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Amended claims in accordance with Rule 137(2) EPC.

(54) **JET DYEING MACHINE COMPRISING A CONVEYOR MEANS**

(57) A fabric dyeing machine includes a machine body (1) in which a screw conveyor device (2) formed of a conveyance screw (21) and a fabric support board (22). Fabric (3) passes through a dyeing tube (11) provided on the machine body (1) and falls onto the screw con-

veyor device (2) and the fabric support board (22) so that the fabric (3) is further moved forward by the screw conveyor device (2) to pass through a re-circulation means inside the machine body (1) to re-enter the dyeing tube to achieve cyclic operation of dyeing.

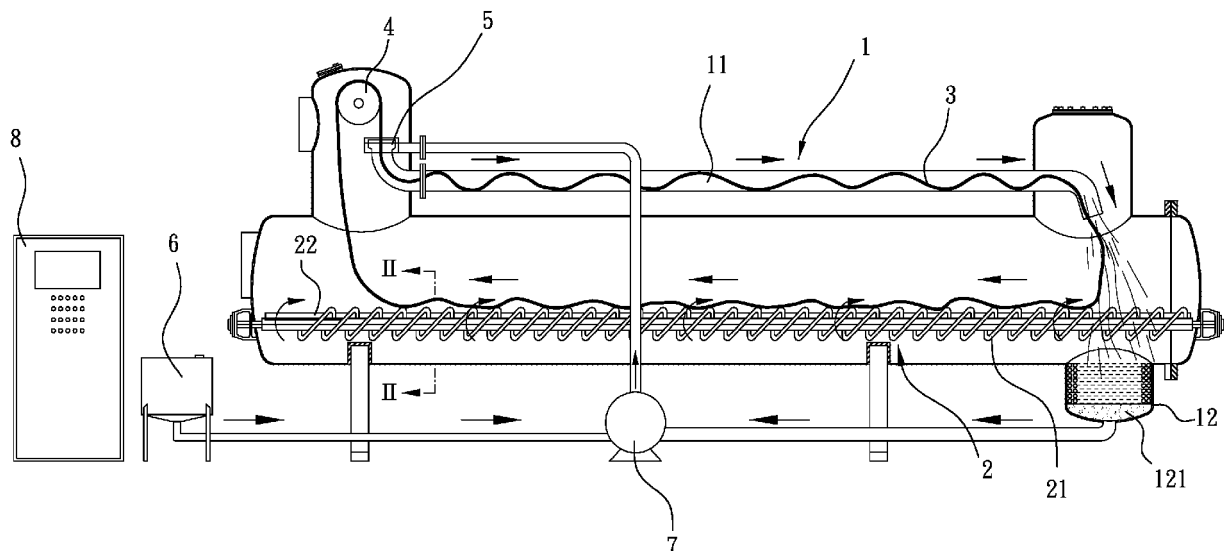


FIG. 1

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a dyeing machine that carries out a dyeing operation on fabric, and more particularly to a dyeing machine that includes a screw conveyor device and a fabric support board to circulate and move the fabric for carrying out the dyeing operation in order to reduce water consumption.

DESCRIPTION OF THE PRIOR ART

[0002] A known fabric dyeing machine carries out a dyeing operation of fabric by using a pump to pressurize and supply dye liquid through a heat exchanger for increase or decrease of temperature before entry into a nozzle, in which a jet or overflow is generated with the liquid to provide a driving force, and then the liquid returns to a fabric accumulator of the dyeing machine. The fabric is guided by a fabric roller into the nozzle and the driving force generated in the nozzle by the jet or overflow drives the fabric through a dyeing tube to return to a rear part of a main body of a dyeing cylinder, where a floating and pushing force created by the dye liquid moves the fabric toward a front part of the machine body to complete a cycle of circulation of the fabric. At the same time, the pump also supplies a chemical agent into the dyeing machine. During the circulation of the dye liquid and the fabric, the heat exchanger provides a temperature control cycle that involves heating, temperature keeping, and temperature lowering to make the dye absorbed by the fabric to achieve the effects of scouring, dyeing, and rinsing.

