

Feb. 26, 1924.

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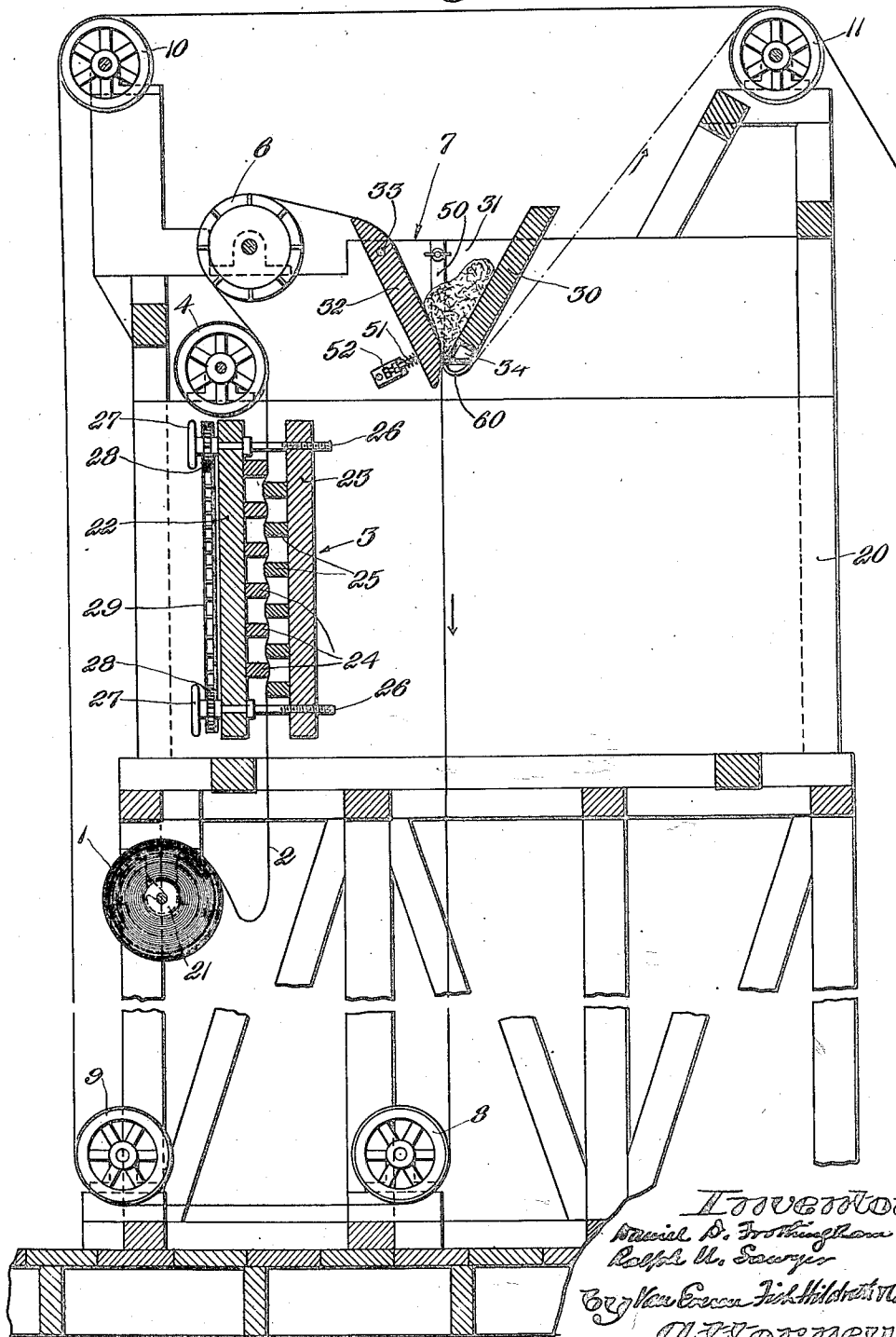
D. D. FROTHINGHAM ET AL

MACHINE FOR AND METHOD OF COATING FABRICS

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2 Sheets-Sheet 1

*Fig. 1.*



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Fig. 2.

