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TREATMENT OF TEXTILE MATERIALS

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FIG. 1

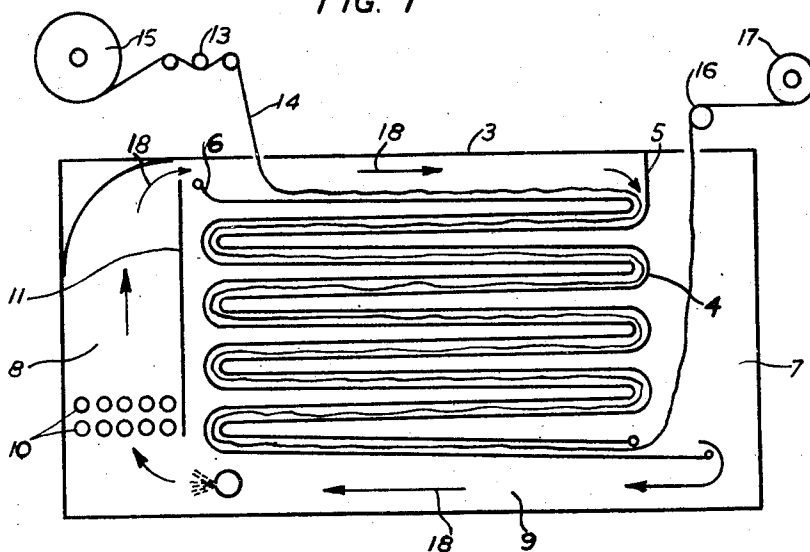
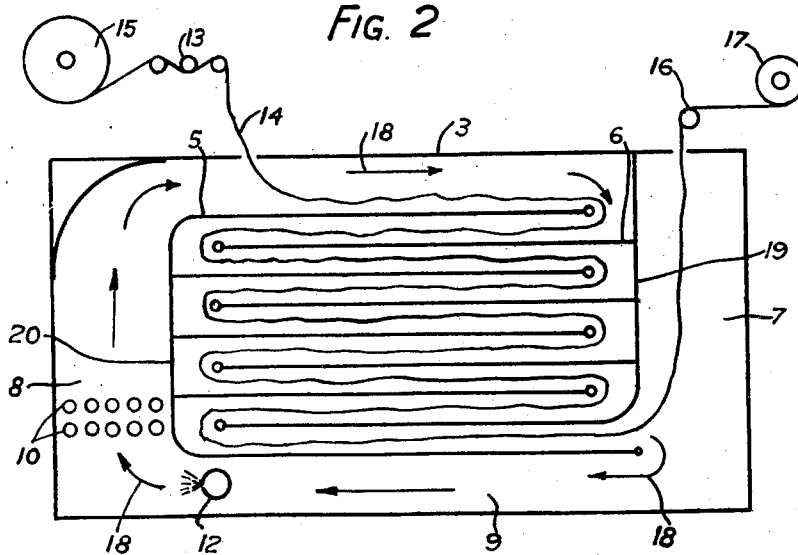


FIG. 2



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TREATMENT OF TEXTILE MATERIALS

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3 Claims. (Cl. 68—184)

This invention relates to a process and apparatus for the liquid treatment of textile fabrics in open width and is especially concerned with the avoidance of tension during such treatments. The invention is of special value in connection with the liquid treatment of fabrics comprising yarns of cellulose acetate or other cellulose ester or ether.

Certain fabrics, notably those comprising yarns of cellulose acetate or other cellulose ester or ether, cannot in general be safely dyed or otherwise processed in rope or other folded form, e. g. on a winch, without a previous liquid treatment in open width during which the fabric is thoroughly wetted out and any strains are released. In the absence of such a pretreatment the fabric is prone to acquire permanent creases or "river marks" during the treatment in folded form.

