June 30, 1936. S. COHN 2,045,755

METHOD OF TREATING FABRICS

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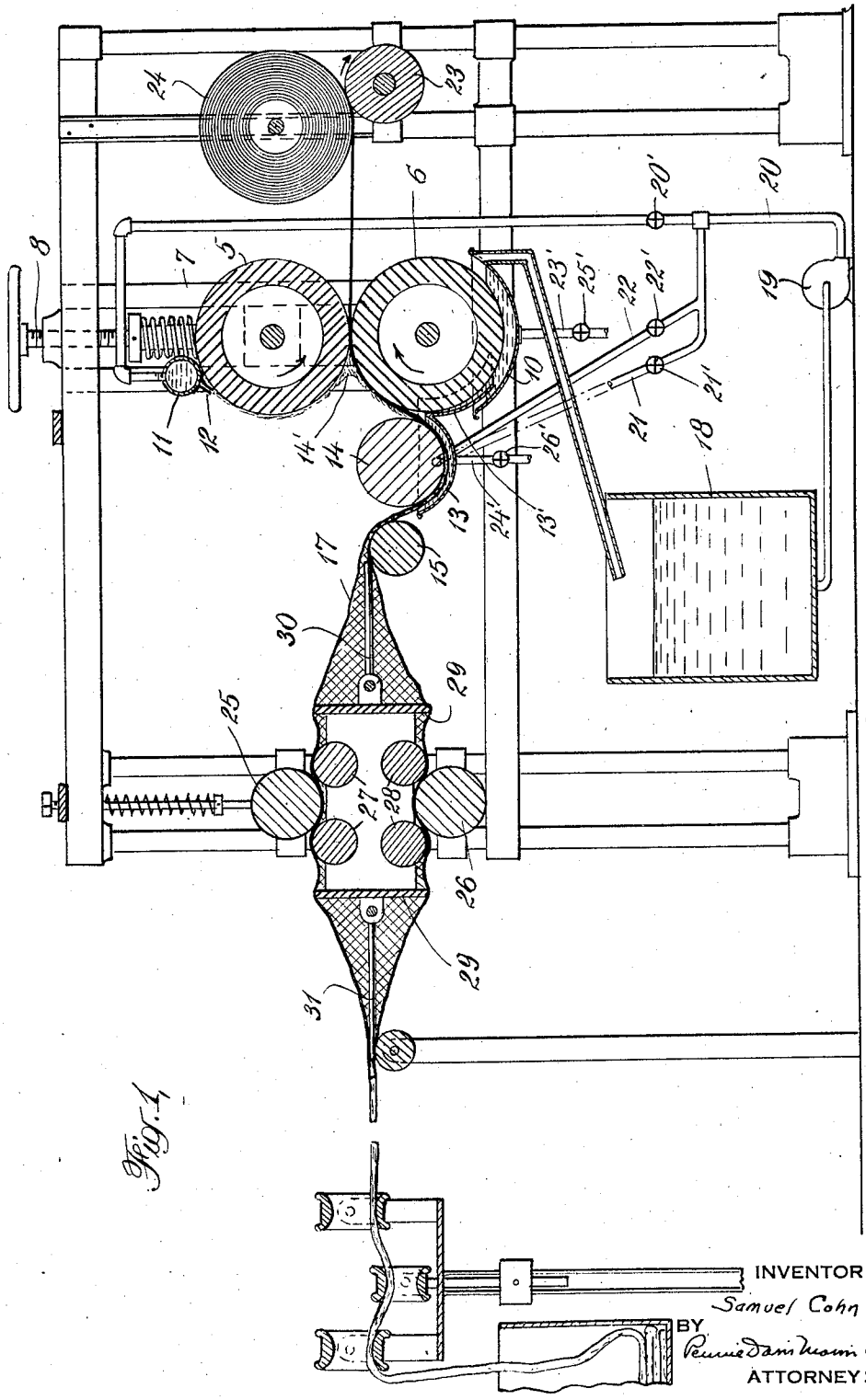


Fig. 1.