SUMMARY OF THE INVENTION

[0003] The present invention provides a dyeing machine that has a machine body that is provided with a dyeing tube, a screw conveyor device, and a fabric support board for forward conveying fabric to pass through a fabric roller and enters a nozzle for subsequent movement through the dyeing tube to interact with dye liquid for dyeing. The aforesaid fabric roller and the conveyance screw are controlled by a control box in respect of operation speeds thereof, so that they are operated or rotated at operation speeds in synchronization with a circulation speed of the fabric. Such operation speeds are preferably adjustable. Under the control of the control box, in the course of conveyance and movement of the fabric, when the fabric is detected as being not conveyed forward or being conveyed in an excessively high or low speed, the control box instructs the conveyance screw to stop operation or to increase or decrease speed.

[0004] The technical feature of the present invention is that the interior of the machine body of the dyeing machine is provided with a screw conveyor device that is formed of a conveyance screw and a fabric support

board, and the fabric is carried on and supported by the fabric support board and the fabric is uniformly and steadily moved forward through rotation of the conveyance screw.

[0005] In an embodiment of the present invention, the fabric support board of the screw conveyor device is arranged at two opposite sides of the conveyance screw in a direction perpendicular to an axial direction thereof and is arranged so as to be immobile or alternatively, the board is arranged in a movable manner.

[0006] Compared to a known fabric dyeing machine, the present invention allows for steadier and more uniformly arrangement, stacking, and conveyance of fabric in a dyeing machine, so that circulation and conveyance of the fabric is made more steady and consumptions of water, electrical power, and chemical agent can be greatly reduced and an amount of waste water generated is also reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIG 1 is schematic view illustrating a structure of a dyeing machine according to the present invention; and

FIG 2 is a cross-sectional view taken along line II-II of FIG 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0008] As shown in FIGS. 1 and 2, the present invention provides a fabric dyeing machine that includes a screw conveyor device, wherein a dyeing tube 11 is provided above a machine body 1 to allow fabric 3 to move therethrough. The machine body 1 has a front end part having an upper portion in which a nozzle 5 and a fabric roller 4 are arranged. The screw conveyor device 2 is arranged in the machine body and located under the dyeing tube 11. The screw conveyor device 2 is formed of a conveyance screw 21 and a fabric support board 22. In an embodiment, there is one single conveyance screw 21, and in an alternative embodiment, multiple conveyance screws 21 are provided. In the embodiment that includes multiple conveyance screws 21, it is preferable that the conveyance screws are arranged parallel. The fabric support board 22 includes two parts that are respectively arranged at two opposite sides of the conveyance screw 21 in a direction perpendicular to an axial direction thereof, and the fabric support board 22 is arranged so as to be immobile or alternatively, the board is arranged in a movable manner.

[0009] Operation of the present invention is as follows. When fabric 3 is fed into the machine body 1, it is moved by the fabric roller 4 to get into the nozzle 5 and then moves through the dyeing tube 11 to subsequently fall onto the conveyance screw 21 and the fabric support

board 22 of the screw conveyor device 2 so as to be conveyed by the conveyance screw 21 that is driven to rotate toward the front end part to complete a cycle of circulation. A pump 7 draws dye liquid from a liquid accumulation tank 12 for supplying through a pipeline to the nozzle 5 to be jetted therefrom for driving the fabric 3 to move forward. The dye liquid interacts with the fabric 3 in the nozzle 5 and the dyeing tube 11 to achieve an effect of dyeing of the fabric. The dye liquid then falls from a rear end of the dyeing tube 11 down back to a bottom of the machine body, such that a major portion of the dye liquid directly fall into the liquid accumulation tank 12, while another portion of the dye liquid follows a slope of the bottom to flow into the liquid accumulation tank 12, and the dye liquid is then drawn and pumped by the pump 7 to jet from the nozzle 5 again to pass through the dyeing tube 11 and fall back into the machine body 1 to complete a cycle of circulation.

[0010] The aforesaid fabric roller 4 and the conveyance screw 21 are controlled by the control box 8 in respect of operation speeds thereof, so that they are operated or rotated at operation speeds in synchronization with a circulation speed of the fabric 3. Such operation speeds are preferably adjustable. During an operation of dyeing, under the control of the control box 8, in the course of conveyance and movement of the fabric 3, when the fabric is detected as being not conveyed forward or being conveyed in an excessively high or low speed, the control box 8 instructs the conveyance screw 21 to stop operation or to increase or decrease speed.

