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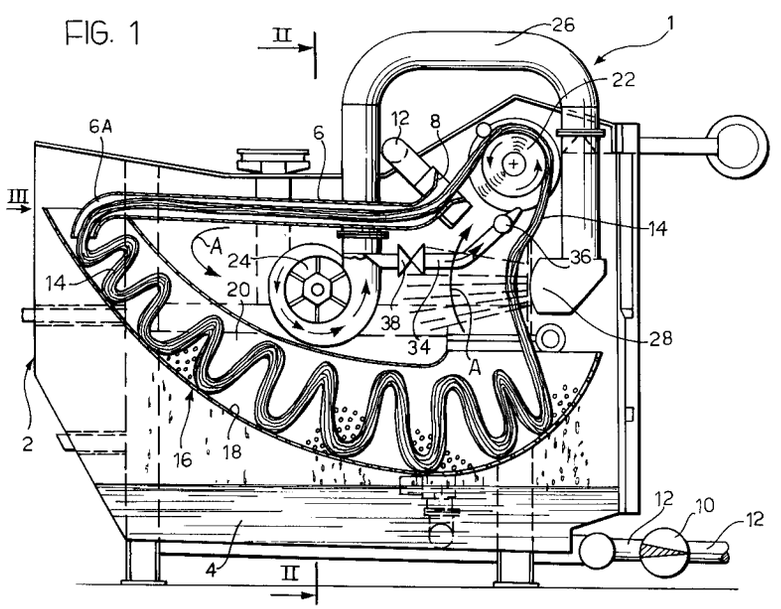
(54) A machine for dyeing fabric in rope form.

(57) A machine for dyeing fabric gathered into a rope and sewn into a loop including a tank (2) containing the dye bath (4), a soaking, dyeing and hydraulic entrainment nozzle (8) connected to a hydraulic transportation tube (6) and a folding system (6A), all disposed in the upper portion of the tank (2) downstream of a motor-driven roller (22) for lifting the rope of fabric (14) which is supplied to the nozzle (8). The machine includes a blowing circuit (26) for directing a quantity of air onto the rope of fabric (14) upstream of the lifting roller (22). The flow of air is directed so as to open out and move the creases in the rope of fabric (14) and urge it in a direction such that it passes around a larger angular portion of the lifting roller (22). The machine can operate equally well with a low bath ratio so that the rope of fabric is not immersed or with a conventional bath ratio so that the rope of fabric is partially or fully immersed.

FIG. 1



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The present invention relates to a machine for dyeing fabric gathered into a rope and sewn into a loop.

More precisely, the invention relates to a machine of the type comprising:

- a tank for holding the dye bath,
- a nozzle for soaking the fabric and entraining it hydraulically, the rope being dyed in the nozzle through which the fabric being treated and a flow of dye bath are intended to pass,
- a tube downstream of the dyeing nozzle for transporting the rope hydraulically,
- a folding chamber in which the rope of fabric collects in an orderly series of folds at the outlet of the dyeing tube, and
- a motor-driven roller for lifting the rope of fabric which is supplied to the dyeing nozzle.

Various types of fabric have been found to be unsuitable for dyeing in rope-form because of their tendency to form permanent creases.

The problem of the tendency of the material to crease has already been confronted in the fabric fulling field. A fulling machine known from German patent No. 937,465 has a fan which puffs air onto the fabric being treated. The purpose of the puffs of air is to open out the rope of fabric. This prevents the creases from always forming in the same position in the fabric as it passes repeatedly between the fulling rollers.

In a dyeing machine of the type defined above, the fabric is circulated by a single motor-driven roller rather than by two contra-rotating rollers as is the case in fulling machines. In the case of a dyeing machine, therefore, as well as the problem of preventing creases from forming in the fabric, there is also a need to ensure that the fabric is in contact with a large angular portion of the entrainment roller to prevent the fabric from slipping relative to the roller.