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Fig. 2,

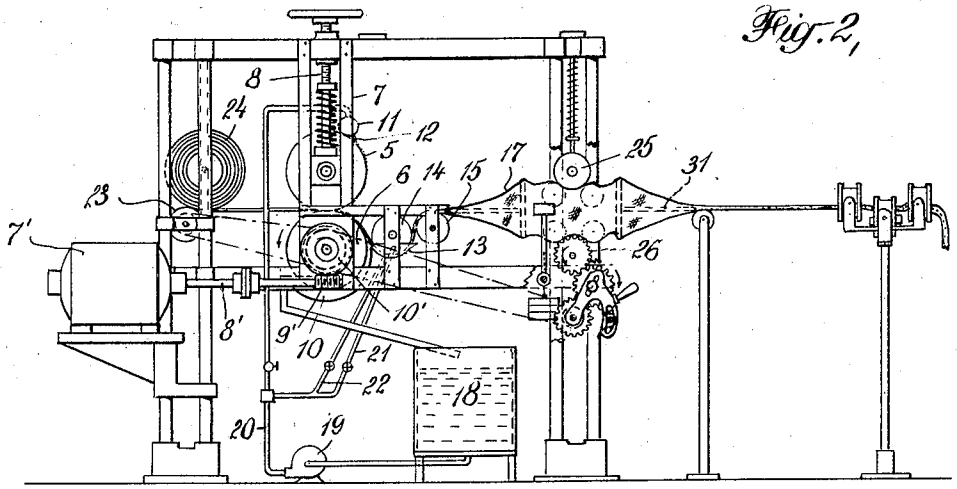


Fig. 3,

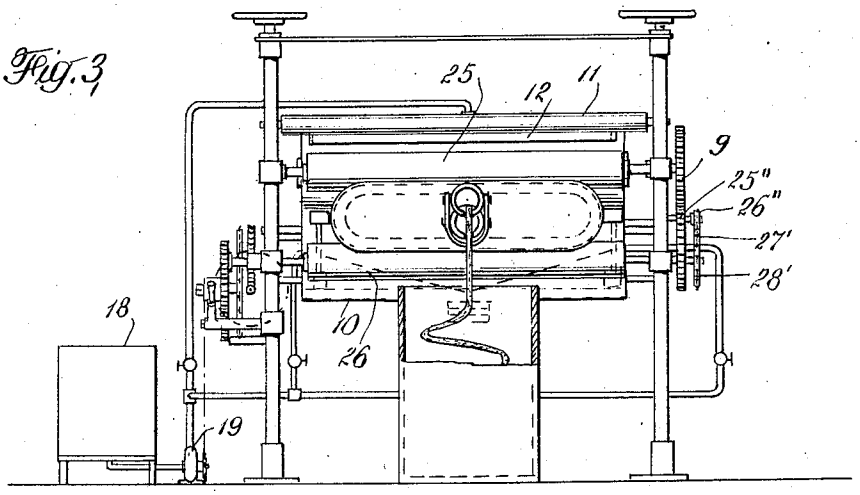
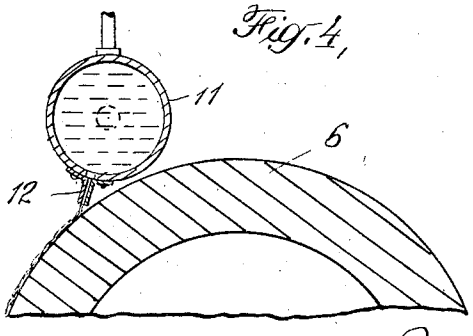


Fig. 4,



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UNITED STATES PATENT OFFICE

2,045,755

METHOD OF TREATING FABRICS

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5 Claims. (Cl. 8—19)

This invention relates to the treatment of fabrics and particularly to the application thereto of liquids containing treating agents for the purpose of delustering, weighting, dyeing, softening, or otherwise modifying the characteristics of the fabric. The invention is applicable to flat woven fabrics and is especially useful in the treatment of tubular goods.

The application of solutions and liquids containing treating agents to fabrics has been accomplished heretofore in vats or tanks. In such equipment it is difficult to secure uniform action of the treating agents used. Thus, for example, in dyeing fabrics the color often presents a non-uniform appearance when the fabric is dry. Furthermore, it is not practicable in vats to employ chemicals which are insoluble in water, that is to say, the fabric cannot be treated with a chemical agent in suspension with any reasonable degree of success.

