

[54] **APPARATUS FOR TREATING LONG AND BROAD FABRIC WITH LIQUID**

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[51] Int. Cl. **B05c 8/02**

[58] Field of Search..... 68/150, 189, 198,
68/199

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[57] **ABSTRACT**

Fabric having a large breadth and length wound in the form of a cylindrical spiral roll around a reel with a space provided between respective adjacent turns is treated with a treating liquid in a cylindrical vessel while causing relative motion of the roll of fabric and the treating liquid. This new method enables the broad and lengthy fabric such as carpet to be treated uniformly throughout its entire portions with no loss of feel and without any development of entanglement, clustering and bending of the pile of such fabric.

6 Claims, 9 Drawing Figures

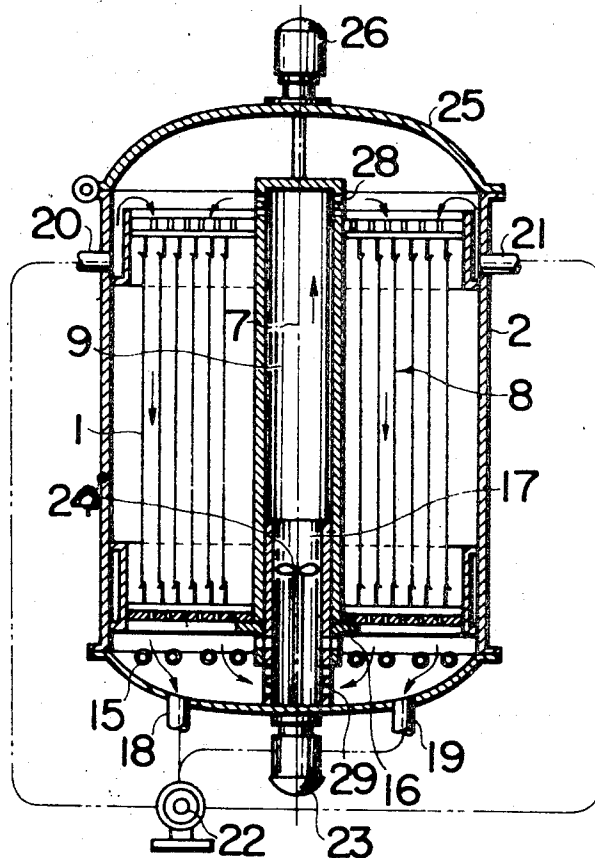


FIG. 1

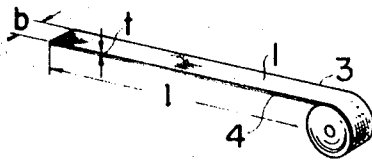


FIG. 2

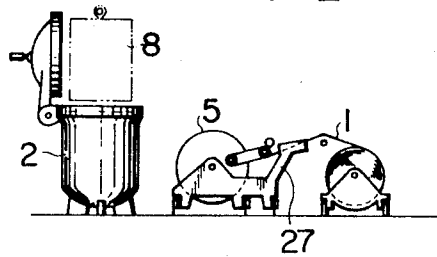


FIG. 3

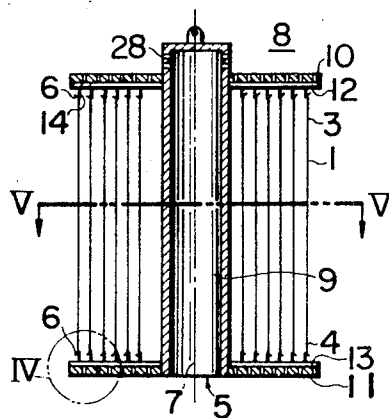
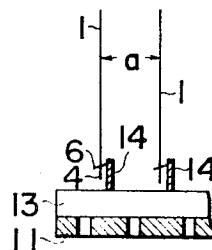


