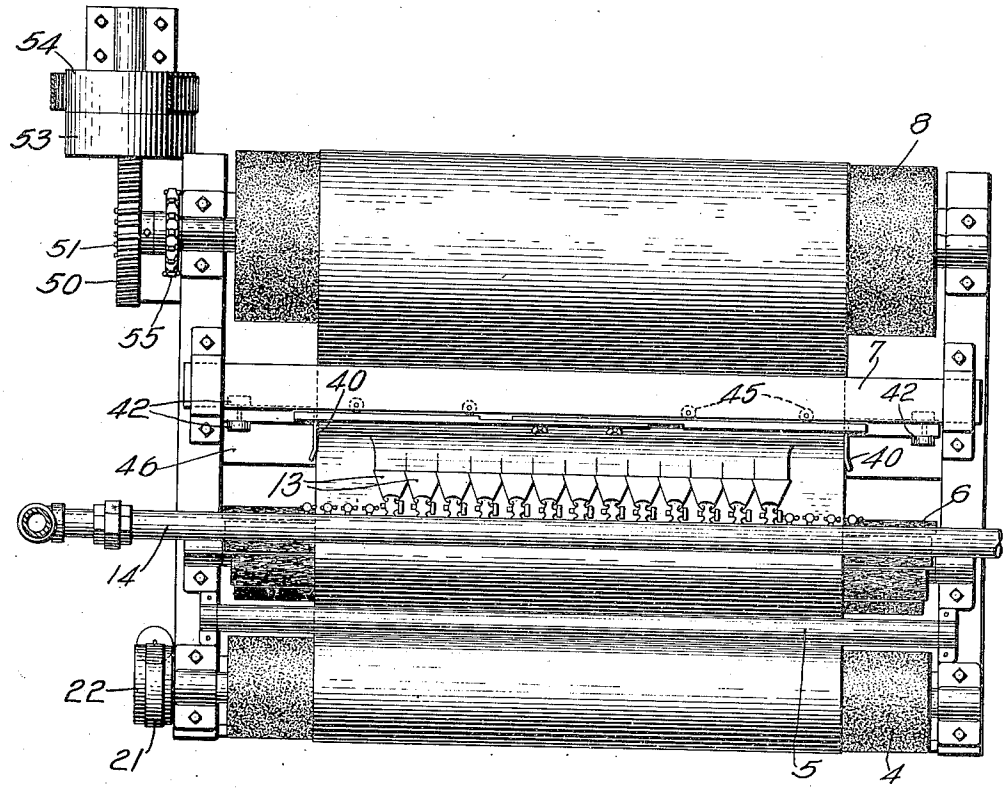
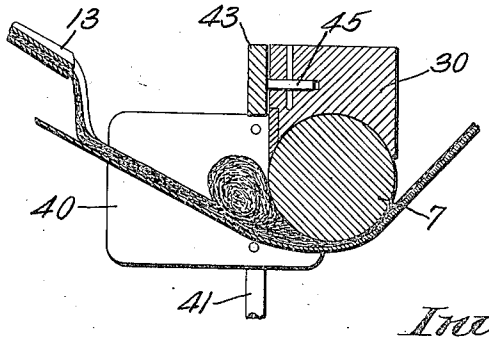


Fig. 3.



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UNITED STATES PATENT OFFICE.

DANIEL D. FROTHINGHAM, OF SALEM, AND RALPH U. SAWYER, OF WINCHESTER, MASSACHUSETTS, ASSIGNORS TO SAWYER PRODUCTS COMPANY, OF WATERTOWN, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

MACHINE FOR COATING FABRICS.

1,316,784. Specification of Letters Patent. Patented Sept. 23, 1919.

Application filed February 18, 1918. Serial No. 217,969.

To all whom it may concern:

Be it known that we, DANIEL D. FROTHINGHAM and RALPH U. SAWYER, citizens of the United States, residing at Salem and Winchester, respectively, in the counties of Essex and Middlesex, respectively, and State of Massachusetts, have invented certain new and useful Improvements in Machines for Coating Fabrics; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to a machine for coating fabrics and more particularly to machines for applying a coating material which is of a stiff, viscous nature.