The object of the present invention is to provide a dyeing machine of the type defined at the beginning which improves the adhesion of the fabric to the entrainment roller so that the fabric is entrained more effectively. A further object of the present invention is to provide a dyeing machine which is cheaper to run and can also dye ropes of fabrics which, because of their tendency to crease, could not be treated by conventional machines for dyeing ropes.

According to the present invention, this object is achieved by the provision of a dyeing machine of the type specified above, characterised in that it includes means for directing a flow of air onto the rope of fabric upstream of the lifting roller, the flow of air being directed so as to urge the rope of fabric in a direction such that the rope passes around a larger angular portion of the lifting roller.

The air flow inflates the rope of fabric so that it opens out and closes up continually, thus changing the positions of the creases and preventing them from forming permanent marks.

Moreover, the air generates a transverse force on the rope of fabric which causes it to pass around a larger angular portion of the roller so that positive entrainment is maintained without slippage.

Another characteristic of the invention is that, when the machine is operating, the fabric in the folding chamber is still above the level of the bath so that the machine can operate with low bath ratios (about 1:5). In these conditions, moreover, the rope of fabric is drained as it returns to the entrainment roller and is thus lighter and opens out more easily under the effect of the air so as to optimise the essential movement of the creases.

Further characteristics and advantages of the present invention will become clear in the course of the detailed description which follows with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a schematic, longitudinal section of a dyeing machine according to the present invention,

Figure 2 is a section taken on the line II-II of Figure 1, and

Figure 3 is a view taken on the arrow III of Figure 1.

With reference to Figure 1, a dyeing machine, indicated 1, includes a tank 2 containing the dye bath 4. In the upper portion of the tank 2 is a soaking, dyeing and hydraulic entrainment nozzle 8 which is supplied with the dye bath 4 by means of a circulation pump 10 and a pipe 12, and through which the rope 14 passes. Next to the nozzle 8 is a tube 6 for transporting the rope hydraulically to a folding chamber 16.

The rope of fabric 14 moves in the sense indicated by the arrow A. At the outlet of the transportation tube 6, the fabric is deposited in the folding chamber 16 in an orderly manner by a folding device constituted by a curved tube portion 6A which is rotatable about the axis of the tube 6. The portion 6A is connected to a compressed-air linear actuator (not shown) which causes the portion 6A to pivot to and fro about its axis of rotation so that the the entire width of the folding chamber is filled.

The chamber 16 has a quadrangular cross-section the width of which increases in the direction in which the fabric 14 moves. The base wall 18 of the folding chamber 16 is covered internally with self-lubricating material (for example teflon) to facilitate the sliding of the fabric 14. The side walls 20 of the chamber 16 are perforated so that the dye bath can drain out when the machine is operating with the dye-bath level below the base wall 18 of the chamber 16.

A motor-driven roller, indicated 22, lifts the fabric 14 from the folding chamber 16 and sends it to the nozzle 8.

A fan 24 disposed inside the loop defined by the rope of fabric 14 draws air into the tank 2 and sends it into an air duct 26. The duct 26 extends outwardly of the loop of fabric 14, passes over the motor-driven roller 22 and ends in a diffusor 28 which lies between the outlet of the folding chamber 16 and the motor-driven roller 22 in a vertical plane parallel to the axis of rotation of the roller 22.

The air blown out of the diffusor 28 opens out and inflates the rope of fabric and generates a force which moves it continually so as to achieve the main object of the invention.

As can be seen in Figure 1, the level of the dye bath 4 is below the base wall 18 of the folding chamber 16 and the fabric 14 thus extends completely out of the dye bath 4. The fabric 14 is thus dyed exclusively as a result of its contact with the bath in the dyeing tube 16. Except for the blowing circuit, the same machine can operate with a higher dye-bath level so that the fabric is partially or fully immersed.

It can be seen from Figure 2 that the machine 1 is constituted by a single tank 2 in which two entrainment and blowing circuits are arranged side by side and have a single terminal diffusor 28. The end of the pipe 12 for supplying the bath has a manifold 30 for supplying the bath to the two dyeing nozzles 8.