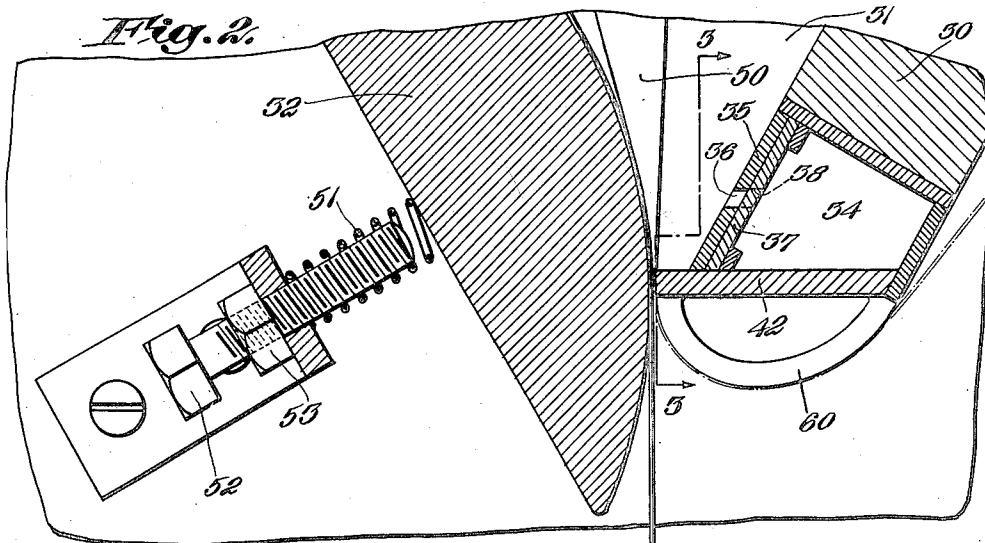


Fig. 3.

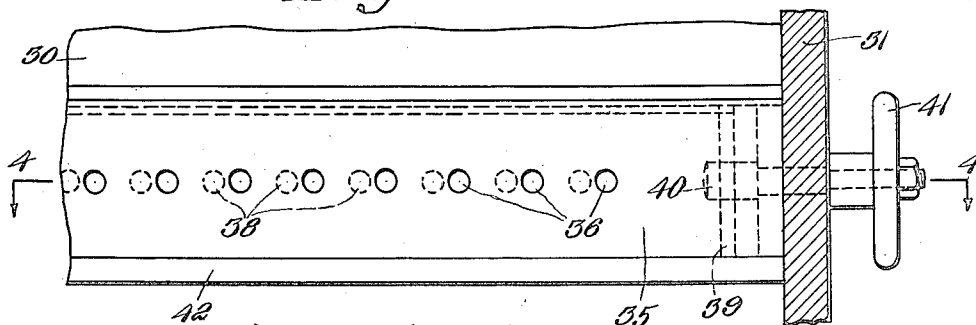
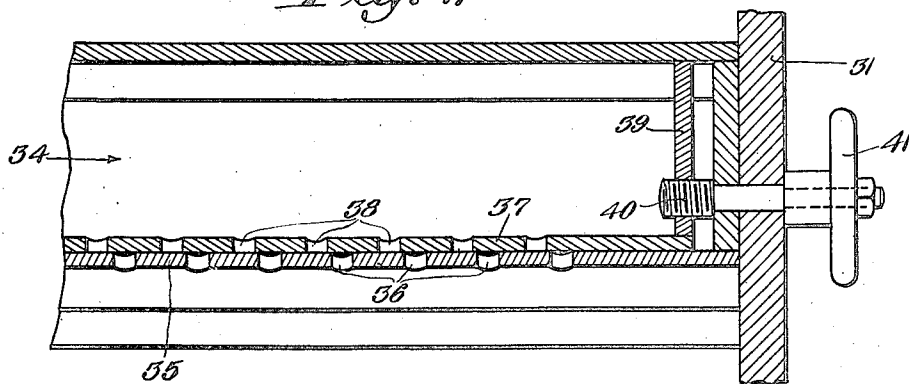


Fig. 4.