Again it is often desirable to effect the liquid treatment of textile fabrics whilst allowing free shrinkage in all directions to take place. An example of such a treatment is the development of the figure on crepe fabrics. A fabric is woven which has in the weft, or both the weft and warp, highly twisted yarns, for example yarns of natural silk or of regenerated cellulose artificial silk or of cellulose acetate. Usually the fabric is then subjected to hot aqueous treatment, for example at temperatures of 85–90° C. or higher, for the purpose of developing the crepe figure. It is essential that during this treatment the fabric shall be substantially free to shrink both in the weft direction and in the warp direction if full development of the crepe figure is to be attained. Moreover, especially in the case of cellulose acetate fabrics, owing to the plasticity of the yarn at the temperature employed, there is considerable risk of uneven or incomplete crepe development and of permanent creasing and distortion.

It will be appreciated therefore that most of the machines commonly used for the liquid treatment of textiles are unsuitable when effecting crepe development. For example, the use of the jig involves some application of tension to the material and does not permit free shrinkage. Again, use of a winch machine involves both creasing of the material and some tension and machines of the type in which the fabric is suspended by the selvedge or in loops or is suspended as a hank are costly as regards labour requirements and do not permit continuous operation.

It has now been found that the liquid treatment of textile fabrics in a continuous manner while in open width, and particularly the development of crepe figure in fabrics containing highly twisted yarns of cellulose acetate, can advantageously be conducted by feeding the fabric in open width into a current of the treating liquid so that the fabric is simultaneously forwarded by and subjected to the action of the liquid while

said fabric is maintained in open width. In this way tension can be substantially avoided during the treatment, and substantially complete freedom of shrinkage allowed in all directions.

It has further been found that when using hot treating liquids the requisite liquid movement can be in the form of a convection current created by suitable application of heat to the liquid.

An apparatus utilising these principles can thus be of great simplicity.

According to our invention therefore an apparatus for the treatment of textile fabrics with liquids comprises a conduit through which the fabric can be passed in open width, and means for creating a flow of the treating liquid through the conduit, the conduit being so arranged that a textile fabric can be fed in at one point thereof and out at another after being carried through the conduit by a flow of liquid through the latter. The conduit preferably is covered and has its outlet lower than the inlet. Further it is best arranged so that it can be maintained full of the treating liquid.

When the conduit is of considerable length, e. g. over 30 feet, it is advantageously of compact sinuous form. This permits the apparatus to be of reasonable dimensions and arranged so that heat losses are substantially lower than when a conduit of extended form is used.

The invention will now be described with reference to the accompanying drawing which shows two alternative forms of apparatus in accordance with the invention.

Figure 1 illustrates a very convenient form of apparatus in accordance with the invention. A covered rectangular tank is provided with a sinuous conduit 4 formed by a pair of metal sheets 5 and 6 spaced apart substantially uniformly (say about 2 inches) and extending from one side to the opposite side of the tank with their widths substantially perpendicular to the said sides. In the direction of their length the sheets are folded backwards and forwards in a vertical plane so that the conduit formed by them in conjunction with the sides of the tank consists of a series of superimposed horizontal or downwardly inclined portions each, with the exception of the first and last, united at one end to the portion of conduit next above and at the other to the portion of conduit next below.

Spaces 7 and 8 are left between each end of the tank and the adjacent sinuous conduit. Space 7 serves to permit passage of fabric withdrawn from the lower end of the conduit upwardly through the tank, e. g. to a winding device. Space 8 in conjunction with a space 9 left between the lowest portion of the sinuous conduit and the bottom of the tank, serves to convey liquid from the lower end of the conduit to the upper end of the conduit. Within space

8 heating pipes 10 are provided to heat liquid in the tank and create a convection current upwards in the space and downwards through the sinuous conduit. A vertical partition 11 adjoining and extending above the upper end of the conduit is provided to ensure that upwardly flowing liquid can reach the opposite end of the tank only by way of the sinuous conduit. Instead of or in addition to the heating coil a perforated pipe 12 may be provided in the end space or below the sinuous conduit, said pipe being adapted to inject steam, preferably in the direction it is desired to cause the liquid to flow.

Positively driven rollers 13, arranged to engage the fabric frictionally, are provided for feeding a textile fabric 14 from a supply roll 15 into the upper part of the tank so that it is carried down the conduit by the flow of liquid. For this purpose positively driven nip-rollers may be employed instead of the set of positively driven but non-contacting rollers 13. Similarly a guide roller 16 and a positively driven take-up roller 17 are provided for withdrawing the fabric after it has passed through the sinuous conduit. The feed and take up mechanism are conveniently arranged to be driven in synchronism at a relative speed to allow for shrinkage undergone by the fabric during the treatment.