[0011] In brief, the present invention provides an arrangement in which a screw conveyor device is used to achieve circulation of fabric by substituting a known way of applying dye liquid to drive the movement of the fabric for circulation, so that with the fabric being at least partly supported on the fabric support board 22, rotation of the conveyance screw 21 would steadily and uniformly move the fabric forward. Further, a control operation carried out with a computer or a program could be applied to make the fabric 3, the fabric roller 4, and the screw conveyor device 2 in synchronization with each other in respect of the operation speeds thereof.

Claims

1. A fabric dyeing machine, comprising a machine body (1) that is provided with a dyeing tube (11), a nozzle (5), and a fabric roller (4), a pump (7) being connected between a bottom of the machine body (1) and the nozzle (5), the pump (7) being operable to draw dye liquid from the machine body (1) and supplying the dye liquid to the nozzle (5) and the dyeing tube (11) to dye fabric (3), the dye liquid then directly falling back into the bottom of the machine body (1), **characterized in that** the machine body (1) is provided, in an interior thereof, with a screw conveyor device (2) that includes a conveyance screw (21)

and a fabric support board (22), the fabric support board (22) being arranged at two opposite sides of the conveyance screw (21) in a direction perpendicular to an axial direction of the conveyance screw and being mounted in an immobile manner.

Amended claims in accordance with Rule 137(2) EPC.

1. A machine for dyeing fabric in a cycle of circulation, comprising:
a machine body (1) that is provided with:

a dyeing tube (11), a nozzle (5) for jetting therefrom dye liquid for driving the fabric (3) to move forward, and a roller (4) for said fabric (3), a pump (7) being connected between a liquid accumulation tank (12) mounted to a bottom of the machine body (1) and the nozzle (5), the pump (7) being operable to draw dye liquid from the bottom of the machine body (1) and supplying the dye liquid to the nozzle (5) and the dyeing tube (11) to dye said fabric (3), the dye liquid then can directly fall back on the bottom of the machine body (1),
wherein the machine body (1) is provided, in an interior thereof, with a screw conveyor device (2) that includes a conveyance screw (21) and a fabric support board (22), **characterized in that** the fabric support board (22) comprises two parts that are respectively arranged at two opposite sides of the conveyance screw (21) in a direction perpendicular to an axial direction of the conveyance screw (21).

