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(54) **Pneumohydraulic liquid dye-spraying apparatus**

(57) Pneumohydraulic liquid dye-spraying apparatus including a rectangular straight nozzle (13) and an upper and a lower sector-shaped air input conduits (25). The nozzle (13) is composed of upper and lower sets of guide boards (1311,1321) having opposite oblique guide edges each defining an elongated straight spray jet (131,132). Each spray jet (131,132) is independently provided with an air input conduit (25). One end of the conduit (25) is formed as an inlet (251) which is diverged and extended toward the other end of the conduit to form

a sector-shaped outlet (252) for connecting with the nozzle (13). An atomizing nozzle (253,254) is mounted on the conduit (25). During spraying operation, the liquid dye passing through the nozzle (13) is evenly atomized and sprayed onto a dyed piece (3). The amount of upper and lower sprayed air and the liquid dye can be independently controlled to meet requirements of different dyed pieces.

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention is related to an improved pneumohydraulic liquid dye-spraying apparatus.

[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] 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.

[0006] 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.

SUMMARY OF THE INVENTION

[0007] It is therefore a primary object of the present invention to provide an improved pneumohydraulic liquid dye-spraying apparatus in which the air pipeline is divided into an upper and a lower bypasses respectively connected to the upper and lower air input conduits. The air input conduits are respectively connected to the upper and lower sides of the nozzle which are respectively connected with upper and lower liquid dye bypasses. The respective bypasses are independently provided

with switches for independently controlling the flow amount of the respective bypasses and amount of the liquid dye so as to meet requirements of different dyed pieces.

[0008] The present invention can be best understood through the following description and accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

Fig. 1 is a plane view of the pneumohydraulic liquid dye-spraying apparatus of the present invention; Fig. 2 is a perspective exploded view of the pneumohydraulic liquid dye-spraying apparatus of the present invention; and Fig. 3 is a perspective exploded view of the rectangular straight nozzle of the pneumohydraulic liquid dye-spraying apparatus of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] Please refer to Fig. 1. The pneumohydraulic liquid dye-spraying apparatus of the present invention includes a cylindrical body 10 and a pneumohydraulic liquid dye-spraying unit 20. A dyed piece 3 (such as a piece of cloth) 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 is guided by a cloth-carrying roller 12, the dyed piece 3 passes through the pneumohydraulic liquid dye-spraying unit 20.

[0011] The pneumohydraulic liquid dye-spraying unit 20 is composed of a rectangular straight nozzle 13 and two air input conduits 25 arranged on upper and lower side of the nozzle 13. An air circulation pipeline 24 is laid in front of the nozzle 13, including an upper and a lower air bypasses 241, 242 which are respectively connected to the upper and lower conduits 25. The upper and lower conduits 25 are respectively connected to the upper and lower sides 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 sides of the nozzle 13. Cooperatively, the nozzle 13 is provided with elongated straight spray jets 131, 132. 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 131, 132. Two ends of the guide boards are fixed connected by fixing boards 133. The conduits 25 are further formed with atomizing nozzles 253, 254 which are respectively

connected with the liquid dye bypasses 226, 227 for atomizing the liquid dye.

[0012] According to the above arrangement, during spraying operation of the pneumohydraulic liquid dye-spraying apparatus of the present invention, through the upper and lower air bypasses 241, 242 and the conduits 25, a great amount of air is strongly blown into the nozzle 13, whereby the dyed piece 3 is driven and circulated by the injected air. At this time, via the upper and lower liquid dye bypasses 226, 227, the liquid dye is atomized and input into the conduits 25 to be mixed with the great amount of air. Then the liquid dye through the nozzle 13 is sprayed onto the dyed piece 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.

[0013] 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.

claimed in claim 1 or 2, wherein an atomizing nozzle is connected with one end of each liquid dye bypass connected in the conduit.

- 5 **5.** Pneumohydraulic liquid dye-spraying apparatus as claimed in claim 1, 2 or 3, wherein the 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.

Claims

1. Pneumohydraulic liquid dye-spraying apparatus comprising a rectangular straight nozzle and two air input conduits arranged on upper and lower side of the nozzle, the upper and lower sides of the nozzle being respectively connected to one end of each of the conduits, the other end of the conduit being connected with an air bypass connected to an air transferring system, a liquid dye bypass being connected in the conduit for inputting liquid dye.
2. Pneumohydraulic liquid dye-spraying apparatus as claimed in claim 1, wherein one end of the conduit is formed as an inlet connected with the air bypass, the inlet being diverged and extended toward the other end of the conduit to form a sector-shaped outlet for connecting with the nozzle.
3. Pneumohydraulic liquid dye-spraying apparatus as claimed in claim 1 or 2, wherein the respective bypasses are independently provided with switches for independently controlling the turning on/off and the flow amount of the respective bypasses.
4. Pneumohydraulic liquid dye-spraying apparatus as