FIG. 4



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FIG. 5

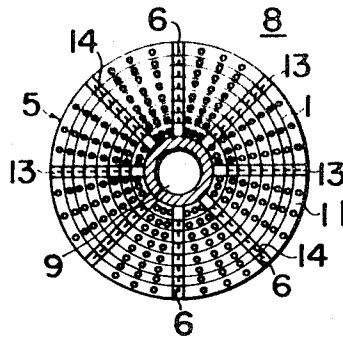
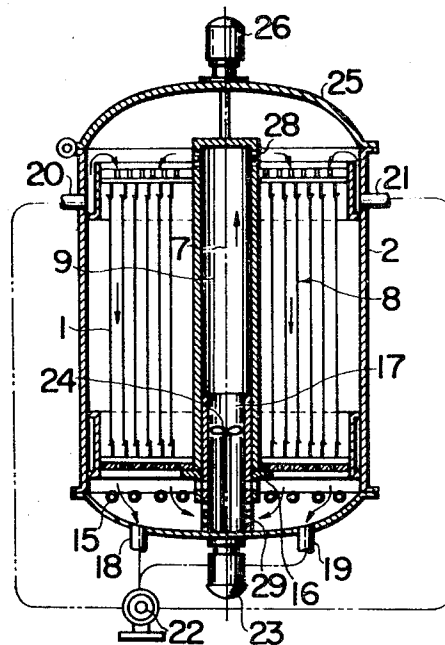


FIG. 6



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FIG. 7

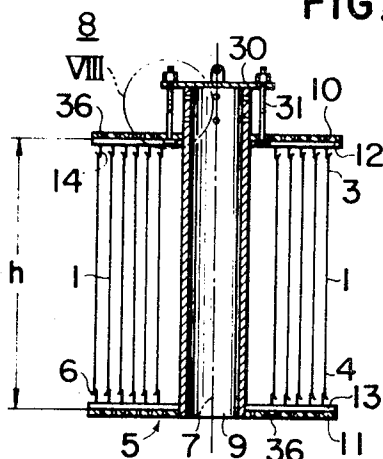


FIG. 8

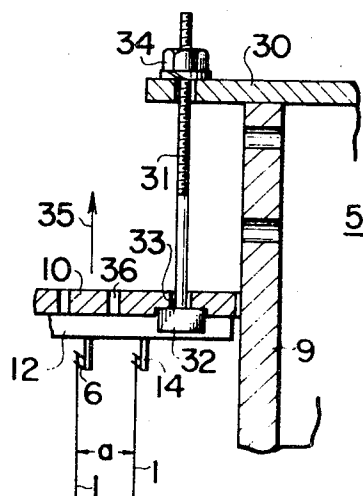
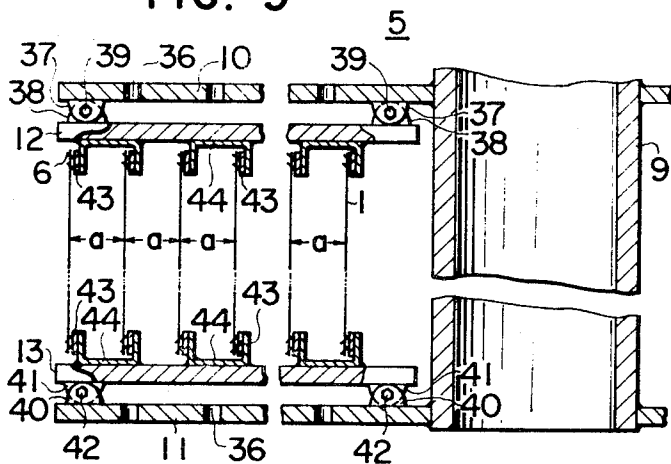


FIG. 9



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APPARATUS FOR TREATING LONG AND BROAD FABRIC WITH LIQUID

BACKGROUND OF THE INVENTION

a. Field of the Invention

The present invention is concerned with a method and apparatus for treating fabric with liquid, and more particularly, it relates to a method and apparatus for treating fabric having a large breadth and length with a liquid in a treating vessel in which the treating liquid is contained.

b. Description of the Prior Art

One previously known method of treating fabric with liquid is conducted by the use of a draw-up reel which is positioned above the surface level of the treating liquid contained in a treating vessel. The fabric to be treated is drawn out of the treating liquid and then it is again fed into the liquid lengthwise thereof and it is immersed therein. Therefore, as this fabric is withdrawn upwardly from the surface of treating liquid, the latter which has been adhering to the fabric material is then allowed to flow downwardly in streams along the faces of the fabric owing to the action of gravity of such liquid. These liquid streams constitute an important cause for derangement of the neat faces of the fabric being treated which may be a carpet made of acrylic fibers, especially when the treating liquid used is held at a high temperature. Let us now take up the treatment by liquid of a fabric made of those recently developed man-made fibers which, by nature, tend to become soft whenever subjected to a high temperature. As the liquid streams which are held at a high temperature run down along the faces of such a fabric during the treatment process, they would bring forth considerable ill effect upon the faces of the fabric, causing entanglement, clustering and/or bending of the individual fibers which form the pile of the fabric.

