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H. B. NIELSEN

3,443,880

JIGGER

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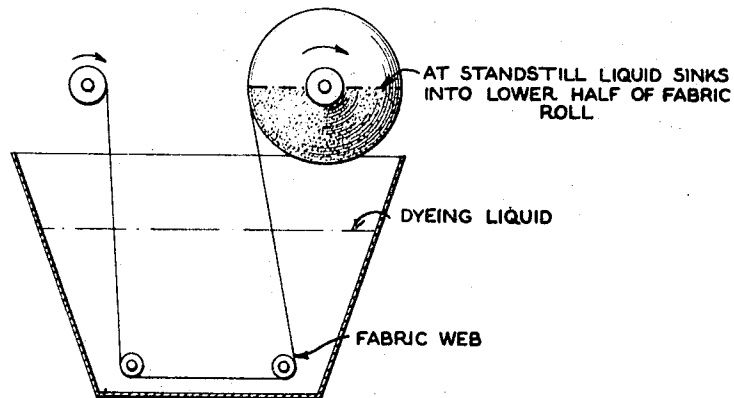


FIG. 1
PRIOR ART

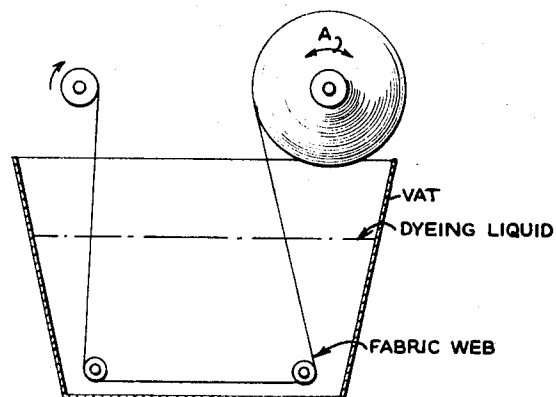


FIG. 2

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JIGGER

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U.S. Cl. 8—150

2 Claims

ABSTRACT OF THE DISCLOSURE

A jigger for the treatment of fabric webs in which the web is passed through a liquid in a vat by being alternately wound and unwound on two main rollers. An oscillating, pendulous movement is produced on the roller on which the web is being wound, at periodic intervals corresponding to at least one revolution of the slower rotating roller. The frequency of the oscillating movement is increased when the material on the winding roller reaches a prescribed amount, while the speed of revolution of the winding roller is decreased.

The present invention relates to a jigger, i.e., a dyeing machine of the kind used for dyeing or other liquid treatment of fabric webs in lengths of, for example, 100–4000 m.

The jigger is of the kind having a vat containing a dyeing or other liquid for treatment, through which a fabric web is passed, and two main rollers on which the web is alternately wound and unwound, the rollers being driven by a motor with an automatic reversing mechanism in such manner that the rotation is reversed whenever the web on one of the rollers has been unwound.

The fabric web treated on a jigger passes many times from one roller to the other, but this operation has to be interrupted repeatedly, often for several minutes, for example for adding dyes and chemicals to the liquid in the vat, and this involves difficulties when the machine is to be re-started because the liquid, e.g. the colored liquor, owing to gravity sinks into the lower half of the wound fabric web, whereby the said roll of material becomes eccentric and very heavy on one side, resulting in widely uneven tensions in the material and correspondingly varying actions on the motor. This may involve mechanical damage to, or non-uniform dyeing of the fabric.

This difficulty has been particularly increasing in recent years after the introduction of fully synthetic materials and synthetic elastic materials which require a substantially more careful treatment than part-synthetic materials and cotton materials and which cannot stand up to the additional tension produced if the jigger is driven with webs of material excessively heavy on one side on the rollers. Hitherto, attempts have been made to remedy this difficulty by reducing the length of the webs treated by means of jiggers so as to obtain rolls of smaller diameter. This, however, amounts to an uneconomical use of the jigger and non-efficient production.

It has now been found that the aforesaid difficulties are avoided if, according to the invention, the automatic reversing mechanism of the jigger is so adapted that at any desired stage of the passage of the web between the rollers the said mechanism may be adjusted to cause automatic reversal at brief intervals of time at least one revolution of the slower rotating roller. When this form of reversal is used in the extreme positions in which all the material is wound on one of the rollers of the jigger, the jigger will perform a pendulating movement instead of being stationary. This will prevent the liquid contained

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in the web roll from sinking into the lower part and thereby to become inordinately heavy on one side.