The two fans 24 are operated by a single shaft 32 driven by a variable-speed motor which enables the flow-rates and output pressures of the fans to be adjusted so that the effect of the air can be adjusted according to the characteristics of the fabric.

As can be seen in Figure 1 in particular, a tube 34 extends from the air duct 26 immediately downstream of the outlet of the fan 24 and its free end has a nozzle 36 for directing a flow of air into the region between the rope 14 and the surface of the lifting roller 22. The machine 1 has a nozzle 36 for each rope of fabric 14. Each of the tubes 34 has a valve 38 for shutting off and adjusting the air flow directed to the nozzle 36. The air-flows produced by the nozzles 36 create a cushion of air between the fabric 14 and the lifting roller 22 thus achieving a much more delicate, pneumatic entrainment of the rope 14 and avoiding the otherwise inevitable mechanical action on the fabric when it is entrained in direct contact with the roller.

Claims

1. A machine for dyeing fabric gathered into a rope and sewn into a loop, including:

- a tank (2) for holding the dye bath (4),
- a nozzle (8) for soaking the fabric and entraining it hydraulically, the rope (14) being dyed in the nozzle through which the fabric (14) being treated and a flow of dye bath (4) are intended to pass,
- a tube (6) downstream of the dyeing nozzle (8) for transporting the rope hydraulically,
- a folding chamber (16) in which the rope of fabric (14) collects in an orderly series of folds at the outlet of the dyeing tube (6), and
- a motor-driven roller (22) for lifting the rope of fabric (14) which is supplied to the dyeing tube (6),

characterised in that it includes means for directing a flow of air onto the rope of fabric (14) upstream of the lifting roller (22), the flow of air being directed so as to urge the rope of fabric in a direction such that the rope (14) passes around a larger angular portion of the lifting roller (22).

2. A machine according to Claim 1, characterised in that it includes a fan (24) disposed inside the loop defined by the rope of fabric (14) being treated, the fan (24) being connected to an air duct (26) which extends outwardly of the loop, and ends in a diffusor (28) which blows inwardly of the loop.

3. A machine according to Claim 2, characterised in that the diffusor (28) on the air duct (26) lies substantially in a vertical plane parallel to the axis of rotation of the motor-driven roller (22).