I am aware of machines for coating fabrics in which thin, fluid, mobile coating material is applied in a series of successive layers, and in which each layer is allowed to set or dry before the next is applied. I am also aware that use has been made of a narrow scraping member called a knife or doctor, which contacts with the fabric at only a very small portion of its surface and whose function is to act as a regulating or scraping means to push back the surplus of the fluid and very thin coating material. In contra-distinction to these machines, this invention has for its object to provide a machine in which a stiff, viscous substantially non-fluid coating material is applied to the fabric in such a manner that upon a single passage through the machine a non-laminated, integral, homogeneous coating of the desired substantial thickness is applied to the fabric and united thereto by a superior bond.

To this end the fabric is put under tension in a manner now well understood, and its course through the machine is so directed that it is drawn around a substantially large bearing or pressure surface of a presser, or presser bar or abutment member in such a manner that the tension of the fabric presses it against the presser. The stiff, viscous, non-fluid material has, because of its thickness and viscosity, the important property of resistance to flow or distortion, so that after the mass of the coating material is supplied to the surface of the fabric, and as the latter begins to bend around the first portion of the presser, its viscosity and resistance to distortion or flow causes the reactive force of the presser upon the fabric to force a portion of the coating material into the interstices of the fabric and at the same time to spread upon the surface thereof an integral, homogeneous layer of the desired thickness. As the coated fabric continues to pass around the remaining portion of the large bearing surface of the presser, the coating is subjected to a continued pressure which contributes to the spreading of the coating uniformly over the fabric and to securely unite it.

A single passage of the fabric through this machine produces a coating of the desired thickness with the accompanying improvement in the adhering bond between the coating and the fabric, so that in addition to producing a superior product, a very material reduction in the cost of manufacture is effected, and particularly in the expensive operations of repeated application of thin coatings with the accompanying drying of each coating before the application of the succeeding one, in order to produce a commercial product having the desired substantial thickness of coating.

To the above ends the present invention consists in the machine hereinafter described and particularly pointed out in the claims.

In the accompanying drawings Figure 1 is a sectional elevation of a machine embodying the invention; Fig. 2 is a plan with the supply tanks removed; and Fig. 3 is an enlarged detail showing the action of the large bearing surface of the presser upon the thick viscous coating.

The illustrated embodiment of the invention is described as follows:—First, the general construction and arrangement of the machine will be set forth and then will follow a more detailed description:—The roll of cloth 1 is supported upon suitable bearings at one end of the machine from which the web of cloth 2 passes around the guide roller 3 and then over the tension roll 4 covered with card clothing, and held from free rotation by a brake strap hereinafter referred to. From the tension roll 4 the web passes under the guide roll 5, thence over the lateral stretching roll 6, under a presser 7, and over the draw roll 8 covered with card clothing, and thence down into the oven 9

where it passes around the guide rolls 10 and 11 as it enters and leaves the oven. From the oven the cloth passes up over the lifting roll 12 and thence to the drying room. The foregoing sets forth briefly the general run of the cloth through the machine. The coating material is supplied at the angle between the presser 7 and the cloth. A series of nozzles 13 in the coating supply pipe 14 leading from the tanks 15, one on each side of the machine, distributes the coating over the surface of the cloth as seen best in Fig. 2. The tanks 15 are filled with the coating material through a hole in the top, normally hermetically closed by the cap 16. Air presser is supplied to the tanks through the air pressure supply pipe 17 so that the stiff, viscous coating material is pressed out through the supply pipe 14 and the nozzles 13, and thus distributed upon the surface of the cloth.