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## UNITED STATES PATENT OFFICE.

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## MACHINE FOR AND METHOD OF COATING FABRICS.

Application filed October 27, 1921. Serial No. 510,722.

*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 and Methods of 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 and method of coating fabrics.

One object of the invention is to produce a machine adapted to coat fabrics with a uniform layer of coating material, and adapted for use either with thin, fluid, mobile coating material, or for use with stiff, viscous, substantially non-fluid coating material, in which the thickness of the coating applied is uniform throughout the length of the fabric being coated capable of being run at a high speed, and having provision, among other things, for regulating the tension under which the fabric passes through the machine.

Another object of the invention is to produce an improved method of coating fabrics by which the thickness of the coating may be readily maintained uniform when thick viscous coating material is employed. To the above ends the present invention consists in the coating machine and method hereinafter described, and particularly defined in the claims.

In the accompanying drawings illustrating the preferred form of the machine, Fig. 1 is a sectional elevation of the machine embodying the invention; Fig. 2 is an enlarged sectional elevation of the instrumentalities employed for applying the coating to the fabric; Fig. 3 is a view on the line 3—3, Fig. 2, showing the coating supply pipe; and Fig. 4 is a section on the line 4—4, Fig. 3, showing the mode of adjusting the discharge of the coating material at the point of application to the fabric.

The illustrated embodiment of the machine is described as follows: The roll of cloth 1, is supported upon suitable bearings at one end of the machine, from which the web of cloth 2 passes to the tension device

indicated in a general way by the reference character 3, from which the web passes to and over a tension roll 4, and thence over the lateral stretching roll 6, to the coating trough, indicated in a general way by the reference character 7, from which the web passes to the draw roll 8, and thence around the guide rolls 9 and 10 to the draw roll 11 from which it passes to the drying chamber or oven.

More specifically considered, the machine is provided with a frame-work 20 supporting the various elements of the machine. The cloth roll 1 is supported in the bearings 21, mounted on the frame 20 of the machine. From the cloth roll the web 2 passes to the tension 3, which consists of a fixed member 22, and a movable member 23. The fixed member 22 is supported on the frame 20 of the machine and provided with a series of web engaging blocks 24, which press against the web and deflect its course between blocks 25, mounted on the movable member 23. The movable member 23 is supported from the stationary member 22 by a series of screws 26, four of such screws being provided. These screws 26 are rotatably mounted in the stationary member 22, and each is provided with a hand wheel 27 and a sprocket wheel 28. A sprocket chain 29 extends around all four sprocket wheels 28, and by this means all four screws 26 may be operated in unison so as to draw the movable member closer to or move it farther from the stationary member, thereby increasing or decreasing the tension on the fabric as it passes through the tension 3. From the tension 3, the cloth passes over the surface of the tension roll 4 covered with card clothing, which is positively driven by power and operates to draw the cloth through the tension, thereby smoothing and straightening the web as it is drawn out. From the tension roll 4 the web passes to and around the surface of the lateral stretching roll 6, for stretching the cloth laterally in the usual manner and spreading it ready to receive the coating material applied at the trough 7 just beyond. The coating trough 7 comprises a fixed trough member 30 supported on the frame of the machine, end trough members 31, forming closures for the ends of the trough, and the movable trough member or cloth presser 32 which is pivoted at 33 at its ends on the end trough members 31.

