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(54) **Pneumohydraulic dyeing machine**

(57) Pneumohydraulic dyeing machine including a cylindrical body (10) and a pneumohydraulic dyeing unit (20). A cloth (3) to be dyed is circularly driven in the cylindrical body (10). The pneumohydraulic dyeing unit (20) includes a blower (23) for blowing a great amount of air to atomize and mix with liquid dye. A rectangular straight nozzle (13) sprays the mixture of air and liquid dye onto the circulated cloth (3). The air and the liquid dye are independently input from upper and lower sides into the

nozzle (13) by independent bypasses (241,242,226,227) and conduits (25). The amount of upper and lower sprayed air and the liquid dye can be independently controlled and adjusted in accordance with the property of the cloth. A washing/cleaning tube (26) is further disposed in the cylindrical body in front of the nozzle (13) for washing off the dye and remainders remaining on the cloth (3).

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention is related to an improved pneumohydraulic dying machine.

[0002] A conventional pneumohydraulic liquid dye-spraying apparatus includes a cycle unit and a nozzle disposed in the cycle unit. The cycle unit is composed of a machine head, a cloth-guiding tube and a cloth reservoir connected with each other. A piece of cloth to be dyed is placed in the cycle unit. The nozzle injects high pressure liquid dye onto the cloth to dye the cloth. Simultaneously, the injection force will drive the cloth to move in the cycle unit through the cloth-guiding tube and cloth reservoir back to the nozzle for next spraying and dying. Taiwanese Patent No. 325063 published in January, 1998 discloses such an apparatus.

[0003] However, the above apparatus has many shortcomings needing to be overcome. Taiwanese Patent No. 337795 published in July, 1998 discloses a pneumohydraulic dying machine. Such dying machine includes improved cloth-guiding tube and cloth reservoir and a nozzle which can selectively spray liquid dye in forward or backward direction. This structure overcomes the problems of tangling and knotting of the cloth.

[0004] However, in the above conventional pneumohydraulic dying machine, the nozzle is not only used to spray the liquid dye, but also is necessary to inject liquid dye at high pressure sufficient to drive and circulate the cloth. Therefore, the pump must have great power and a great amount of liquid dye is necessary to achieve this object.

[0005] Furthermore, after the cloth is folded and accumulated in the cloth reservoir and pushed and moved, folding track will be inevitable. This will affect the dying of the cloth.

[0006] In Taiwanese Patent Application No. 88207289, the applicant discloses a pneumohydraulic dying machine in which atomized liquid dye is mixed with air to spray onto the cloth and drive the cloth. The cloth is driven by injected air so that the pump needn't have great power and only a little amount of liquid dye is necessary. In addition, such dying machine is provided with straight nozzle for regularly intermittently injecting air. Therefore, the cloth is folded in N-form. This avoids folding track of the cloth due to accumulation and pressing during dying.

[0007] However, the liquid dye-spraying apparatus of the above pneumohydraulic dying machine cannot adjust the amount of the sprayed liquid dye and air in accordance with the variety and thickness of the cloth. Therefore, the dying condition can be hardly freely controlled and dying material is wasted. In addition, after the dying is completed, the remaining dye and other remainders cannot be fully washed and cleaned.

SUMMARY OF THE INVENTION

[0008] It is therefore a primary object of the present invention to provide an improved pneumohydraulic dying machine in which the air and the liquid dye are independently input from upper and lower sides into the nozzle by independent bypasses and conduits. The amount of upper and lower sprayed air and the liquid dye can be independently controlled and adjusted in accordance with the property of the cloth. A washing/cleaning tube is further disposed in the cylindrical body in front of the nozzle for washing off the dye and remainders remaining on the cloth.

[0009] The present invention can be best understood through the following description and accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a plane view of the pneumohydraulic dying machine of the present invention; and

Fig. 2 is a perspective exploded view of the rectangular straight nozzle and the cooperative sector-shaped conduits of the pneumohydraulic dying machine of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0011] Please refer to Fig. 1. The pneumohydraulic dying machine of the present invention includes a cylindrical body 10 and a pneumohydraulic dye-spraying unit 20. A piece of cloth 3 is driven and circulated in the cylindrical body 10. During circulation, the cloth passes through a cloth guiding tube 11 and is guided by a cloth-carrying roller 12. Between the cloth guiding tube 11 and the cloth-carrying roller 12 is disposed a rectangular straight nozzle 13.