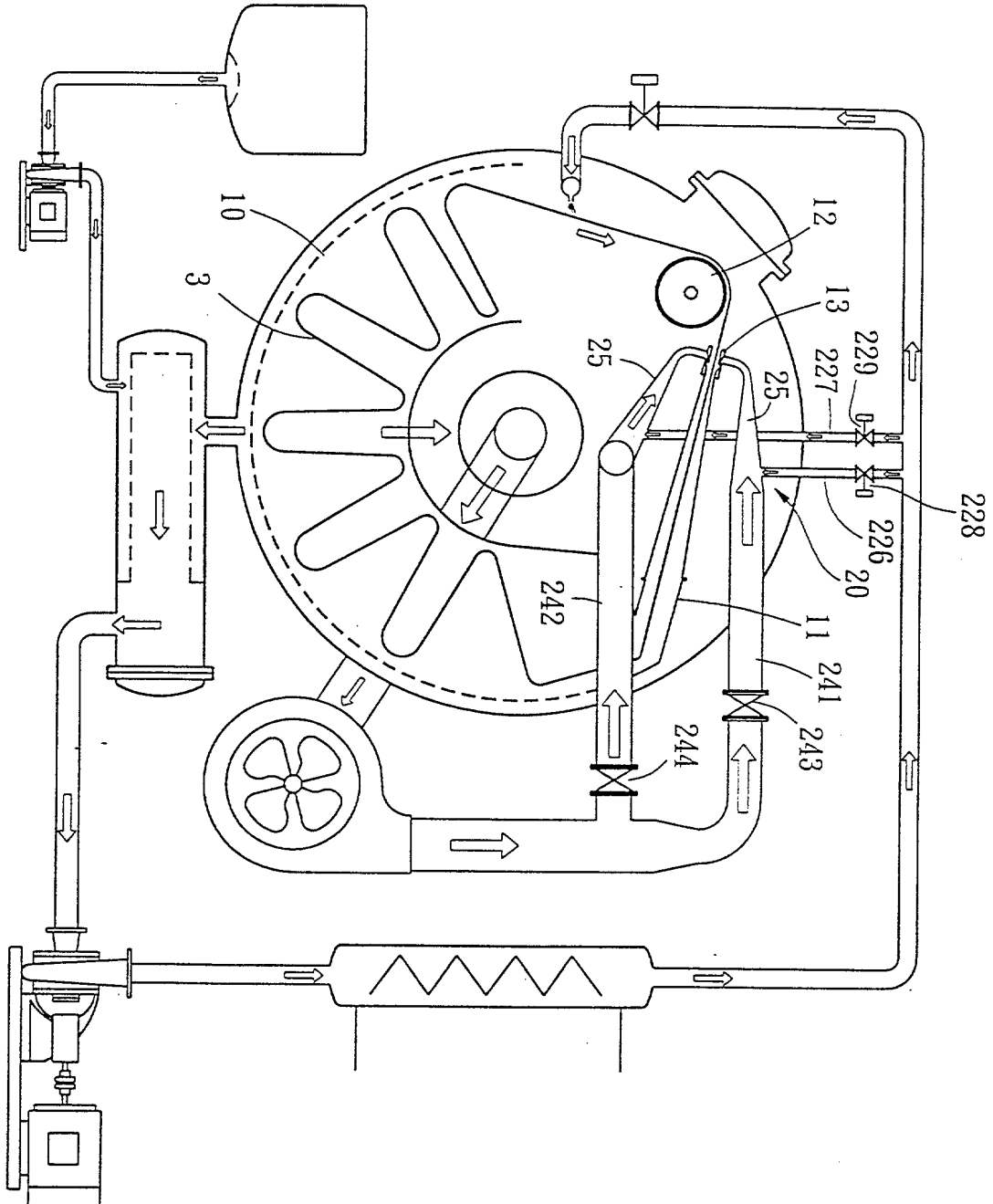


Fig. 1

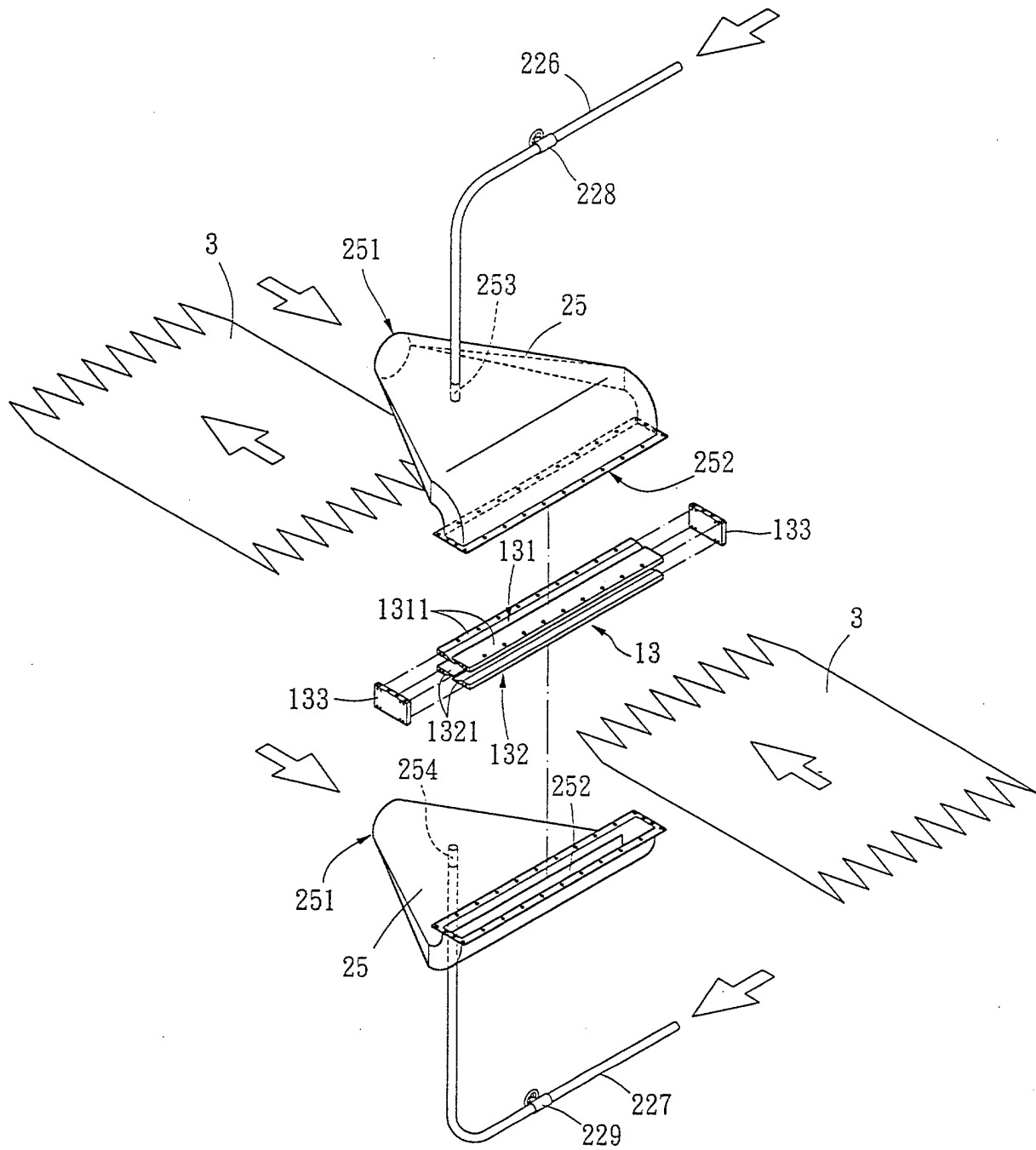


Fig. 2

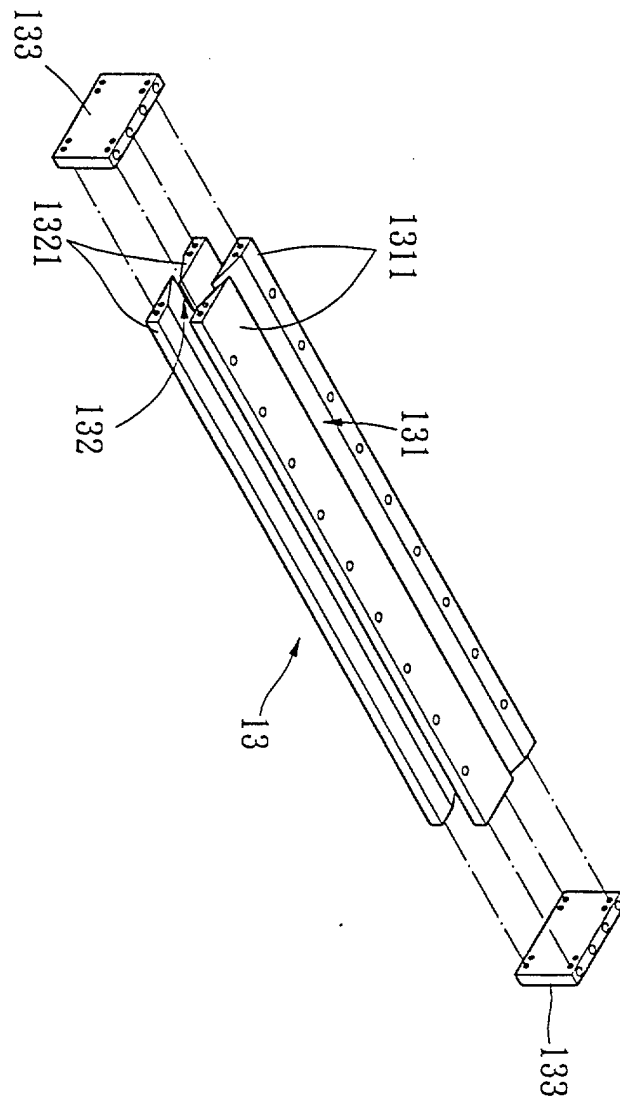


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 01 10 6246

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 5 014 525 A (A. BENE) 14 May 1991 (1991-05-14) * column 3, line 7 - line 62 *	1	D06B3/28
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	
			TECHNICAL FIELDS SEARCHED (Int.Cl.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.**

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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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03-08-2001

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