Nov. 2, 1937. B. C. GIBBS 2,097,592

DYE JIG

Filed Feb. 14, 1935

Fig. 1.

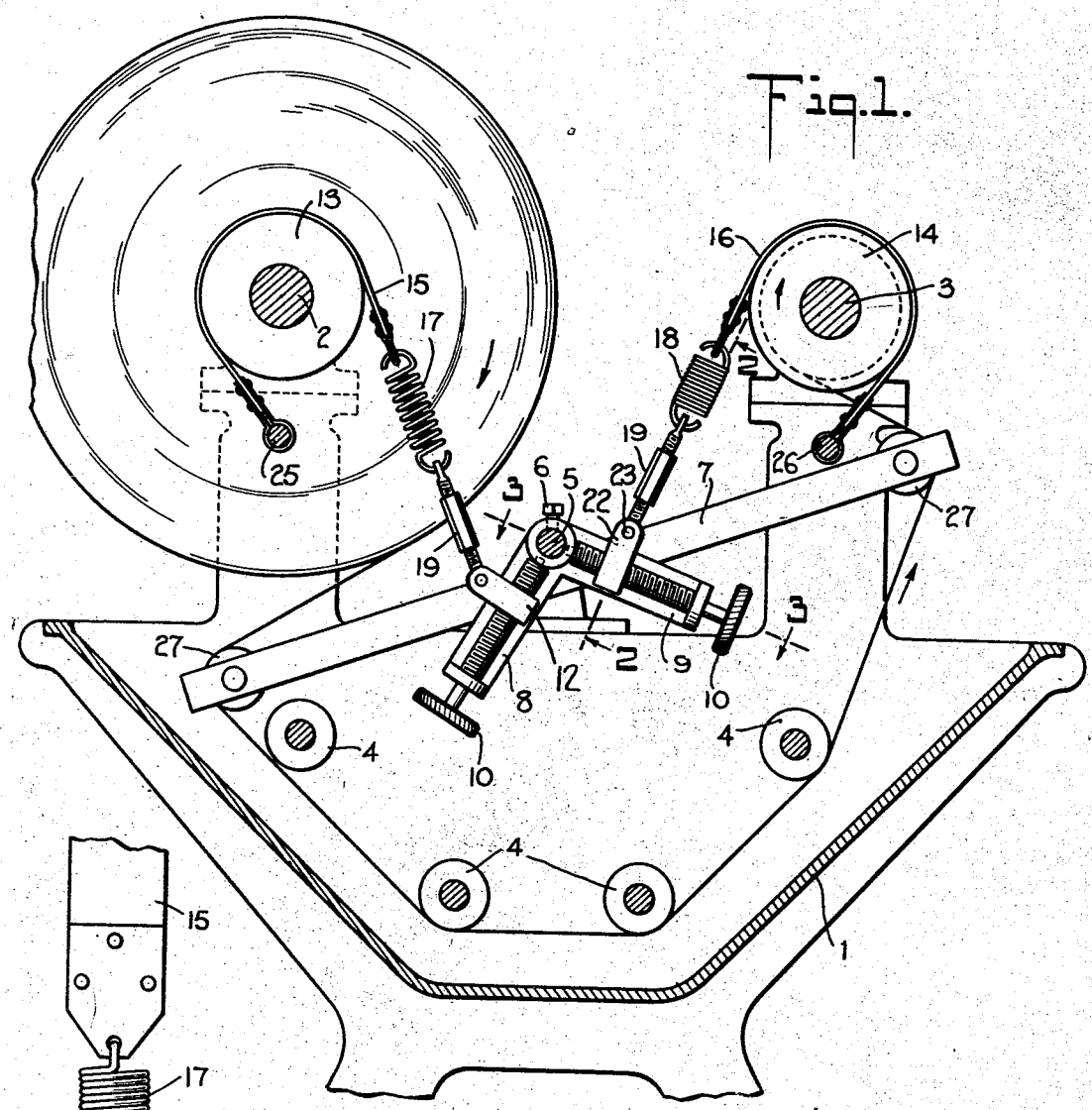


Fig. 2.

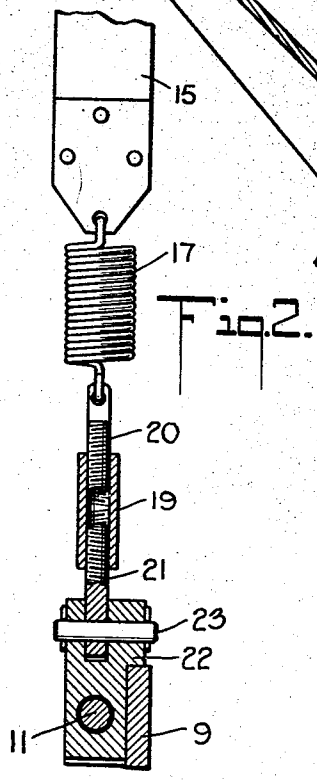
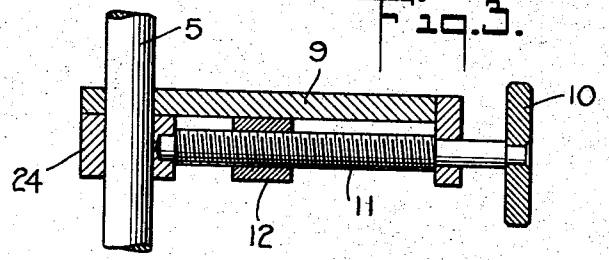


Fig. 3.