The lower end of the fixed trough member 30 is provided with a coating supply pipe 34, which receives the coating at one end or at both and distributes it throughout the width of the trough into the space between the side and end trough members. The supply pipe 34 is provided on the trough side with a plate 35 having a series of holes 36 therein, through which the coating material flows into the trough. A gate 37 consisting of a plate provided with holes 38, corresponding in number and position to the holes 36, is provided by means of which the discharge of the coating material into the trough may be stopped or started at pleasure, and which, in addition, by varying the overlap of the holes, adjusts and regulates the rate of passage of the coating material into the trough. The plate 38 is provided at its end with an end piece 39, which receives a screw 40 which extends through the end member 31 of the trough, and upon its outside end is provided with a hand wheel 41, which is secured to it, and by means of which the gate may be moved to open and close the holes 36 and to regulate the flow of coating material through them. The bottom of the supply pipe 34 consists of a plate 42 which extends beyond the pipe toward the movable trough member, or cloth presser 32, and this plate supports the coating material in the bottom of the trough, and acts in cooperation with the cloth presser 32 as a doctor or knife to regulate the thickness of the coating to be applied to the cloth. The distance of the cloth presser 32 from the plate 42 is determined by two gauges 50, one at each end of the trough. The gauges have tapered lower ends which are inserted between the cloth presser 32 and the surface of the edge of the plate 42. The thickness of the coating applied to the fabric is determined by the gauges. The presser is pressed against the gauges by the springs 51, of which four are employed along the length of the presser on a machine for coating cloth sixty inches wide. These springs are strong springs capable of holding the cloth presser against the gauges, irrespective of the variations in the fluidity or viscosity of the coating material. It is required that they be strong enough to support it against the pressure exerted by the stiffest and most viscous coating material which may be used in the machine. Each cloth presser spring 51 encircles an adjusting stop screw 52, which may be adjusted toward and from the cloth presser 32, and held in fixed position by the set nuts 53. These stops prevent the presser from swinging back too far under conditions of the passage of seams or other things between it and the knife.

In the operation of the machine, the cloth presser springs exert sufficient pressure upon the presser to continuously hold it up

against the coating thickness gauges 50. When, however, at the end of a length or bolt of cloth, a seam is encountered, when it passes between the knife and the cloth presser, it forces the cloth presser backward away from the knife, and permits the seam to pass through the opening between the presser and the knife. This is a matter of great convenience in the operation of the machine, because the machine automatically takes care of these seams with a minimum loss of fabric due to an excess of coating upon it, a minimum loss of coating, due to the fact that the opening through which the seam passes is enlarged only to the extent and for the necessary length of time, and because further it eliminates the necessity of the supervision of the operative at the time of the passage of the seam through the trough. Incidentally, this opening of the passage between the presser and the knife allows the escape of any solid materials which may have accumulated in the bottom of the trough.

The gauges 50 are made in pairs. Each pair corresponds to a certain thickness of coating to be applied to the cloth. When it is desired to change the thickness of coating applied to the cloth, a new pair of gauges corresponding to the proper thickness of the coating desired are put in place.

The draw roll 8 may be omitted under some circumstances of machine dimensions and fabric strengths. Thus, with a weak fabric, both the rolls 8 and 11 would be draw rolls; with a strong fabric, however, the roll 8 would, or might be, merely a guide roll and the roll 11 the only draw roll.

The machine as thus far described is adapted for applying any sort of thin fluid or mobile coating material to the fabric. It provides for the passage of seams through the machine without loss of time by requiring the attention of the operative, and without loss of material by opening up the machine to permit the passage of the seam. The machine is capable of rapid application of coatings, varying from three yards to ten per minute. The coating is not pressed into the fabric in a manner calculated to afford any more intimate union of the coating and the fabric than ordinary machines. With the machine thus described, the coating might be any usual coating, and would preferably have the consistency of heavy molasses. Any ordinary coating consisting essentially of pyroxylin, castor oil and acetone may be used. The tension device is effective to maintain the cloth smooth, even when the cloth has loose portions; that is to say, cloth called "lop-sided cloth" may be coated in the machine without folds or injury.

In Figs. 1 and 2, is shown an additional device for the machine, whereby it may be

adapted for use in practicing the method of coating cloth patented to us in the patent No. 1,316,782, and, in addition, one of the subjects of the present invention, namely the improved method of coating fabrics. This modification consists in providing the plate 42, with a portion 60 curved away from the edge of the plate 42, and extending back to the plate again, as shown and constituting a coating presser. In case the presser 60 is employed, the cloth lead, instead of being down around the rolls 8, 9 and 10, will run directly from the presser 60 upward as indicated in dot and dash line to and over the roll 11, which will, in such case, be a draw roll. The cloth in such case, after having the layer of coating applied to it, will be subjected to long continued rubbing pressure during the passage of the coating over the surface of the coating presser 60, as described in said patent. In the construction of said patent, the thickness of the coating was determined by the tension of the cloth, and difficulty has been experienced in securing a uniformity of thickness of coating. According to this method the thickness of the coating is determined by the distance between the cloth presser 32 and the knife of plate 42, and then long continued rubbing pressure is applied to the coating, so as thereby to force the coating into the interstices of the cloth with great pressure, as described in said patent.