Recently, there has been developed a new dyeing technique for conducting high speed dyeing operation. This new method which has been put into practice uses a jet nozzle for drawing up a long, continuous piece of cloth at high speed from the dyeing bath where it is immersed and it incorporates the process of circulating the cloth through the dyeing bath. Although this method permits the dyeing to be carried out at high speed, it has the disadvantage that the cloth is exposed to a considerably great amount of tension during the circulation of the cloth in the treating system, resulting in that the finished cloth is obtained as one which is undesirably hard with loss of feel. This method has a further drawback that the equipment is costly. Also, there has been known a method which is designed to treat fabrics by circulating the latter in a vessel containing a treating liquid. This latter method, however, has not a few problems including the one that the feed reel for the fabric which is immersed in the treating liquid often fails to feed the lengthy fabric properly and smoothly.

SUMMARY OF THE INVENTION

In this specification, hereinafter, the term "fabric" expresses cloth such as woven fabric, knitted fabric and non-woven fabric, and needless to say, carpet etc.

It is, therefore, a primary object of the present invention to provide improved method and apparatus for performing highly uniform and unfailing treatment by liquid — such as dyeing, degumming, heat-treatment

and washing — of a lengthy continuous fabric having a large breadth.

Another object of the present invention is to provide a method and an apparatus for conducting a reliable treatment, by liquid, of fabric of the type described by the use of a treating apparatus which is quite simple in structure and which is easy in both operation and control and which can be installed in such a place as having a relatively small floor area.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an example of continuous, lengthy, fabric having a large breadth which is to be treated by the method and apparatus of the present invention;

FIG. 2 is a somewhat schematic elevation of an example of the vessel for use in performing treatment with liquid and its associated reel-loading unit both of which are used in putting the method of the present invention into practice;

FIG. 3 is a somewhat diagrammatic vertical sectional view of a cylindrical roll of fabric under treatment which is wound around a reel in cylindrical spiral fashion with a space between respective adjacent turns;

FIG. 4 is an explanatory plan view, on an enlarged scale, of the portion indicated at IV in FIG. 3;

FIG. 5 is a cross sectional plan view taken along the line V—V in FIG. 3;

FIG. 6 is a somewhat diagrammatic vertical sectional view showing the state of said roll of fabric which is being treated with liquid in a cylindrical treating vessel containing the liquid therein.

FIG. 7 is somewhat diagrammatic vertical sectional view of a cylindrical roll of fabric under treatment which is wound in a spiral fashion around a reel different in type from the reel shown in FIG. 3, with a space between respective adjacent turns of the spiral roll;

FIG. 8 is a somewhat diagrammatic explanatory representation, on an enlarged scale, of the region VIII in FIG. 7; and

FIG. 9 is a somewhat diagrammatic explanatory representation, on an enlarged scale, with parts broken away, showing a reel of a type further different from those shown in FIGS. 3 and 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will be described in further detail in connection with several preferred embodiments by referring to the accompanying drawings.

FIG. 1 is a perspective view of an example of a continuous, lengthy fabric having a large breadth which is the object of treatment. The fabric 1 which is under treatment, in this instance, is a carpet. This object 1 to be treated usually has a length l of 70–120 m, and it can often be as long as 200 m. This fabric 1 is of a breadth b of the order of 4.5–5.0 m, and a thickness t of the order of 5–30 mm.

FIG. 2 is an elevation of an example of the treating apparatus for use in putting the method of the present invention into practice. More specifically, FIG. 2 is an elevation showing an example of the vessel 2 for treating fabric with liquid and its associated reel-loading unit 27.

The object 1 to be treated which is a fabric is wound around the axis 7 of a reel 5 in spiral fashion into a cylindrical roll 8 with an appropriate space a provided be-

tween respective adjacent turns while the opposite side edge portions 3 and 4 breadthwise *b* of the fabric are anchored by pins 6 or bolts and nuts or like anchoring means — which will be discussed later — which are provided on the reel 5.