More specifically considered, the cloth in its passage through the machine passes under the footboard 20, upon which the operative may stand so as to reach over the tension roll to have access to the cocks by which the coating material is distributed on the fabric. The cloth in passing over the tension roll 4 is engaged by the card coating thereon, and the brake strap 21 which surrounds the brake drum 22 affords a resistance to the turning of the tension roll 4, thereby putting a tension upon the cloth in its passage through the machine. The guide roll 5 merely guides the cloth from the tension roll onto the lateral stretching roll 6 which is of any suitable or convenient type, but which in the illustrated embodiment is shown as a roll made up of a series of staves, covered with carpet, the opposite ends of which move apart as the cloth rises over them, thereby stretching the cloth laterally and spreading it ready to receive the coating material applied just beyond. The mechanism for stretching the cloth laterally is that usually employed for such purpose and which is well known in the art. The cocks 13 by which the coating material is spread upon the cloth, have thin diverging nozzles, of broom shape, which distribute the material over the surface of the cloth, and which nozzles overlap each other so that there is no space between the successive streams of coating material poured out upon the cloth. By reference to Fig. 3 it will be observed that the cocks 13 simply pour their materials out upon the cloth, which run down on it as the cloth progresses, the excess accumulating as a roll of material at the presser. On each side of the series of diverging nozzles 13 there are a few small nozzles, which may be used to supply additional coating material in case it is found to be necessary, or sometimes when the coating material becomes somewhat small in quantity in the course of the running of the machine. The presser 7 has a half-round lower surface which engages the cloth as it passes thereunder. The details of construction of the preferred form of the presser are shown enlarged in Fig. 3, wherein the presser itself, 7, is mounted upon a bar support 30 which carries the presser 7, and to which the presser is attached by any suitable means such that the bar may be turned to bring a different wearing surface to exposed position. The cloth is engaged at each edge at the presser by guides 40 which afford means for damming or holding the coating material from overflowing at the edge of the cloth. By the use of these guides the coating is extended from edge to edge of the cloth. These guides 40 are carried by posts or guide supports 41 which have little trucks 42 mounted upon their lower ends so that the guides may move laterally with the fabric. The guides 40 are connected together by means of a rod 43, which is adjustable in length by means illustrated in Fig. 2, that is to say, by having the two halves of the rod reduced in thickness and united together by bolts provided with wing nuts passing through a slot in one of the parts of the rod and holes in the other part of the rod. This rod 43 engages the presser 7, or presser support 30, as seen in Fig. 3, which is provided with anti-friction rolls 45, so that the guides are free to move laterally with great ease to adapt themselves to the position of the fabric. The trucks 42 upon which the guides are mounted rest upon and move on a floor plate 46, supported on the frame of the machine, as shown. These guides are held in fixed position with relation to each other during any given run of cloth, but are adapted to be adjusted to the width of the cloth and secured in position with relation to each other. The draw roll 8 is provided as above described, with a card clothing surface; it is mounted in suitable bearings on the frame of the machine, and its shaft carries at its end a worm wheel 50 which is engaged by a worm 51 mounted on the power shaft 52 carrying the fast and loose pulleys 53 and 54. As the draw roll 8 is rotated it pulls upon the cloth and draws it through the machine and gives it a longitudinal tension due to the resistance offered by the brake on the tension roll 4. The shaft of the draw roll 8 is provided with a sprocket wheel 55 for a sprocket chain by means of which the lifting roll 12 is driven. The lifting roll 12 keeps the cloth tight in it passage from the draw roll 8, through the oven 9, up to the lifting roll itself. From that point on the cloth is supported in the usual means not deemed necessary to be described.