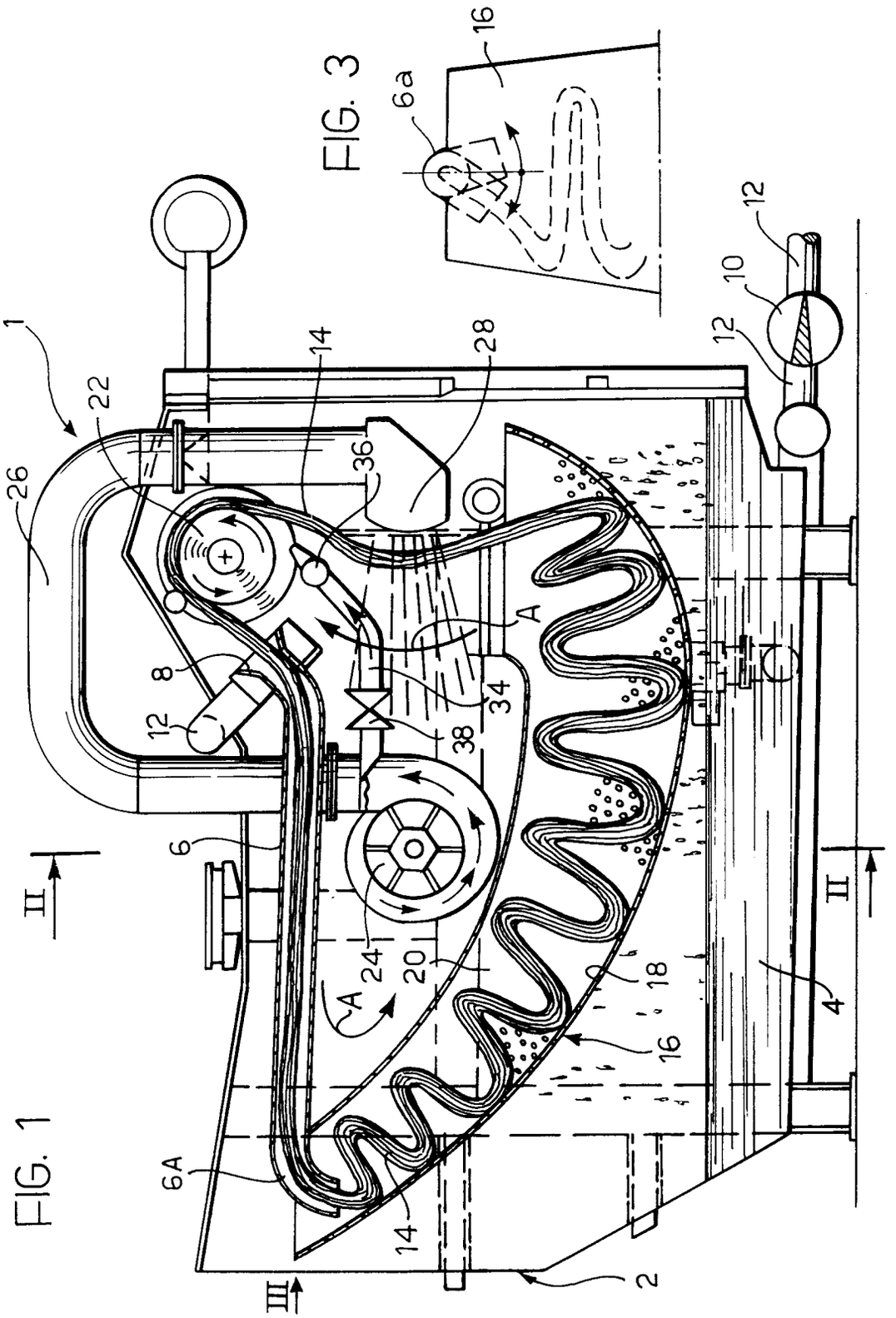
4. A machine according to Claim 1, characterised in that it includes means for adjusting the level of the dye bath in the tank (2) to enable the machine to operate with the fabric completely above the level of the dye bath so that treatment takes place exclusively by means of the nozzle (8), or with the fabric partially or fully immersed.

5. A machine according to Claim 1, characterised in that the tube (6) carries at its outlet end of the rope (14) a folding device comprising a curved tube portion (6A) which is rotatable on the end of the tube (6) and is connected to a linear actuator which causes the curved portion (6A) to pivot to and fro about its axis of rotation.

6. A machine according to Claim 2, characterised in that a tube (34) extends from the air duct (26) and carries a nozzle (36) for sending a flow of air into the region between the rope of

fabric (14) and the surface of the lifting roller (22).

7. A machine according to Claim 6, characterised in that a valve (38) is interposed in the tube (34) for shutting off and adjusting the air flow sent to the nozzle (36).


