The air-flow dyeing machine utilizes a blower to produce high-pressure jet steam to mix and atomize dyes pumped to a nozzle so that a fabric runs through the nozzle is dyed. The jet steam also helps moving the fabric through a dying channel. The fabric then falls on a transmission device to cycle the fabric through the dyeing process. The present invention provides significantly reduced consumption of water, power, steam, and agent.
AIR-FLOW DYEING MACHINE

BACKGROUND OF THE INVENTION

(a) Technical Field of the Invention

The present invention is generally related to fabric dyeing machines, and more particular to an air-flow dyeing machine capable of preventing fabrics from having creases during the dyeing process.

(b) Description of the Prior Art

A conventional air-flow dyeing machine contains components such as nozzle, dyeing channel, guiding pulley, blower, dye pump, heat exchanger, filter, etc. A fabric is placed inside the machine body. The blower pressurizes the air inside the machine into jet steam so as to drive the fabric to move. The dyeing channel provides a passage for the fabric to cycle through so that the fabric is contracted and sprayed with dyes. The guiding pulley helps the fabric to cycle inside the machine body. The dye pump pressurizes the dyes into the heat exchanger to heat up or cool down. The dyes are then atomized by mixing with the jet stream, and sprayed by the nozzle on the fabric.

Compared to liquid-flow dyeing machines which drive the fabric to cycle by dyeing agent and guiding pulley, air-flow dyeing machines drive the fabric to cycle by air and guiding pulley. The former has a larger dye pump whereas the latter has an additional blower. The air-flow dyeing machines have the advantages of significantly reduced water usage and therefore agent usage.

However, the air-flow dyeing machines require high-volume and high-pressure air-flow, and the blower therefore consumes much more power than the power consumed by the liquid-flow dyeing machines’ agent pump. As such, despite the reduced water usage, air-flow dyeing machines fail to achieve true environmental friendliness and reduced production cost. In addition, to facilitate fabric’s cycling, the air-flow dyeing machine bodies are usually designed to have a U-like, circular, or short tubular shape. The fabric therefore is often compressed together and creases are produced.

SUMMARY OF THE INVENTION

A major objective of the present invention is to provide an air-flow dyeing machine which, in addition to having a transmission device to move the fabric, utilizes a blower to produce high-pressure jet steam to mix and atomize dyes pumped to a nozzle so that the atomized dyes can easily permeate into a fabric runs through the nozzle. The jet steam also helps moving the fabric through a dyeing channel. The fabric then falls on a transmission device to cycle the fabric through the dyeing process. The air-flow dyeing machine provides significantly reduced consumption of water and power. The fabric cycled by the transmission device is prevented from having creases due to compression during the dyeing process. The production quantity and efficiency are both enhanced.

The air-flow dyeing machine comprises a machine body, a blower, a pump, and a heat exchanger. The machine body comprises a nozzle, a dyeing channel, a post guiding device, and a transmission device. The nozzle is connected to the blower via a high-pressure tube so that a high-pressure jet steam is delivered to the nozzle. The jet steam mixes with and atomizes dyes delivered to the nozzle by the pump. The atomized dyes are sprayed on the fabric running through the nozzle. The jet steam helps moving the fabric through the dyeing channel, and the fabric then falls on the transmission device and cycles back to the dyeing channel. The machine body has a long tubular shape so that the fabric is prevented from compression and as such creases.

Preferably, the transmission device is configured inside the machine body, and there can be one or more transmission devices. The transmission device moves the fabric to cycle through the nozzle and the dyeing channel. The power of the jet stream can be effectively reduced as well. In other words, using both the transmission device and the high-pressure air-flow as driving source has more environmental friendliness, enhanced production, and reduced cost.

Furthermore, using transmission device to move the fabric prevents the fabric from compression and creases.

The foregoing objectives and summary provide only a brief introduction to the present invention. To fully appreciate these and other objects of the present invention as well as the invention itself, all of which will become apparent to those skilled in the art, the following detailed description of the invention and the claims should be read in conjunction with the accompanying drawings. Throughout the specification and drawings identical reference numerals refer to identical or similar parts.

Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram showing an air-flow dyeing machine according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following descriptions are exemplary embodiments only, and are not intended to limit the scope, applicability or configuration of the invention in any way. Rather, the following description provides a convenient illustration for implementing exemplary embodiments of the invention. Various changes to the described embodiments may be made in the function and arrangement of the elements described without departing from the scope of the invention as set forth in the appended claims.

