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(54) Title: AIR-ASSISTED RECOVERY AND CLEANING SYSTEM USED IN DYEING MACHINES

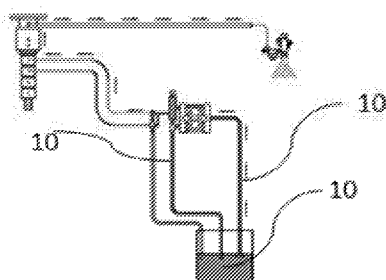


Figure - 1

(57) Abstract: The invention is related to the cleaning of dyeing machines. Particularly, it is related to an air-assisted cleaning and recovery method that is used for recovery of dye in dyeing machines and also increases the consistency and quality of the reusable dye by making sure that the machine is washed and cleaned thoroughly and cleared of dye completely.



AIR-ASSISTED RECOVERY AND CLEANING SYSTEM USED IN DYEING MACHINES**5 TECHNICAL FIELD**

The invention is related to the cleaning system of dyeing machines.

Particularly, it is related to an air-assisted cleaning and recovery method that is used for recovery of dye in dyeing machines and also increases the consistency and quality of the reusable dye by making sure that the machine is washed and cleaned thoroughly and
10 cleared of dye completely.

CURRENTLY USED TECHNIQUE

In the current technique, the washing handle used to wash the machine with water is operated manually. When this handle is not turned completely, pipes cannot be cleared of dye and waste materials, as there is no pressure in the recovery line.

15 In the current technique, the recovery process is aborted by turning off the valve before the water circulation is completed so that the dye and water are mixed. Thus, the dye left in the system is sent to the drain, which leads to both environmental pollution and economic loss.

In the cleaning systems where the current technique is used, the water pressure must be high during washing. The dyeing pressure must be 1.5 bars and the washing pressure 4 bars
20 so that the dye left in the pipes can be cleaned. When this level of pressure is not created, dye particles are left in the pipes from previous processes, which results in undesired changes in colour in the new dyeing process.

In the cleaning systems where the current technique is used, the washing process must
25 continue after the washing valve is turned on and the dye is recovered. However, the personnel turn off the valve and terminate the washing process once the dye is recovered. This results in a clogged spray and dye particles left in the pipes.

In the cleaning systems where the current technique is used, the operator tries to clear the system of the dye by supplying the whole system with water following the dyeing process. As there is no pressure in the hosepipes, they cannot be cleaned even if the spray is cleaned. Then, washing recovery systems were developed to overcome this problem, but the
5 necessary level of cleaning cannot be achieved since the amount of water used for this purpose is not sufficient.

In the current technique, 10 litres of dye in average remains in the machine after the washing process. As approximately half of this dye is mixed with water, it cannot be
10 recovered and is discarded into the drain. This leads to serious economic losses.

In conclusion, an improvement was necessary in the technical field because of the abovementioned problems and the insufficiency of the current solutions.

ASPECTS OF THE INVENTION

The most significant aspect of the invention is the use of air instead of water to recover the
15 dye in the system. Therefore, the problem of dye mixed with water is eliminated. Thus, all dye can be recovered from the machine, which results in a considerable amount of financial saving.

Another aspect of the invention is that dye can be recovered up to 4 times faster through the hosepipes thanks to the use of air instead of water to propel the dye, and even the
20 tiniest bits of particles can be recovered. Thus, the cleaning process is completed in a shorter period of time, and the dye leaves the hosepipes owing to a sudden propulsion before it dries, as the cleaning time is shortened.

Another aspect of the invention is that it speeds up the discharge through propulsion of water and solvent materials with air, and moves on to the next process expeditiously.

Yet another aspect of the invention is that after the process of cleaning with air the system automatically raises the pump pressure to 4-5 bars and washes the system again with water. If desired, better cleaning is possible without operator's initiative by fully turning on the
25 sprays and bypassing in the washing process just like in the pumping process while the dye

regulators are being operated by use of air at 0.1-0.5 bar. Thus, the operator initiative is eliminated.

Among the other aspects of the invention are that all valves are operated automatically and it eliminates the human factor, that the pressure is higher and the cleaning is easier, that the washing time is determined by the system, and that the system can be cleaned before the dye dries and holds on to the inner surface of pipes owing to the fact that the air accelerates abruptly and at an extreme speed.

Structural and characteristic features and all advantages of the invention can be understood more clearly, thanks to the figures given below and the detailed explanations referring to those figures. Hence, the evaluation should be made taking into account the figures and the detailed explanations.

FIGURES HELPING UNDERSTAND THE INVENTION

FIGURE-1: Appearance of the invented dyeing machine during the dyeing process.

