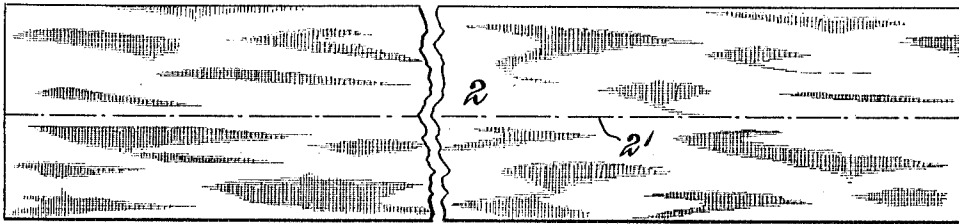


H. C. BROOK.  
METHOD OF DYEING.  
APPLICATION FILED SEPT. 30, 1913.

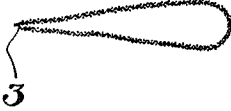
1,096,997.

Patented May 19, 1914.

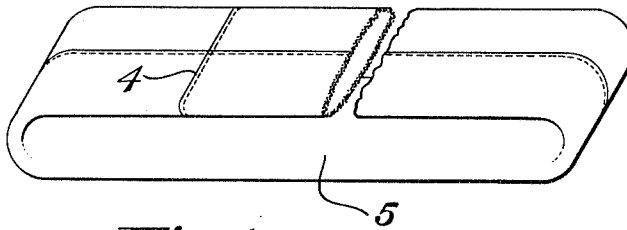
*Fig. 1.*



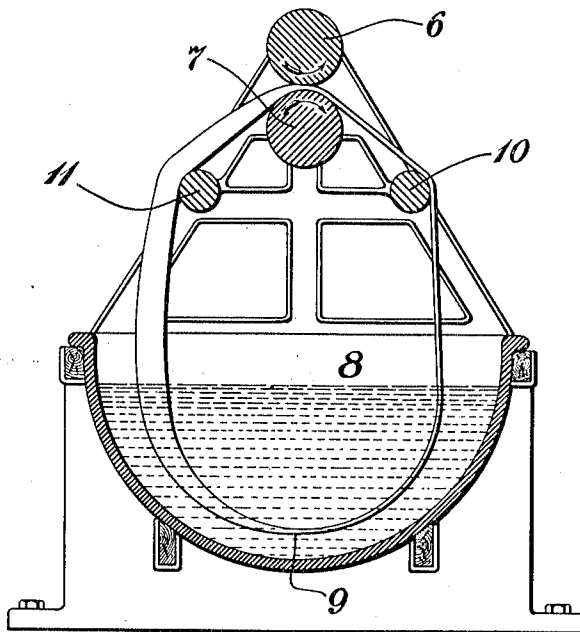
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Witnesses:*

*G. A. Hamm.*

*S. D. Lappen.*

*Inventor:*

*H. C. Brook*

*By his Attorneys,*

*Sutherland Hudson*

# UNITED STATES PATENT OFFICE.

HARRY C. BROOK, OF HARTFORD, CONNECTICUT.

## METHOD OF DYEING.

1,096,997.

Specification of Letters Patent.

Patented May 19, 1914.

Application filed September 30, 1913. Serial No. 792,603.

*To all whom it may concern:*

Be it known that I, HARRY C. BROOK, a subject of the King of Great Britain, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Methods of Dyeing, of which the following is a specification.

This invention relates to a method of dyeing. By my method I find that I can dye fabrics without "shading."

In the drawings accompanying and forming part of the present specification I have shown certain apparatus which I may for convenience employ in carrying my method into effect. Where apparatus is required in this respect it may, however, be radically and decidedly different from that illustrated in said drawings.

Referring to said drawings: Figure 1 is a view of a piece of fabric showing by dotted lines, a line of fold. Fig. 2 is a cross section of the fabric formed into a tube. Fig. 3 is a perspective view of an endless tube of fabric. Fig. 4 is a sectional view of a dye-tank and certain adjunctive devices, showing also the tubular fabric in position for dyeing.

The customary proceeding at the present time, in dyeing fabric in the piece, consists in suspending the same from a skeleton reel located above a tank or vat which contains the dye liquor, the ends of the fabric being connected to each other to make it practically in the form of a belt or an endless or circuit-like piece. By the rotation of the reel, the fabric which is immersed in the dye liquor, is given a movement and as it is thus operated, it moves through the dye liquor. Owing to the manner in which the fabric is suspended and advanced it wrinkles and creases on itself at times between the side edges thereof, the consequence being that when the wrinkling or creasing is present, the dye liquor cannot uniformly penetrate the fabric, the result being uneven incorporation of the dye which causes the shading to which I have already alluded. Shaded pieces are inferior to those which are uniformly and evenly dyed, and as a consequence bring a much lower price in the market; in fact in the textile art such pieces are generally considered as "seconds." By my method I have found by practice, that under all conditions I can uniformly impregnate the fabric with the dye liquor and

thus avoid these shaded effects. The elemental consideration in my method is the smoothing of the same, for instance by subjecting it to tension preferably while under the action of the dye liquor, and this irrespective of the manner in which the two are associated, although I get the best results by immersing the fabric in the dye substance of whatever nature the same may be. By tensioning the fabric when below the level of the dye liquor, I prevent the formation of wrinkles therein, by virtue of which the fabric can be uniformly dyed. The tensioning of the fabric can be secured in various manners, unless otherwise expressed by my claims.