As illustrated in FIG. 1, an air-flow dyeing machine according to an embodiment of the present invention contains a machine body 1, a blower 6, a pump 7, a heat exchanger 8, a control box 9, and an agent barrel 11. Inside the machine body 1, there is a dyeing channel 12 in an upper portion and a transmission device 2 in a bottom portion. A fabric 3 to be dyed runs through the dyeing channel 12 and over the transmission device 2. Also in the top portion inside the machine body 1, there are a guiding pulley 4, an idle pulley 41, and a nozzle 5. The nozzle 5 is piped to the heat exchanger 8 and the pump 7. The pump 7 is also piped to the agent barrel 11. The nozzle 5 is also connected to the blower 6 via a high-pressure tube 61. A fabric examination device 10 is configured in an appropriate place inside the machine body 1, and a post-guiding device 13 is configured adjacent to the transmission device 2 so as to guide the fabric 3 after it runs through the
dyeing channel 12 onto the transmission device 2. The dyeing process by the airflow dyeing machine is controlled by the control box 9. The transmission device 2, depending on requirement, can be a belt-based, a roller-based, or a mesh-based transmission device.

[0016] The fabric 3 inside the machine body 1 is delivered through the nozzle 5 by the idle pulley 41 and the guiding pulley 4, and then into the dyeing channel 12. The fabric 3 then falls on the transmission device 2 through the post-guiding device 13 and enters a cycling process. During the cycling process, the pump 7 forces dyes and the agent in the agent barrel 11 out of the nozzle 5 after they run through the heat exchanger 8. In the meantime, the blower pressurizes outside air into a jet stream which is sent to the nozzle 5 via the high-pressure tube 61. The dyes are then atomized by the jet steam and sprayed onto the fabric 3 by the nozzle 5. The jet steam also drives the fabric 3 to move. The fabric 3 is dyed both in the nozzle 5 and in the dyeing channel 12. In addition, as the fabric 3 runs through the dyeing channel 12, the fabric examination device 10 can detect the fabric 3’s cycle time, number of cycles, and display, record, and output various information and signals to the control box 9.

[0017] After going through the dyeing channel 12 and falling on the transmission device 2, the fabric 3 is delivered by the transmission device 2 back to the idle pulley 41 and the guiding pulley 4, and re-enters the nozzle 5. The foregoing movement and dyeing process is as such repeated.

[0018] The airflow dyeing machine according to the present invention has the following advantages.

[0019] First, the fabric inside the machine body is driven entirely by high-pressure airflow together with the transmission device without using any water. Therefore, dyes and agents are significantly saved, and power consumption and waste process cost are highly reduced.

[0020] Second, the fabric is supported and moved on the transmission device during the process and the fabric is cycled steadily and smoothly. The fabric therefore is not scratched, fluffed, or damaged. Furthermore, the fabric is free from problems such as knots, tangles, and pressing.

[0021] Third, the machine body has a long tubular shape, and fabrics can be uniformly arranged on the transmission device. The production quantity is increased and the fabrics are free from creases.

[0022] While certain novel features of this invention have been shown and described and are pointed out in the annexed claim, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

1 claim:  
1. An airflow dyeing machine, comprising a machine body, a blower, a pump, and a heat exchanger, and the machine body comprising a nozzle, a dyeing channel, and a post-guiding device, characterized in that:  
the machine body further comprises a transmission device;  
the nozzle is connected to the blower via a high-pressure tube so that a high-pressure jet steam is delivered to the nozzle;  
the jet steam mixes with and atomizes dyes delivered to the nozzle by the pump;  
the atomized dyes are sprayed onto the fabric running through the nozzle;  
the jet steam helps moving the fabric through the dyeing channel; and  
the fabric then falls on the transmission device and cycles back to the dyeing channel.

2. The airflow dyeing machine according to claim 1, wherein the airflow dyeing machine further comprises a guiding pulley.

3. The airflow dyeing machine according to claim 1, wherein the transmission device is a belt-type transmission device.

4. The airflow dyeing machine according to claim 1, wherein the transmission device is a roller-type transmission device.

5. The airflow dyeing machine according to claim 1, wherein the transmission device is a mesh-type transmission device.

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