[0012] The pneumohydraulic dye-spraying unit 20 is composed of an air-circulating/transferring system 21 and a liquid dye-circulating/transferring system 22. The air-circulating/transferring system 21 is composed of a blower 23 and an air circulation pipeline 24. In front of the nozzle 13, the air circulation pipeline 24 is divided into an upper and a lower air bypasses 241, 242 which are respectively connected to the upper and lower sector-shaped conduits 25. The sector-shaped conduits 25 are respectively connected to the upper and lower entrances 131, 132 of the nozzle 13. One end of each conduit 25 is provided with an inlet 251 for connecting with the upper and lower air bypasses 241, 242. The other end is diverged into a sector-shaped outlet 252 for connecting with the upper and lower entrances 131, 132 of the nozzle 13. The nozzle 13 is composed of quite simplified upper and lower sets of guide boards 1311, 1321 having opposite oblique guide edges. The guide boards

1311, 1321 are symmetrically arranged and directed to the moving direction of the cloth so as to define an elongated straight spray jets. Two ends of the guide boards are fixed connected by fixing boards 133. The liquid dye-circulating/transferring system 22 is composed of a liquid dye circulation pump 221, a liquid dye filter 222, a heater 223, a liquid dye implementing unit 224 and a liquid dye circulating/transferring pipeline 225. The liquid dye filter 222 is connected to the bottom of the cylindrical body 10 for receiving the recovered liquid dye. The liquid dye filter 222 is also connected with the liquid dye circulation pump 221 for outputting the filtered liquid dye. The pump 221 is further connected with the heater 223 and then divided into two liquid dye bypasses 226, 227 which via atomizing nozzles are connected with the sector-shaped conduits 25 for spraying in the liquid dye.

[0013] According to the above arrangement, during spraying operation of the pneumohydraulic dying machine of the present invention, through the upper and lower air bypasses 241, 242 and the sector-shaped conduits 25, a great amount of air is strongly blown into the nozzle 13, whereby the cloth 3 is driven and circulated by the injected air. At this time, the liquid dye circulating/transferring system 22 pumps liquid dye and via the upper and lower liquid dye bypasses 226, 227 respectively inputs liquid dye into the conduits 25 to be atomized and mixed with the great amount of air. Then the liquid dye through the nozzle 13 is sprayed onto the cloth 3 for dying the same. The air and the liquid dye are input from upper and lower sides into the nozzle 13 by independent bypasses and conduits so that the air and the liquid dye can be more evenly mixed at a unified ratio and the evenness of the dye can be more easily controlled.

[0014] In addition, in order to adjust the amount of the input air and liquid dye in accordance with different properties and thickness of the dyed piece, the air bypasses 241, 242 and the liquid dye bypasses 226, 227 are respectively independently provided with switch valves 243, 244, 228, 229 for independently freely adjusting and controlling the flow of the respective bypasses. Therefore, the evenness of the liquid dye sprayed on the cloth 3 can be controlled to an optimal condition. Moreover, during adjustment, by means of bias control, the soft dyed piece can be conveyed and sprayed in an extended state so as to avoid straight folding track.

[0015] Moreover, after the cloth 3 is completely dyed, excessive dye and other remainders often remain on the surface of the cloth 3. These remainders must be cleaned. Otherwise, the dying quality of the cloth will be affected. Therefore, a washing/cleaning tube 26 is further disposed at the end of the liquid dye circulating/transferring pipeline 225. An atomizing nozzle 261 is connected with the end of the washing/cleaning tube 26 and directed to the cloth 3 in front of the cloth-carrying roller 12. The washing/cleaning tube 26 is provided with a switch valve 262 for controlling turning on/off of the pipeline. The liquid dye circulation pump 221 is used to pump clean water which is heated by the heater 223 and

then guided into the atomizing nozzle 261. The clean water is atomized and injected toward the cloth 3 to strongly wash off the dye or remainders remaining on the cloth. Such washing operation can be quickly completed.