As shown in FIGS. 3 through 5, the reel 5 is provided with a hollow shaft 9 having an open lower end. This hollow shaft 9 has an upper liquid stream-rectifying disk 10 fixedly centered about the upper portion thereof, and a lower liquid stream-rectifying disk 11 fixedly centered about the lowermost end of the shaft 9. The lower face of the upper liquid stream-rectifying disk 10 is provided, fixed thereto, with a plurality of upper arm-like rods 12 extending radially from the outer periphery of said hollow shaft 9. On the other hand, the upper face of the lower liquid stream-rectifying disk 11 is provided, fixed thereto, with a plurality of lower arm-like rods 13 which extend radially from the outer periphery of the hollow shaft 9. These plurality of rods 12 and 13 preferably extend from the outer periphery of the hollow shaft 9 at uniform diverging intervals between the adjacent rods. Each of the upper arm-like rods 12 and the lower arm-like rods 13 is provided with a desired number of spaced anchoring means comprising projections 14 having hooks 6 or bolts and nuts or like anchoring means which are intended to anchor the opposite side edge portions breadthwise of the fabric 1 for treatment so as to securely hold the fabric in position as it is wound in cylindrical spiral fashion around the reel with an appropriate space *a* provided between respective adjacent turns.

FIG. 6 is a vertical sectional view, showing the state in which the cylindrical spiral roll 8 of fabric 1 is treated with a liquid in the cylindrical treating vessel 2. As shown in FIG. 6, the treating vessel 2 is provided at its bottom with a winding of heating pipe 15 and a hollow supporting member 17 having a flange 16 for supporting the hollow shaft 9 of the reel 5 in place. Externally of the treating vessel 2, there is provided a reversibly operable treating-liquid circulator pump 22 which is connected to conduits 18, 19 and 20, 21 which are open at the bottom portion and the upper side portions, respectively, of the treating vessel 2. Within the hollow supporting member 17, there is provided a rotary vane 24 for circulating the treating liquid in the vessel 2 and being capable of effecting reversible revolution by being driven from a motor 23 provided externally of the vessel 2. On top of the cover member 25 of the treating vessel 2, there is provided a motor 26 for intermittently or continuously rotating said reel 5 or, alternatively, for causing vertical oscillating motion of the reel 5 through appropriate crank means not shown.

Description will next be made on the manner in which the method of the present invention is put into practice by the use of a treating apparatus having the foregoing arrangement.

As a first step, the broad and lengthy fabric 1 is wound in cylindrical spiral fashion about the axis 7 of the reel 5 with an appropriate space *a* provided between respective adjacent turns while anchoring the opposite side edge portions 3 and 4 breadthwise *b* of the fabric 1 by the anchoring members such as pins 6 or bolts and nuts which are provided on the projections 14 of the reel 5, to thereby form a desired cylindrical spiral roll 8 of fabric as shown in FIG. 3. The formation of this roll 8 may be performed manually. More conve-

niently, the roll 8 of the fabric may be formed by rotatably supporting the reel 5 horizontally on a shaft of a loading unit 27, as shown in FIG. 2. Thereafter, as shown in FIG. 6, the roll 8 of fabric is placed in the treating vessel 2 in such a manner that the axis 7 of the roll 8 of fabric is positioned vertical. A treating liquid is then introduced into the treating vessel 2. Thereafter, the fabric 1 is subjected to treatment with the liquid while imparting motion to either one of the treating liquid and the roll 8 of fabric, or alternatively, to both of them. More specifically, the roll 8 of fabric may be held stationary while the treating liquid is circulated through the vessel 2 by means of the pump 22 and the rotor 24. Or, the roll 8 of fabric may be either intermittently or continuously rotated, or oscillated vertically by being driven from the motor 26, or by appropriately combining motions of these types.