The arrows 18 indicate the direction of flow of the liquid.

Various modifications of the aforementioned apparatus may be made.

It will be seen that essentially the apparatus shown in Figure 1 comprises a covered tank provided with a sinuous conduit through which the fabric can be passed in open width, said conduit being formed by a pair of suitably spaced and folded sheets extending from one side to the opposite side of the tank with their widths substantially perpendicular to the said sides, means for creating a flow of liquid through the conduit in order to carry the fabric through the conduit and a space for conveyance of the liquid from one end of the conduit to the other, said tank also being provided with apertures for admission of the fabric to and withdrawal of the fabric from the conduit.

The apparatus comprising a tank having a sinuous conduit situated therein as described above constitutes a particularly compact, economical, and simple device, particularly when circulation is effected by suitable choice of the point for applying heat. Other constructions having the characteristic of a sinuous conduit within a tank are within the scope of the invention. One such construction is shown in Figure 2 where instead of the conduit being formed from a pair of long metal sheets suitably shaped it is formed by a series of spaced horizontal sheets 5 and 6 each extending across the width of the tank. Lengthwise of the tank the alternate sheets project beyond their immediate neighbours at one end and likewise the intervening alternate sheets project beyond their immediate neighbours at the other end. The two sets of projecting sheet ends terminate respectively on vertical plates 19 and 20 extending across the tank. The numbering of the remaining parts shown in Figure 2 is the same as that of the corresponding parts in Figure 1. With a construction such as is shown in Figure 2 it is less easy than with the construction of Figure 1

to provide a conduit free from sharp corners or edges which might impede free passage of the fabric through the conduit.

The invention includes both the aforementioned apparatus and the process wherein a textile fabric is subjected to the action of a liquid by feeding the fabric while in open width into a current of the liquid so that the fabric is simultaneously forwarded by and subjected to the action of the liquid while said fabric is maintained in open width.

Having described our invention, what we desire to secure by Letters Patent is:

1. Apparatus for the liquid treatment of textile fabrics in a continuous manner while in open width, comprising a covered tank provided with a smooth sinuous conduit, free of obstructions, through which the fabric can be passed in open width, said conduit having rounded bends being formed by a pair of suitably spaced and folded sheets extending from one side to the opposite side of the tank with their widths substantially perpendicular to the said sides, heating means for creating a flow of liquid through the conduit in order to carry the fabric through the conduit and a space for conveyance of the liquid from one end of the conduit to the other, said tank also being provided with apertures for admission of the fabric to and withdrawal of the fabric from the conduit, said apparatus including means for feeding a textile fabric in open width into one end of the conduit and means for withdrawing it from the other.

2. Apparatus for the liquid treatment of textile fabrics while in open width, comprising a tank capable of containing the treatment liquid, a smooth sinuous conduit, free of obstructions, in said tank through which the fabric can pass in open width, said conduit comprising a series of substantially horizontal portions, of which all but the first and last are united at one end to the portion next above and at the other to the portion next below by rounded bends, spaces below and at each side of the conduit system, heating means in at least one of said spaces adapted to create a convection current of liquid downwardly through said conduit and upwardly through said space and means for feeding a textile fabric in open width into one end of the conduit and for withdrawing it from the other end.

3. Apparatus for the liquid treatment of textile fabrics in a continuous manner while in open width, comprising a tank having therein a pair of sheets extending from one side to the opposite side of the tank and spaced and folded so as to form a smooth, sinuous unobstructed conduit through which the fabric can pass in open width and which comprises a series of substantially horizontal portions of which all but the first and last are united at one end to the portion next above and at the other to the portion next below by rounded bends, spaces below and at each side of the said conduit system, heating means within at least one of said spaces adapted to create a convection current of liquid downwardly through said conduit and upwardly through said space, and means for feeding the fabric into the upper end of the conduit and withdrawing it from the lower end.

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