FIGURE-2: Integrated compressed air system used to recover dye following the dyeing process in the invented dyeing machine.

FIGURE-3: Collection of dye from the pipes into the reservoir through the use of compressed air for recovery of dye following the dyeing process in the invented dyeing machine.

FIGURE-4: Supply of pipes with water and drainage in the reservoir during the washing process following the recovery of the dye while the air pressure is off in the invented dyeing machine.

FIGURE-5: How the water gets out of the reservoir and the system is cleared of dye after the pipes are washed and the water circulates through the entire system during the washing process in the invented dyeing machine.

FIGURE-6: How the water in the pipes is dried to prevent impairment of dyeing efficiency in the next uses of the machine by supplying the whole system with compressed air again following the washing process in the invented dyeing machine.

REFERENCE NUMBERS

10. Area Containing Dye

20. Compressed Air

30. Drainage Area

5 **40.** Water

DETAILED EXPLANATION OF THE INVENTION

The invention is related to a washing and recovery method that is used for recovery of dye in dyeing machines and also increases the consistency and quality of the reusable dye by making sure that the machine is washed and cleaned thoroughly and cleared of dye completely.

Figure 1 shows the appearance of the invented dyeing machine while the spray is on and active during the dyeing process. Figure 2 displays how the compressed air circulates through the pipes for recovery of dye following the completion of the dyeing process in the invented dyeing machine. Figure 3 is a depiction of how all of the dye in the pipes is collected into the reservoir through the use of compressed air following the dyeing process in the invented dyeing machine. Figure 4 shows how the pipes are supplied with water for washing and the reservoir is drained to wash the pipes while the air pressure is off following the completion of the recovery process in the invented dyeing machine. Figure 5 demonstrates how the water gets out of the reservoir and the system is cleared of dye after the pipes are washed and the water circulates through the entire system during the washing process in the invented dyeing machine. Figure 6 shows how the water in the pipes is dried to prevent impairment of dyeing efficiency in the next uses of the invented machine by supplying the whole system with compressed air again following the washing process in the machine.

The recovery and washing method employed in the invention is as follows:

- The areas containing dye (10) are supplied with compressed air (20) following the completion of the dyeing process;
- The dye left in the areas containing dye (10) is collected into the reservoir;
- 5 • Once the dye is collected into the reservoir and thus recovered, the system is supplied with water (40);
- When the system is supplied with water (40), the mixture of dye and water is drained (30) into another reservoir;
- The circulation of water (40) continues until water (40) with no dye in it is observed
10 in the reservoir;
- When the water (40) with no dye in it is obtained, the water (40) circulation is terminated;
- The system is dried using compressed air (20) so that no water is left in it for the
15 next dyeing process.

CLAIMS

1. The invention is a washing and recovery method that is used for recovery of dye in dyeing machines and also increases the consistency and quality of the reusable dye by making sure that the machine is washed and cleaned thoroughly and cleared of dye completely. It is defined by the following features:
- The areas containing dye (10) are supplied with compressed air (20) following the completion of the dyeing process;
 - The dye left in the areas containing dye (10) is collected into the reservoir;
 - Once the dye is collected into the reservoir and thus recovered, the system is supplied with water (40);
 - When the system is supplied with water (40), the mixture of dye and water is drained (30) into another reservoir;
 - The circulation of water (40) continues until water (40) with no dye in it is observed in the reservoir;
 - When the water (40) with no dye in it is obtained, the water (40) circulation is terminated;
 - The system is dried using compressed air (20) so that no water is left in it for the next dyeing process.