Claims

1. Pneumohydraulic dying machine comprising a cylindrical body and a pneumohydraulic dying unit, a cloth to be dyed being previously placed in the cylindrical body and circularly driven, a rectangular straight nozzle being disposed in the moving path of the cloth for spraying mixture of air and liquid dye onto the cloth, the pneumohydraulic dye-spraying unit being composed of an air-circulating/transferring system and a liquid dye-circulating/transferring system, said dying machine being **characterized in that** at least one of the air-circulating/transferring system and liquid dye-circulating/transferring system is divided into at least two bypasses prior to connection with the nozzle, the bypasses being connected to the nozzle at least in two directions so as to independently produce injected mixture of air and liquid dye.
2. Pneumohydraulic dying machine as claimed in claim 1, wherein each of upper and lower sides of the nozzle are respectively connected with one end of a sector-shaped conduit, the other end of the conduit being connected with an air bypass connected to the air circulating/transferring system, the liquid dye-circulating/transferring system being connected in the sector-shaped conduit for inputting liquid dye.
3. Pneumohydraulic dying machine as claimed in claim 2, wherein the sector-shaped conduit via an inlet is connected with the air bypasses of the air circulating/transferring system, the inlet being diverged and extended toward the other end of the conduit to form a sector-shaped outlet for connecting with the nozzle.
4. Pneumohydraulic dying machine as claimed in claim 1, 2 or 3, wherein the air-circulating/transferring system is composed of a blower and an air circulation pipeline, in front of the nozzle, the air circulation pipeline being divided into at least two bypasses which are respectively connected to the sector-shaped conduits, the sector-shaped conduits being respectively connected to the nozzle.
5. Pneumohydraulic dying machine as claimed in claim 4, wherein the respective bypasses are independently provided with switches for independently controlling the turning on/off and the flow amount of

the respective bypasses.

6. Pneumohydraulic dying machine as claimed in claim 1, 2 or 3, wherein the liquid dye- circulating/ transferring system is composed of a liquid dye circulation pump, a liquid dye filter, a heater and a liquid dye implementing unit which are connected by a liquid dye circulating/transferring pipeline. 5
7. Pneumohydraulic dying machine as claimed in claim 6, wherein the liquid dye-circulating/transferring system is divided into at least two bypasses in front of the nozzle, the bypasses being respectively connected to the sector-shaped conduits which are connected with at least two sides of the nozzle. 10 15
8. Pneumohydraulic dying machine as claimed in claim 7, wherein the respective bypasses are independently provided with switches for independently controlling the turning on/off of the respective bypasses. 20
9. Pneumohydraulic dying machine as claimed in claim 1, 2 or 3, wherein a washing/cleaning tube is further disposed at the end of the liquid dye circulating/transferring system, an end of the washing/cleaning tube extending into the cylindrical body and being directed to the cloth in front of the nozzle for washing the cloth with clean water. 25 30
10. Pneumohydraulic dying machine as claimed in claim 7, wherein an atomizing nozzle is connected with the end of the washing/cleaning tube.
11. Pneumohydraulic dying machine as claimed in claim 1, 2 or 3, wherein the rectangular straight nozzle is composed of upper and lower sets of guide boards having opposite oblique guide edges, the guide boards being symmetrically arranged and directed to a moving direction of a dyed piece so as to define a spray jet, the guide boards being fixed connected by fixing boards. 35 40