By referring to FIG. 6, description will now be directed to the operation of the type which is conducted by circulating only the treating liquid while holding the roll 8 of fabric stationary. Within the hollow shaft 9, the treating liquid is caused to travel upwardly in the direction indicated by the arrow as the rotor 24 is rotated so that the upgoing flow of liquid is discharged outside the hollow shaft 9 through openings 28 formed in the upper portion of this hollow shaft 9. The discharged streams of liquid located externally of the hollow shaft 9 are allowed to pass in the direction indicated by the arrow through the perforations provided in the upper liquid stream-rectifying disk 10 and to run downwardly into the respective spaces *a* provided between the respective turns of the roll 8 of fabric 1 which is wound in spiral fashion. These downgoing streams of liquid, after travelling through the cylindrical portion of the vessel, are caused to pass through the perforations of the lower liquid stream-rectifying disk 11 and through the openings 29 formed in the lower portion of the hollow supporting member 17, to thereby effect circulation of the treating liquid throughout the vessel 2. Let us now assume that the conduits 18 and 19 serve as suction ports and that the conduits 20 and 21 as delivery ports for the treating liquid. By driving the pump 22 to actuate these conduits, the treating liquid is fed from the conduits 20 and 21 — which exert discharging action — into the upper portion of the treating vessel 2. The delivered streams of liquid will then pass also through the perforations formed in the upper liquid stream-rectifying disk 10 as shown by the arrow and they travel downwardly through the spaces *a* provided between the respective adjacent turns of the fabric 1 being treated which is wound in spiral fashion. These divided streams of liquid will then pass through the perforations of the lower liquid stream-rectifying disk 11. Therefrom, the liquid will be sucked into the conduits 18 and 19 and thus, the treating liquid is forced to circulate throughout the vessel 2. The circulation of the treating liquid which is effected by the rotor 24, and the circulation of the liquid effected by means of the pump 22 may be performed either separately or simultaneously. Alternatively, the rotor 24 and the pump 22 may be rotated reversely together to cause the treating liquid to circulate in a direction opposite to that indicated by the aforesaid arrows.

In FIG. 6, the driving of the rotor 24 and the pump 22 may be suspended, or the provision of the rotor 24 and the pump 22 may be omitted, and the roll 8 of fabric alone may be rotated by the motor 26 either inter-

mittenly or continuously in the treating liquid. Or, the direction of rotation of the roll 8 of fabric may be periodically reversed and such rotation in the two alternate directions may be repeated. Instead, the roll 8 of fabric alone may be subjected to repetitive vertical oscillatory movement in the treating liquid by means of an appropriate mechanism. It is needless to say that these types of motion of the roll 8 and the aforesaid manners of circulation of the treating liquid may be combined in any way as desired.

If the object 1 to be treated which is shown in FIG. 1 is a carpet, it is desirable that the spaces a or the distance between the respective adjacent turns of the spiral roll of the carpet be about 100mm, that the diameter of the reel 5 be 3.5-4.0 m, that the rotation speed of the roll 8 of carpet being treated in the liquid in the manner as shown in FIG. 6 be about five revolutions per minute, and that the vertical stroke of oscillation of the roll 8 of carpet be about 100 mm.

It should be understood that the carpets to be treated generally have a breadth b of as large as 5 meters. Therefore, if the roll 8 of fabric is to be placed in the treating vessel 2 or withdrawn therefrom from the open top of the cylindrical treating vessel 2, such loading and unloading operations will be possible if there is a sufficient space or clearance above the vessel to enable these operations to be performed without any obstacle, and accordingly, the use of a very tall building will become necessary. This inconvenience can be eliminated by the use of a treating vessel 2 which is of the type that can be turned sideways from its upright position, and by loading and unloading the roll 8 of fabric into and from the turned treating vessel 2 sideways instead of from the top of the upright vessel, and by conducting a liquid treatment in the vessel 2 in its upright position to which it has been turned back after the roll 8 of fabric was loaded therein sideways.

Description will next be directed to the explanation of an example of reel which is of a type different from the one shown in FIG. 3, by referring to FIGS. 7 and 8.

This reel 5 is provided with a longitudinal hollow shaft 9 having an open bottom. This shaft 9 has an upper disk 10 which is loosely mounted on an upper portion thereof for sliding movement. A lower disk 11 is fixed to the shaft 9 around the bottom thereof. The lower face of the upper disk 10 is provided, secured thereto, with a number of upper arm-like rods 12 radially with respect to said hollow shaft 9. On the other hand, the upper face of the lower disk 11 is provided, secured thereto, with a corresponding number of lower arm-like rods 13 which extend radially relative to the hollow shaft 9. These plurality of rods 12 and 13 extend radially relative to the hollow shaft 9 preferably at uniform diverging intervals between the adjacent rods. Each of the upper arm-like rods 12 and the lower arm-like rods 13 is provided with a desired equal number of spaced anchoring means comprising projections 14 having hooks 6 or bolts-and-nuts or like anchoring means which are intended to anchor the opposite side edge portions of the fabric 1 to be treated so as to securely hold the fabric 1 in position after it is wound in a cylindrical spiral fashion around the reel, maintaining an appropriate space a between the respective adjacent turns. Also, between the aforesaid upper disk 10 and a flange plate 30 which is provided on an upper portion of the vertical shaft 9 above the upper disk 10, there are provided several adjustment rods 31 for effecting