By being adjustable to perform a pendulating movement, the jigger according to the invention may also partly relieve the general disadvantage of jiggers in that they are unable to treat any point of a web of fabric quite uniformly since a point at the middle of the web is immersed in the liquid of the vat once during each passage at equal intervals of time between the immersions, while points at the ends of the web are immersed in the liquid twice during each two passages, there being, every second time, a long interval of time between the immersions and every second time a brief interval of time. With certain materials it is easier to obtain a uniform shade of color throughout the length of the web by utilizing the jigger according to the invention in such manner that it is adjusted to pendulate for a definite interval of time at each passage of the web. The same may be the case if the whole treatment of the material by means of the jigger is automated with the consequent lack of the possibility of manual intervention at times when heating or addition of chemicals is taking place.

The reversal is to take place after at least one revolution of the roller since it has been found that an apparently sufficient reversal after each half revolution of the roller fails to give the desired result. On the other hand, reversal after more than one revolution of the roller affords no additional advantages, and the reversing mechanism according to the invention is therefore adapted to effect reversal at each revolution of the slower roller.

A pendulation of only one revolution of the roller, that is, with only the minimum length of the web being unwound and wound during the pendulation, is also advantageous for another reason, more particularly if a sample is to be cut from the material during the pendulation.

The slower roller is that on which the greater amount of material has been wound, which, in the case of a full passage of the web, means the roller with the wound material. Since it is chiefly in the extreme positions, in which the whole fabric web has been wound on one of the rollers, that it is necessary to avoid rolls heavy on one side, the reversing mechanism is adapted in such manner that it may be switched to a more frequent reversal after a roll has been wound with a specified length of material as detected by means of a passage counter.

Another requirement, however, is to avoid rolls of fabric heavy on one side in positions other than extreme positions, for example when a sample of the web is to be cut. The reversing mechanism is, therefore, also adapted in such manner that it may be switched manually to frequent reversal, at any stage whatever, of the passage of the web between the rollers.

According to the invention use is preferably made of a two-speed motor controlled by the reversing mechanism in such manner that it is switched to its slow speed simultaneously with the reversing mechanism being changed from normal reversal to frequent reversal. Any excessive heat development in the motor during the pendulation of the jigger is thereby avoided, and at the same time it becomes easier to cut a sample from the moving web.

While the reversing mechanism, on reversing at normal frequency, is activated by end stops provided on the two rollers of the jigger, it may, when performing frequent reversals, be controlled in many different ways, of which the simplest is control of the rollers, for example by a means operating in connection with the rollers and switching the mechanism for each revolution of the rollers.

The reversing mechanism may also be controlled by the web whereby the passage of a definite length of the web in one direction or the other activates the reversing mechanism.

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According to the invention the reversing mechanism is, however, preferably controlled by time, for example in such manner that at each switching of the mechanism to frequent reversal a timing member is activated which after a desired interval of time causes the web to reverse its direction of movement. To be true, the jigger will hereby be adapted in such manner that only in case of a certain material in a certain position, it reverses exactly at each full revolution of the roller, while in all other cases it reverses after more than one revolution of the roller. However, this does not reduce the effect of the frequent reversal in regard to avoiding rollers that are heavy on one side, and at the same time it becomes possible to use an electric relay as a timing member so that the entire operation and control of the jigger is electrical.

In FIG. 1 of the accompanying drawing there is illustrated schematically the disadvantage of known jiggers in that the liquid will settle down by gravity into the lower half of the wound wet web when the roller onto which it is wound remains stationary. FIG. 2 illustrates the result which is achieved by the invention as indicated by the arrow A representing the pendulating movement of the wound web.

What I claim and desire to secure by Letters Patent:

1. In a jigger for the treatment of fabric webs in which

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a fabric web is passed through a liquid in a vat by being alternately wound and unwound on two main rollers, an improvement comprising the steps of: producing an oscillating, pendulous movement of the roller on which the fabric web is being wound at periodic intervals corresponding to at least one revolution of the slower rotating roller, varying the frequency of the oscillating movements to produce more frequent oscillation when the material on the winding roller has reached a prescribed amount, and decreasing the speed of revolution of the rollers when the frequency of oscillation is increased.

2. The method of claim 1 wherein said varying of the frequency of the oscillations is effected timewise.

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WILLIAM I. PRICE, *Primary Examiner*.

U.S. Cl. X.R.

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