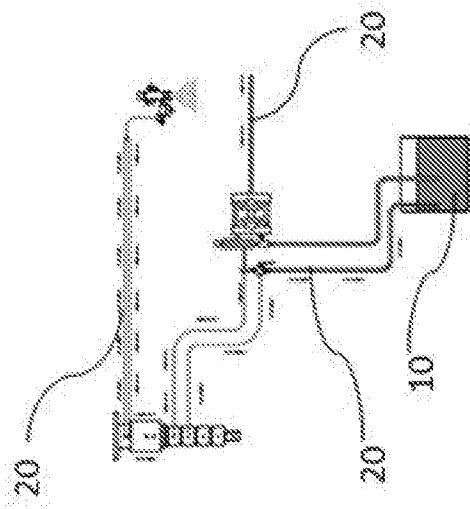


Figure – 1

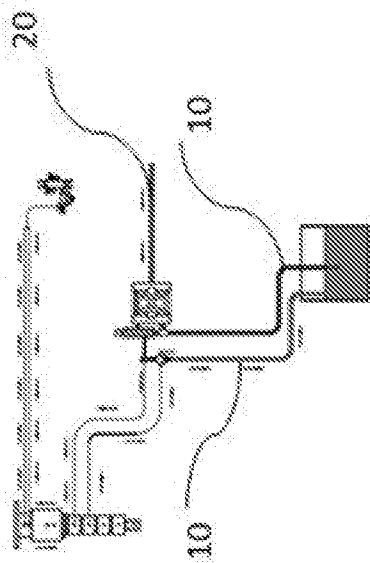


Figure – 2

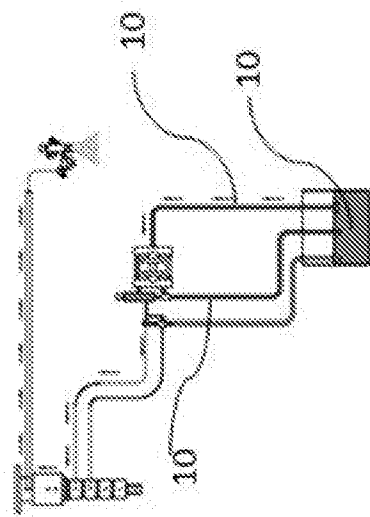


Figure – 3

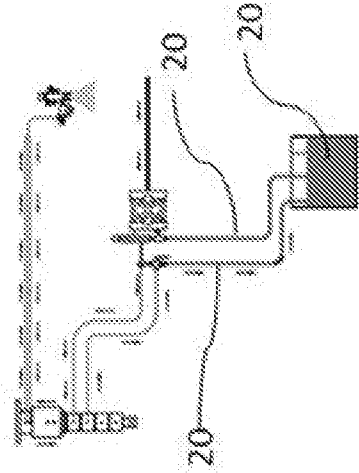


Figure – 6

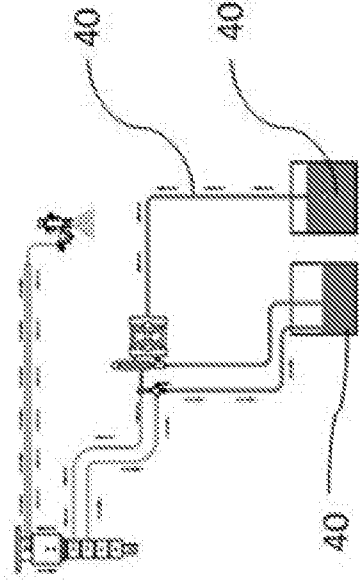


Figure – 5

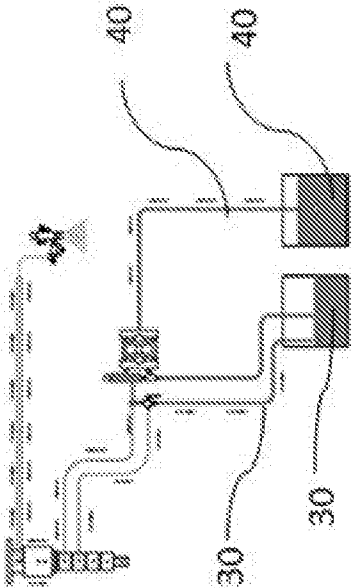


Figure – 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/TR2017/050143

A. CLASSIFICATION OF SUBJECT MATTER
INV. B08B9/032 B05B15/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B08B B05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP S60 102975 A (HONDA MOTOR CO LTD) 7 June 1985 (1985-06-07) abstract figure	1
X	----- WO 93/17800 A1 (PLUMMER DESIGN & TECHNOLOGIES [US]) 16 September 1993 (1993-09-16) abstract page 2, line 20 - line 33 page 4, line 4 - line 23 page 6, line 4 - page 7, line 31 page 8, line 26 - page 9, line 5 claims figure ----- -/--	1

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search

19 September 2017

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INTERNATIONAL SEARCH REPORT

International application No
PCT/TR2017/050143

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 116 261 A (ROSEN PAUL W [US]) 12 September 2000 (2000-09-12) abstract column 1, line 32 - column 2, line 7 column 4, line 43 - line 60 column 6, line 16 - line 31 claims figures	1
X	----- US 2009/134241 A1 (HOFFMANN ANDREAS [DE]) 28 May 2009 (2009-05-28) abstract paragraph [0010] paragraph [0025] paragraph [0032] - paragraph [0037] claims figures	1
A	----- US 4 902 352 A (CHRISTIAN ROBERT L [US]) 20 February 1990 (1990-02-20) abstract column 1, line 10 - line 21 column 3, line 31 - line 50 column 3, line 61 - column 4, line 10 claims figures -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/TR2017/050143

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