fine adjustment of the distance h between the upper disk 10 and the lower disk 11. These adjustment rods 31 are inserted through slots 33, respectively, which are formed in the upper disk 10. Each of the adjustment rods 31 is of an enlarged square head portion 32 formed at one end thereof to engagingly receive the lower face of the upper disk 10. A nut 34 is screwed onto the other end portion of the adjustment rod 31. By this arrangement, any downward displacement of the upper disk 10 due to the weight of the object 1 to be treated is prevented at the upper face of the flange plate 30. Accordingly, by turning the nut 34 about the adjustment rod 31, it is possible to effect fine adjustment of the distance h between the upper disk 10 and the lower disk 11. Reference numeral 36 in the drawing represents a liquid stream-rectifying perforation.

Description will next be directed to the manner in which a liquid treatment is performed by the use of a reel 5 having the foregoing arrangement.

As a first step, in the manner similar to that for the reel shown in FIG. 3, the broad and lengthy fabric 1 is wound in a cylindrical spiral fashion about the axis 7 of the reel 5 with an appropriate space a left between respective adjacent turns while anchoring the opposite side edge portions 3 and 4 in the direction of the breadth b of the fabric 1 by the anchoring members such as hooks 6 or bolts-and-nuts which are provided on the projections 14 of the reel 5, to thereby form a desired cylindrical spiral roll 8 of fabric as shown in FIG. 7. The formation of this roll 8 may be performed manually. However, the roll 8 of fabric is formed preferably by rotatably supporting the reel 5 sideways on a shaft of a loading unit 27, as shown in FIG. 2. Thereafter, the formed roll 8 of fabric is placed in the treating vessel 2 and the axis 7 of the roll 8 is positioned vertical therein. When the roll 8 of fabric is loaded in the treating vessel in such a way that its axis 7 is held vertical as discussed above, it becomes necessary that the spirally wound object 1 to be treated be straightened or tensioned in the vertical direction, i.e., breadthwise. This can be accomplished by tightening the nuts 34, so that as shown in FIG. 8, the upper disk 10 is lifted upwardly in the direction of the arrow in accordance with the amount of tightening of the nuts 34. Thus, the object 1 to be treated can be tensioned vertically up to the desired extent. After the roll 8 of fabric has thus been placed in the liquid treatment vessel 2, a treatment liquid is charged in the vessel 2. Thereafter, it is only necessary to impart appropriate movements to either one of the treating liquid and the roll 8 of fabric or to both of them to perform a treatment of the roll of fabric with the treating liquid.

As has been discussed, the reel 5 of the type shown in FIGS. 7 and 8 is of the arrangement that the upper disk 10 is loosely mounted on the vertical shaft 9 for slidable movement and that there are provided, between the upper disk 10 and the flange plate 30 provided on an upper portion of the vertical shaft 9 above said upper disk 10, an appropriate number of adjustment rods 31 for effecting fine adjustment of the vertical distance between the upper disk 10 and the lower disk 11. Therefore, the use of such a reel 5 not only permits the distance between the upper and the lower disks 10 and 11 to be adjusted to comply with the breadth b of the object 1 to be treated which is provided in the form of a spiral winding, but also permits such a spirally wound object 1 for treatment to be held

in the state of being tensioned of its breadth b to the desired and accurate extent. Thus, it is possible to perform a treatment of the object 1 with a treating liquid under an extremely desirable condition.

Description will next be made on another example of reel for use in the present invention by referring to FIG. 9.