In case the machine is used with the presser 60, the tension device 3 is of even more importance than when the machine is used in applying coatings of thin, mobile material, because the resistance exerted by the tension device to the pull of the cloth through the machine by the draw roll 11 determines the pressure with which the coating is forced against the presser 60, and thereby contributes to the greater or lesser penetration of such material into the fabric, without affecting the thickness of the coating.

The modified form of the machine in which the presser 60 is employed to exert a long continued pressure upon the coating so as thereby to force it into the interstices of the cloth with great pressure, and to cause the coating to penetrate such interstices, is a valuable feature of the machine, as it renders it capable of being used either for the application of coating in a thin, fluid or mobile condition, or coatings in a thick, stiff, viscous condition, as described in said patent. It is to be observed that the machine provided with the presser 60 may be used with the lead of the cloth, as shown in Fig. 1, for use in applying thin, fluid, mobile coatings, as well as for applying the thick, stiff, viscous coatings when the lead will be changed, as shown in dotted lines.

It is also to be observed that the machine is adapted for use in applying single thickness coatings in accordance with the method described in said patent, as well as for applying the multiple layer coatings.

The present invention not only contemplates the machine for coating fabrics hereinbefore described, but in addition the method of coating fabrics with thick, viscous coating material, which consists in applying a coating material of the nature described in stiff viscous condition and of a determined thickness to the fabric to be coated, and thereafter subjecting the coating to long continued rubbing pressure between the coating material and the fabric, whereby the coating material is forced into the interstices of the cloth with great pressure, and penetrates such interstices and forms tentacle-like integral projections on the coating, which bind and securely hold the coating to the cloth, but being stiff and viscous, which does not pass through the cloth, but is forced into its surface and around the surfaces of the threads of the surface of the cloth. This pressure exists from the point where the plate or knife 42 engages the coating opposite the cloth presser 32, around the surface of the coating presser 60, to the point where the cloth leaves the coating presser on its way to the pull roll 11.

Having thus described the invention, what is claimed is:

1. A machine for coating fabrics having, in combination, a tension and a draw roll cooperating with the fabric to maintain tension thereon, and an intermediate coating device, comprising a trough between two adjacent surfaces of which the cloth is drawn, wherein the distance between such surfaces is regulated to determine the thickness of the coating applied.

2. A machine for coating fabrics having, in combination, a tension, a draw roll, and a coating trough having a fixed side and a movable side, the latter being pressed toward the former by spring pressure permitting it to yield when a seam passes through the trough.

3. A machine for coating fabrics having, in combination, a tension, a draw roll cooperating with the fabric to maintain the tension thereon, cloth coating devices located between the draw roll and the tension, having provision for applying a coating of a certain determined thickness, and a fixed bearing surface of material length in the direction of travel of the fabric around and against which a material portion of the fabric is normally wrapped and held by the tension of the fabric.

4. A machine for coating fabrics having, in combination, a tension and a draw roll cooperating with the fabric to maintain ten-

sion thereon, and a coating device for applying coating to the fabric while under tension, comprising a trough having two sides between which the fabric passes, and  
5 gauges for determining the distance between such surfaces in order to determine the thickness of the coating to be applied to the fabric.

5. The method of coating fabrics which  
10 consists in applying a coating material of the nature described in a stiff, viscous condition to the fabric to be coated, of a determined thickness, and thereafter applying

long continued rubbing pressure between the coating material and the fabric.

6. The method of coating fabrics which  
15 consists in applying a coating material in a stiff viscous condition to the fabric to be coated, determining the thickness of the coating material upon the fabric, and there-  
20 after applying long continued rubbing pressure between the coating material and fabric.

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