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UNITED STATES PATENT OFFICE

2,097,592

DYE JIG

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Application February 14, 1935, Serial No. 6,419

2 Claims. (Cl. 242—75)

This invention relates to a method of dyeing materials containing thermoplastic filaments or fibers and to a device for performing the method wherein the fabric or textile material is under uniform tension throughout its length.

An object of the invention is the economic and expeditious dyeing or otherwise treating of thermoplastic textile materials in warm or hot liquid baths. Another object of the invention is the construction of a device which makes uniform treatment of textile materials more automatic and uniform. Other objects of the invention will appear from the following detailed description.

In the drawing, wherein like reference numerals refer to like or similar elements, there is shown a device that forms a part of this invention. In the drawing

Fig. 1 is a side elevation, in section, of a dye jig constructed according to this invention.

Fig. 2 is an enlarged view of a section of the device taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged view of a section of the device taken on the line 3—3 of Fig. 1.

In the treatment of fabrics containing thermoplastic materials or materials that are plasticized by certain treating liquids a moiré effect is produced which is not always desirable. This is due to unequal tension upon the fabric. By employing this invention fabrics may be washed, scoured, dyed and otherwise treated without developing a moiré effect therein.

In accordance with my invention, I maintain an even tension on textile materials while they are being treated in a liquid. Further, in accordance with my invention, I construct a device that is labor saving and which maintains automatically an even tension upon the textile materials treated in a bath.

This invention is applicable to the treatment of any kind of textile material which is woven, knitted or knotted into a fabric like material. It is, however, particularly applicable to textile materails which contains yarns that are placticized, softened or otherwise made more susceptible to stretching and elongation in the presence of liquids and/or heated treating baths. Thus, the invention is particularly applicable to fabrics containing organic derivatives of cellulose such as the organic esters of cellulose and the cellulose ethers. Examples of organic esters of cellulose are cellulose acetate, cellulose formate, cellulose propionate and cellulose butyrate, while examples of cellulose ethers are methyl cellulose, ethyl cellulose and benzyl cellulose.

It is not necessary that the fabric being treated be made entirely of yarns or filaments containing the type of material described above, but they may be mixtures of such yarns and filaments and other yarns and filaments which are little affected by heated treating baths. For instance, fabrics which may be beneficially processed by this invention are those which contain fibers and filaments of an organic derivative of cellulose mixed with fibers or filaments of other materials such as cotton, wool, silk, etc. Either the yarns themselves may be formed of fibers of different materials or yarns or filaments or fibers of organic derivatives of cellulose may be woven with or otherwise processed with yarns containing fibers and filaments of other materials. Thus, yarns of organic derivatives of cellulose may be alternated with yarns of cotton or wool in either the warp or the weft or both in the formation of woven fabrics.

The primary object of the invention is the treatment of such materials in a liquid or heated liquid bath while an even tension is maintained upon the fabric, as it is being treated, throughout its full length, thereby preventing moiré effects from being built up due to uneven tension and also avoiding uneven stretching of various sections of the material. The differential of tension which is necessary as the fabric is being processed is made automatic by this invention, the tension being responsive to the pull of the fabric and regulated thereby.

As an aid in visualizing this invention, the same will be described with reference to the accompanying drawing wherein a device for carrying out this invention, and itself forming a part of this invention, is shown. In the drawing 1 is a conventional type of container used in connection with a dye jig. The container 1 may be provided with uprights for supporting a shaft 2 on one side and a shaft 3 on the other side of the container. A plurality of guide rolls 4 may be positioned in the container for guiding the material through the container such that it will be submerged and evenly treated by the liquids contained therein. Further, uprights may be provided on the container 1 midway between the shafts 2 and 3 for supporting in a rotatable manner a shaft 5.

A spacer bar 7 may be non-rotatably fastened to the shaft 5 such that upon rotation of the bar 7 a corresponding rotation of the shaft 5 is produced. There may be adjustably mounted upon the shaft 5, at one or both ends of the dye jig, a bell crank lever which may be held in fixed po-

sition on the shaft 5 by means of a set screw 6. The bell crank lever may be formed of two arms 8 and 9 substantially at right angles to each other, which arms are substantially similar in proportion and construction and, therefore, a description of one arm only will be given.