It is the object of the present invention to provide a simple and effective method and apparatus permitting the uniform application of chemical agents to fabrics for the purposes indicated. Various liquids including chemicals in solution or suspension can be applied uniformly in accordance with the invention with the minimum of effort and maximum assurance of a satisfactory product.

Another object of the invention is to facilitate the application of chemical agents to tubular fabrics which present special difficulties because of their tubular form and other characteristics tending to prevent uniform impregnation under the methods heretofore in use.

In carrying out the invention, I apply the liquid containing the treating agent to the fabric by spreading the liquid over opposing rotating cylindrical surfaces. The liquid is carried by the movement of the surfaces to the point of contact thereof. The fabric is introduced between the rotating cylindrical surfaces and is thoroughly impregnated by the liquid as it comes into contact progressively with the surfaces. The surplus liquid is immediately removed from the fabric by pressure applied through the cylindrical surfaces so that the fabric emerges sufficiently and uniformly impregnated but without any surplus liquid, and may be rolled and conveyed to other equipment for further treatment or passed continuously through the additional equipment for further treatment, drying, etc.

Advantageously I supplement the impregnation of the fabric as hereinbefore described by passing it progressively through a bath of liquid containing a treating agent which is disposed in front of the rotating cylindrical surfaces. The fabric may pass through the bath, absorbing therefrom a certain amount of the liquid containing the treating agent, and then pass to the rotating cylindrical surfaces where the impregnation is completed. Thus, the uniform and complete absorption of the treating agent is assured.

Preferably in the operation of the procedure the liquid containing the treating agent is circulated continuously from a source of supply to the rotating cylindrical surfaces and to the bath, if one is used. The surplus liquid drains from the cylindrical surfaces and is returned to the supply tank for recirculation. A suitable pump may be employed to maintain the circulation which ensures the most effective and economical use of the treating agent.

The procedure as described is applicable generally to fabrics. It is particularly appropriate for the treatment of tubular fabrics although it may be applied to fabrics which are not tubular. If the fabric to be treated is in tubular form, it is desirable to avoid distortion and wrinkles and to present the fabric in the form of a flattened tube so that it will pass smoothly between the cylindrical surfaces and receive the liquid containing the treating agent uniformly throughout.

In practising the invention with tubular material, I may employ mechanism for distending the fabric initially and then causing it to assume a flattened form. In certain cases it may be sufficient to use a simple frame supported in any suitable way so that the fabric will pass over it and will be distended laterally into the form of a flattened tube. It is desirable, though not essential, to conduct the operation of preparing the flattened tube and of treating it continuously as in the embodiment of the invention hereinafter described.

I may employ mechanism for distending the fabric such as that illustrated and described more particularly in my Patent No. 1,790,655. The apparatus embodies spaced rolls driven at a predetermined rate and co-operating with a floating stretcher frame enclosed within the tubular fabric and having rolls which are rotated by contact through the fabric with spaced driving rolls. The tubular fabric is distended to the desired amount, depending upon the initial and desired width, by lateral adjustment of complemetary parts of the floating stretcher frame. Rollers which are positively driven to afford a peripheral speed preferably slightly higher than that of the

spaced driving rolls co-operate with idler rolls outside the fabric at the lateral edges of the frame. Hence both the top and bottom as well as the sides of the tubular fabric are propelled positively at a predetermined rate. The fabric is opened initially by a spreader which is sized in accordance with the width of the fabric treated and is interchangeable with spreaders of varying dimensions to co-operate properly with the propelling mechanism. The spreader offers substantially no resistance to the fabric, the friction being easily overcome by the uniform pull of the propeller. The fabric is opened by the propeller to substantially its tubular dimensions. As it leaves the propeller it is formed into a flattened tube.

In carrying out the invention, the fabric is delivered to the rotating cylindrical surfaces which supply the liquid containing the treating agent and act as a wringer to remove the surplus. The fabric may pass directly to the rotating cylindrical surfaces or intermediately through the bath of liquid containing the treating agent. Suitable means may be provided to maintain the fabric in laterally stretched condition between the propeller and the rotating cylindrical surfaces. It is desirable also to maintain a suitable tension longitudinally of the fabric between the propeller and the rotating cylindrical surfaces. This is readily accomplished by maintaining a differential in speed of the fabric at the propeller mechanism and at the rotating cylindrical surfaces by driving the latter so that the linear speed of the fabric is slightly higher at the point of engagement with the rotating cylindrical surfaces than at the propeller. The tension must be varied depending upon the particular fabric which is treated, and should be adjusted to give the required stretch to the fabric. Provision may be made, therefore, to vary the speed of the propeller rolls, for example, or alternately the speed of the rotating cylindrical surfaces forming the wringer.