1
22
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A
34
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II
II
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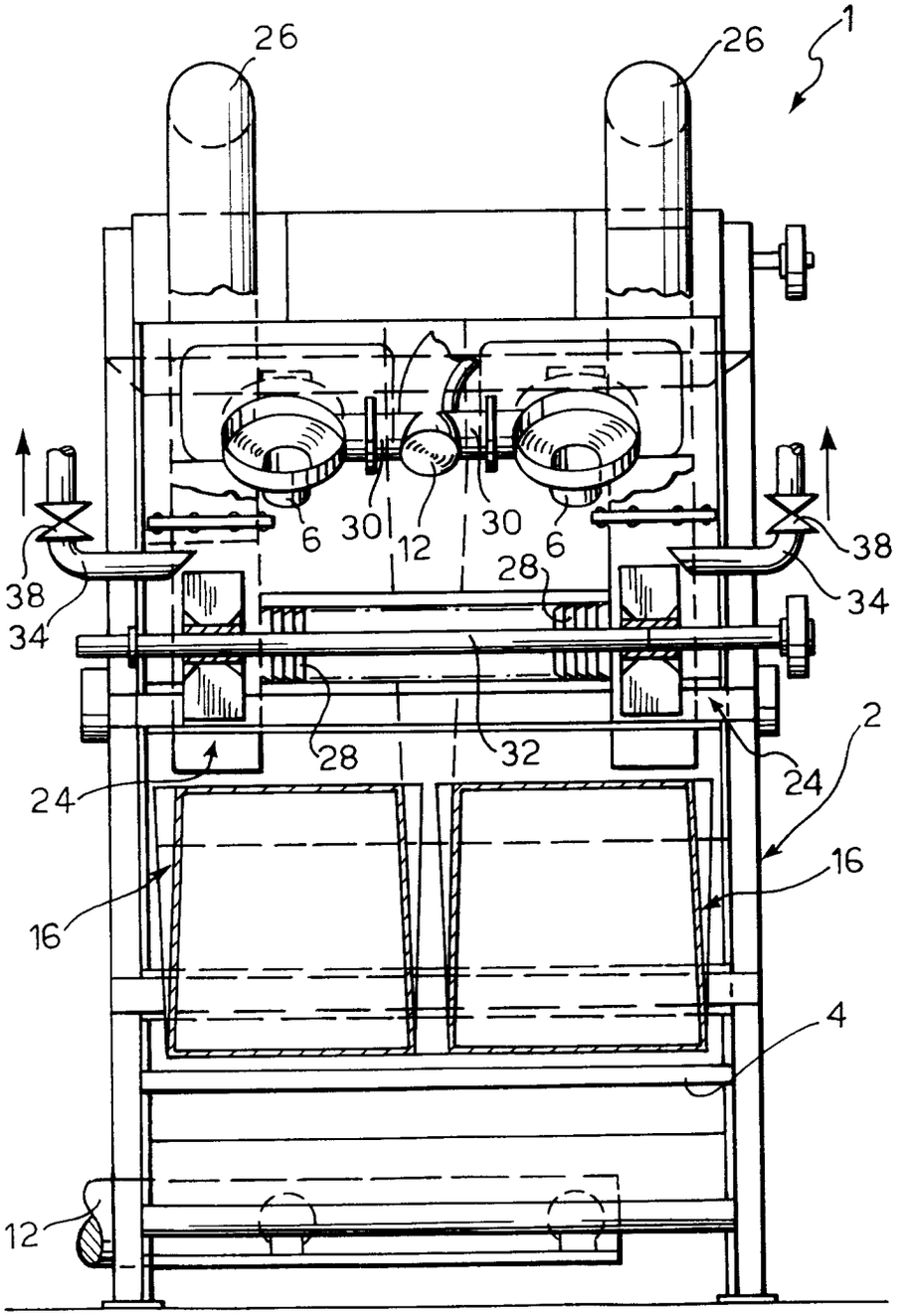
A
18
16
4
6A
14
2
III

FIG. 1

16
6a

FIG. 3

FIG. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0305

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.5)
A	EP-A-0 334 749 (TEINTURERIE DE CHAMPAGNE) * the whole document *	1	D06B3/28
A	GB-A-1 547 367 (SAMUEL PEGG) * the whole document *	1	
A	FR-A-2 193 333 (LEEMETALS) * claim 2 *	1	
A	DE-A-3 613 364 (VEB FEINWÄSCHE "BRUNO FREITAG") * the whole document *	1	
A	FR-A-2 619 834 (BENE) * figure 1 *	2	
A	GB-A-2 078 803 (KRANTZ) * the whole document *	4	
A	GB-A-2 004 927 (MEZZERA) * the whole document *	5	
A,D	DE-C-937 465 (SPÄNICH)	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 AUGUST 1992	PETIT J.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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