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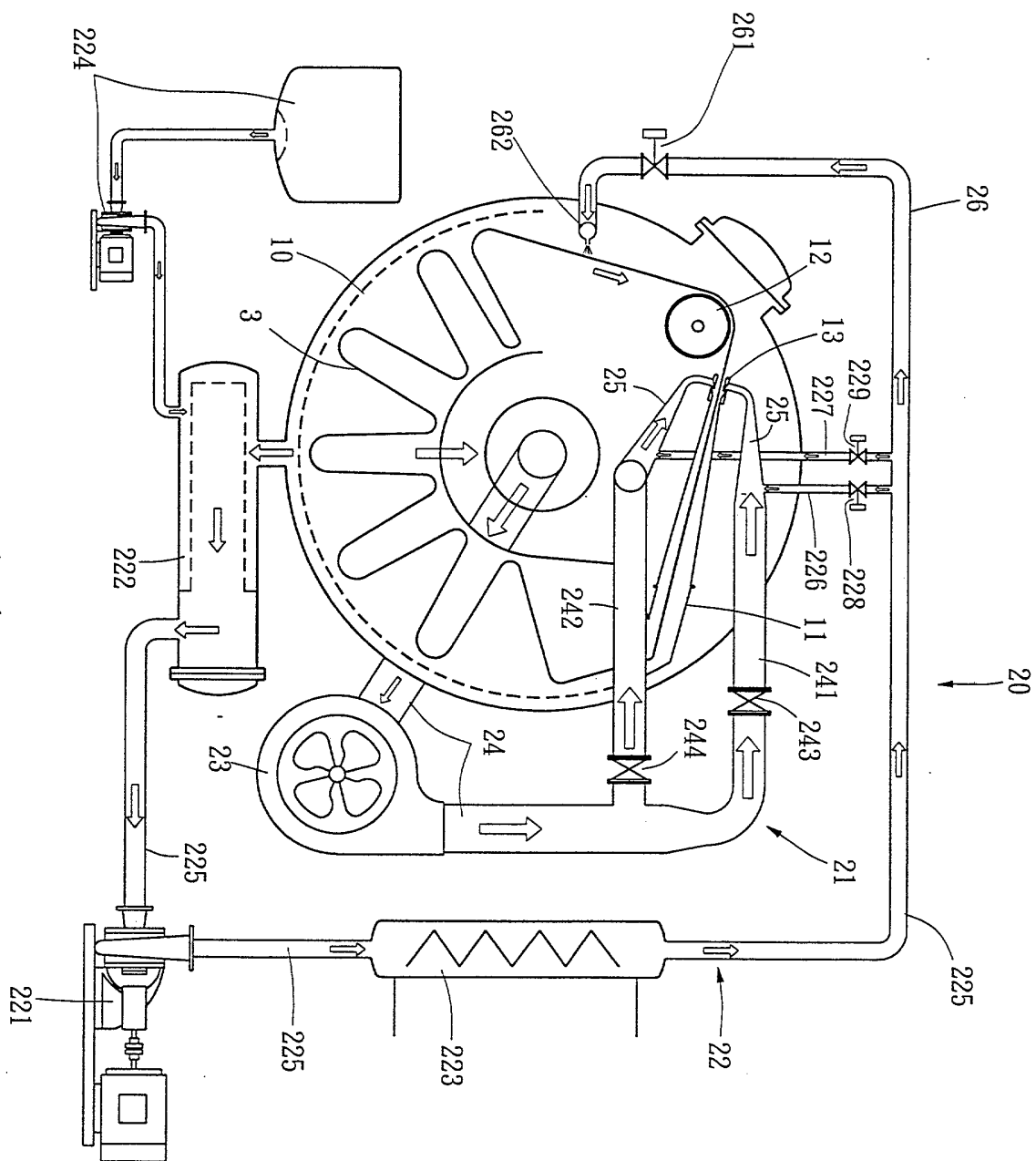