This reel 5 is of no great difference from the one shown in FIG. 3 with the exceptions that the upper arm-like rods 12 are detachably mounted to the upper disk 10 and that the lower arm-like rods 13 are detachably provided on the lower disk 11. More specifically, the upper disk 10 of the reel 5 shown in FIG. 9 has, at its lower face, a number of paired lugs 37 provided radially relative to the longitudinal shaft 9. The upper arm-like rods 12 are provided on the upper faces thereof with projections 38 each mating with its corresponding pair of lugs 37 of the upper disk 10. Each pair of lugs 37 sandwiches its mating projection 38 therebetween in such a way that the bolt-insertion holes formed in the center of each of the lugs and the projection are aligned. Said upper arm-like rod 12 is detachably but securely fastened to the lower face of the upper disk 10 by fastening means 39 which may be a bolt and a nut. Also, the lower disk 11 has at its upper face a number of paired lugs 40 which are provided radially relative to the longitudinal shaft 9 in the same fashion as those lugs 37 of the upper disk 10. The lower arm-like rod 13 also has at its lower face a corresponding projection 41. This projection 41 is sandwiched between the paired lugs 40 in such a way that the bolt-insertion holes formed in the center of each of the lugs and the projection are aligned. The lower arm-like rod 13 is detachably but securely fastened to the upper face of the lower disk 11 by similar fastening means 42 which may also be a bolt and a nut. Moreover, the upper arm-like rod 12 is provided with a plurality of spaced U-shaped members 44 along the lower face of the rod 12. In the same fashion, the lower arm-like rod 13 is provided with a corresponding number of spaced U-shaped members 44 along the upper face of the rod 13. These U-shaped members 44 of the rods 12 and 13 are intended to provide and keep an appropriate space a between each adjacent turn of the object 1 to be treated, and also to anchor the opposite side edge portions breadthwise so as to maintain the state of this spiral winding of the object 1 by means of hooks 6 or bolts-and-nuts which are provided on seat members 43 which, in turn, are welded to the U-shaped members, respectively. In FIG. 9, reference numeral 36 represents a liquid-stream rectifying perforation.

The treatment, with a liquid, of a broad and lengthy fabric 1 by the use of a reel 5 having the foregoing arrangement is performed generally in the same manner as that discussed in connection with FIG. 3. However, as stated previously, when a roll of fabric is formed by winding a broad and lengthy fabric 1 in spiral fashion around the axis of the reel 5 leaving an appropriate space a between respective turns of winding while anchoring the opposite side edge portions 3 and 4 of the breadth b of said fabric by the use of anchoring means, such as hooks 6 or bolts-and-nuts, which are provided on the reel 5, there arises the necessity of increasing or decreasing the space a between the respective turns of the spiral winding of fabric, depending on such factors as the surface configuration and the thickness t of the fabric to be treated and the purpose of the liquid treat-

ment. If the space a is too narrow, it will be impossible to perform a satisfactory and sufficient liquid treatment, whereas if the space a is conversely too broad it will mean that the spiral roll of fabric has a reduced number of turns, which in turn will give rise to an undesirably increased bath to fabric ratio leading to an increase in cost. Such an excessively small or large space a between adjacent turns of a spiral roll of fabric, in dyeing operation in particular, can bring about a poor dyeing efficiency depending on the type of the dyes used, so that there can even arise unexpected changes in color of the dyed fabrics. Such inconveniences can be avoided by the adoption of the following procedure. It should be remembered that both the upper arm-like rods 12 and the lower arm-like rods 13 are detachably secured, by means of for example bolts-and-nuts 39 and 42, to the upper disk 10 and the lower disk 11, respectively. Therefore, it is only necessary - when a reel 5 is used - to select a set of upper arm-like rods 12 and lower arm-like rods 13 which will give a desired space a for the respective turns of a spiral roll of fabric from among the stock of a series of sets of rods 12 and 13 having different distances of spaces a between the anchoring means provided thereon.

According to the present invention, a long and broad fabric is formed into a cylindrical spiral roll by winding it about the axis of a reel while anchoring the opposite side edge portions of the fabric to the anchoring means provided on the reel. Therefore, in spite of the fact that the object to be treated is of considerable breadth and length, the roll can be formed into a substantially compact size. Thus, the roll of fabric will occupy only a small floor area and furthermore it is convenient for handling. Since this compact roll of fabric is subjected to treatment with liquid in a cylindrical treating vessel, the operation is simple and easy accordingly. Because the object to be treated is anchored to the reel via anchoring means provided on the arm-like rods of the reel at breadthwise opposite side edge portions thereof, this object being treated will not come off the reel spontaneously. Moreover, the direction of circulation of the treating liquid and the direction of motion of the roll of fabric may be reversed as desired. As stated, the object to be treated is wound in cylindrical spiral fashion with an appropriate space provided between respective adjacent turns thereof. Thus, the treating liquid is allowed to flow smoothly through these spaces without any appreciable difficulty. Therefore, even in case the object to be treated is of the nature that does not allow the treating liquid to pass easily therethrough, it can be treated uniformly by the liquid throughout the entire portions thereof with no difficulty. Furthermore, the aforesaid roll is received in the treating vessel to be subjected to treatment by a liquid in such a way that its axis is positioned vertical. Therefore, together with the fact that this object to be treated is anchored to the reel at the opposite side edge portions breadthwise thereof, the object being treated will never be subjected to any ill effect even when the gravity of the treating liquid acts thereupon, so that there will occur no less of feel, nor will there develop any bit of entanglement, clustering and bending of the pile of the material.