The fabric which is positively fed by the propeller in a distended condition is brought to the rotating cylindrical surfaces or wringer under tension with the two opposite layers of the fabric in contact. The double thickness of fabric passes between the rotating cylindrical surfaces and is subjected to pressure which may be adjusted by the provision of suitable mechanism such as is commonly used in wringers. By suitably adjusting the pressure, the major portion of the liquid may be removed from the fabric. The fabric leaves the wringer as a flattened tube free from wrinkles. It may be folded or preferably rolled on a mandrel and thereafter subjected to further treatment to dry and finish the fabric, or it may be delivered directly to the drying and finishing machine.

The invention will be described in further detail by reference to the drawings, in which

Fig. 1 is a diagrammatic view of an apparatus adapted for the practice of the invention;

Fig. 2 is a side elevation of the apparatus;

Fig. 3 is a front elevation of the apparatus; and

Fig. 4 is a detail in section illustrating the spreader for applying liquid to the upper roll of the wringer.

Referring to the drawings, **5** and **6** indicate co-operating wringer rolls having preferably a hard surface. The rolls are mounted in suitable supports **7** with adjustable means **8** of the type usually employed in wringers to permit adjustment of the pressure between the rollers. The rolls may be driven from any suitable source of power such as a motor **7'**, shaft **8'**, worm **9'** and worm wheel **10'**.

The lower roll **6** dips into a receptacle **10** which is adapted to contain a supply of liquid containing the treating agent. As the roll rotates in the direction of the arrow, the liquid is picked up by the rotating cylindrical surface and is carried upwardly to the point of contact with the upper roll **5**. Liquid containing the treating agent is supplied to the surface of the latter roll from a receptacle **11** having a linear orifice **12** formed by securing two angle members in spaced relation to the side of the receptacle and a slot through which the liquid escapes to the orifice. The spacing of the angles should be very slight, so as to direct a thin film of the liquid uniformly over the surface of the roll. The liquid is thus carried downwardly to the point of contact with the roll **6**.

Preferably a receptacle **13** is disposed between a roll **15** and the rolls **5** and **6**. A roll **14** is mounted therein to direct the web of fabric **17** through the liquid in the receptacle and thence into the bight of the rolls **5** and **6**. Liquid from the receptacle **13** flows over an apron **13'** onto the surface of the roll **6** and into the receptacle **10**. Liquid carried upwardly by the roll **6** and by the fabric and flowing downwardly over the roll **5** tends to provide a layer **14'** of liquid constantly at the bight of the rolls **5** and **6**. The liquid is thus applied uniformly to the fabric entering the bight of the rolls.

The liquid containing the treating agent is supplied continuously from a storage receptacle **18** into which the surplus liquid drains continuously. A pump **19** and pipes **20**, **21** and **22**, controlled by valves **20'**, **21'** and **22'**, serve to convey the liquid to the several points of application. Drain pipes **23'** and **24'** with valves **25'** and **26'** facilitate cleaning.

The web of fabric, after passing between the rolls **5** and **6** where the surplus liquid is removed, may be conveyed over a roll **23** and thence around a mandrel **24** upon which it is wound. It may, as hereinbefore indicated, be conveyed directly to other mechanism for further treatment.

The apparatus as described is applicable generally to the treatment of fabrics. If the fabric is tubular, I employ suitable means to spread it uniformly, and preferably the apparatus described in my patent hereinbefore mentioned and illustrated diagrammatically in the drawings. It comprises rollers **25** and **26** driven through gears **9** and a pinion **25''** from a sprocket **26''**, chain **27'** and sprocket **28'** and cooperating with rollers **27** and **28** supported on a frame **29** which is disposed within the fabric and held against longitudinal movement by the rollers **25** and **26**, the latter rollers co-operating with the rollers on the frame to cause the fabric to advance uniformly thereover, the fabric being at the same time distended to its tubular dimensions. As the fabric leaves the propeller, it is permitted to assume a flattened form, a guide **30** being provided preferably to maintain the fabric in laterally stretched condition. An opener **31** may be provided at the opposite end of the propeller to spread the fabric as it enters the device in rope form.