The arm 9 may be positively fastened to a header 24 adapted to act as a bearing for the same on the shaft 5. The opposite end of the arm 9 may be turned at right angles to the main portion thereof and have a hole made therein which acts as a bearing for a shaft 11. The shaft 11 may be threaded throughout a substantial part of its length and have one end adapted to be journaled in the header 24 and a part of the other end adapted to be journaled in the end piece of the arm 9. The shaft 11 may be rotated by hand wheel 10. Adapted to ride on the arm 9 and be positioned by rotation of the threaded section of the shaft 11 is a block 12.

On the shaft 2 there may be provided a brake drum 13 of any conventional type, while on the shaft 3 there may be provided a similar brake drum 14. About the drum 13 there may be provided a brake band 15 while around the brake drum 14 there may be provided a brake band 16. The brake band 15 may be operatively connected to a block, similar to block 12, mounted on arm 8 through a spring 17 and a turn buckle 19, while brake band 16 may be operatively connected to the block 12 on the arm 9 through a spring 18 and a turn buckle 19. The turn buckle 19 may be formed of a threaded member 20 and a threaded member 21 having threads of opposite direction, which thread members are relatively movable by means of a coupling member adapted to be manually rotated, as is well understood in the art and shown in Fig. 2. The block 12 may have an extended portion 22 having a slot therein adapted to receive a flattened portion of the threaded member 21, which threaded member is held in communication therewith by means of a pin 23.

The band 15 may be held in position by a pin 25 connected to the main frame, or the upright of the main frame, while the band 16 may be held in position by a similar pin 26 also connected to the main frame or the other upright of the main frame. Mounted on the rotating arm 7 may be guide rollers 27 for reducing the friction of the textile material passing over same.

The shafts 2 and 3 may be rotated by any suitable means, for instance, by hand, or by being geared to a source of power such as an electric motor.

In operation, when a roll of fabric is being dyed on a jig the cloth passes from jig roll on shaft 2, for instance, over the guide roller 27 attached to the arm 7 through the bath over the opposite guide roller 27 and on to the other jig roll on shaft 3. The guide rollers 27 being mounted on the bar 7 which is pivoted at its center, naturally follow a certain path with respect to the pivot point, the amount of travel depending on the size of the rolls of the fabric. The brake is designed so that a maximum of tension is on the brake drum on the side which contains the full roll and a minimum of tension on the empty roll. As shown on the drawing, the roll on shaft 2 has a maximum tension and the roll on shaft 3 has a minimum tension.

Referring more particularly to the drawing, it will be seen that as the fabric on the roll on shaft 2 is being transferred to the roll on shaft 3 the spring 17 loses its tension in direct proportion to the size of the roll until it reaches the point where the roll is empty, at which time the spring is entirely released and has no braking power. In the meantime the spring 18 increases its tension from zero up to the maximum as the size of the roll increases. The braking power on this side, however, only increases slightly due to the rotation of the drum against the action of the spring. The full braking power due to the spring tension is not exerted until the rotation is reversed, at which time the brake acts as a snub, being fixed at one end and having a spring on its other.

The amount of tension may be adjusted by changing the position of turnbuckles 19 and blocks 12. In order that the tension on spring 17 is always released when roll is empty, it is necessary that bell crank lever be made such that arms 8 and 9 are substantially at right angles and are mounted in non-rotatable relation on the shaft 5 and at the proper angle thereto, which may be determined in the field when assembling by trial.

When employing the device shown in the drawing, a ready adjustment may be made in order to make the device suitable for the treatment of any type of material. After the tension required by different qualities of fabric is determined, for instance, by trial, the turnbuckles and bell crank lever may be graduated or marked so that the same tension may always be used on fabrics of the same quality, thus enabling the production of more uniform pieces of fabric.

It is to be understood that the foregoing detailed description and drawing are given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. In a device for treating fabrics wherein the fabric during treatment is unwound from one roll and wound upon another roll, a combination with a brake operatively connected to each of said rolls, of a shaft, a member on said shaft, operable by an unrolled portion of the fabric, adapted to decrease the braking action on one roll and simultaneously to increase the braking action on the other roll, and means on said shaft and movable with said member for initially adjusting the tension exerted on said rolls by said brakes.

2. In a device for treating fabrics wherein the fabric during treatment is unwound from one roll and wound upon another roll, a combination with a brake operatively connected to each of said rolls, of a member, operable by an unrolled portion of the fabric, adapted to decrease the braking action on one roll and simultaneously to increase the braking action on the other roll and means for initially adjusting the tension exerted on said rolls by said brakes, said tension adjusting means including a bell crank lever having a screw-threaded shaft on each arm thereof, a block adapted to move along each of said shafts and means connecting said blocks to said brakes.

BRADFORD C. GIBBS.

CERTIFICATE OF CORRECTION.

Patent No. 2,097,592. November 2, 1937.

BRADFORD C. GIBBS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 42, after "knitted" insert the comma and word ", netted"; line 43-44, for "materails" read materials; line 44, for "placticized" read plasticized; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of December, A. D. 1937.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.