It is to be observed that the fabric as it

approaches the presser where the coating is applied, is under heavy lateral strain due to the lateral stretching of the roll 6, as well as heavy longitudinal strain due to the pull exerted on the cloth by the draw roll 8, resisted by the tension roll 4. Thus the interstices of the cloth are opened and the stiff, viscous coating material which flows out the of nozzles 13, as seen in Fig. 3, collects in the angle between the cloth and the presser 7, and owing to the resistance to distortion offered by the coating material, the fabric to be coated is deflected from the path which it would occupy in the absence of such resistance. The resistance, therefore, of the coating material to distortion, causes it to exert a great pressure upon the fabric which tends to force the coating material into the interstices thereof. This pressure between the presser and the fabric forces the coating material into the interstices of the fabric and spreads it over the fabric in a uniform layer; this pressure is a long, heavy continued pressure and is exerted from the point, say where the pressure of the cloth begins to distort the coating material, to the point where the coated fabric leaves the presser roll. The tension of the fabric is relied upon to exert this coating pressure upon the fabric so as to spread it out over and force it into the surface of the fabric. The presser is therefore required to be a thick, heavy presser, so as to cause a long continuation of the pressure between the presser and the coating against the cloth. The limits within which it has been found the thickness of the presser may vary are from $\frac{1}{8}$ of an inch as a minimum to 12 inches as a maximum. Any thickness greater than the latter would be unnecessary, as the material has already been thoroughly spread over and united to the fabric, and longer duration of contact would therefore tend to impair the product. It is to be observed that coating applied by this machine is a single coat, that is, it is a coating made up of a single layer; that this coating is an integral, non-laminated coating, having a unitary body of material; and, in the third place, that the coating is homogeneous from top to bottom, having the same constitution throughout. Also that but one passage of the cloth through the machine is required, owing to the peculiar qualities of the presser coöperating with the stiff, viscous coating material. Another feature of importance in the operation of the machine is the use of the overlapping nozzles, so that the coating material is laid upon the cloth in a sheet without spaces between. In other words, the coating is all applied to the cloth in a single body, as it were, so that the duration of contact of the coating with the cloth before it is engaged and forced into its surface and spread over it in a uniform manner is of the same length of time throughout from edge to edge of the cloth, thereby securing a uniform adhesion of the coating to the fabric throughout the width of the cloth.

The coated fabric and method disclosed herein form the subject matter of copending applications filed by us on even date herewith and bearing Serial Nos. 217,968 and 217,967 respectively.

Having thus described the invention, what is claimed is:—

1. A machine for coating fabrics having, in combination, a tension roll and a draw roll coöperating with the fabric to maintain tension therein, and an intermediate presser bar having a convex bearing surface of material length in direction of travel of the fabric and around and against a material portion of which the fabric is normally wrapped and held by the tension of the fabric.

2. A machine for coating fabric having, in combination, means for maintaining the fabric under tension and a presser having a convex bearing surface of material length in the direction of travel of the fabric, cooperating with the fabric and around and against a material portion of which the fabric is normally wrapped and held by the tension of the fabric.

3. A machine for coating fabrics having in combination, a presser having a convex bearing surface, means for drawing the fabric under tension around and in contact with a material portion of the convex bearing surface of the presser, means for applying a mass of thick viscous coating material to the fabric in front of the presser, the course of the fabric and tension therein being arranged so that after the coating has been reduced to the desired thickness, it is subjected to continued rubbing pressure against the rearward portion of the convex bearing surface of the presser.

4. A machine for coating fabrics having, in combination, means for maintaining the fabric under tension, a presser having a convex bearing surface of material length in the direction of travel of the fabric, coöperating with the fabric and around and against which the fabric is normally wrapped and held by the tension on the fabric, means for applying a stiff viscous coating material in front of the presser, and self-alining guides for retaining said viscous coating material upon the fabric.

5. A machine for coating fabrics having, in combination, means for producing longitudinal tension in the fabric, means for supplying a viscous coating material to the fabric, and means coöperating with said viscous coating and fabric constructed to utilize the tension of the fabric to reduce the coating

to the desired thickness and to subject the same to continued rubbing pressure against the rearward portion of the convex bearing surface of the presser.

6. A machine for coating fabrics having, in combination, means for producing longitudinal and lateral tension in the fabric, means for supplying a viscous coating material to the fabric, and means coöperating with said viscous coating and the fabric of such area of contact with the viscous material as to utilize the tension of the fabric to press a portion of the viscous coating material into the pores of the fabric and to spread a homogeneous layer of substantial thickness on the surface thereof.

7. A machine for coating fabrics having, in combination, means for producing longitudinal tension in the fabric, overlapping discharge nozzles for supplying a viscous coating material to the fabric in a continuous layer, and means coöperating with said viscous coating and fabric constructed to utilize the tension of the fabric to press a portion of the viscous coating material into the pores of the fabric and to spread a homogeneous layer of substantial thickness on the surface thereof.

8. A machine for coating fabrics having, in combination, means for drawing the fabric through the machine, means for applying coating material, and edge guides for the coating material connected to move in unison.

9. A machine for coating fabrics having, in combination, means for drawing the fabric through the machine, and means for applying the coating material to the fabric comprising a series of overlapping discharge nozzles for supplying a series of overlapping bands of coating material to the fabric.

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