Fig. 1

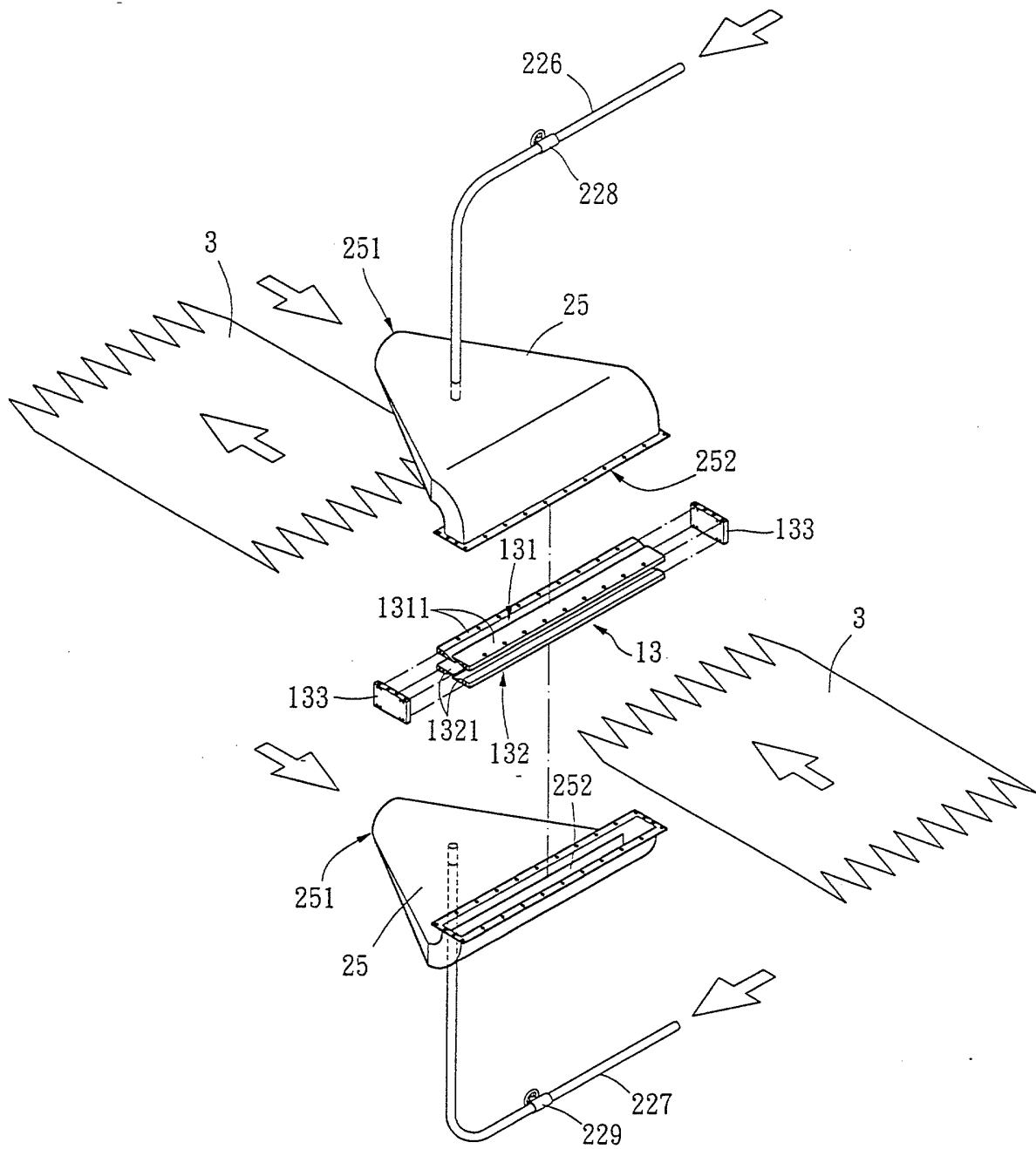


Fig. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 6245

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
A	EP 0 945 538 A (THEN MASCHINEN- UND APPARATEBAU GMBH) 29 September 1999 (1999-09-29) * column 6, line 43 - column 8, line 4 *	1, 6	D06B3/28
A	US 5 014 525 A (A. BENE) 14 May 1991 (1991-05-14) * column 3, line 7 - line 62 *	1	
			TECHNICAL FIELDS SEARCHED (Int.CI.7)
			D06B D06C
The present search report has been drawn up for all claims			
Place of search: THE HAGUE		Date of completion of the search: 3 August 2001	Examiner: Goodall, C
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			

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

EP 01 10 6245

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The members are as contained in the European Patent Office EDP file on
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03-08-2001

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82