I claim:

1. Apparatus for treating by liquid a broad cloth-like fabric, comprising:
 - a generally cylindrical vessel having a substantially vertical axis;

a reel removably generally coaxially mounted in the vessel;

said reel including a tubular longitudinal shaft extending between two axially spaced radial flange means each having a side which faces the respective other one of the two flange means; securement means positioned on the two facing sides of the flange means for gripping opposite side edges of the fabric to be treated when the fabric to be treated is convolute wound with radial spacing between each adjacent turn, along substantially the full length of the fabric and for maintaining said fabric in such disposition on the reel; said flange means radially extending to circumferential adjacency with the vessel; means defining a plurality of openings through each of the two flange means, distributed broadly throughout the radial and angular extent thereof; means defining a first conduit within the vessel communicating between the throughbore of the tubular shaft and the upper side of the upper flange means; and means defining a second conduit within the vessel communicating between the throughbore and the lower side of the lower flange means;

and pump means operatively incorporated in the liquid circuit which proceeds through the shaft, out one of the conduit means, through one of the flange means to where the fabric is disposed between the two flange means, through the other one of the flange means, and into the shaft through the other one of the conduit means, for circulating the treating liquid about said circuit.

2. The apparatus of claim 1 wherein the pump is disposed within the throughbore of the shaft means and said pump includes reversible driving means whereby the liquid may be reversibly circulated about said circuit.

3. An apparatus according to claim 1, in which said apparatus is provided with driving means for imparting motion to said reel received within said treating vessel when the latter contains said treating liquid therein.

4. An apparatus according to claim 1, in which said treating vessel is provided at the inner bottom portion with heating means for heating said treating liquid contained in said vessel.

5. An apparatus for treating by liquid a broad and lengthy cloth-like fabric, comprising:

a reel having a plurality of upper arm-like rods and lower arm-like rods extending radially from upper

and lower portions of a longitudinal shaft of said reel, respectively, said upper and lower arm-like rods each being provided with a plurality of anchoring means for anchoring the opposite end edge portions breadthwise of said fabric with an appropriate space provided between respective adjacent turns when said fabric is wound around the axis of said shaft in the form of a cylindrical spiral roll of fabric; and

a treating vessel for containing therein said treating liquid and for being able to receive said reel in such a way that the axis of said roll of fabric is positioned vertical;

said upper arm-like rods being secured to the lower face of an upper disk loosely mounted on said shaft of the reel for sliding movement,

said lower arm-like rods being secured to the upper face of a lower disk secured to the shaft of the reel, and

a plurality of adjustment rods being provided between said upper disk and a flange plate mounted on said shaft above said upper disk for effecting fine adjustment of the distance between the upper disk and the lower disk.

6. An apparatus for treating by liquid a broad and lengthy cloth-like fabric, comprising:

a reel having a plurality of upper arm-like rods and lower arm-like rods extending radially from upper and lower portions of a longitudinal shaft of said reel, respectively, said upper and lower arm-like rods each being provided with a plurality of anchoring means for anchoring the opposite end edge portions breadthwise of said fabric with an appropriate space provided between respective adjacent turns when said fabric is wound around the axis of said shaft in the form of a cylindrical spiral roll of fabric; and

a treating vessel for containing therein said treating liquid and for being able to receive said reel in such a way that the axis of said roll of fabric is positioned vertical;

said apparatus having an upper disk and a lower disk both of which are secured to the shaft of the reel, said upper arm-like rods being detachably fastened to the lower face of said upper disk, and said lower arm-like rods being detachably fastened to the upper face of said lower disk.

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