The operation will be understood readily from the foregoing description. The liquid containing, for example, chemical agents adapted to deluster, weight, dye, soften or otherwise modify the fabric, either in solution or suspension, is applied uni-

formly to the fabric and readily saturates it before the fabric enters the bight of the wringer rollers. The surplus liquid is removed by the wringer rolls and returns to the storage receptacle whence it is recirculated for further use. The application of the liquid in the manner described results in uniform impregnation of the fabric. The amount of the chemical agent thus added to the fabric may be regulated easily by varying the concentration of the solution or suspension, the speed of travel of the fabric, the pressure of the rolls, etc. The procedure and apparatus afford, therefore, an effective means for modifying the characteristics of fabrics and especially tubular fabrics.

The procedure as described is most effective in applying various liquids including solutions and suspensions of chemical agents to both dry and wet fabrics. The application of pressure to the fabric, particularly while it is in a distended condition, tends to distribute the impregnating material uniformly throughout the fabric, thus ensuring a product of satisfactory appearance. Furthermore, the application of the liquid in the manner described is most economical in respect to labor, time required, and simplicity, and the consequent low cost of the apparatus employed. Instead of large vats with complicated stirring mechanism and the various types of apparatus heretofore required to impregnate and substantially dry the fabric, I am able to complete the treatment in the manner described and with the simple and inexpensive apparatus which delivers the fabric free from wrinkles and substantially free from moisture so that the drying and finishing of the fabric is easily accomplished.

Various changes may be made in the procedure, particularly with respect to the liquid employed and in the details of the apparatus used without departing from the invention or sacrificing any of the advantages thereof.

I claim:

1. The method of treating textile fabric with a liquid containing chemical treating agents, which comprises passing the fabric through a body of said liquid while the same is maintained in an agitated condition by circulation of liquid to and from said body, and thereafter subjecting the fabric, while both surfaces thereof are in contact with the liquid in circulation to and from said body of liquid, to pressure to expel surplus liquid.

2. The method of uniformly impregnating the circumferential surface of tubular textile fabric with treating liquid containing chemicals in suspension, which comprises forming the traveling tubular fabric into a flattened tube of two juxtaposed layers, both similarly positioned and distended, maintaining a mass of said treating liquid, circulating said liquid from and to said mass at a rate sufficient to maintain the mass of liquid in an agitated condition, initially subjecting each layer of the flattened tube so conditioned to said agitated mass of the treating liquid, and thereafter subjecting the flattened tube with both layers in contact to rolling pressure to expel surplus liquid.

3. The method of uniformly treating tubular textile fabric in flattened tube formation with a liquid containing treating agents, which comprises passing the two uniformly juxtaposed layers of the flattened tube through a body of said liquid while the same is maintained in an agitated condition by circulation of liquid to and from said body, and thereafter subjecting the two uniformly juxtaposed layers of the flattened tube while in contact with the liquid in circulation to and from said body of liquid, to pressure to expel surplus liquid.

4. The method of uniformly treating both surfaces of a textile fabric in flat form with a liquid containing a treating agent, which comprises maintaining a body of said treating liquid, circulating said liquid from and to said body at a rate sufficient to maintain the body of liquid in an agitated condition, initially immersing the flat fabric in said agitated body of the treating liquid, thereafter subjecting the treated fabric to rolling pressure, and subsequent to the initial immersion and directly prior to subjecting the fabric to rolling pressure applying at least a portion of the liquid in circulation to and from said body of liquid to both surfaces of the flat fabric.

5. The method of uniformly treating all surfaces of a traveling tubular textile fabric with a liquid containing treating agents, which comprises, maintaining a body of said treating liquid, circulating said liquid from and to said body at a rate sufficient to maintain the body of liquid in an agitated condition, forming the fabric into contiguous layer formation by lateral distension, applying the treating liquid maintained in agitated condition to both similarly positioned layers of the flattened tube, and thereafter subjecting the flattened tube while both surfaces thereof are in contact with the liquid in circulation to and from said body of liquid to pressure to expel surplus liquid.

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