The invention as to one of its broader aspects therefore resides in the steps of smoothing the fabric and then while smoothed subjecting it to the action of the dye substance. The tension when utilized for smoothing need not necessarily be extreme or excessive, but should be sufficient to remove any wrinkles, creases or folds that may be in the fabric to insure the uniform penetration of the latter by the dye liquor. At this point I might mention an action which I have found in practice to be quite satisfactory. Initially I take the material in the piece, double it on itself transversely into two approximately equal folds or plies, these plies being then stitched or otherwise suitably connected together, for instance by cementing, along their selvage or side edges, the article when thus folded and secured being in the form of a tube. The ends of this tube are connected together to produce a tubular belt which is advanced while the lower portion of the belt-like tubular fabric is immersed in the dye liquor. As the fabric is moved forward it is, while in the dye liquor expanded by entrapped air therein. I call this particular action "ballooning" of the tube. As I intimate the fabric is opened out or ballooned while in the liquor, so that its plies are smoothed to an extent sufficient to remove all wrinkles and practically flatten down the material. As the fabric emerges from the liquor the air is retained therein up to the point where it is acted on by expressing means which acts to expel the air from the tube and to also squeeze out the excess dye liquor.

It should be noted that when the fabric is subjected to the action of the dye liquor it is in a "free" condition by which I mean

that there is nothing to restrain its movement at this particular time nor anything to obstruct the ready flow of the dye liquor into all the interstices of the fabric which might not be the case were the fabric to pass over a submerged guide roller or over and in contact with a member having a jetting orifice or orifices. This free condition of the fabric is important and advantageous, although not necessary in every case, but I have secured the best results through such relation.

Referring to the drawings the numeral 2 (Fig. 1) represents the fabric in the piece or as it comes from the loom. This fabric is doubled or folded on itself transversely throughout its complete length along the longitudinal center line 2' to bring it into the condition shown in Fig. 2. The selvage edge portions are then stitched together as at 3 (Fig. 2) to produce a tube. The ends of this tube are then brought and secured together by stitching or otherwise as at 4 to produce the endless belt 5 of Fig. 3. This endless belt of fabric is then received between the complementary expressing rollers 6 and 7, the direction of rotation of movement of which is denoted by arrows thereon. As the two rollers rotate they feed or advance the endless tubular fabric in the direction indicated by the arrow applied thereon, the fabric in its movement entering and then leaving the dye liquor in the tank 8. I find that the piece starts ballooning or expanding at about the point 9 and remains in this relation up to the height of the rollers 6 and 7 which expel the air from the tube and also express the excess dye liquor from the piece, such liquor falling into the tank. The fabric while in the dye liquor as already observed, is wholly free, there being nothing to affect in any wise its free expansion or opening, the consequence being that it is so smoothed that the dye liquor can readily and easily penetrate every portion thereof. The tubular fabric may pass over guide rollers 10 and 11.

What I claim is:

1. A method of dyeing fabric in the piece, which comprises the step of smoothing the fabric while the same is free, and subjecting the free, smoothed fabric to the action of dye material.

2. A method of dyeing fabric in the piece

which comprises the step of subjection of the fabric to tension in a free condition, and while under tension bringing it under the action of a dye material.

3. A method of dyeing comprising the formation of fabric into a tube, and ballooning the tube while under the action of dye material.

4. A method of dyeing fabric in the piece which comprises the steps of immersing the fabric in dye liquor while in a free condition, and smoothing out the fabric while in such free condition and below the level of the dye liquor.

5. A method of dyeing fabric in the piece which comprises the steps of forming the fabric into a tube and passing it in tubular form through dye liquor.

6. A method of dyeing fabric in the piece which comprises the following: transversely doubling the fabric on itself, connecting the selvage edges of the fabric to each other to form a tube, and then passing the tube through dye liquor.

7. A method of dyeing fabric in the piece which comprises the following: doubling the fabric on itself transversely, connecting together the selvage edges of the fabric to form a tube, forming the tube into an endless tube, and then moving said endless tube through a body of dye liquor.

8. A method of dyeing fabric in the piece which comprises forming the fabric into an endless tube, suspending said endless tube of fabric with its lower portion in dye liquor, passing the fabric through expressing rollers located above the dye liquor and giving to the tube a motion to carry all parts of the same through the dye liquor.

9. A method of dyeing comprising the formation of fabric into a tube, and ballooning the tube pneumatically while under the action of dye material.

10. A method of dyeing fabric in tubular formation comprising opening out the tubular fabric while under the action of dye material.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY C. BROOK.

Witnesses:

AMY K. BROOK,  
JAMES BROOK.