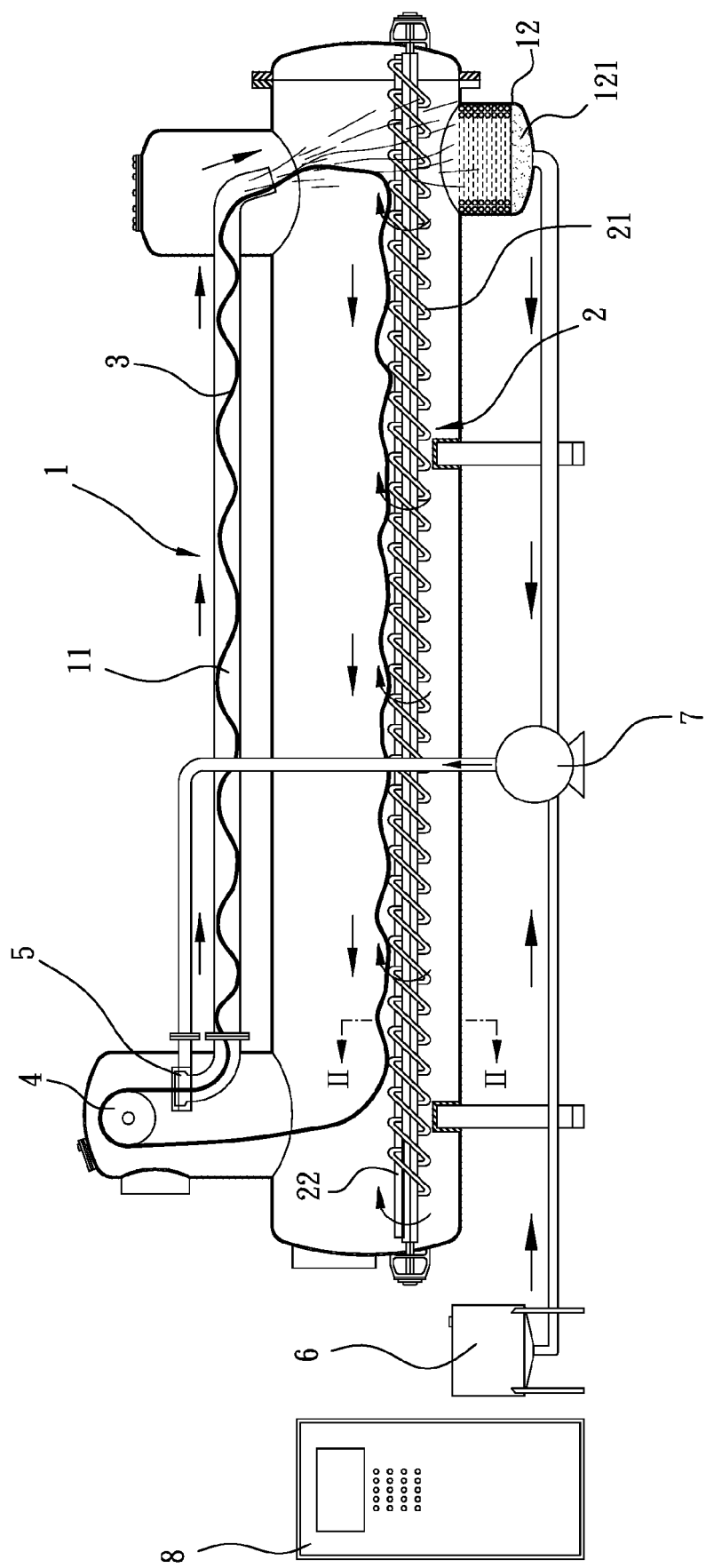


FIG. 1

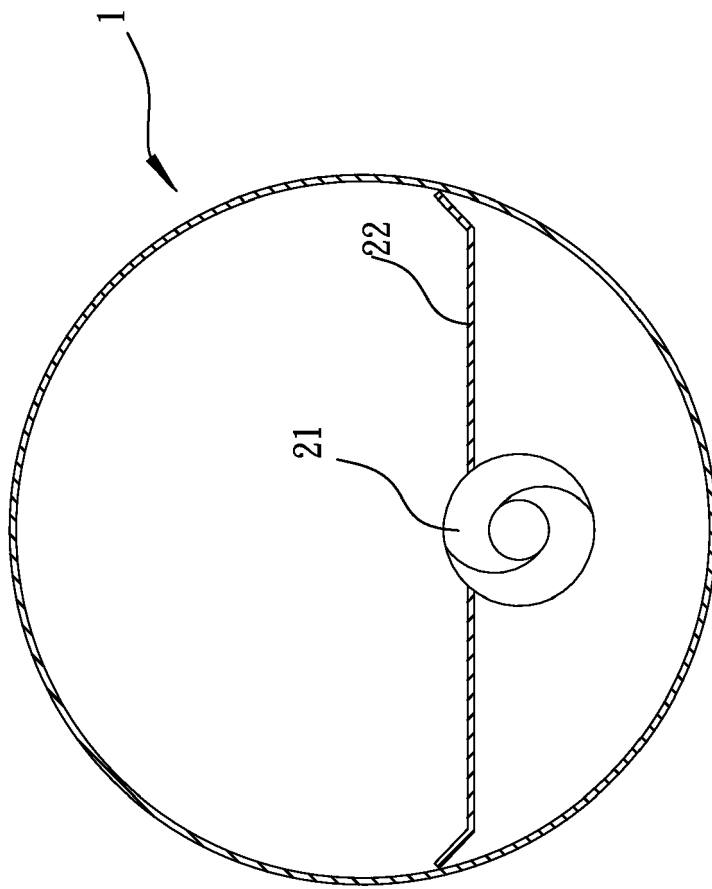


FIG. 2



EUROPEAN SEARCH REPORT

Application Number
EP 19 19 2204

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T	US 6 393 871 B1 (CHIANG CHAO-CHENG [TW]) 28 May 2002 (2002-05-28)	1	TECHNICAL FIELDS SEARCHED (IPC)
			D06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 4 February 2020	Examiner Uhlig, Robert
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 19 2204

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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